Kübler

Sensor Technology

- Encoders
- Draw wire encoders
- Magnetic measurement systems
- Inclinometers
- Slip rings
- Connection technology
- Accessories

pulses for automation

State-of-the Art Technology. Highest Quality. Excellent Service.

Managing Directors Lothar and Gebhard Kübler

Kübler guarantees customer satisfaction above and beyond expectations! Our company has followed this goal for over five decades with great success. Quality, flexibility and innovation are the three main pillars, on which the trust of our countless customers in more than 50 countries is based. Our expertise in the field of encoders, linear measuring sensors, counters, process controllers and signal transmission goes hand-in-hand with consistently ground-breaking innovation and excellent service. Over the years this has enabled us to grow faster than the sector average. For - ultimately - it is your success that breeds our success.

Display and Control

- Display and Preset Counters
- Timers, Frequency Meters and Tachometers,
- Process Displays and Controllers
- Time and Energy Meters

Position and Motion Sensors

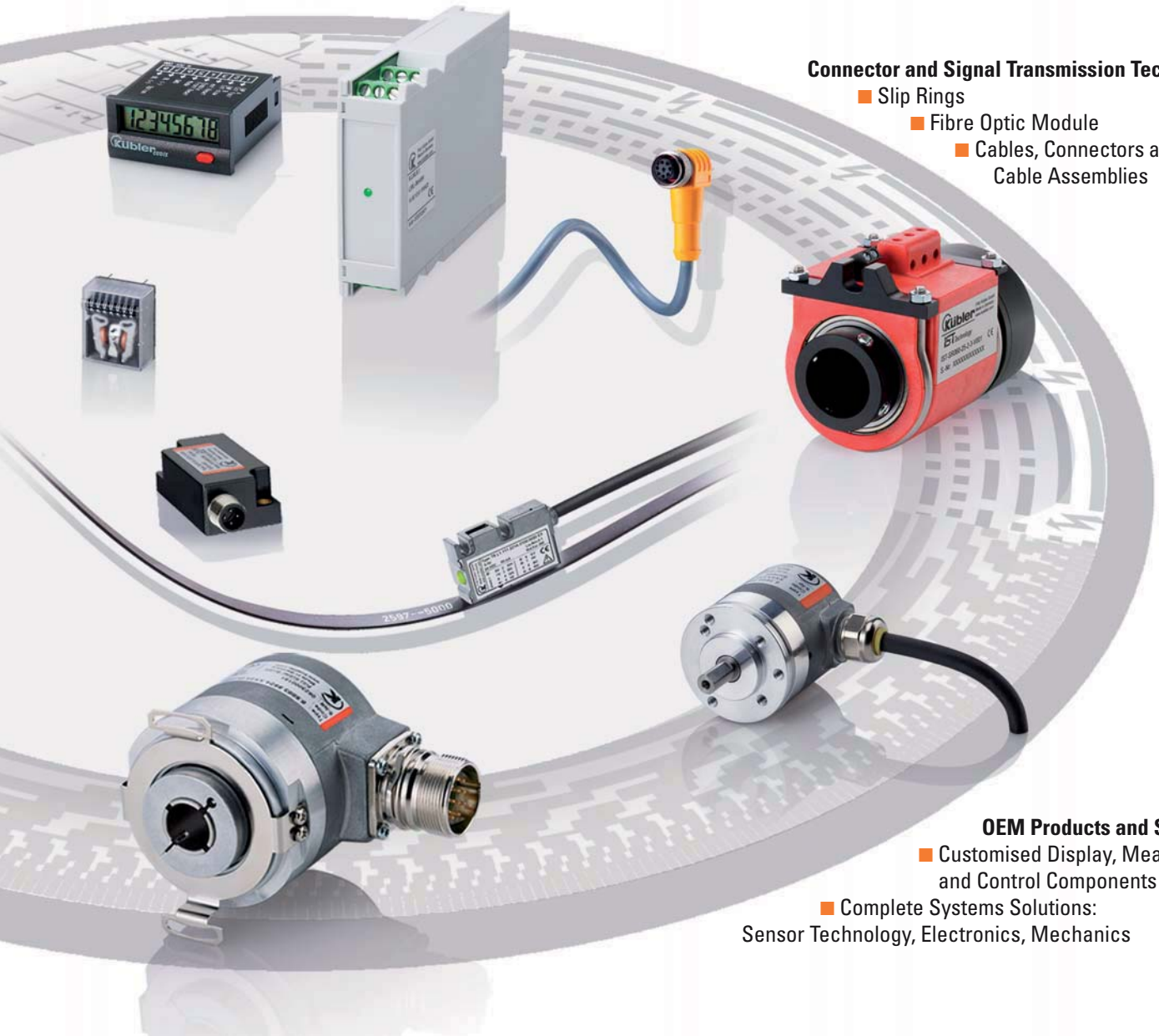
- Incremental Encoders
- Absolute and Fieldbus Encoders
- Draw-wire Systems
- Linear Measuring Systems
- Inclinometers

Kübler plus

10 by 10

10 encoders in 10 days

With our '10by10 Service' we guarantee to manufacture 10 encoders within 10 working days. This delivery guarantee is valid throughout the whole year, simplifies your order processes and offers you flexibility for small production batches.



Connector and Signal Transmission Technology

- Slip Rings
- Fibre Optic Module
- Cables, Connectors and Cable Assemblies

OEM Products and Systems

- Customised Display, Measurement and Control Components
- Complete Systems Solutions: Sensor Technology, Electronics, Mechanics

Sample and Repair Service

We can quickly manufacture samples of customised versions for you in our service centre and we are happy to help you with the practicalities of using our products - at your own location if desired. We can carry out repairs within 5 working days. A Hotline is available to help answer your technical questions, Mon-Fri from 7am till 5pm CET.

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EN: +49 (0)7720-3903-35

24 h

24 hour Express Service

48 h

48 hour Express Service

Fast delivery, meeting deadlines, product quality that stands up to tough industrial usage and the passionate commitment of our employees - these are what our customers can depend on. If necessary, we can process your order within 24 hours or deliver from stock - the same day.

Products – an overview

Encoders, Linear Measurement Systems + Connection Technology

Rotary and Linear Encoders and Connection Technology

- Encoders
- Draw wire encoders
- Magnetic measurement systems
- Inclinometers
- Slip rings
- Connection technology
- Accessories

Catalogue Sensor Technology
Order code R.100.569

Counting Technology

Counting Technology

- Electromechanical and electronic Pulse Counters, Timers and Tachometers – high quality, wide variety
- Timers
- Energy measurement technology components

Catalogue Counting Technology
Order code R.100.157

Process Technology

Process Technology

- Process displays and process controllers for all linear and non-linear inputs

Catalogue Process Technology
Order code R.100.801

OEM Products and Systems (OPS)

OEM Products and Systems

- We develop and manufacture customised display, measurement and control components for you
- We integrate sensor technology, electronics and mechanics into a complete system solution

Call Mrs Mancuso now to order your catalogues – Tel.: +49 (0) 7720 - 3903 - 29

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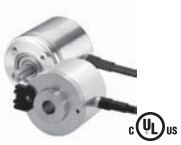
Incremental encoders



Version	Miniature Shaft / blind hollow shaft 2400 / 2420	Compact Shaft / hollow shaft 3610 / 3620	Economy Shaft / hollow shaft 3700 / 3720	Universal, compact Shaft / hollow shaft* 5000 / 5020 Sendix® inkremental
Mechanical characteristics				
Shaft/Hollow shaft ø [mm]	4/6	4 ... 5/8"	4 ... 8	6 ... 15,7
Max. housing diam. [mm]	ø24 x 20 or 30 x20	ø36.5x35 or 36.5x31.5	ø 37 x 32 mm	ø 50 (58) x 53 mm
Max. Speed [min^{-1}]	12000	12000	6000	12000
Max. shaft load rad./ax. [N]	20/10	40/20	20/10	80/40
Max. operating temp. [°C]	–20 ... +85	–20 ... +85	–20 ... +70	–40 ... +85
Max. protection to	IP 64 housing side	IP 65 housing side	IP 67 housing side	IP 67
EX approval for hazardous areas	–	optional zone 2/22	optional zone 2/22	optional zone 2/22
Type of connection	Cable	Cable	Cable	Cable/plug
Max. resolution [PPR]	1024	2500	1024	5000
Electrical characteristics				
Output	Push-pull	Push-pull	RS 422 or push-pull	RS 422, push-pull 7272 or push-pull
Supply voltage [V DC]	5 ... 24 or 8 ... 30	5 ... 24 or 8 ... 30	5 or 5 ... 30	5 or 5 ... 30
Max. pulse frequency [kHz]	160	200	250	300
Page	32	35	37	43

* More stringent requirements compared with the EMC standard 89/336/EWG, described in EN 50121-3-2 and EN 61326-1

* Hollow shaft version available with optional isolating inserts

Incremental encoders

New

Version	Universal Shaft / hollow shaft 5800 / 5820	Economy Shaft 5810	Hollow shaft Stainless steel (Niro) 5826	Magnetic measuring system *LIMES* RI20/LI20
Mechanical characteristics				
Shaft/Hollow shaft ø [mm]	6 ... 15	6/10	10/12	up to 30 mm
Max. housing diam. [mm]	ø58 x 66	ø58 x 41.5	ø58 x 41.5	16 mm x 10 mm
Max. Speed [min^{-1}]	12000	6000	12000	6000
Max. shaft load rad./ax. [N]	80/40	80/40	–	–
Max. operating temp. [°C]	–20 ... +90 (+110 °C*)	–20 ... +75	–20 ... +90	–20 ... 80 °C
Max. protection to	IP 65	IP 64	IP 66	IP67
EX approval for hazardous areas	optional zone 2/22	optional zone 2/22	optional zone 2/22	–
Type of connection	Cable/Plug	Cable/Plug	Cable	Cable:•PUR
Max. resolution [PPR]	5000 (36 000*)	1024	5000	3600
Electrical characteristics				
Output	RS 422, push-pull Sine wave output*	Push-pull	RS 422 or push-pull	RS 422 or push-pull
Supply voltage [V DC]	5. 5 ... 30 or 10 ... 30	10 ... 30	5.5 ... 30 or 10 ... 30	4.8 ... 30 V DC
Max. pulse frequency [kHz]	300	100	300	
Page	50	55	50	57

* 58X3 High temp. to 110 °C
58X4 Sine wave output
58X5 high res. to 36000 ppr

Incremental encoders

	Version	Ex-proof Shaft / hollow shaft	Heavy duty model and stainless-steel (Niro) version	Large hollow shaft up to 42 mm	Heavy Duty Model hollow shaft up to 42 mm A02H
	Series	7030	9000 / 9000 Niro	A020	
Mechanical characteristics					
Shaft/Hollow shaft ø	[mm]	12	12	up to 42	up to 42*
Max. housing diam.	[mm]	ø70 x 94	ø 90 x 90	ø100 x 43	ø100 x 50
Max. Speed	[min^{-1}]	6000	6000	1500	6000
Max. shaft load rad./ax.	[N]	20/10 (shaft)	140/70	–	–
Max. operating temp.	[°C]	–20 ... +60	–20 ... +90	–20 ... +75	–20 ... +60
Max. protection to		IP 64	IP67	IP 65	IP 65
EX approval for hazardous areas		ATEX*	optional zone 2/22	optional zone 2/22	optional zone 2/22
Type of connection		Cable	Cable/Plug	Cable/Plug	Cable/Plug
Max. resolution	[PPR]	5000	5000	5000	5000
Electrical characteristics					
Output		RS 422 or push-pull	RS 422 or push-pull	RS 422, push-pull, sine wave	RS 422 or push-pull, sine wave
Supply voltage	[V DC]	5 or 10 ... 30	5 or 10 ... 30	5 or 10 ... 30	5 or 11 ... 24
Max. pulse frequency	[kHz]	300	300	300	50
Page		62	60	66	69

*Ex II 2G EEx d II C•T6
Ex II 2D IP6x T85°C

* with optional isolating inserts

Absolute encoders – Singleturn

New

New

New

New CANopen

	Version	Singleturn Miniature	Singleturn Sendix absolut	Singleturn Sendix absolut	Singleturn Sendix absolut
	Series	2450 / 2470	3650 / 3570 Sendix® absolut	3651 / 3671 Sendix® absolut	3658 / 3678 Sendix® absolut
Mechanical characteristics					
Shaft/Hollow shaft ø	[mm]	4, 5, 6	6/ 1/4"/ 8 / 10	6/ 1/4"/ 8 / 10	6/ 1/4"/ 8
Max. housing diam.	[mm]	ø 24 x 24	ø 36 x 42	ø 36 x 42	ø 36 x 42
Max. Speed	[min^{-1}]	12000	6000	6000	6000
Max. shaft load rad./ax.	[N]	10/20	40/20	40/20	40/20
Max. operating temp.	[°C]	–20 ... +90	–40 ... +85	–40 ... +85	–40 ... +85
Max. protection to		IP 64	IP 69k	IP 69k	IP 69k
EX approval for hazardous areas		–	optional zone 2/22	optional zone 2/22	optional zone 2/22
Type of connection		Cable	Plug/Cable	Plug/Cable	Plug/Cable
Electrical characteristics					
Max. resolution	[PPR]	4096 (12 Bit)	512 (9 Bit)	4096 (12 Bit)	16384 (14 Bit)
Version		Singleturn	Singleturn	Singleturn	Singleturn
Interface		SSI	SSI	analogue	CANopen Encoder Profile DS 406 V3.1
Type of code		Gray	–	–	
Supply voltage	[V DC]	5 or 8 ... 30	5 ... 30	18 ... 30	8 ... 30
Page		78	81	84	88

Absolute encoders/•Singleturn

	Version	Singleturn Sendix absolut	Singleturn Universal	Singleturn Parallel version	Singleturn Stainless steel (Niro), hollow shaft
	Series	5853 / 5873 Sendix absolut	5850 / 5870	5852 / 5872	5876
Mechanical characteristics					
Shaft/Hollow shaft ø	[mm]	6/10/ 1/4" / 3/8" / 15	6/8/10/12	6/10/12	10/12
Max. housing diam.	[mm]	ø 58 x 38	ø 58 x 66	ø 58 x 66	ø 58 x 41.3
Max. Speed	[min^{-1}]	12000	12000 / 6000	12000	6000
Max. shaft load rad./ax.	[N]	80/40	80/40	80/40	–
Max. operating temp.	[°C]	–40 ... +90	–20 ... +90	–20 ... +90	–20 ... +80
Max. protection to		IP 67	IP 65	IP 65	IP 66
EX approval for hazardous areas		optional zone 2/22	optional zone 2/22	optional zone 2/22	optional zone 2/22
Type of connection		Plug/Cable	Plug/Cable	Plug/Cable	M12-Plug/Cable
Electrical characteristics					
Max. resolution	PPR]	131072 (17 Bit)	16384 (14 Bit)	16384 (14 Bit)	16384 (14 Bit)
Version		Singleturn	Singleturn	Singleturn	Singleturn
Interface		SSI, BISS*	SSI, Parallel, 4 ... 20 mA	Parallel	SSI or Parallel
Type of code		Binary, Gray	Gray, Binary, BCD	Gray or Gray-Excess	Gray, Binary, BCD
Supply voltage	[V DC]	5 or 10 ... 30	5 or 10 ... 30	5 or 10 ... 30	5 or 10 ... 30
Page		92	99	105	137

* with optional incremental track

Absolute encoders/•Singleturn

	Version	Singleturn Sendix absolut	Singleturn ATEX-approved	Connection technology
	Series	5858 / 5878 Sendix absolut	7031	
Mechanical characteristics				
Shaft/Hollow shaft ø	[mm]	6/10/15 1/4" / 3/8"	12/12	Please enquire about our wide range of connection technology:
Max. housing diam.	[mm]	ø 58 x 50	ø 70 x 94	
Max. Speed	[min^{-1}]	9000	6000	
Max. shaft load rad./ax.	[N]	80/40	20/10	
Max. operating temp.	[°C]	–40 ... +90	–20 ... +70	• Connectors
Max. protection to		IP 67	IP 64	• Cable assemblies
EX approval for hazardous areas		optional zone 2/22	ATEX*	• M12 technology
Type of connection		Plug/Cable	Plug/Cable	• Profibus, CANopen and DeviceNet connection technology
Electrical characteristics				• M23x1, MIL and Right-angle plugs
Max. resolution	[PPR]	65536 (16 Bit)	16384 (14 Bit)	
Version		Singleturn	Singleturn	
Interface		Profibus, CANopen,	SSI, Parallel, 4 ... 20 mA	
Type of code		EtherCat	Gray, Binary, BCD	
Supply voltage	[V DC]	10 ... 30	5 or 10 ... 30	
Page		110	131	

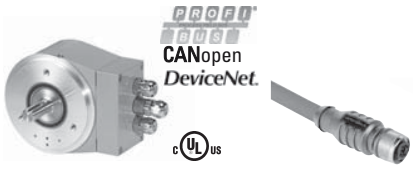
Ex II 2G EEx d II C•T6
Ex II 2D IP6x T85°C

Absolute encoders / Multiturn

	Version	Multiturn Sendix absolut 5863 / 5883 Sendix® absolut	Multiturn, shaft programmable 5862 / 5882	Multiturn, Fieldbus shaft, blind hollow shaft 5860	Multiturn Sendix absolut 5868 / 5888 Sendix® absolut
	Mechanical characteristics				
Shaft/Hollow shaft ø [mm]		6/10/15 1/4" / 3/8"	6/10/12	6/10	6/10/15 1/4" / 3/8"
Max. housing diam. [mm]		ø 58 x 49.5	ø 58 x 66	ø 60 x 88	ø 58 x 70
Max. Speed [min^{-1}]		12000	6000	6000	9000
Max. shaft load rad./ax. [N]		80/40	80/40	80/40	80/40
Max. operating temp. [°C]		–40 ... +90	–20 ... +80	–10 ... +80	–40 ... +80
Max. protection to		IP 67	IP 65	IP 65 (IP 66 on requ.)	IP 67
EX approval for hazardous areas		optional zone 2/22	optional zone 2/22	optional zone 2/22	optional zone 2/22
Type of connection		Plug/Cable	Plug/Cable	Cable, M12-connect	Plug/Cable
Electrical characteristics					
Max. resolution [PPR]		17 x 12 Bit progr.	13 x 12 Bit progr.	13 x 12 Bit	65536 (16 Bit)
Version		Multiturn	Multiturn	Multiturn/Binary	Multiturn
Interface		SSI, BISS*	SSI, RS 485, AWG-Pr.	DeviceNet	CAN/CANlift, Profibus, EtherCat
Type of code		Gray or Binary	Gray or Binary		
Supply voltage [V DC]		10 ... 30	5 ... 30	10 ... 30	10 ... 30
Page		141	148	176	154

* with optional incremental track

Absolute encoders / Multiturn



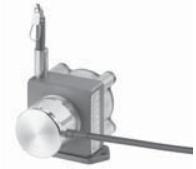
	Version	Multiturn, hollow shaft or shaft programmable 9081	Multiturn, Fieldbus hollow shaft/shaft 9080	Connection technology
	Mechanical characteristics			
Shaft/Hollow shaft ø [mm]		up to 28	12 / 12 ... 28	Please enquire about our wide range of connection technology: • Connectors • Cable assemblies • M12 technology • Profibus, CANopen and DeviceNet connection technology • M23x1, MIL and Right-angle plugs
Max. housing diam. [mm]		ø 90 x 50	ø 90 x 60	
Max. Speed [min^{-1}]		6000	6000	
Max. shaft load rad./ax. [N]		–	80/40	
Max. operating temp. [°C]		–20 ... +80	–10 ... +80	
Max. protection to		IP 65	IP 65 (IP 66 on requ.)	
EX approval for hazardous areas		optional zone 2/22	optional zone 2/22	
Type of connection		Plug	Cable, M12-connect	
Electrical characteristics				
Max. resolution [PPR]		13 x 12 Bit progr.	13 x 12 Bit	
Version		Multiturn	Multiturn/Binary	
Interface		SSI, RS 485, AWG-Pr.	Profibus DP/CANopen/ DeviceNet	
Type of code		Gray or Binary		
Supply voltage [V DC]		5 ... 30	10 ... 30	
Page		181	185	

Linear measurement systems

New

New

New



New

	Version	Magnetic measuring system	Magnetic measuring system	Draw wire sensor	Draw wire sensor
	Series	*LIMES* LI20/B1	*LIMES* LI50/B2	A50	B80
Mechanical characteristics					
Measuring range	[mm]	up to 50 000	up to 50 000	up to 1250	up to 3000
Resolution	[mm]	0.01	0.005	0.05	0.05
Travelling speed max.	[m/s]	25	16,25	10	10
Acceleration max.	[m/s²]	–	–	100	140
Service live		–	–	> 2 mill. compl. cycles	> 2 mill. compl. cycles
Max. repeatability	[mm]	10 x 25 x 40	10 x 25 x 40	77 x 135 x 70	110 x 165 x 143
Temperature range	[°C]	–20 ... +80	–20 ... +80	–20 ... +85	–20 ... +85
Materials					
Housing		Zinc die-cast	Zinc die-cast	Titanium anodised Al.	Titanium anodised Al.
Wire		–	–	Stainless-steel wire	Stainless-steel wire
Suitable encoders/interfaces		Push-pull, RS422	Push-pull, RS422	Incr. encoder 3610 or analogue output: 0 ... 10 V, 4 ... 20 mA, potentiometer	Incr. encoders Abs. encoders Fieldbus encoders analogue output
Page		196	199	202	206

Linear measurement systems

New

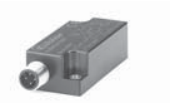
New

	Version	Draw wire sensor	Draw wire sensor	Miniature draw wire sensor	Draw wire sensor Economy
	Series	C120	D135		
Mechanical characteristics					
Measuring range	[mm]	up to 6000	up to 40 000	up to 2000	up to 6000
Resolution	[mm]	0.08	0.08	0.1	0.1
Travelling speed max.	[m/s]	10	10	0,8	3
Acceleration max.	[m/s²]	140	140	–	–
Max. repeatability	[mm]	155 x 234 x 135	135 x 254 x 141	40 x 40 x 55	105 x 115
Service live		> 2 mill. compl. cycles	> 2 mill. compl. cycles	–	–
Temperature range	[°C]	–20 ... +85	–20 ... +85	–10 ... +80	–20 ... +80
Materials					
Housing		Titanium anodised Al.	Titanium anodised Al.	Plastic reinforced	Al.
Wire		Stainless-steel wire	Stainless-steel wire	Steel wire	Steel wire, Paraleine
Suitable encoders/interfaces		Incr. encoders Abs. encoders Fieldbus encoders Analogue output	Incr. encoders Abs. encoders Fieldbus encoders Analogue output	Encoder (2400) or potentiometer	Incr. encoders Abs. encoders Fieldbus encoders
Page		210	214	220/222	224

Length measuring kits/ Measuring technology

Inclinometer

New



Data transmission

New

New

Version	Length measuring kits	Inclinometer	Slip ring	Slip ring
Series		IS 40	SR060	SR085
Specification				
	With rack & pinion or measuring wheels. With encoder holding device for optimum contact pressure of the encoder. No limitation to the measuring length, resolution up to 0.1 mm	Sensor for measuring 2 dimensional inclinations Resolution up to <0.05° Measuring range ±60 Temperature range –30 ... +70 °C Supply voltage 5 or 10 ... 30 VDC Output 4 ... 20 mA or 0.1 … 4.9 V	Compact, for the transmission of load current and signals from a stationary to a rotating platform.	Rugged, Safety-Trans™-design for the transmission of load current and signals from a stationary to a rotating platform.
			Up to 240 V and 16 A, max. 500 rpm.	Up to 240 V and 16 A, max. 800 rpm.,
			Operating temperature 0 ... 70 °C	Operating temperature 0 ... 80 °C
			Service life exceeds 500 million revolutions.	Service life exceeds 500 million revolutions.
			Protection rating IP50	Protection rating IP50
Page	226	231	233	234

Data transmission

New

Version	Optical fibre module LWL
Series	
Characteristics	
Max. transmission distance [m]	1000
Max. input/output frequency [kHz]	400
Optical transmission rate [Mbit/s]	120
Temperature range [°C]	–10 ... +60
Supply voltage [V DC]	5, 10 ... 30
Power consumption [W]	2
Page	257

Connection technology

Standard M12 from page 238
Standard M23 from page 249
Profibus from page 239
CANopen from page 245
DeviceNet from page 245

Large selection of connectors from page 248
Cable by the metre from page 251

Fixing solutions

Selection guide:
Fixings for hollow shaft encoders
from page 260

Flange adapters
The flange adapters are suitable for Kübler encoders with clamping flange. The flanges are manufactured from aluminium and are available in various sizes.

from page 268

Spring encoder
Spring encoder arm, can be combined with all Kübler encoders and measuring wheels, aluminium construction, choice of mounting locations, adjustable contact pressure.

230

Bearing block
Separation of bearing load and sensor technology: the encoder is well-protected even in harsh application conditions, no mechanical adaptation, long service life, increases the maximum bearing load by a number of times

277

Fastening eccentrics
The fastening eccentrics are suitable for Kübler encoders with synchronous flange. Use at least three fastening eccentrics to mount the encoder.

278

Accessories

Couplings
Kübler offers you two different coupling principles: Bellows couplings: these are recommended for a cost-effective connection. Spring washer type couplings: these are ideal for high speeds

Page 275

Assembly bell
The assembly bell allows for fast, reliable and secure mounting of the encoders thanks to: electrical and thermal isolation due to the use of glass-reinforced plastic, isolating spring washer coupling, delivered as complete set

Page 278

Measuring wheels
The measuring wheels are designed for use with our encoders, to measure the length of running material. Application areas include paper and textiles.

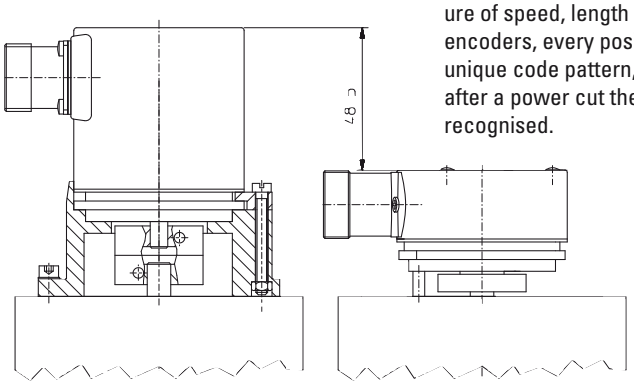
Page 228

SSI Display 570 Multifunction Displays 571,572
Various displays, programmable. Clock frequencies up to 1 MHz, 15 mm high displays. Versions with serial interface.

From page 280

Rotary Measuring Technology

Introduction:
Encoders can be used in applications, where length, positions, speed or an angular position are measured. They transform mechanical movements into electrical signals and can be divided into incremental and absolute measuring systems.

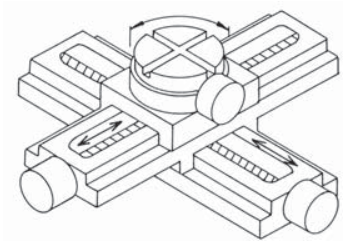


Incremental encoders generate pulses, where the number of pulses can be a measure of speed, length or position. In absolute encoders, every position corresponds to an unique code pattern, so that even after a power cut the actual position is recognised.

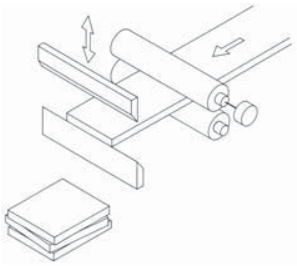
In principle we can supply all encoders, whether with a solid shaft or in a hollow shaft version. Nowadays hollow-shaft encoders are becoming more and more popular. Kübler has been pioneering hollow shaft encoder technology for many years. Using a hollow shaft encoder saves up 30 % of costs and up to 50% of the required space compared to a shaft encoder. This is achieved by avoiding additional couplings, brackets and other assembly aids.
To mount a hollow shaft encoder, it is simply necessary to put it on the shaft and prevent the encoder from rotating by using a pin.
On top of that hollow shaft encoders require less installation height.
The basic advantages of hollow shaft encoders in comparison to shaft encoders are shown in the sketch below.

Application examples:

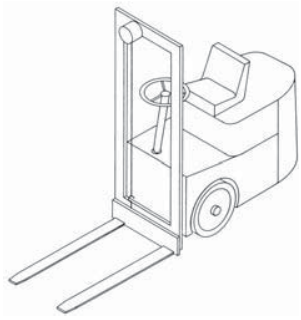
Positioning



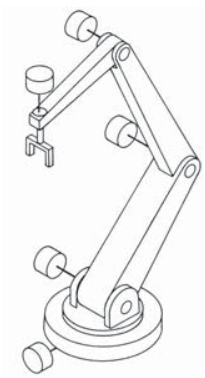
Length measurement



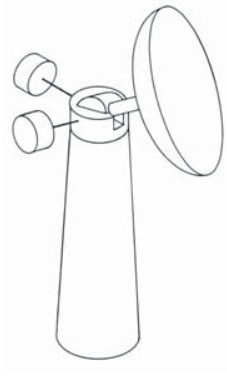
Detecting of fork's position



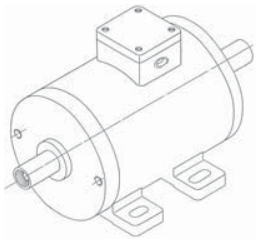
Detecting of position



Angular measurement



Velocity measurement, e.g. in drive engineering (geared motors)



Selection criteria

Conformity:

All Kübler encoders fully comply with the CE-regulations and are intensively tested in our EMC laboratories.

They conform to CE requirements according to EN 61000-6-1, EN 61000-6-4 and EN 61000-6-3.

High quality of signals:

Kübler's encoders excel thanks to electronic temperature and ageing compensation.

Rotary Measuring Technology

Approvals:

Many of our products are UL **(Underwriters Laboratories Inc.)** approved.
Our products can also be supplied on request with EX approval for use in Hazardous Areas Zones 2 and 22. All new plant and equipment that is destined for use in explosion-protected areas must be installed according to Directive 94/9/EG (ATEX 100a). Our products that are approved for use in hazardous areas carry additional labelling in line with RL 94/9/EG and EN 50014.

Kübler is active worldwide and has made a commitment to protecting the environment.

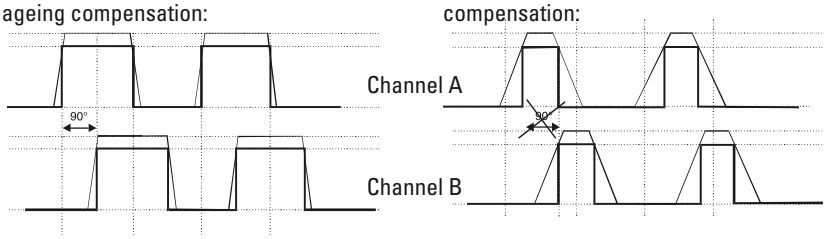
Our products comply with the RoHS standards.

Ageing compensation:

Each LED will inevitably lose its power over a period of time. As a result, the output signal degrades. The phase shift between channel A and B of 90° becomes less and less. The direction of rotation may no longer be detected. A special electronic circuit, built into the Kübler specific ASIC, prevents this effect.

Signals of a new encoder or encoders with ageing compensation:

Signals of an older encoder without ageing compensation:



Benefit: The ageing compensation circuit ensures the same signal, even after many years of operating time. The down time of machines will be reduced dramatically and the reliability is increased.

Temperature compensation:

This specialised circuit ensures that the quality of the signal will stay on the same high level over the whole working temperature range.

Benefit:
The positioning accuracy of a machine will not be affected by temperature changes.

Current Consumption:

The typical values for current consumption given in the catalogue apply for ambient temperature (23° C). Because of the temperature compensation, the current consumption of the encoder rises with the temperature. This increase in current is taken into consideration when giving the figure for maximum current consumption. The output currents are dependent on the user's input circuit and are therefore not included in the figures given; these should therefore be calculated and added in.

Short-circuit Protection:

The outputs of all the encoders are short-circuit protected, provided that the supply voltage is correctly wired. If an output is connected by mistake to 0 V or +Ub or with another output, the device will not be damaged. As soon as the error is corrected, the encoder is ready for use again.

Benefit:
Wiring circuit errors during installation that often occur in the hectic of day-to-day industrial environments do not lead to the encoder being permanently damaged.

Environmental conditions:

A significant influence on the lifetime of the encoder is set by the environment in which the encoder is operating, e.g.:

- The ambient temperature
- The expected shaft load
- The possible grade of dust/dirt and humidity/liquids

The support design and the use of high quality components makes our encoders suitable for applications in **rough conditions.**

Many references from customers including Bosch, Siemens and Bombardier are proof of this high quality.

Rotary Measuring Technology

Temperature:
Definition according to DIN standards 32 878

Working temperature:
Is defined as the environmental temperature, in which the encoder will produce the signals defined in the data sheets.

Operating temperature:
Is defined as the environmental temperature which the encoder can withstand without getting damaged.

Dirt/dust and humidity/water:

The IP classification according to EN 60529 describes how the encoder is protected against particles and water. It is described as an abbreviation "IP" followed by two numbers.
The first digit defines the size of the particles. The higher the number the smaller the particles.

The second digit defines the resistance against water. The higher the number, the higher the water pressure can be.

Our encoders have a protection up to IP 67.

These two tables summarise the most used IP ratings:

Protection against particles (first digit):

0	not protected
1	protected against particles 50 mm and larger
2	protected against particles 12,5 mm and larger
3	protected against particles 2,5 mm and larger
4	protected against particles 1,0 mm and larger
5	protected against dust
6	dust proof

IP 69K acc. to DIN 40050 Part 9: protected against high-pressure water/steam jet cleaning

Protection against water (second digit)

0	not protected
1	protected against vertically falling drops of water
2	protected against falling drops of water up to 15° from vertical
3	protected against water sprayed up to 60° from vertical
4	protected against water sprayed from all directions, limited ingress permitted
5	protected against low pressure jets from all directions, limited ingress permitted
6	protected against strong jets of water, e.g. for use on ship decks, limited ingress permitted
7	protection against the affects of immersion between 15 cm and 1 m
8	protected against long periods of immersion under pressure

Designation of colours
to DIN standard 757

abbreviation	colour
BK	black
BN	brown
RD	red
OG	orange
YE	yellow
GN	green
BU	blue

VT	violet
GY	grey
WH	white
PK	pink
GD	gold
TQ	turquoise
SR	silver

Installing encoders

Encoders shafts and in turn their bearings are subjected to loads for a variety of reasons:

- Installation tolerances when mounting the encoders (radial and angular displacement)
- Thermal changes, e.g. linear expansion of the drive shaft
- Effects of wear, e.g. radial runout of the drive shaft or vibrations

These load factors have a direct effect on the life expectancy of the shaft bearings and on the quality of the signal.

Facilities must therefore be provided during installation to compensate for these forces. For encoders having a solid shaft this is generally done by using shaft couplings between the drive shaft and the encoder shaft. The solution with hollow shaft

Rotary Measuring Technology - Encoders

Installing encoders
(continued)

encoders is to use stator couplings, fixing brackets or torque stops between the encoder bracket and the mounting surface. Not making use of a coupling but instead rigidly mounting the shaft and the encoder housing generally leads to unacceptably high loads on the bearings; the ensuing wear will cause the encoder to fail prematurely.

In order to avoid permanent damage of the encoder, certain bearing loads should not be exceeded. If hollow shaft encoders are correctly installed and the torque stops or stator couplings that are available from Kübler are used, then no problems will occur. For solid shaft encoders the maximum permitted axial and radial loads are shown in the appropriate technical data.

Safety-Lock™
Safety-Lock*plus*™

Kübler plus

Safety-Lock™: Interlocked bearings, large bearing span and extra strong outer bearings ensure stability when subjected to vibration and tolerance of installation errors. Machine downtime and repairs are eliminated.

Safety-Lock*plus*™: mechanically protected shaft seal. Mounting examples for hollow shaft.

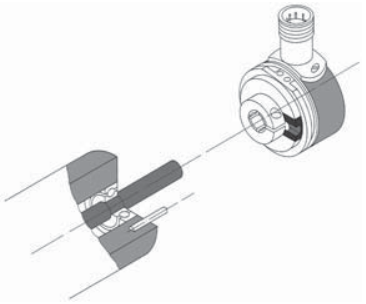
Safety-Lock™

Mounting options:

Mounting examples for hollow shaft encoders:

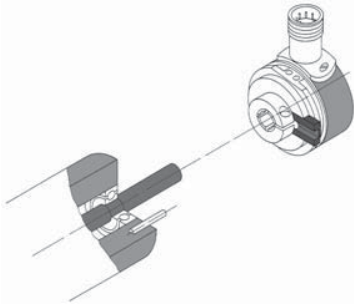
Mounting of a hollow shaft encoder with torque stop and pin (easiest and fastest mounting). Standard hollow shaft encoders are equipped with the torque stop.

Application:
If axial play is less than 0.5 mm. Resolution up to 2500 ppr (If no pulse doubling is used).



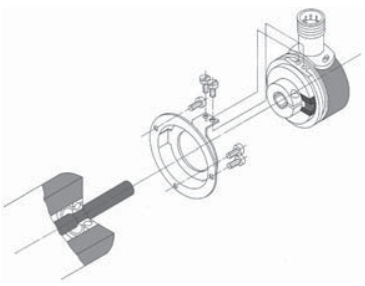
Mounting of a hollow shaft encoder with extended torque stop and long pin.

Application:
Specially recommended, if there is a large axial play. Due to the bigger mounting radius of the pin, the resolution can be higher (up to 3600 ppr, if no pulse doubling is used)



Mounting of a hollow shaft encoder with a stator coupling

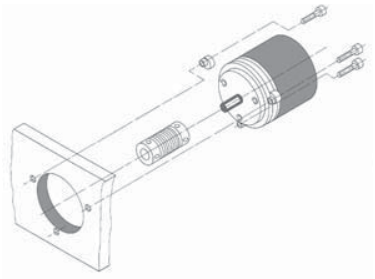
Application:
For higher resolution or if no pin can be used, due to mechanical restrictions.
No restrictions on resolution.



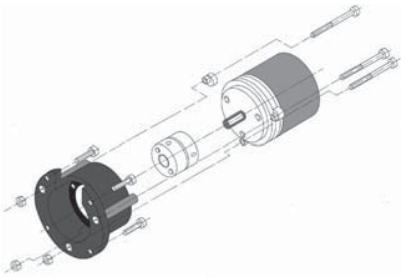
Rotary Measuring Technology - Encoders

Mounting examples for shaft encoders with synchronous bracket:

Mounting with fastening eccentrics and coupling (to reduce shaft overload).

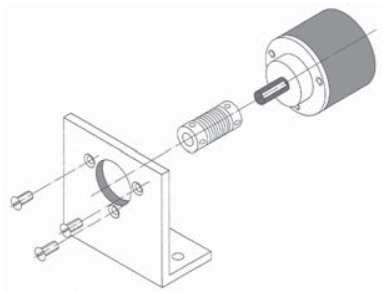


Mounting with assembly bell, fastening eccentrics and coupling (to prevent shaft overload and to insulate the encoder thermally and electrically).

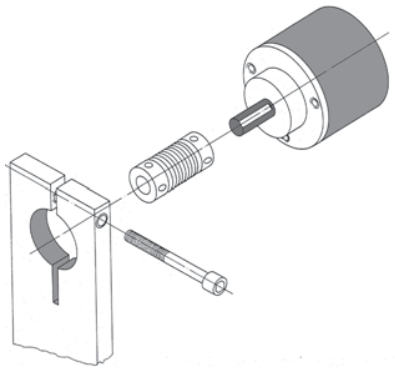


Mounting examples for shaft encoders with clamping bracket:

Mounting with an angular bracket and coupling (to reduce shaft overload).



Mounting with a commonly used clamping device and coupling (to reduce shaft overload).



Rotary Measuring Technology - Encoders

Loading of encoder shaft bearings using coupling forces

With all spring couplings (shaft coupling, stator coupling, fixing bracket), alignment and axial errors are converted to a force that corresponds to the spring constant of the coupling. This force has to be absorbed by the encoder shaft bearings. When installing an encoder, this should be done with as little force as possible, i.e. without any unnecessary initial tension on the coupling. If this is adhered to, then with all Kübler couplings adequate tolerance compensation is guaranteed for the whole service life of the encoder bearings.

This force does not occur with torque stops for hollow shaft encoders, where the encoder is prevented from turning also by means of a pin or rod. Although the encoder is prevented from rotating due to a rigid interlock, the encoder is still free to move in any other direction. This is of course dependent on it being mounted in such a way that it has freedom to move radially and especially axially (thermal linear expansion of the drive shaft!).

Possible errors in accuracy due to couplings:

Two reasons for errors in accuracy of couplings:

1. Deviations in accuracy caused by torsion of a spring coupling (in particular shaft couplings)

This deviation in accuracy is defined by the torque to be transmitted (bearing friction and mass moment of inertia) and by the torsional spring constant of the torque stop.

The following applies:

$$\text{Max. error (degree)} = \frac{\text{max. torque [Ncm]}}{\text{torsional spring constant [Ncm/degree].}}$$

The following table serves to estimate the ratio between such an error and the smallest increment of an encoder:

Relationship between the resolution of an encoder in bit and the smallest increment in angular degrees:

Resolution	binary	10 bit	11 bit	12 bit	13 bit	14 bit	17 bit
	ppr	1024	2048	4096	8192	16384	131072
Increment	degres	0,352	0,176	0,088	0,044	0,022	0,0028
	degress: min: sec	0:21:06	0:10:33	0:05:16	0:02:38	0:01:19	0:00:10
	sec	1266	633	316	158	79	10

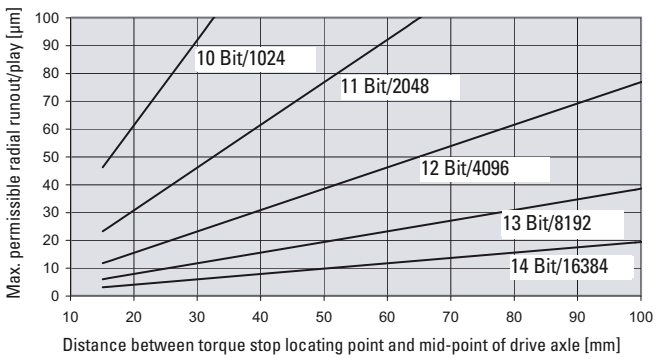
2. Deviations in accuracy caused by radial play in the drive shaft with asymmetrical mounting of the couplings

Here one has to differentiate between couplings that are mounted in an axially symmetrical manner round the shaft (all shaft couplings, many stator couplings) and asymmetrically mounted couplings (many stator couplings, all mounting brackets and pin-based torque stops).

With asymmetrical couplings deviations in accuracy can arise due to radial movements of the drive shaft (radial runout/play); this is determined by the system. These deviations are dependent on the amount of the radial play and the distance of the torque stop locating point from the drive shaft.

The relationship is shown in the following diagram:

Maximum permissible radial runout to achieve an accuracy ≥1/2 LSB when using an asymmetrical 1 point torque stop



Rotary Measuring Technology - Encoders

Particular shaft loading due to toothed-wheels, gear-pulleys and similar elements

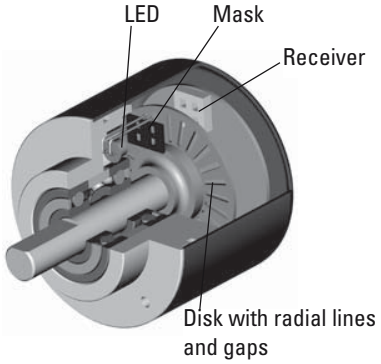
Measuring wheels, toothed wheels or gear pulleys, which are mounted directly on the encoder shaft, exert radial forces on the latter, dependent on prestressing and angular acceleration. Kübler encoders are designed so that they can absorb these forces to a great extent. The maximum permissible load capacity of the shaft is shown in the technical data for the encoder. If these load values may be exceeded in a particular application, then the encoder shaft must be isolated from the radial load by interposing an appropriate shaft with its own bearings that can absorb the forces. Kübler offers suitable bearing blocks and bearing boxes for this purpose (please refer to the 'Accessories' section in the catalogue).

Rotary Measuring Technology – Incremental Encoders

Incremental encoders Assembly and function:

Kübler encoders operate on an electro-optical scanning principle.

A disk with a radial grating of lines and gaps rotates between a light source (mostly an LED) and a receiver which produces a sine wave signal proportional to the light received.



Mechanical advantages of Kübler encoders

Kübler plus

Sendix® inkremental

- Interlocked bearings, large bearing span and extra strong outer bearings ensure stability when subjected to vibration and tolerance of installation errors. Machine downtime and repairs are eliminated.
- Ideal for use outdoors thanks to its solid die-cast housing and radial shaft seal. The Sendix Inkremenal benefits from a high IP 67 protection rating and a wide operating temperature range from –40 °C up to +85 °C.

Processing of the signals:

The sine wave signals are processed further in an electronic circuitry, usually a Kübler specific ASIC. This is necessary because most controllers (like e.g. Kübler counters) require digital signals with a certain voltage level. For that the signals are pre-processed in the encoder. The pre-processed signals are provided by the output circuit depending on the application.

Selecting an incremental encoder:

When selecting a suitable incremental encoder, then in addition to the general selection criteria shown on Page 13 the following special points must be observed:

Rotary Measuring Technology – Incremental Encoders

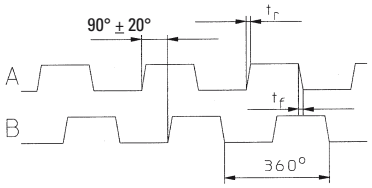
Number of channels:

Encoders with one output channel

Encoders with one output channel are used where no direction sensing is needed, e.g. speed control or length measuring.

Encoders with two output channels

Applications, where the direction of a rotation should be sensed, e.g. positioning, require encoders with two channels A and B being shifted 90° out of phase. By detecting the phase shift, the direction can be located.

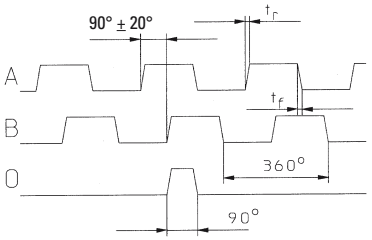


- Shaft turning clockwise, top-view of shaft
- Inverted signals available
- 0-pulse is linked to AND with channel A and B

tr = rise time
tf = fall time

Encoders with three output channels

In addition to the two channels A and B there is a zero signal available, that appears once per turn. This can be used e.g. as a reference signal during the first revolution after power up.



- Shaft turning clockwise, top-view of shaft
- Inverted signals available
- 0-pulse is linked to AND with channel A and B

tr = rise time
tf = fall time

Multiplication of pulses:

The resolution of a two channel encoder can be multiplied by two or four using a special edge detecting. An encoder with physically 5000 pulses per revolution can generate 20000 pulses per revolution using this technique.

Inverted signals:

When used in environments, with a lot of electrical noise and/or if very long cable distances are required, we recommend to use encoders with inverted (complementary) signals. These signals are always available with output circuits of the RS 422 type and sine wave outputs. Kübler also offers them for push-pull outputs.

Resolution:

Example: An encoder is equipped with a measuring wheel. Every revolution corresponds to a distance of 200 mm (circumference). The accuracy should be 0.1 mm. What is the required resolution (ppr)?

Given: Circumference of the measuring wheel: U = 200 [mm]

Accuracy of the system: G = 0.1 [mm]

Wanted: Resolution of the encoder: A = ? [pulses/resolution]

$$\text{resolution} = \frac{\text{Circumference}}{\text{Accuracy}} = \frac{U}{G}$$

The required resolution would be 2000 ppr (pulses per revolution).

Rotary Measuring Technology – Incremental Encoders

Pulse frequency:

The required pulse frequency can be calculated. This is based on the number of pulses per turn (ppr) and the speed (rpm). The max. pulse frequency is listed for each encoder. Usually it is 300 kHz. Kübler also offers high resolution encoders with a pulse frequency of up to 800 kHz.

Example:
how to calculate the required pulse frequency f_{max}:

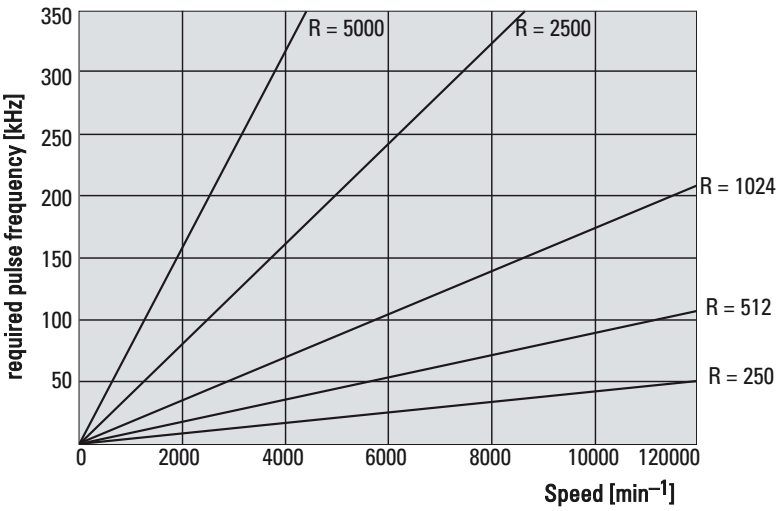
Given: Speed n= 3000 min^{-1}

Resolution of the encoder
R = 1000 ppr

$$f_{max} = \frac{n \times A}{60}$$

The required pulse frequency is 50 kHz. Now you can compare this result with the data of the encoder you would like to choose.

This diagram can be used as a quick guide for the most common resolutions:



Outputs and voltage supplies (overview):

Kübler offers a wide range of possible outputs and voltage supplies for any application:

Output	Inverted signals	Voltage supply
RS 422	Yes	5 V DC
RS 422	Yes	10 ... 30 V DC or 5 ... 30 V DC
Push Pull output	No	10 ... 30 V DC or 5 ... 30 V DC
Push Pull output	Yes	10 ... 30 V DC or 5 ... 30 V DC
Push Pull (7272)	Yes	5 ... 30 V DC
Sine wave voltage output	Yes	5 V DC
Sine wave voltage output	Yes	10 ... 30 V DC

If the encoder is used in an environment with strong electrical noise and long cables we highly recommend the use of inverted signals.

Sensor outputs:

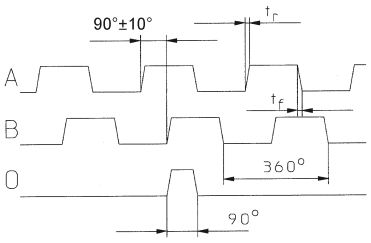
The sensor outputs are used if the distance from the encoder to the control unit is very long and the voltage supply at the encoder could drop due to this long distance.
The input impedance of the sensor inputs (Controller) is very high, and the voltage drop on the sensor output line is almost zero. Due to this it is possible to detect the actual supply voltage of the encoder (e.g. 4.2 V instead of 5 V). Based on this information the controller will increase the voltage supply to e.g. 5.8 V.

Rotary Measuring Technology – Incremental Encoders

Digital outputs:

The sine wave signal from the optical system is first digitised to have square wave signals available.

- Shaft turning clockwise, top view of shaft
- Inverted signals are available
- 0-pulse is linked to AND with channel A and B



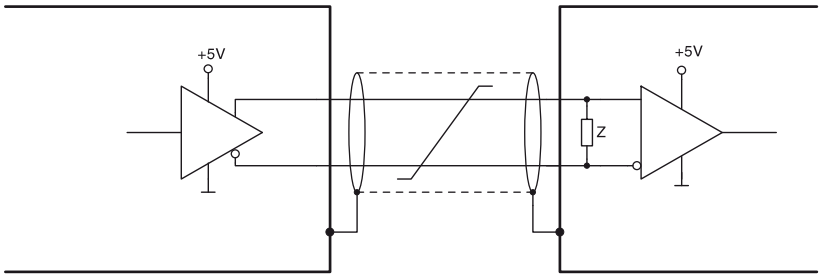
To transmit the signals there are two possible outputs available. RS 422 (TTL compatible) or push-pull (covers PNP or NPN). When choosing the suitable output for the application the following points have to be considered:

- The corresponding unit / controller the encoder will be connected to
- The distance from the encoder to the receiver unit
- The sensitivity against electrical noise or other interference

RS 422:

Output circuit and recommended input circuit

Encoder — recommended input circuit



RS 422 line driver

RS 422 line receiver
e.g. AM26 C 32
Z = 120 Ω

Push-pull outputs:

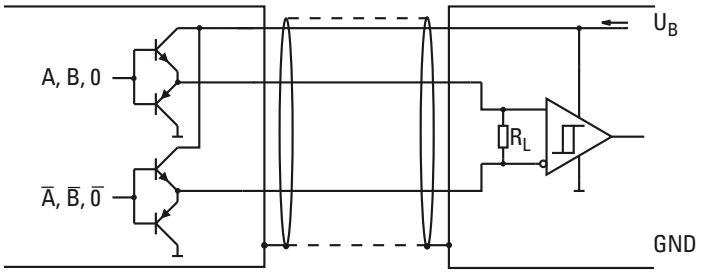
Push-pull outputs are suitable for count interface cards, electronic counters or PLC inputs. They are available in **two versions:**

Push-pull:
- Push-pull with integrated wave impedance adjustment, recommended cable impedance 40 … 150 Ω
- Recommended for long cable lengths, high pulse frequencies and output voltages to 30 V
- With or without inverted (complementary) signals

Push-pull (7272):
- Universal line driver 5 … 30 V with low-level (max 0.5 V)
- Recommended for cable lengths up to 30 m
- With inverted signals

Output circuit and recommended input circuit push-pull with inverted signals:

Encoder — recommended input circuit



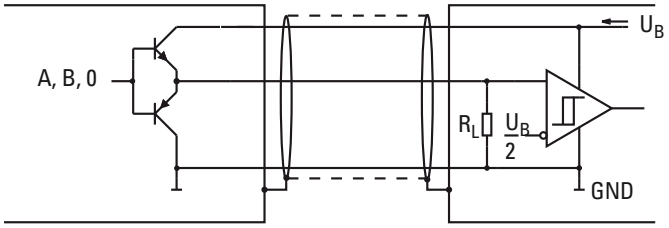
integrated push-pull driver

R_L = 1 kΩ

Rotary Measuring Technology – Incremental Encoders

Output circuit and recommended input circuit push-pull without inverted signals:

encoder recommended input circuit

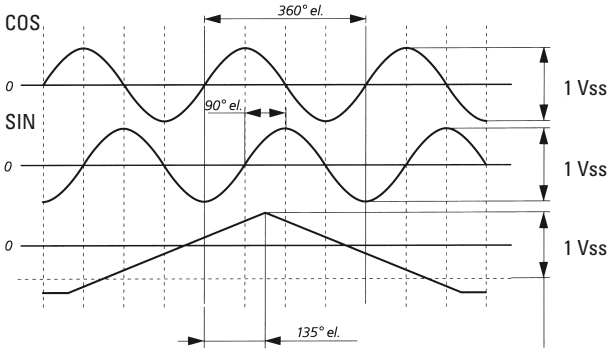


Integrated push-pull driver RL = 1 kΩ

Sine wave outputs:

The sine wave signals are available as voltage signals. They can be further processed and be multiplied by a factor of usually 10, 20, 50, 100, 400, 500, 1000 res. binary factors (512, 1024). Due to the interpolation of the two signals, which are 90° out of phase, a very high resolution can be achieved.

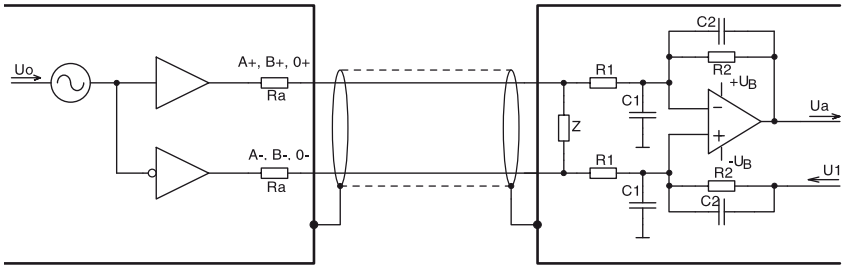
This makes these kind of signals specially useful for applications where very high resolutions are required. Further they are very suitable for digital drives with a very slow and precise movement, e.g. for grinding machines or lifts and elevators.



- Shaft turning clockwise, top view of shaft
- 0-pulse is generated once per turn

Output circuit and recommended input circuit for sine wave voltage signals:

encoder recommended input circuit



R_a = 10 Ω Z = 120 Ω OPV: e.g. MC33074
C_1 = 150 pF $U_1 = U_0$
C_2 = 10 pF
R_1 = 10 kΩ
R_2 = 33 kΩ
U_0 = 2.5 V ±0.5 V

Rotary Measuring Technology – Incremental Encoders

Cable lengths for incremental encoders:

Depending on the output circuit and the electrical noise the following cable lengths are recommended:

Output circuit	max. cable length	Encoder connected to e.g.
Push-pull without inverted signals	100 m*	Kübler counter/PLC
Push-pull with inverted signals	250 m*	PLC/IPC[1)]
Push-Pull with inverted signals (7272)	30 m	
RS 422 with inverted signals	up to 1000 m (> 50 m depending on frequency)	PLC/IPC[1)]
Voltage sine with inverted signals	50 m	PLC/IPC[1)1)]

[1)] IPC = industrial PC
*depends on frequency

Annotations:

- Depending on the application the recommended cable length can be shorter, especially in areas with strongly electrical noise.
- Always use shielded cables
- The core diameter of the signal cores should be ≥ 0.14 mm^2
- The core diameter of the voltage supply cores should be large enough depending on the cable length, that the voltage supply of the encoder is high enough and the signals do not go below the minimum levels!
  We strictly recommend the use of the cable types written down in the accessories.

Rotary Measuring Technology – Absolute Encoders

Absolute encoder

Design and function:

Absolute encoders have a disk with a digital coding on concentric tracks. This code is read by a Kübler Opto-Asic. A unique bit pattern is assigned to each position.

The advantage is, that after power failure true position verification is available as soon as power is up again, even if the shaft was moved during the dead state.

Advantage: No reference drives after starting-up are necessary as with incremental systems. Safety is increased and the time taken for reference drives is saved.

Mechanical advantages of Kübler encoders:

Sendix® absolut

Kübler plus

Sturdy bearing construction: "Safety-Lock TM design"

- Interlocked bearings, large bearing span and extra strong outer bearings ensure stability when subjected to vibration and tolerance of installation errors. Machine downtime and repairs are eliminated.
- Ideal for use outdoors thanks to its solid die-cast housing and radial shaft seal. The Sendix Inkremenal benefits from a high IP 67 protection rating and a wide operating temperature range from –40 °C up to +85 °C.

Selecting an absolute encoder:

When selecting the right absolute encoder the following parameters should be considered in addition to the recommendations on page 13.

- Supply voltage
- Type of code
- Interface (SSI, parallel, fieldbus, 4 ... 20 mA)

Rotary Measuring Technology – Absolute Encoders

Versions:

Singleturn encoders:
Depending on the number of divisions they generate up to 16384 (14 Bit) unique positions per turn. This corresponds to an angular resolution of 0.022° (= 1.3'). After one revolution the process re-starts.

Singleturn encoders can be used in applications where revolution is sufficient, e.g. measurement of angles, robotic.

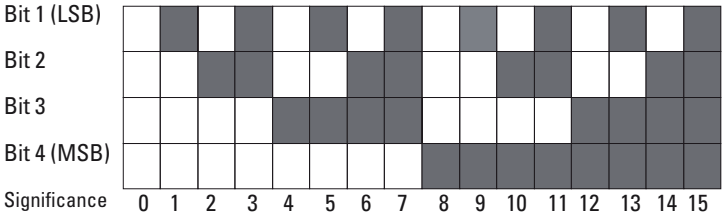
Multiturn encoders:
They are available with up to 8192 (13 Bit) definite angular positions per revolution and in addition 4096 (12 Bit) definite revolutions. This corresponds to 33.5 million definite positions.

Multiturn encoders can be used for positioning applications e.g. automatic storage, retired systems, lift elevators, cranes, machine tool, etc.

Code types:

Binary Code:

The Binary Code can be processed very easily by computer systems. When using optical read-out, errors may occur, because the change from one bit to another on the different concentric tracks (LSB, LSB+1...) is not exactly synchronized. Due to this, without any correction of the code, the position information could be wrong.

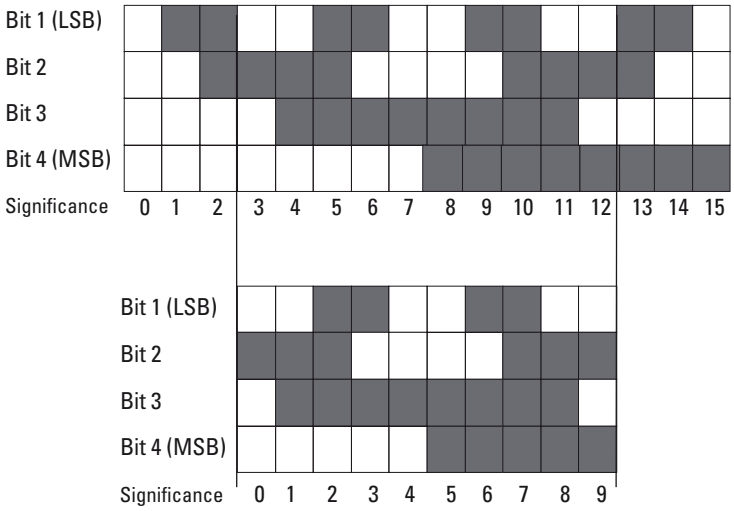


Gray Code:

The Gray Code is a single-step code. This indicates, that from one position to the next only 1 bit is changed. The reliability of the code detection is increased, which leads to a high position-reliability. The Gray Code is used to optically read out the position for all absolute encoders

Symmetrically cut Gray Code (Gray-Excess):

The extraction of a defined part of the Gray Code leads to the gray-excess code. This code enables the generation of non binary based divisions, e.g. 360, 720, 1000, 1440.



Reversion of the Gray Code:

The code values increase when the shaft is turning clockwise. If the most significant bit (MSB) is inverted, the code values decrease when the shaft is turning clockwise.

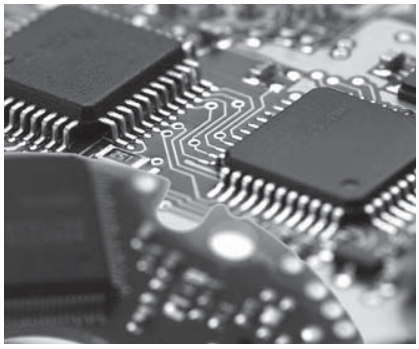
Rotary Measuring Technology – Absolute Encoders

Patented Integrative Technology®:

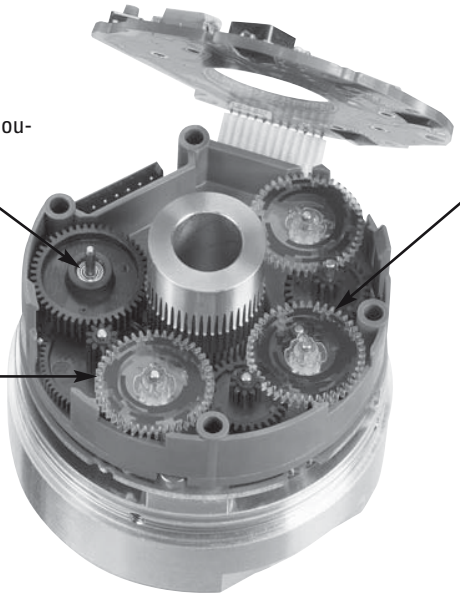
Integrative Technology, developed and patented by Kübler, is a package of measures that ensures compact construction, high signal quality, high shock resistance - up to 2500 m/s2, high reliability and a high level of immunity to EMC.

This is achieved using an Opto ASIC, a multilayer board and an especially shock resistant and space-saving method of mounting the sensor unit. In addition the use of a highly optimized interface ASIC ensures the integration of several hundred individual components. Components that had previously been needed to balance the system, such as balancing potentiometers, can be dispensed with.

Advantages of Integrative technology:
Singleturn shaft encoders are available with the same dimensions as their incremental correspondents. This allows an easy mechanical substitution.



The multiturn gear module – armed to the teeth (12 Bit resolution)



Mechanical or electronic gears?

Absolute singleturn and multiturn encoders have established themselves as the standard method for measuring linear displacement or angular position. With absolute encoders a reference trip is no longer needed after system start-up or a power-down. Multiturn encoders in particular are now being employed, where previously incremental encoders had predominated, for example with geared motors or in lifts.

Today all manner of multiturn encoders are available in a variety of designs. As a rule the manufacturers offer either mechanical gears for 'counting turns', or swear by electronic counters with electronic data storage. They are critical of any other technology.

The fact is however: it is not a case of which is better or worse; each technology has its advantages and drawbacks. Only the actual application can decide.

Outputs:

To transfer the position data to a controller, different interfaces are available.

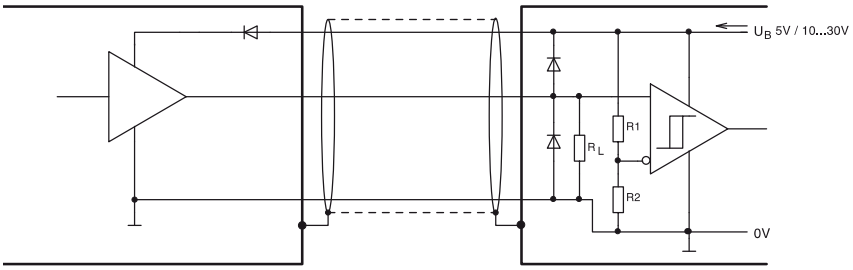
Parallel output:

This type of transfer is very fast. All bits of a position are transferred simultaneously each via a separate line.

Rotary Measuring Technology – Absolute Encoders

Output circuit and recommended input circuit parallel interface:

encoder recommended input circuit



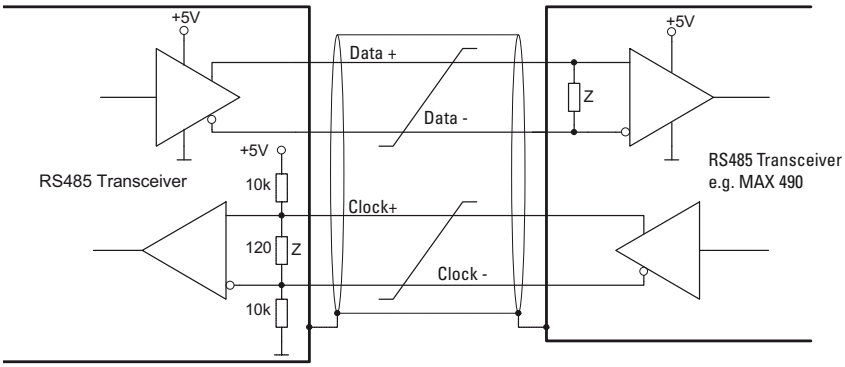
Integrated push-pull driver

Synchronous Serial Interface (SSI):

Compared to the parallel interface, the SSI interface needs less components and the EMC-characteristics are much better. In addition less cores are needed for transmission and the possible cable length is much longer.

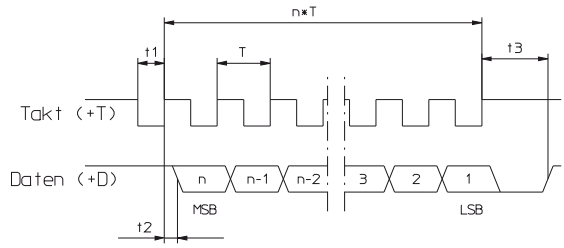
Output circuit and recommended input circuit for multiturn encoders with SSI output

Encoder types 5850,5870 and 7031 have inputs galvanically isolated by opto-couplers.



Z = 120 Ohm

Data transmission SSI:



t1 = T / 2
t2 < 1 / (4 x fmax)
t3 = Monoflop time (see below)
n = Resolution in Bit
1/ fmax =< T =< 1 / fmin
fmin = min. SSI clock rate (see data sheet)
fmax = max. SSI clock rate (see data sheet)

At rest, the clock and data lines are at a high level. With the first falling clock-pulse edge, the current encoder data are stored in the buffer ready to be sent. With the next rising clock-pulse edge, the data are transmitted bit by bit, starting with the MSB. The transfer of a complete data word requires n+1 rising clock-pulse edges (n=resolution in Bit), e.g. 14 clock signals for a complete readout of a 13 Bit encoder. After the next positive-going clock-pulse edge the data line will remain at a low level until the encoder is ready for a new data word. The clock line must stay high for at least as long, and then can begin a new read-out sequence again with the next falling edge.

BISS-Interface:

We offer absolute encoders with a wide variety of interfaces. Details about our BiSS interface can be found on our website at:

www.kuebler.com/service/biss_en.pdf

Rotary Measuring Technology – Absolute Encoders

Please note!

Only for type series 5850, 5870, 5862, 5882 and 9081:

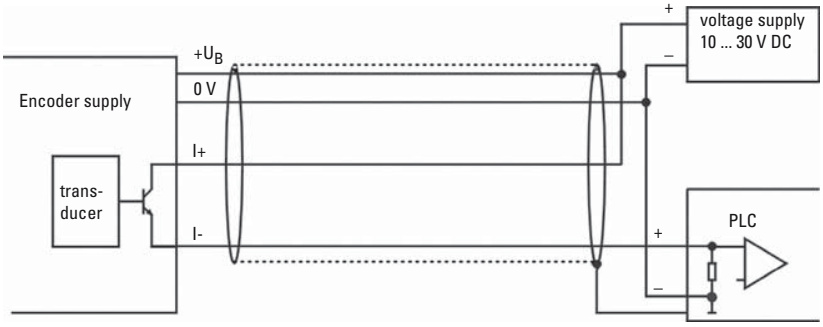
The updating of the data occurs synchronously with the read-out cycle. So, the data are as up-to-date as the interval time between two read-outs. A periodic read-out of the encoder in the application is therefore recommended, using appropriately short cycle times, so that current position values are constantly maintained. It is not possible to read out the same data word several times.
Monoflop time of the encoder: t3 = max. 40µs

Only for the new Sendix Absolut encoders:

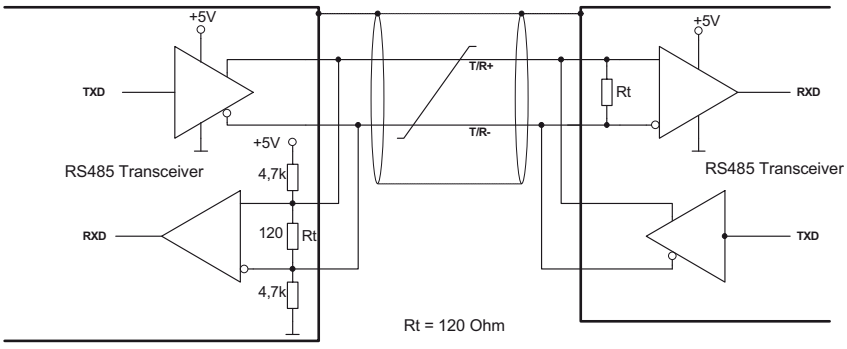
The updating of the data occurs immediately with the first falling edge of the clock signal. The data are thus always up-to-date. If a repeated read-out of the same data word is desired, then a new clock sequence must be started within the time interval t3. If the clock sequence is terminated before the necessary number of clock pulses, needed for a complete readout of the data word, has been transmitted, then after a further time interval t3 the data line will go high again and signal that the last read-out sequence has been aborted. It will also indicate that it is ready for a new data word to be sent. Monoflop time of the encoder: t3 = see data sheet.

Type of connection and recommended input circuit for encoder type 5850 and 7031 with current interface 4 ...20 mA

encoder — recommended input circuit



Output circuit and recommended input circuit for encoder
with **RS485 interface (half-duplex)**
e.g. 5862, 5882, 9081:



Encoders with internal termination have a fixed terminating resistor Rt built in. This variant is designed for point-to-point transmissions between 2 devices. With devices having external termination the user must activate the terminating resistor by placing a jumper between pins 5 and 6. This option is suitable to the construction of bus systems with several encoders. With bus systems, the EIA-485 standard recommends terminating each end of a data link circuit with a terminating resistor. The RS-485 interface is asynchronous. In half-duplex operation it is not possible to send and receive at the same time. The data transmission is controlled via ESC commands.

Rotary Measuring Technology – Absolute Encoders

Bus systems:

Bus systems: we offer absolute encoders with a wide variety of fieldbus bus systems. Details about our fieldbus bus systems can be found on our website at:

www.kuebler.com/service/fieldbus.pdf

Cable length:

Cable length: the following maximum cable lengths are recommended, depending on the output circuitry and any noise sources present:

Interface and output circuit	max. cable length	Connected to
Parallel CMOS/TTL	2 m	SPS/IPC[1)]
Parallel push-pull	100 m	SPS/IPC[1)]
SSI	up to 1000 m[2)]	SPS/IPC[1)]
RS 422 /RS 485	1000 m	SPS/IPC[1]
Analogue 4 ... 20 mA	200 m	

1)IPC = Industrial PC

2) Depends on clock frequency: at 100 kHz L_{max} approx. 250 m; at f = 250 kHz L_{max} approx. 50 m

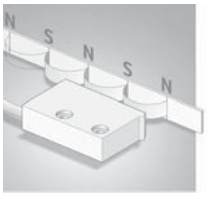
Annotations:

- Depending on the application the max. allowed cable length can be shorter, especially in areas with strong electrical noise.
- Always use shielded cables
- The core diameter of the signal cores should be ≥ 0.14 mm^2
- The core diameter of the voltage supply cores should be large enough depending on the cable length, that the voltage supply of the encoder is high enough and the signals do not go below the minimum levels! We strictly recommend the use of the cable types written down in the accessories.

Linear Measuring Technology

Magnetic measuring system *LIMES*
up to 90 m measuring length
up to 0.005 mm resolution

A magnetic sensor is guided across a magnetic band without coming into contact with it. The changes in polarity on the magnetic band are counted and intermediate values are interpolated. Our engineers have fine-tuned the system to such a degree that resolutions up to 0.005 mm are possible. The system is not affected by dust, shavings or humidity and is resistant to many liquids and to oil. Assembly is easy - the magnetic band just has to be glued into place. There are no problems for calibration.



Kübler plus

The distance between the sensor and the magnetic band can be up to 2 mm.
Repeat accuracy is very high.

Where is our LIMES system used?

The idea:
The measuring system offers an economical alternative to optical systems in applications where the high accuracy of the glass rules is not absolutely necessary but where up till now no other suitable alternative has been available.

Because of its rugged construction the measuring system can now be used even in tough industrial environments.

The system is not affected by vibration nor is it damaged if subjected to high shock loads. Our flexible magnetic band offers a further interesting area of application,

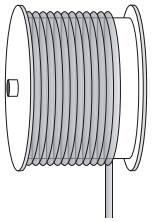
due to the fact that it can be fitted round very large shafts. The maximum length of the magnetic band is 50 m!

Linear Measuring Technology

Draw wire systems:
Measuring length up to 40 m
Resolution up to 0.1 mm

The idea:
At the core of a draw wire encoder is a drum mounted on bearings, onto which a wire is wound. The winding takes place via a spring-loaded device. The number of revolutions is measured by means of an encoder. If the circumference of the drum is known, then the length can be calculated from it.

Thus draw wire systems convert linear motion into rotary motion. This is then measured with encoders. Our spectrum ranges from miniature draw-wire versions up to models capable of measuring 40 m.



- Specially for demanding applications
- With analogue sensors
  (0 ... 10 V, 4 ... 20 mA, potentiometer)
  or encoders
  (incremental, absolute, fieldbus)
- Measuring lengths from
  250 mm up to 40.000 mm
- High travelling speed
- High acceleration

Dynamic spring traction by means of a constant force spring, long service life, approx. 2 million complete cycles.

Kübler plus

- Simple wire fixing using clip
- Quick mounting
- Diamond-polished ceramic guide
- Titanium anodised aluminium housing

Linear Measuring Technology

Length measuring kits
unlimited length
resolution up to 0.1 mm

We have taken our expertise from the fields of sensor and counting technology and applied this to length measuring kits.

We will supply you the measuring wheel, the encoder and the counter – **all from one source.**

Plug in and go – saves you time and effort – no need to assemble the component parts.

We supply the complete kits.

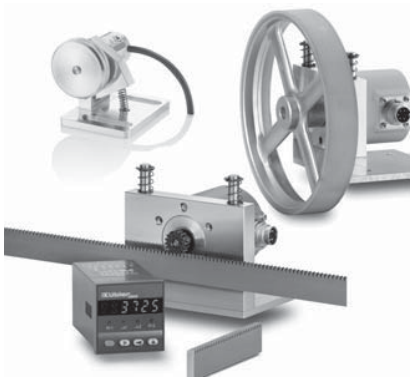
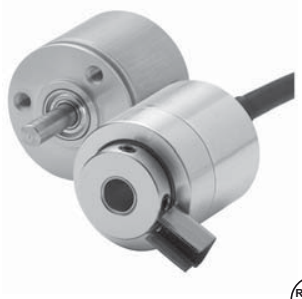


Table of contents

Miniature Type 2400 (shaft) / 2420 (hollow shaft)



- Wide temperature range (-20 ... +85 °C)
- Sturdy cable outlet with multiple clamping
- Temperature compensation
- Broad input voltage range (5 ... 24 V or 8 ... 30 V)
- Highly flexible cable withstands constant flexing from 0 °C ... 70 °C)
- Low power consumption despite high scanning rate
- Short-circuit proof
- •• Very high EMC standard
  - **Kübler encoder type 24xx meets German Railways standard EN 50121****

Speed:	max. 12 000min^{-1}
Rotor moment of inertia:	approx. 0.1 x 10^{-6} kgm^2
Starting torque:	<0.001 Nm
Radial load capacity of shaft:	10 N
Axial load capacity of shaft:.	20 N
Weight:	approx. 0.06 kg
Protection acc. to EN 60529:	IP 64 housing side, IP 64 shaft side on request
Working temperature:	–20° C ... +85 °C[2)]
Materials:	Shaft: stainless steel Blind hollow shaft: brass
Shock resistance acc. to DIN-IEC 68-2-27	1000 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	100 m/s^2, 55 ... 2000 Hz

[2)] Non-condensing

**** Kübler encoder type 24xx meets German Railways standard**

An independent test laboratory (TTI-P-G115/96-01) approved by the German Accreditation Council (DAR) certified the compliance with the railway standard, according to EN 50121.
This means our encoder is compatible with higher electromagnetic noise standards than standard industrial encoders. You will have a higher quality encoder even in applications with higher EMC noise levels.
We will gladly send you a copy of the test report on request. When ordering an encoder to the railway standard, please ensure you state this explicitly on the order.

Deutscher Akkreditierungs Rat DAR

Electrical characteristics:

Output circuit:	Push-pull (7272)[1)]	Push-pull (7272)[1)]
Supply voltage:	5 ... 24 V DC	8 ... 30 V DC
Power consumption (no load):	max. 50 mA	max. 50 mA
Permissible load/channel:	max. 50 mA	max. 50 mA
Pulse frequency:	max. 160 kHz	max. 160 kHz
Signal level high:	min. U_B = -2.5 V	min. U_B = –3 V
Signal level low:	max. 0.5 V	max. 0.5 V
Rise time t_r:	max. 1 µs	max. 1 µs
Fall time t_f:	max. 1 µs	max. 1 µs
Short circuit proof outputs:	yes	yes
UL certified	File 224618	
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3		
RoHS compliant acc. to EU guideline 2002/95/EG		

[1)] Max. recommended cable length 30 m

Terminal assignment

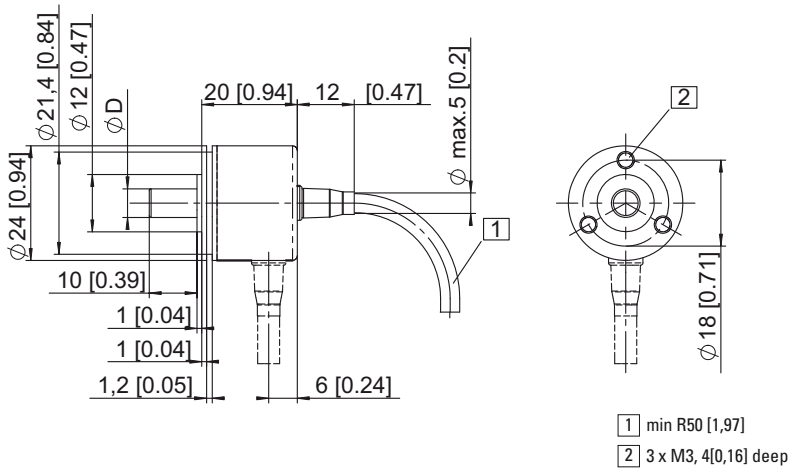
Signal:	0V	+U_B	A	$\overline{A}$	B	$\overline{B}$	0	$\overline{0}$	
Colour:	WH	BN	GN	YE	GY	PK	BU	RD	
without inverted signal:	WH	BN	GN		YE		GY		

Isolate unused outputs before initial start-up

Miniature Type 2400 (shaft) / 2420 (hollow shaft)

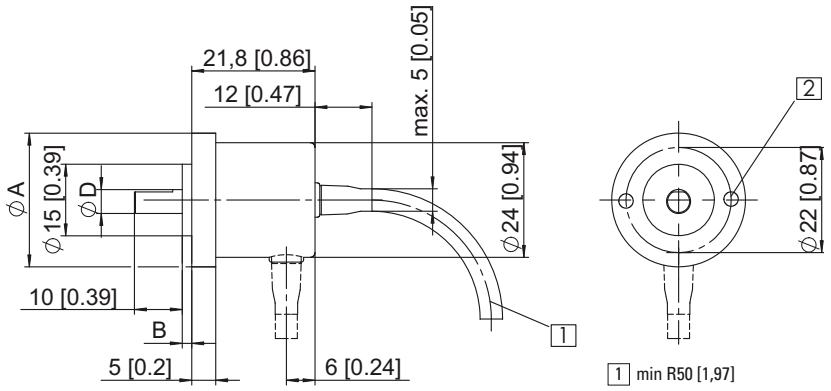
Dimensions shaft version:

Flange type 1 (Ø 24 mm)



1 min R50 [1,97]
2 3 x M3, 4[0,16] deep

Flange type 2 (Ø 30 mm)
Flange type 3 (Ø 28 mm)



1 min R50 [1,97]
2 2 x M3, 4[0,16] deep

Mounting advice:

The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time! We recommend the use of suitable couplings (see Accessories section).

Flange type	2	3
A	ø 30 mm	ø 28 mm
B	3 mm	2 mm

Order code shaft version:

05.2400.XXXX.XXXX

10 by 10

Type

Flange
- 1 = ø 24 mm
- 2 = ø 30 mm
- 3 = ø 28 mm
- further options on request

Shaft
- 1 = ø 4 mm x 10 mm
- 2 = ø 6 mm x 10 mm
- 3 = ø 5 mm x 10 mm with flattening

Pulse rate
- 4, 6, 8, 10, 16, 20, 25, 36, 40, 50, 60, 80, 100, 120, 125, 180, 200, 250, 300, 360, 400, 500, 512, 1000, 1024
- (e.g. 360 pulses=> 0360)
- Other pulse rates on request

Type of connection
- 1 = Cable axial (2 m PVC cable ø 4.5 mm)
- 2 = Cable radial (2 m PVC cable ø 4.5 mm)

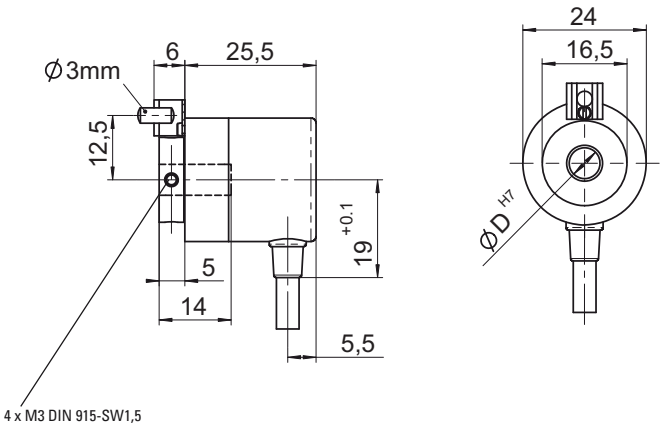
Output and voltage supply
- 1 = Push-pull (without inverted signals) 5 ... 24 V supply voltage
- 2 = Push-pull (with inverted signals) 5 ... 24 V DC supply voltage
- 3 = Push-pull (without inverted signals) 8 ... 30 V DC supply voltage
- 4 = Push-pull (with inverted signals) 8 ... 30 V supply voltage

Stock types
05.2400.1122.0050
05.2400.1122.0100
05.2400.1122.0360
05.2400.1122.0500
05.2400.1122.1000
05.2400.1122.1024
05.2400.3321.1000
05.2400.3341.1000
05.2400.3331.0500
05.2400.3331.1000

Accessories:
- Cables and connectors, also pre-assembled, can be found in the chapter Counting Technology
- Mounting attachments and couplings can be found in the Chapter Accessories

Miniature Type 2400 (shaft) / 2420 (hollow shaft)

Dimensions hollow shaft version:



Mounting advice:
The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time! A cylindrical pin (ISO 2338-A-3m6 x 10), for use as a torque stop, is supplied

Order code hollow shaft version: 05.2420.1XXX.XXXX

Type

Flange
1 = ø 24 mm

Blind hollow shaft (insert depth max. 14 mm)
1 = ø 4 mm
2 = ø 6 mm

Stock types
05.2420.1212.0100
05.2420.1212.0360
05.2420.1212.0500
05.2420.1212.1000
05.2420.1212.1024
05.2420.1222.0050
05.2420.1222.0100
05.2420.1222.0360
05.2420.1222.0500
05.2420.1222.1000
05.2420.1222.1024

Pulse rate
4, 6, 8, 10, 16, 20, 25, 36, 40, 50, 60, 80, 100, 120, 125, 180, 200, 250, 300, 360, 400, 500, 512, 1000, 1024
(e.g. 360 pulses=> 0360)
Other pulse rates on request

Type of connection
1 = Cable axial (2 m PVC-Cable)
2 = Cable radial (2 m PVC-Cable)

Output and voltage supply
1 = Push-pull (without inverted signals)
5 ... 24 V supply voltage
2 = Push-pull (with inverted signals)
5 ... 24 V DC supply voltage
3 = Push-pull (without inverted signals)
8 ... 30 V DC supply voltage
4 = Push-pull (with inverted signals)
8 ... 30 V supply voltage

Accessories:
– Cables and connectors, also pre-assembled, can be found in the chapter Counting Technology
– Mounting attachments and couplings can be found in the Chapter Accessories

Economy Encoder Type 3700 (shaft) / 3720 (hollow shaft)

- Compact size only ø 37 x 33 mm
- Hollow shaft version: Very easy mounting. The encoder is mounted directly on the drive shaft without couplings. This saves up to 30 % cost and 60 % clearance compared to shaft versions.
- Temperature- and ageing compensation
- Short circuit proof outputs
- Resolution up to 1024 ppr
- Protection up to IP 67
- Flange and cover made from a new High-Tech-Material (composite material)
- High component integration leads to low profile design, high performance and economical pricing
- "Tube Tech®" cable outlet guarantees 10x higher strain relief than traditional cabling methods and ensures IP 67 protection
- 1 ½" (37 mm) diameter housing suitable for replacing resolvers

Mechanical characteristics:

Speed:	max. 6000 min^{-1}
Rotor moment of inertia:	Shaft version: approx. 0.4 x 10^{-6} kgm^2
	Hollow shaft version: approx. 1.4 x 10^{-6} kgm^2
Starting torque:	Shaft version: < 0.007 Nm
	Hollow shaft version: < 0,01 Nm
Radial load capacity of the shaft:	20 N
Axial load capacity of the shaft:	10 N
Weight:	approx. 0.1 kg
Protection acc. to EN 60 529:	bearing, shaft: IP 65
	cable outlet: IP 67
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature:	–20° C up to +70 °C[1)2)]
Materials:	Shaft/hollow shaft: stainless steel;
	housing, flange: composite PPA, 40% KF (carbon fibre)
	cable: PVC
Shock resistance acc. to DIN-IEC 68-2-27:	1000 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	100 m/s^2, 10 ... 2000 Hz

1) For versions with push-pull output and supply voltage >15 V DC: max. 55 °C
2) Non-condensing

Electrical characteristics:

Output circuit:	RS 422 (TTL-compatible)	Push-pull (7272)[3)]	Push-pull (7272)[3)]
Supply voltage:	5 V (±5%)	5 ... 30 V DC	10 ... 30 V DC
Power consumption (no load)	typ. 40 mA /	typ. 50 mA/	typ. 50 mA/
with inverted signal:	max. 90 mA	max.100 mA	max.100 mA
Permissible load/channel:	max. ±20 mA	max. ±20 mA	max. ±20 mA
Pulse frequency:	max. 250 kHz	max. 250 kHz	max. 250 kHz
Signal level high:	min. 2.5 V	min. U_B–2.0 V	min. U_B–2.0 V
Signal level low:	max. 0.5 V	max. 0.5 V	max. 0.5 V
Rise time t_r	max. 200 ns	max. 1 µs	max. 1 µs
Fall time t_f	max. 200 ns	max. 1 µs	max. 1 µs
Short circuit proof outputs[1)]:	yes[2)]	yes	yes
Reverse connection protection at U_B:	no	no	yes
UL certified	File 224618		
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3			
RoHS compliant acc. to EU guideline 2002/95/EG			

1) If supply voltage correctly applied
2) Only one channel allowed to be shorted-out:
(at U_B = 5 V short circuit to channel, 0 V, or +U_B is permitted).
3) Max. recommended cable length 30 m

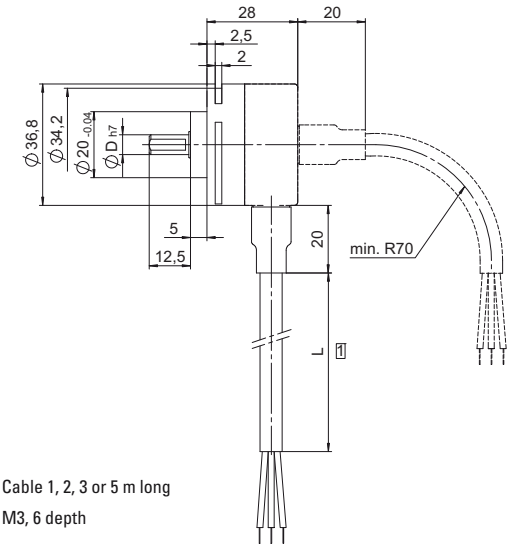
Economy Encoder Type 3700 (shaft) / 3720 (hollow shaft)

Signal:	0 V	+U_B	A	$\overline{A}$	B	$\overline{B}$	0	$\overline{0}$	Shield
Colour:	WH	BN	GN	YE	GY	PK	BU	RD	

Using RS 422 outputs and long cable distances, a wave impedance has to be applied at each cable end.

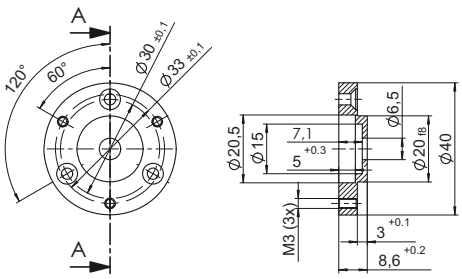
Isolate unused outputs before initial startup.

Dimensions shaft version:



1 Cable 1, 2, 3 or 5 m long
2 M3, 6 depth

Adapting flange Type A



Includes flange and screws M3x8 DIN 63 (3x) for encoder mounting.

Order code: 8.0010.2220.0000

D	4	5	6	7	1/4"	8
m	3.7	4.6	5.5	6.5	5.8	7.5

Mounting advice:

The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time! We recommend the use of suitable couplings (see Accessories section).

Order code shaft version:

8.3700.XXXX.XXXX

Type

Flange
- 1 = Flange without fixing attachment
- A = Flange adapter, mounted

Shaft
- 1 = ø 4 mm
- 2 = ø 5 mm
- 3 = ø 6 mm
- 4 = ø 1/4"
- 6 = ø 8 mm

Stock types
- 8.3700.1332.0050
- 8.3700.1332.0360
- 8.3700.1332.0500
- 8.3700.1332.1000
- 8.3700.1332.1024

Pulse rate
10, 50, 60, 100, 180, 200, 250, 300, 360, 400, 500, 512, 600, 1000, 1024
(e.g. 250 pulses => 0250)
Other pulse rates available on request

Type of connection
- 1 = Cable* axial (1 m PVC-cable)
- 2 = Cable* radial (1 m PVC-cable)
- 3 = Cable* axial (2 m PVC-cable)
- 4 = Cable* radial (2 m PVC-cable)
- 5 = Cable* axial (3 m) PVC-cable)
- 6 = Cable* radial (3 m PVC-cable)
- 7 = Cable* axial (5 m PVC-cable)
- 8 = Cable* radial (5 m PVC-cable)

Output and voltage display
- 1 = RS 422: 5 V DC ±5 %
- 3 = push pull with inverted signals: 5 ... 30 V DC
- 4 = push pull with inverted signals: 10 ... 30 V DC

* "Tube Tech®" cable outlet guarantees 10x higher strain relief than traditional cabling methods plus higher IP-Protection.
Other cable lengths on request.

Accessories:

Couplings see Accessories section

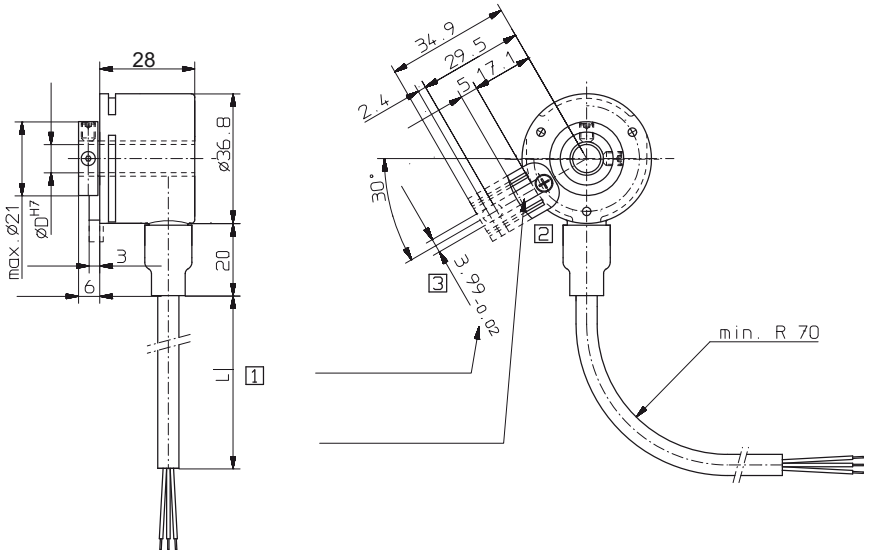
Accessories:

– Cables and connectors, also pre-assembled, can be found in the chapter Counting Technology
– Mounting attachments and couplings can be found in the Chapter Accessories

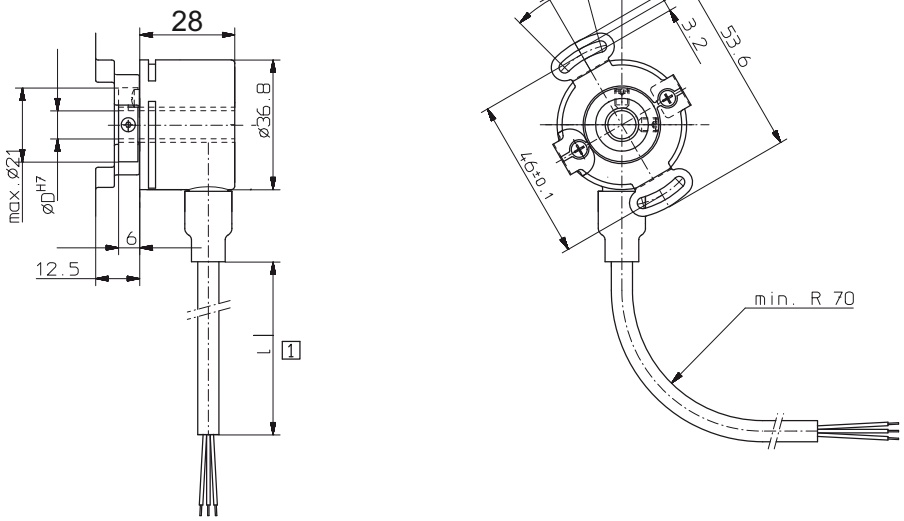
Economy Encoder Type 3700 (shaft) / 3720 (hollow shaft)

Dimensions hollow shaft version:

Short torque stop version;
Long torque stop version is shown dashed



Stator coupling version



1 cable length 1, 2, 3 or 5 m
2 Slot for torque stop, 3 mm deep
3 Recommended pin for long torque stop
Cyl. pin acc. to DIN 7 ø 4 mm

Economy Encoder Type 3700 (shaft) / 3720 (hollow shaft)

Order code: hollow shaft version: **8.3720.XXXX.XXXX**

10 by 10

Type

Flange
- 1 = Hollow shaft with short torque stop
- 2 = Hollow shaft with long torque stop
- 5 = Hollow shaft with stator coupling

Hollow shaft
- 1 = ø 4 mm
- 2 = ø 5 mm
- 3 = ø 6 mm
- 4 = ø 1/4”
- 6 = ø 8 mm

Pulse rate
10, 50, 60, 100, 180, 200, 250, 300, 360, 400, 500, 512, 600, 1000, 1024
(e.g. 250 pulses => 0250)
Other pulse rates available on request

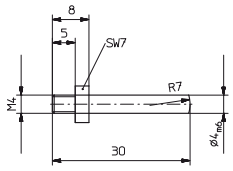
Type of connection
- 1 = Cable* radial (1 m PVC-cable)
- 2 = Cable* radial (2 m PVC-cable)
- 3 = Cable* radial (3 m PVC-cable)
- 4 = Cable* radial (5 m PVC-cable)

Output and voltage supply
- 1 = RS 422: 5 V DC ±5 %
- 3 = Push pull (with inverted signals) 5 ... 30 V DC
- 4 = Push pull (with inverted signals) 10 ... 30 V DC

Stock types
- 8.3720.5631.0100
- 8.3720.5631.0360
- 8.3720.5631.0500
- 8.3720.5631.1000
- 8.3720.5631.1024
- 8.3720.5611.0512
- 8.3720.5611.1024

* “Tube Tech®” cable outlet guarantees 10x higher strain relief than traditional cabling methods plus higher IP-Protection.
Other cable lengths are available on request.

Accessories:
Cyl. pin acc. to DIN 7 ø 4 mm
Art-no.: 8.0010.4700.0000



Accessories:
Cables and connectors, also pre-assembled, can be found in the chapter Connection Technology
Mounting attachments and couplings can be found in the chapter Accessories

Compact Type 3610 (shaft) / 3620 (hollow shaft)

- Chromated housing resistant to cooling lubricants and other environmental influences
- Hollow shaft version: Fits directly onto drive shaft - no couplings needed - saves up to 30% on cost and 60% on installation space and time
- Universal application in mechanical engineering, vehicles, conveyors and elevators
- Wide temperature range (-30 … +90 °C)
- Temperature and ageing compensation
- Low current consumption despite high scanning rate
- IP 65 from housing side
- Sturdy cable entry thanks to multiple clamping
- Highly flexible cable (withstands constant flexing at 0 °C … 70 °C)
- Short circuit proof
- Broad input voltage range (5 … 18 V or 8 … 30 V)

Mechanical characteristics:

Speed:	Shaft version: max. 12000 min^{-1}
	Hollow shaft version: max. 6000 min^{-1}
Rotor moment of inertia:	approx. 0.2 x 10^{-6} kgm^2
Starting torque:	< 0.05 Nm
Radial load capacity of the shaft:	40 N
Axial load capacity of the shaft:	20 N
Weight:	approx. 0.08 kg
Protection acc. to EN 60 529:	IP 65, housing side, IP64 shaft side on request
Working temperature:	–20° C ... +85 °C[2)]
Materials:	Shaft: stainless steel;
	Hollow shaft: brass
	Housing: chromated Aluminium
	Cable: PVC
Shock resistance acc. to DIN-IEC 68-2-27:	1000 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	100 m/s^2, 55 ... 2000 Hz

2) Non-condensing

Electrical characteristics:

Output circuit:	Push-pull (7272)[1)]	Push-pull (7272)[1)]
Supply voltage:	5 ... 18 V DC	8 ... 30 V DC
Power consumption (no load)	< 40 mA	< 40 mA
with inverted signal:		
Permissible load/channel:	max. ±50 mA	max. ±50 mA
Pulse frequency:	max. 200 kHz	max. 200 kHz
Signal level high:	min. U_B - 2.5 V	min. U_B - 3 V
Signal level low:	max. 0.5 V	max. 0.5 V
Rise time tr	max. 1 µs	max. 1 µs
Fall time tf	max. 1 µs	max. 1 µs
Short circuit proof outputs1):	yes[2)]	yes[2)]
Reverse connection protection at U_B:	yes	yes
UL certified	File 224618	
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3		
RoHS compliant acc. to EU guideline 2002/95/EG		

1) Max. recommended cable length 30 m
2) If supply voltage correctly applied

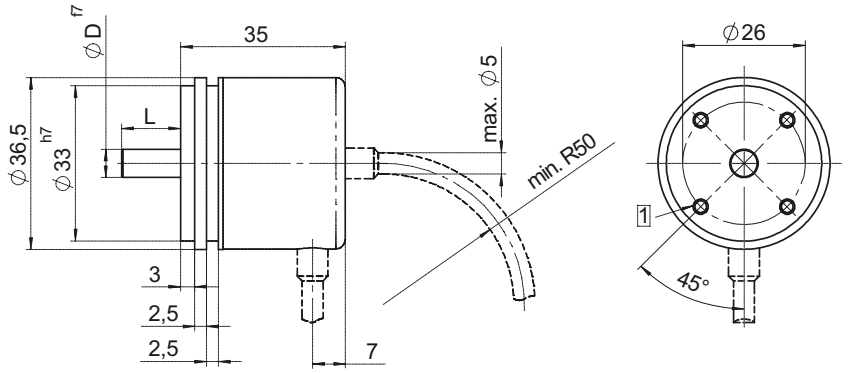
Terminal assignment

Signal:	0V	$+U_B$	A	$\overline{A}$	B	$\overline{B}$	0	$\overline{0}$	
Colour:	WH	BN	GN	YE	GY	PK	BU	RD	
without inverted signal:	WH	BN	GN		YE		GY		
M12 eurofast, 8 pin connector, Pin	1	2	3	4	5	6	7	8	

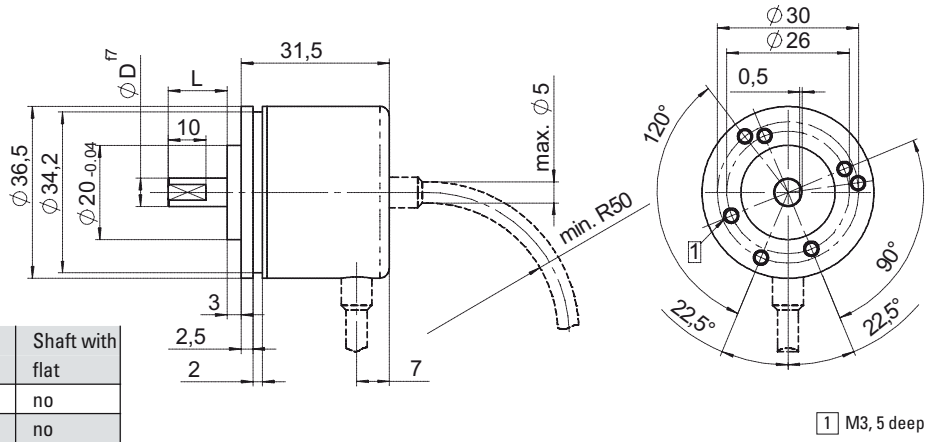
Isolate unused outputs before initial start-up

Compact Type 3610 (shaft) / 3620 (hollow shaft)

Dimensions shaft version:
Synchronous flange



Clamping flange



Order-Code Shaft	D	L	Shaft with flat
1	ø 4	10	no
2	ø 5	10	no
3	ø 6	12.5	yes
5	ø 1/4"	12.5	yes

Order code shaft version:

8.3610.XXXX.XXXX

10 by 10

Type series

Flange
- 2 = Synchronous flange
- **3 = Clamping flange**

Shaft
- 1 = ø 4 mm
- 2 = ø 5 mm
- **3 = ø 6 mm x 12.5 mm**
- 5 = ø 1/4" x 12.5 mm

Pulse rate
25, 100, 200, 360, 500, 600, 1000, 1024, 1500, 2000, 2048, 2500
(e.g. 500 pulses => 0500)
Other pulse rates available on request

Type of connection
- 1 = cable axial (2 m PVC cable)
- **2 = cable radial (2 m PVC cable)**
- 3 = 8-pin M12 connector axial
- 4 = 8-pin M12 connector radial

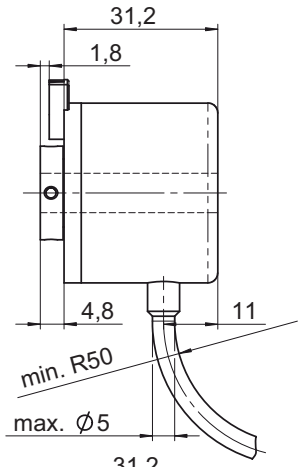
Output and voltage supply
- 2= Push-pull with inverted signals 5 ... 18 V DC Power supply
- 3 = Push-pull without inverted signals 8 ... 30 V DC Power supply
- **4 = Push-pull with inverted signals 8 ... 30 V DC Power supply**
- 5 = RS422 with inverted signals 8 ... 30 V DC Power supply

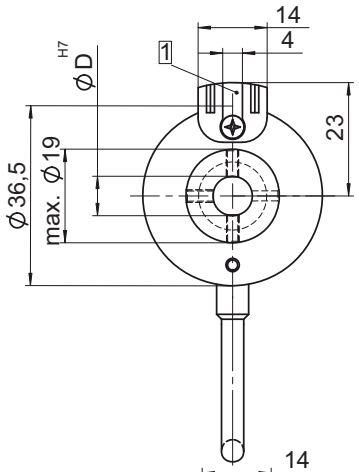
Preferred types are indicated in ***bold***

Compact Type 3610 (shaft) / 3620 (hollow shaft)

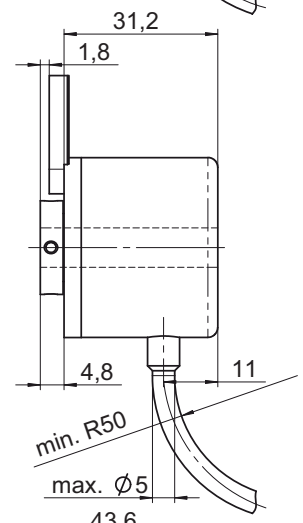
Dimensions hollow shaft version:

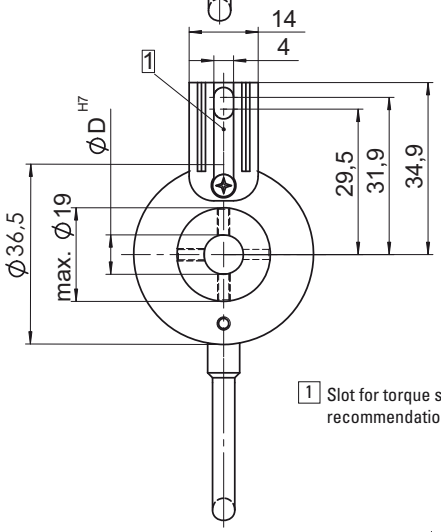
Flange with torque stop
short (1)





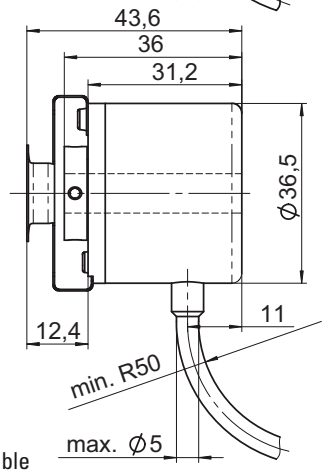
Flange with torque stop
long (2)

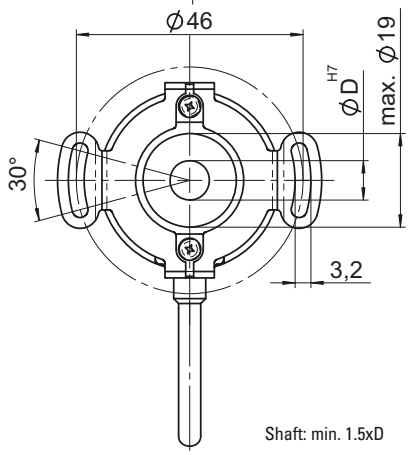




1 Slot for torque stop,
recommendation: Pin DIN 7 ø 4

Flange with stator coupling (5)





Shaft: min. 1.5xD

The industry standard M12 is now also available for our compact encoders.

3 = 8-pin M12 connector radial

Compact Type 3610 (shaft) / 3620 (hollow shaft)

Order code hollow shaft version: **8.3620.XXXX.XXXX**

10 by 10

Type series

Flange
- 1 = Hollow shaft with short torque stop
- **2 = Hollow shaft with long torque stop**
- 5 = Hollow shaft with stator coupling

Hollow shaft
- **2 = ø 6 mm through hollow shaft**
- 3 = ø 6.35 mm (1/4 " through hollow shaft)
- 4 = ø 8 mm through hollow shaft

Preferred types are indicated in ***bold***

Pulse rate
- 25, 100, 200, 360, 500, 600, 1000, 1024, 1500, 2000, 2048, 2500
- (e.g. 500 pulses => 0500)
- Other pulse rates available on request

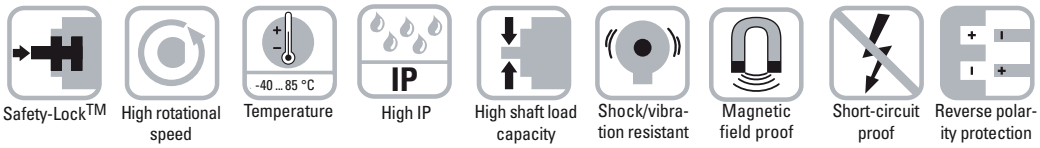
Type of connection
- **E = Cable radial (2 m PVC cable)**
- 4 = 8-pin M12 connector radial

Output circuit and voltage display
- 2 = Push-pull with inverted signal Power supply 5 ... 18 V DC
- 3 = Push-pull without inverted signals 8 ... 30 V DC Power supply
- **4 = Push-pull with inverted signal Power supply 8 ... 30 V DC**
- 5 = RS422 with inverted signals 8 ... 30 V DC Power supply
- 6 = RS422 with inverted signals

Cyl. pin acc. to DIN 7,
ø 4 mm x 12 included in delivery

Accessories:
- Cables and connectors, also pre-assembled, can be found in the chapter Counting Technology
- Mounting attachments and couplings can be found in the Chapter Accessories

Sendix incremental Type 5000 (Shaft) / 5020 (Hollow shaft)



Safety-Lock™ | High rotational speed | Temperature | High IP | High shaft load capacity | Shock/vibration resistant | Magnetic field proof | Short-circuit proof | Reverse polarity protection

Flexible in use:

- **The right connection variant for every application:** Cable, M23 connector or M12 connector
- **Reliable mounting in a wide variety of installation situations:** Comprehensive and proven mounting options
- **Standard encoder for use worldwide:** compatible with all US and European standards, supply voltage 5 … 30 V DC, various interface options, max. 5000 ppr.

Sendix® inkremental

Compact

- **Can be used even where space is tight:** outer diameter 50 mm, installation depth max. 47 mm.

Rugged & Tough

- **Increased resistance against vibrations and installation mistakes:** Avoids machine stops and repair work Sturdy "Safety-Lock™ Design" bearing structure
- **Remains sealed, even in roughest environments:** ensures highest safety against field breakdowns and is thus suitable also for outside use Resistant die-cast housing and protection up to IP 67
- **Can be used in a wide temperature range:** Wide temperature range (-40°C...+85°C)
- also available in **seawater resistant** version, certified acc. to salt-spray test IEC 68-2-11 => 672 hours.

Mechanical characteristics:

Speed IP 65[1]:	max. 12000 min^{-1}
Speed IP 67[2]:	max. 6000 min^{-1}
Rotor moment of inertia:	
Shaft version:	approx. 1.8 x 10^{-6} kgm^2
Hollow shaft version:	approx. 6 x 10^{-6} kgm^2
Starting torque:	< 0.01 Nm, IP 65
	< 0.05 Nm, IP 67
Radial load capacity shaft:	80 N
Axial load capacity shaft::	40 N

Weight:	approx. 0.4 kg
Protection acc. to EN 60 529 without shaft sealing:	IP 65
Protection acc. to EN 60 529 with shaft sealing:	IP 67
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature:	-40 °C[3] ... +85 °C
Shaft:	stainless steel,
Shock resistance acc. to DIN-IEC 68-2-27:	2500 m/s^2, 6 ms
Vibration resistance to DIN-IEC 68-2-6:	100 m/s^2, 10...2000 Hz

1) For continuous operation 6000 min^{-1}
2) For continuous operation max. 3000 min^{-1}
3) with connector: -40 °C, cable fixed: -30 °C, cable moved: -20 °C

Electrical characteristics:

Output circuit:	RS 422 (TTL compatible)	RS 422 (TTL compatible)	Push-Pull	Push-Pull (7272)
Supply voltage:	5 ... 30 V DC	5 V ±5%	10 ... 30 V DC	5 ... 30 V DC
Power consumption (no load):	typ. 40 mA / max. 90 mA	typ. 40 mA max. 90 mA	typ. 50 mA max. 100 mA	typ. 50 mA max. 100 mA
Permissible load/channel:	max. ±20 mA	max. ±20 mA	max. ±30 mA	max. ±20 mA
Pulse frequency:	max. 300 kHz	max. 300 kHz	max. 300 kHz	max. 300 kHz[3]
Signal level high:	min. 2.5 V	min. 2.5 V	min. UB - 1V	min. UB-2.0 V
Signal level low:	max. 0.5 V	max. 0.5 V	max. 0.5 V	max. 0.5 V
Rise time t_r	max. 200 ns	max. 200 ns	max. 1 µs	max. 1 µs
Fall time t_f	max. 200 ns	max. 200 ns	max. 1 µs	max. 1 µs
Short circuit proof outputs[1]:	yes[2]	yes[2]	Yes	yes
Reverse connection protection at U_B:	yes	no	Yes	no
UL certified	File 224618			
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3				
RoHS compliant acc. to EU guideline 2002/95/EG				

1) If supply voltage correctly applied
2) Only one channel allowed to be shorted-out:
(If UB=5 V, short-circuit to channel, 0 V, or +UB is permitted.)
(If UB=5-30 V, short-circuit to channel or 0 V is permitted.)
3) Max. recommended cable length 30 m

Sendix incremental Type 5000 (Shaft) / 5020 (Hollow shaft)

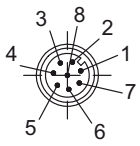
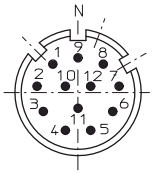
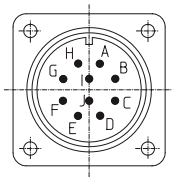
Terminal assignment:

Signal:	0 V GND	+U_B	0 V Sens	+Ub Sens	A	$\overline{A}$	B	$\overline{B}$	0	$\overline{0}$	Shield
M23 , 12 pin connector, Pin:	10	12	11	2	5	6	8	1	3	4	–[1]
M12, 8 pin connector, Pin:	1	2			3	4	5	6	7	8	–[1]
MIL (MS styled), 10 pin con. Pin:	F	D		E	A	G	B	H	C	I	J[1]
Cable colour:	WH	BN	GY PK	RD BU	GN	YE	GY	PK	BU	RD	Shield

1) Shield is attached to connector housing

Isolate unused outputs before initial startup

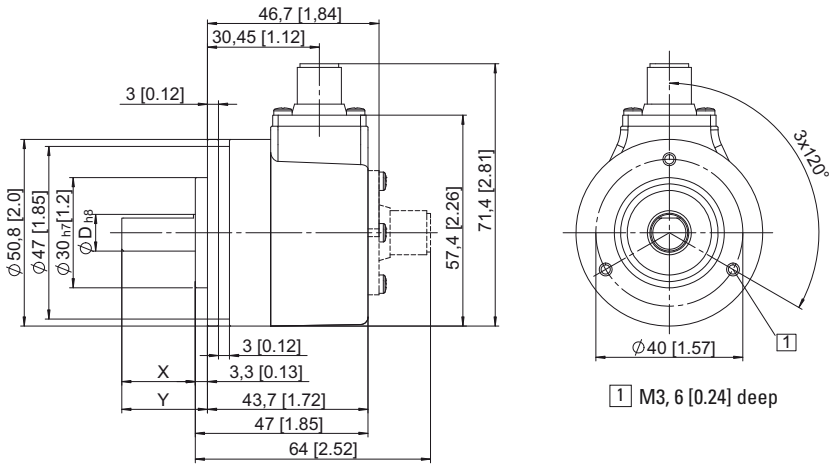
Top view of mating side, male contact base:

Type	8 pin M12 connector	12 pin M23 connector	MIL connector 10 pin
View			
Order code:	8.5000.XXX**3**.XXXX 8.5000.XXX**4**.XXXX	8.5000.XXX**7**.XXXX 8.5000.XXX**8**.XXXX	8.5000.XXX**Y**.XXXX
Corresponding mating connector:	05.CMB-8181-0	8.0000.5012.0000	8.0000.5062.0000

Dimensions shaft version:

Synchronous flange

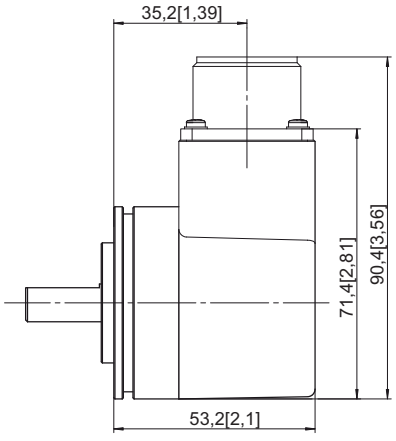
ø 50,8 mm [2.0 inch]
M12, M23 and cable version
(Flange type 5 and 6)



1 M3, 6 [0.24] deep

Synchronous flange

ø 50,8 mm [2 inch]
MIL-connector version



Shaft versions

Order code for shaft	Shaft	length **X**	length **Y**
1	ø 6 mm	10 mm	13.3 mm
2	ø 1/4 "	5/8"	3/4"
3	ø 10 mm	20 mm	23.3 mm
4	ø 3/8 "	5/8"	3/4"
5	ø 12 mm	20 mm	23.3 mm
6	ø 8 mm	15 mm	18.3 mm

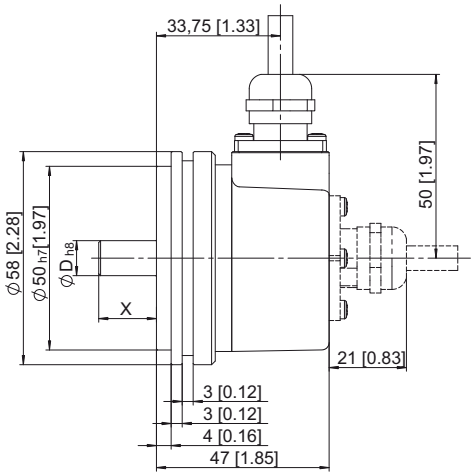
Mounting advice:
The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time! We recommend the use of suitable couplings (see Accessories section).

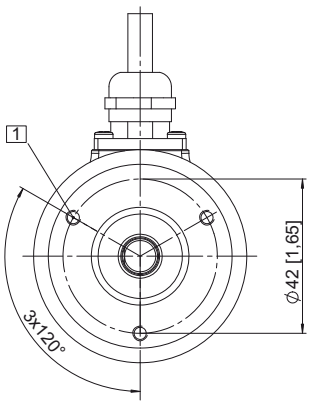
Sendix incremental Type 5000 (Shaft) / 5020 (Hollow shaft)

Dimensions shaft version:

Synchronous flange

ø 58 mm
M12, M23 and cable versions
(Flange type A and B)

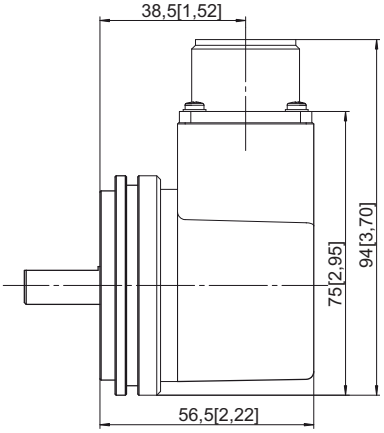




1 3xM4, 6 [0.24] deep

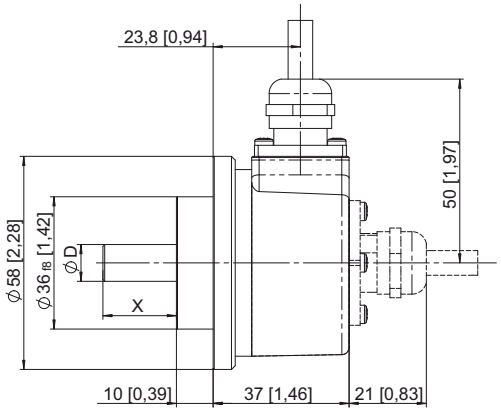
Synchronous flange

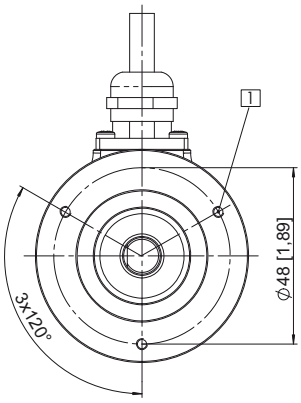
ø 58 mm
MIL-connector version



Clamping flange

ø 58 mm
M12, M23 connector and cable versions
(Flange type 7 and 8)

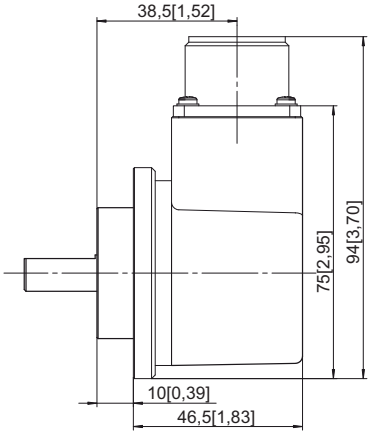




1 M3, 6 [0.24] deep

Clamping flange

ø 58 mm
MIL-connector version



Shaft versions

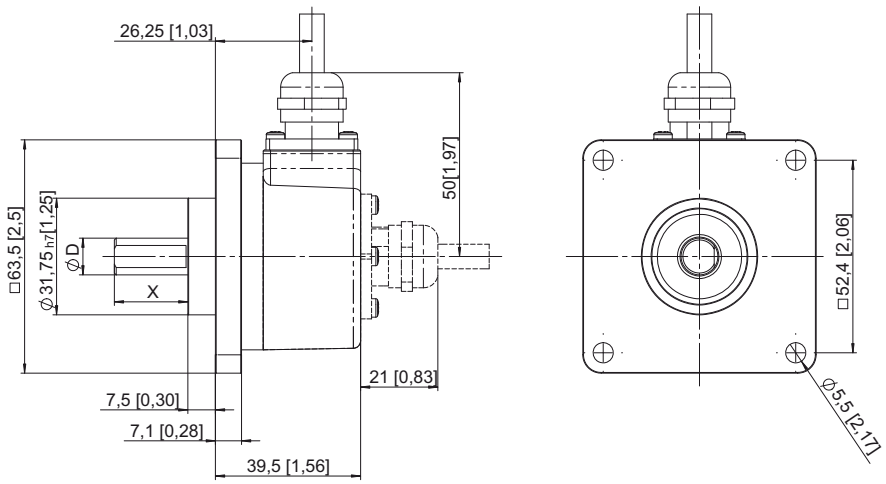
Order code for shaft	Shaft	length **X**
1	ø 6 mm	10 mm
2	ø 1/4 "	5/8"
3	ø 10 mm	20 mm
4	ø 3/8 "	5/8"
5	ø 12 mm	20 mm
6	ø 8 mm	15 mm

Mounting advice:
The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time! We recommend the use of suitable couplings (see Accessories section).

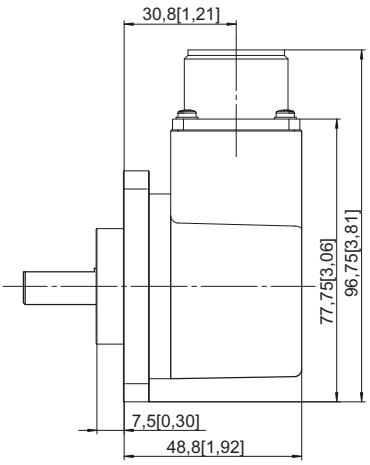
Sendix incremental Type 5000 (Shaft) / 5020 (Hollow shaft)

Dimensions shaft version:

Rectangular flange
□ 63.5 mm [2.5 inch]
M12, M23 connector and cable versions
(Flange type C and D)



Rectangular flange
□ 63.5 mm [2.5 inch]
MIL-connector version



Shaft versions

Order code for shaft	Shaft	length **X**
1	ø 6 mm	10 mm
2	ø 1/4 "	5/8"
3	ø 10 mm	20 mm
4	ø 3/8 "	5/8"
5	ø 12 mm	20 mm
6	ø 8 mm	15 mm

Order code shaft version:

8.5000.XXXX.XXXX

Type

Flange
- 5 = Synchronous flange, metric, ø 50,8, IP 67
- 6 = Synchronous flange, metric, ø 50,8, IP 65
- 7 = Clamping flange, metric, ø 58, IP 67
- **8 = Clamping flange, metric, ø 58, IP65**
- A = Synchronous flange, ø 58, IP 67
- **B = Synchronous flange, ø 58, IP 65**
- C = Rectangular flange 2.5", IP 67
- D = Rectangular flange2.5", IP 65

Shaft (ø x L)
- **1 = ø 6 mm x 10 mm**
- 2 = ø 1/4" x 5/8"
- **3 = ø 10 mm x 20 mm**
- 4 = ø 3/8" x 5/8"
- 5 = ø 12 mm x 20 mm
- 6 = ø 8 mm x 15 mm

Pulse rate
1, 5, 10, 12, 36, 100, 200, 250, 256, **360**, 400, 500, **512**, 600, 800, **1000**, **1024**, 1200, 2000, **2048**, **2500**, **3600**, **4096**, **5000**
(e.g. 500 pulses => 0500)
Other pulse rates available on request

Type of connection
- 1 = Cable axial (1 m PVC cable)
- **2 = Cable radial (1 m PVC cable)**
- 3 = Connector axial 8 pin M12
- **4 = Connector radial 8 pin M12**
- 7 = Connector axial 12 pin M23
- **8 = Connector radial 12 pin M23**
- Y = Connector radial 10 pin MIL-specified

Note: all connector versions without mating connector

Preferred types are indicated in ***bold***

Output circuit and supply voltage
- 1 = RS 422 (with inverted signal) 5 ... 30 V supply voltage
- 2 = Push-pull (7272 with inverted signal) 5 ... 30 V supply voltage
- **4 = RS 422 (with inverted signal) 5 V supply voltage**
- **5 = Push-pull (with inverted signal) 10 ... 30 V supply voltage**

- seawater resistant version on request

Stock types

8.5000.8358.0200	8.5000.B147.2500
8.5000.8358.0360	8.5000.B147.5000
8.5000.8358.0500	8.5000.B157.1024
8.5000.8358.1000	8.5000.B157.2500
8.5000.8358.5000	8.5000.B157.5000
8.5000.B147.1000	8.5000.8354.1024
8.5000.B147.1024	8.5000.8354.5000

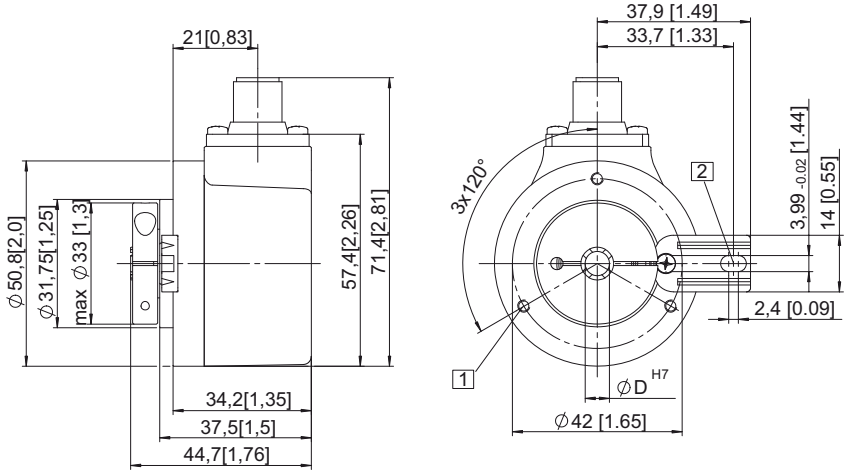
Accessories:
Cables and connectors see Connection Technology section.
Mounting attachments and couplings can be found in the Chapter Accessories

Corresponding mating connector:
M12: 05.CMB-8181-0
M23: 8.0000.5012.0000
MIL-connector 10-pin:
8.0000.5062.0000

Sendix incremental Type 5000 (Shaft) / 5020 (Hollow shaft)

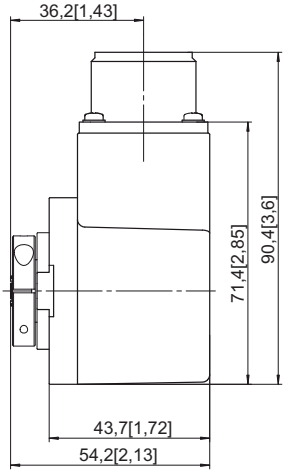
Dimensions hollow shaft version:
Flange with long torque stop

ø 50.8 mm [2 inch]
M12, M23 connectors and cable versions
(Flange type 1 and 2)



Flange with long torque stop

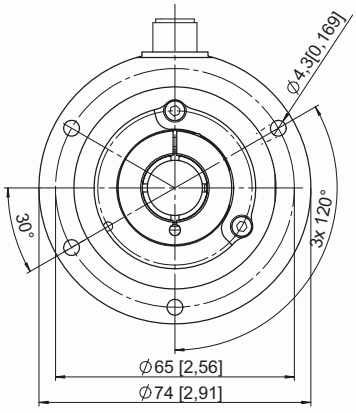
ø 50.8 mm [2 inch]
MIL-connector version

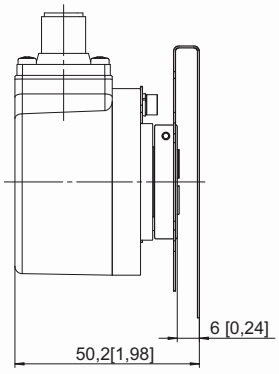


1 M3, 6 [0.24] deep
2 Torque stop slot
Recommendation: cyl. pin acc. DIN 7 ø 4

Flange with stator coupling

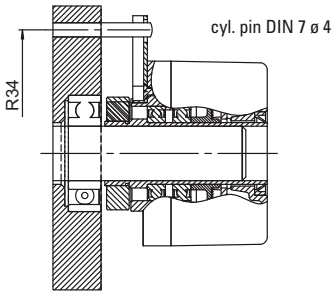
Pitch circle 65 mm
(Flange type 7 and 8)





Mounting advice:
The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time!

We recommend the use of suitable couplings (see Accessories section).

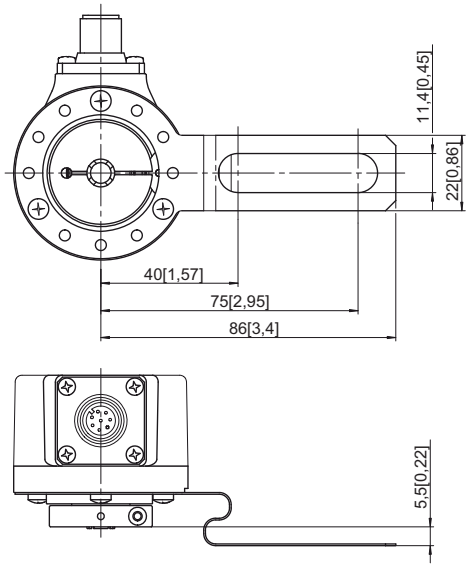


Sendix incremental Type 5000 (Shaft) / 5020 (Hollow shaft)

Dimensions hollow shaft version:

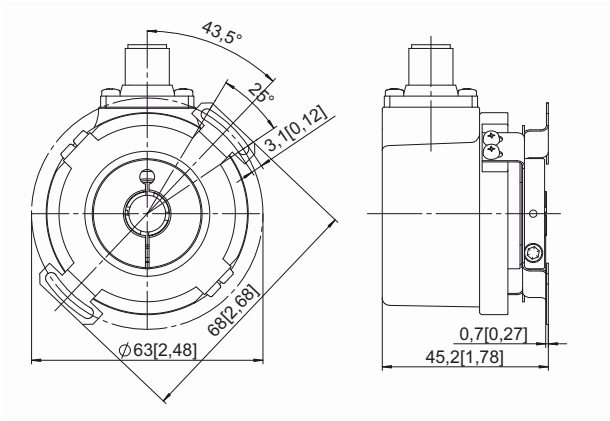
Flange with tether arm

(Flange type 3 and 4)



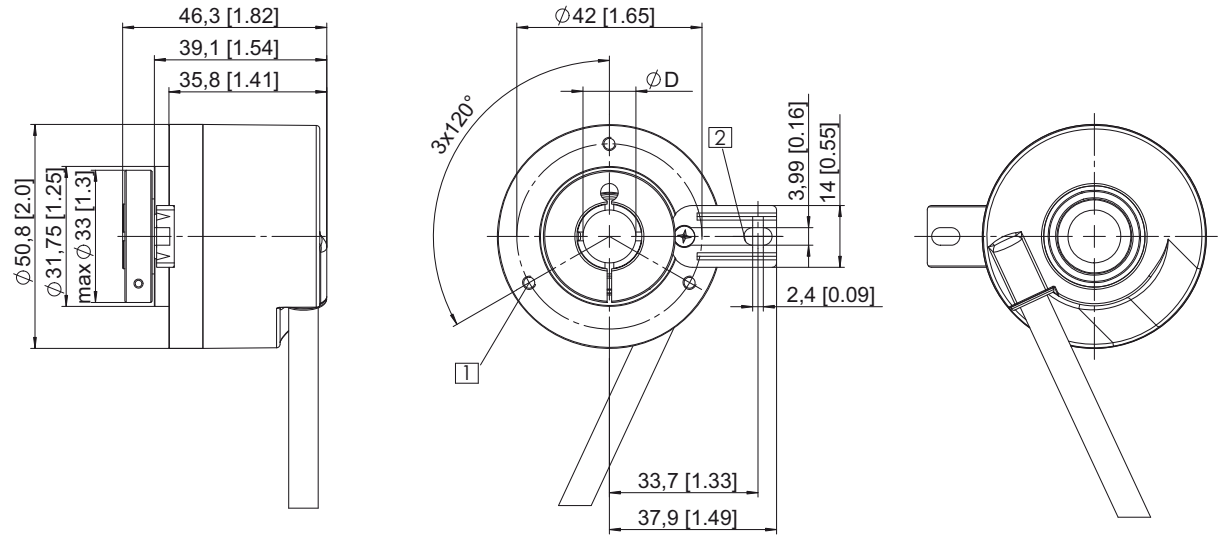
Flange with stator coupling

pitch circle ø 63 mm
(Flange type C and D)



Flange with long torque stop and tangential cable outlet

(Type of connection E)



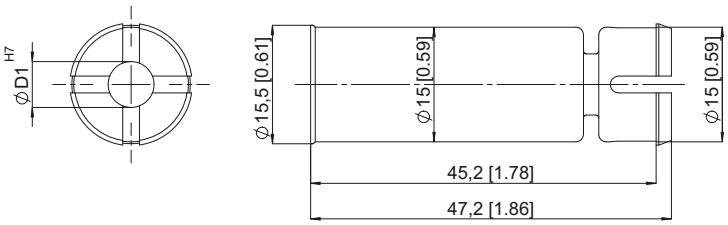
1 M3, 6 [0.24] deep
2 Torque stop slot
Recommendation: cyl. pin acc. DIN 7 ø 4

Sendix incremental Type 5000 (Shaft) / 5020 (Hollow shaft)

Isolation/ adapter inserts for hollow shaft encoders

Thermal and electrical isolation of the encoders:
Isolation inserts prevent currents from passing through the encoder bearings. These currents can occur when using inverter controlled three-phase or AC vector motors and considerably shorten the service life of the encoder bearings. In addition the encoder is thermally isolated as the plastic does not transfer the heat to the encoder.

Tip:
By using these adapter inserts you can achieve six different hollow shaft diameters, all on the basis of one encoder.



Isolation insert	D1 [mm]	D1 [Inch]
8.0010.4021.0000	6	0,24
8.0010.4022.0000	6,35	0,25
8.0010.4023.0000	10	0,39
8.0010.4024.0000	9,53	0,38
8.0010.4025.0000	12	0,47
8.0010.4026.0000	12,7	0,50

Order code hollow shaft version:

8.5020.XXXX.XXXX

10 by 10

Type

Flange
1 = Flange with torque stop IP 67
2 = Flange with torque stop IP 65
3 = Flange with tether arm IP 67
4 = Flange with tether arm IP 65
7 = Flange with stator coupling ø 65 mm, IP67
8 = Flange with stator coupling ø 65 mm, IP65
C = Flange with stator coupling ø 63 mm, IP67
D = Flange with stator coupling ø 63 mm, IP65

Shaft (end to end hollow shaft)
1 = ø 6 mm
2 = ø 1/4 inch
3 = ø 10 mm
4 = ø 3/8 inch
5 = ø 12 mm
6 = ø 1/2 inch
7 = ø 5/8 inch
8 = ø 15 mm
9 = ø 8 mm
A = ø 14 mm

Pulse rate
1, 5, 10, 12, 36, 100, 200, 250, 256, **360**, 400, 500, **512**, 600, 800, **1000**, **1024**, 1200, 2000, **2048**, **2500**, **3600**, **4096**, **5000**
(e.g. 500 pulses => 0500)
Other pulse rates available on request

Type of connection
1 = Cable radial (1 m PVC-cable)
2 = Connector radial 8 pin M12
4 = Connector radial 12 pin M23
7 = Connector 10 pin MIL.-specified radial
E = Tangential cable outlet (1 m PVC-cable)
Note: all connector versions without mating connector

Output circuit and supply voltage
1 = RS 422 (with inverted signal) 5 ... 30 V supply voltage
2 = Push-pull (7272, with inverted signal) 5 ... 30 V supply voltage
4 = RS 422 (with inverted signal) 5 V supply voltage
5 = Push-Pull; 10 ... 30 V with inverted signal

- seawater resistant version on request

Preferred types are indicated in **bold**

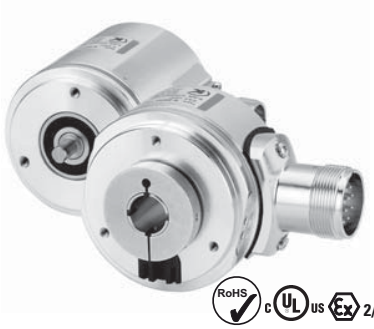
Stock types

8.5020.2351.1000	8.5020.2844.5000
8.5020.2351.2500	8.5020.2844.1000
8.5020.2511.5000	8.5020.2854.0500
8.5020.2551.0500	8.5020.2854.1000
	8.5020.8552.1024
	8.5020.8552.5000

Accessories:
– Cables and connectors, also pre-assembled, can be found in the chapter Counting Technology
– Mounting attachments and couplings can be found in the Chapter Accessories

Corresponding mating connector:
M12: 05.CMB.8181-0
M23: 8.0000.5012.0000
MIL-connector
10-pin: 8.0000.5062.0000

Universal, Type 580X (Shaft) / 582X (Hollow shaft)



- Sturdy model to industry standard, ø58 mm housing
- Many variations, also customized versions
- Short-circuit proof outputs
- Reverse connection protection (at U_B= 10 ... 30 V DC)
- Highly flexible PUR-cable
- Resolution up to 36000 ppr
- High shaft load

Shaft/hollow shaft
5800/5820: Standard
5803/5823: High temperature up to 110 °C
5804/5824: Voltage sine wave outputs
5805: High resolution up to 36000 ppr
5826: Stainless steel housing

Mechanical characteristics:

Speed with seal:	Shaft version max. 12000 min^{-1} Hollow shaft version[5] max. 000 min^{-1}
Speed without seal:	Hollow shaft version max. 12000 min^{-1}
Rotor moment of inertia:	Shaft version approx. 1.8 x 10^{-6} kgm^2 Hollow shaft version approx. 6 x 10^{-6} kgm^2
Starting torque:	Shaft version < 0.01 Nm Hollow shaft version <0.05 Nm
Radial load capacity of shaft*:	80 N
Axial load capacity of shaft:*:	40 N
Weight:	approx. 0.4 kg
Protection acc. to EN 60 529:	IP 65, IP 66 for type 5826
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature:	-20 °C ... +85 °C[1)2)3)] 5803/5823: -20 ... + 105 °C
Shaft:	stainless steel
Shock resistance acc. to DIN-IEC 68-2-27	1000 m/s^2, 6 ms
Vibration resistance acc. to IEC 68-2-6:	100 m/s^2, 10...2000 Hz

1) Constant flexing: -20 ... +70 °C
2) Non-condensing
3) Hollow shaft version with seal: -20 ... +80 °C
5) For continuous operation 3000 min^{-1}, ventilated

Electrical characteristics RS422/Push-pull:

Output circuit:	RS 422 (TTL-compatible)	RS 422 (TTL-compatible)	Push-pull	Push-pull
Supply voltage:	5 V (±5%) or 10 ... 30 V DC	5 ... 30 V DC	10 ... 30 V DC	5 ... 30 V DC
Power consumption (no load) without inverted signal:	–	–	typ. 55 mA / max. 125 mA	typ. 55 mA / max. 125 mA
Power consumption (no load) with inverted signals:	typ. 40 mA / max. 90 mA	typ. 40 mA / max. 90 mA	typ. 80 mA/ max.150 mA	typ. 80 mA/ max.150 mA
Permissible load/channel:	max. ±20 mA	max. ±20 mA	max. ±30 mA	max. ±30 mA
Pulse frequency:	max. 300 kHz	max. 300 kHz	max. 300 kHz	max. 300 kHz
Signal level high:	min. 2.5 V	min. 2.5 V	min. UB-2.5 V	min. UB-1.5 V
Signal level low:	max. 0.5 V	max. 0.5 V	max. 2.0 V	max. 2.0 V
Rise time t_r	max. 200 ns	max. 200 ns	max. 1 µs	max. 1 µs
Fall time t_f	max. 200 ns	max. 200 ns	max. 1 µs	max. 1 µs
Short circuit proof outputs:[1)]:	yes[2)]	yes[2)]	yes	yes
Reverse connection protection at U_B:	5 V: no, 1 0 ... 30 V: yes	yes	yes	no
UL certified	File 224618			
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3				
RoHS compliant acc. to EU guideline 2002/95/EG				

1) If supply voltage correctly applied
2) Only one channel allowed to be shorted-out:
(If UB=5 V, short-circuit to channel, 0 V, or +UB is permitted)
(If UB=5-30 V, short-circuit to channel or 0 V is permitted)

Universal, Type 580X (Shaft) / 582X (Hollow shaft)

Electrical characteristics sine wave output:

Output circuit:	Sine wave	Sine wave
	U = 1 Vpp	U = 1 Vpp
Supply voltage:	5 V (±5%)	10 ... 30 V DC
Current consumption	typ. 65 mA /	typ. 65 mA /
(no load) with inverted signals:	max. 110 mA	max. 110 mA
-3 dB frequency:	≤ 180 kHz	≤ 180 kHz
Signal level channels A/B:	1 Vpp (±20%)	1 Vpp (±20%)
Signal level channel 0:	0.1 ... 1.2 V	0.1 ... 1.2 V
Short circuit proof outputs:[1]:	yes	yes
Reverse connection protection at UB:	no	yes
UL certified	File 224618	
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3		
RoHS compliant acc. to EU guideline 2002/95/EG		

[1] If supply voltage correctly applied

Terminal assignment

Signal:	0 V	0 V Sensor[2]	$+U_B$	$+U_B$ Sensor[2]	A	$\overline{A}$	B	$\overline{B}$	0	$\overline{0}$	Schirm
12-pin. Connector, Pin:	10	11	12	2	5	6	8	1	3	4	PH[1]
7-pin. Connector, Pin:	F	–-	D	E	A	–	B	–	C	-	G
10-pin. Connector, Pin:	F	-	D	E	A	G	B	H	C	I	J
Cable colour: 5800, 5803, 5804, 5805, 5823, 5824, 5825:	WH 0,5 mm²	WH .	BN 0,5 mm²	BN .	GN	YE	GY	PK	BU	RD	
Cable colour: 5820, 5826:	WH	GY PK	BN	BU RD	GN	YE	GY	PK	BU	RD	

[1] PH = Shield is attached to connector housing

[2] The sensor cables are connected to the supply voltage internally if long feeder cables are involved they can be used to adjust or control the voltage at the encoder

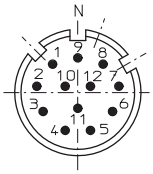
- If sensor cables are not in use, they have to be isolated or $0\,V_{Sensor}$ has to be connected to 0 V and $U_{BSensor}$ has to be connected to U_B

- Using RS 422 outputs and long cable distances, a wave impedance has to be applied at each cable end.

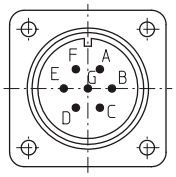
Isolate unused outputs before initial startup.

Top view of mating side, male contact base:

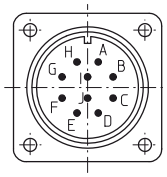
12 pin plug



7 pin plug

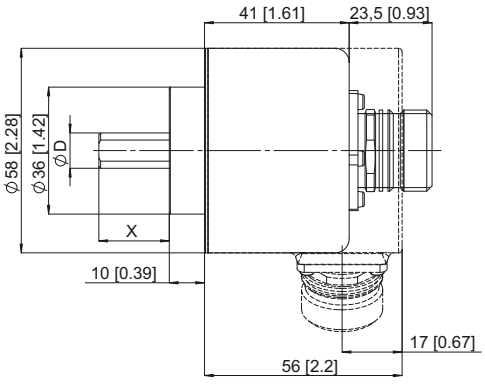


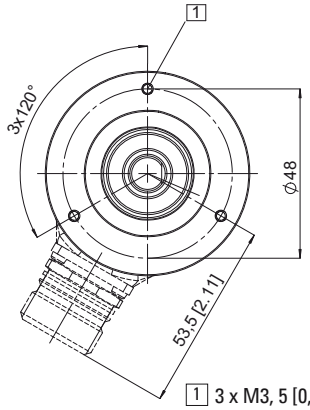
10 pin plug



Dimensions shaft version:

Clamping flange ø 58
Flange Type 1



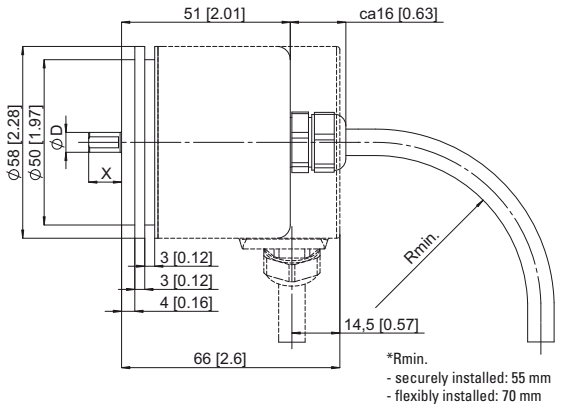


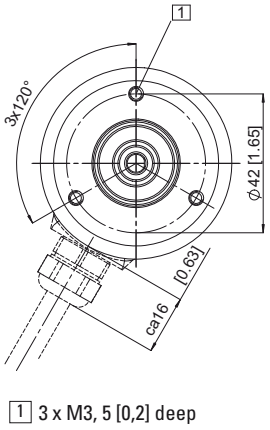
Mounting advice:
The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time! We recommend the use of suitable couplings (see Accessories section).

Universal, Type 580X (Shaft) / 582X (Hollow shaft)

Dimensions shaft version:

Synchronous flange ø 58
Flange Type 2





1 3 x M3, 5 [0,2] deep

Order code shaft version:

8.580X.XXXX.XXXX

Type
00 = Standard
03 = High temperature
04 = Sine wave
05 = High resolution

Flange
1 = Clamping flange ø 58
2 = Synchronous flangeø 58

Shaft (ø x L)
1 = ø 6 mm x 10 mm
2 = ø 10 mm x 20 mm

Pulse rate
25, 50, 60, 100, 125, 200, 250, 256, 300, 360, 500, 512, 600, 720, 800, 1000, 1024, 1200, 1250, 1500, 2000, 2048, 2500, 3000, 3600, 4000, 4096, 5000
Type 5805: 6000, 7200, 8000, 8192, 9000. 10000. 18000. 36000 (e.g. 250 pulses => 0250)
Other pulse rates available on request

Type of connection
1 = Cable axial (1 m PUR-Cable)
2 = Cable radial (1 m PUR-Cable)
3 = axial 12 pin plug without mating connector
5 = radial 12 pin plug without mating connector
W[1] = 7 pin plug, "MIL"-specified[2] without mating connector, radial
Y = 10pin plug, "MIL"-specified[2] without mating connector, radial
[1] only with output 7
[2] only for type 5800

*Preferred types are indicated in **bold***

Type of connection and supply voltage
Type 5800
4 = RS 422 (with inverted signal) 5 V supply voltage
5 = RS 422 (with inverted signal) 10 ... 30 V supply voltage
6 = Push-pull (with inverted signal) 10 ... 30 V supply voltage
7 = Push-pull (without inverted signal) 10 ... 30 V supply voltage
8 = Push-pull (without inverted signal) 5 ... 30 V supply voltage
9 = Push-pull (with inverted signal) 5 ... 30 V supply voltage
Y = RS 422 (with inverted signal) 5 ... 30 V Supply voltage
T = Push-Pull (with inverted signal) 5 ... 30 V supply voltage

Type 5803 and 5805
4 = RS 422 (with inverted signal) 5 V supply voltage
5 = RS 422 (with inverted signal) 10 ... 30 V supply voltage
6 = Push-pull (with inverted signal) 10 ... 30 V supply voltage
7 = Push-pull (without inverted signal) 10 ... 30 V Supply voltage
Type 5804
1 = Sine, 1 Vpp (with inverted signal) 5 V supply voltage
2 = Sine, 1 Vpp (with inverted signal) 10 ... 30 V Supply voltage

Accessories:

Corresponding mating connector to connection type 3 or 5:
Order-No. 8.0000.5012.0000

Corresponding mating connector to connection type W:
Order-No. 8.0000.5052.0000

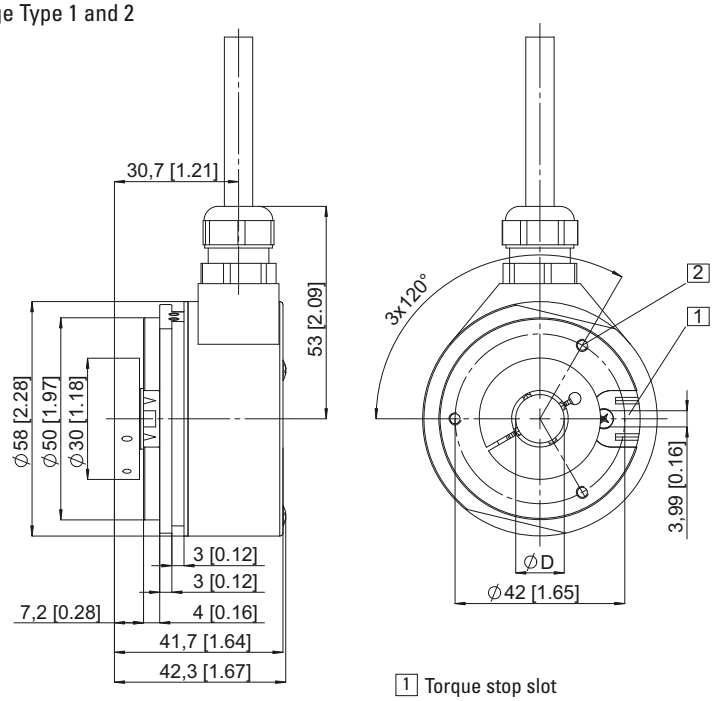
Corresponding mating connector to connection type Y:
Order-No. 8.0000.5062.0000

Cables and connectors, also pre-assembled, can be found in the chapter Counting Technology
Mounting attachments and couplings can be found in the Chapter Accessories

Universal, Type 580X (Shaft) / 582X (Hollow shaft)

Dimensions hollow shaft:

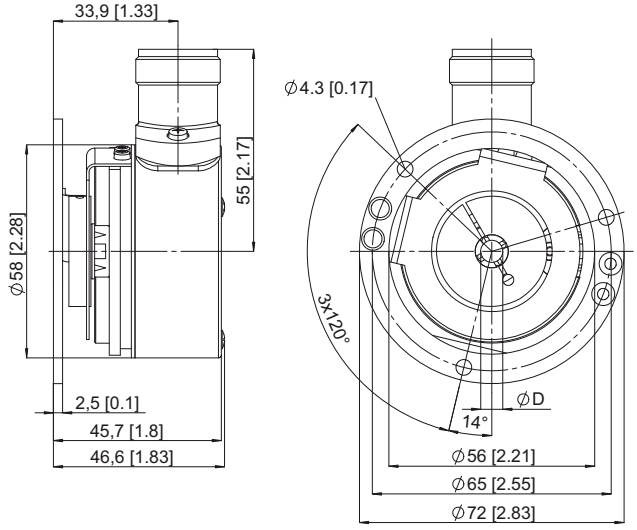
Flange Type 1 and 2

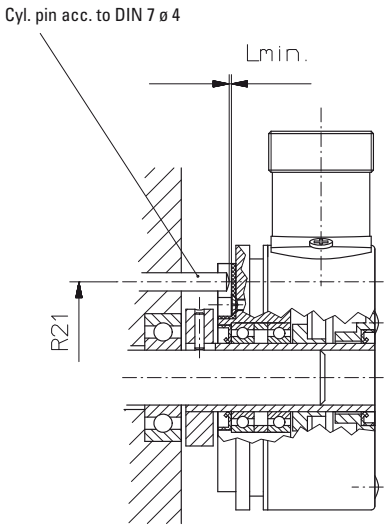


1 Torque stop slot
Recommendation: cyl. pin acc. to DIN 7 ø 4

2 M3, 5 [0,2] deep

Flange Type 3 and 4 with stator coupling





Note: minimum insertion depth 1.5 x $D_{hollow\ shaft}$

Mounting advice:

1) The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time.

2) When mounting a hollow shaft encoder, we recommend using a torque stop pin that fits into the torque stop slot or a stator coupling.

3) When mounting the encoder ensure the dimension Lmin. is greater than the axial maximum play of the drive. Otherwise there is a danger that the device could mechanically seize up.

Universal, Type 580X (Shaft) / 582X (Hollow shaft)

Order code hollow shaft version: 8.582X.XXXX.XXXX

Type
- 20 = Standard
- 23 = High temperature
- 24 = Sine wave
- 25 = High resolution
- 26 = Stainless steel

Flange
- 1 = Flange for through shaft
- 2* = Flange for blind hollow shaft*
- **3* = Flange for through shaft and stator coupling**
- 4* = Flange for blind hollow shaft and stator coupling length of drive shaft ≤ 30 mm

*not for type 5826

Hollow shaft**
- 1 = ø 6 mm without seal
- **2 = ø 6 mm with seal**
- 3 = ø 8 mm without seal
- 4 = ø 8 mm with seal
- 5 = ø 10 mm without seal
- **6 = ø 10 mm with seal**
- 7 = ø 12 mm without seal
- **8 = ø 12 mm with seal**

For type 5826 only versions 6 and 8 are possible

Preferred types are indicated in ***bold***

Pulse rate
25, 50, 60, 100, 125, 200, 250, 256, 300, 360, 500, 512, 600, 720, 800, 1000, 1024, 1200, 1250, 1500, 2000, 2048, 2500, 3000, 3600, 4000, 4096, 5000

Type 5825: 6000, 7200, 8000, 8192, 9000, 10000, 18000, 36000
(e.g. 250 pulses => 0250)

Other pulse rates available on request

Type of connection
- 1 = Cable radial (1 m PVC-cable)
- **2[1] = radial 12pin plug without mating connector**

[1] not for type 5826

Type of connection and supply voltage

Type 5820 and 5826
- **1 = RS 422 (with inverted signal) 5 V supply voltage**
- 2 = Push-pull (without inverted signal) 10 ... 30V supply voltage
- **3 = Push-pull (with inverted signal) 10 ... 30V supply voltage**
- 4 = RS 422 (with inverted signal) 10 ... 30 V supply voltage
- 5 = Push-pull (without inverted signal) 5 ... 30 V supply voltage
- 6 = Push-pull (with inverted signal) 5 ... 30 V supply voltage
- **7 = RS 422 (with inverted signal) 5 ... 30 V supply voltage**
- C* = Push-pull (7272 with inverted signal) 5 ... 30 V supply voltage

* For Type 5826 not available

Type 5823 and 5825
- **1 = RS 422 (with inverted signal) 5 V supply voltage**
- 2 = Push-pull (without inverted signal) 10 ... 30V supply voltage
- **3 = Push-pull (with inverted signal) 10 ... 30V supply voltage**
- 4 = RS 422 (with inverted signal) 10 ... 30 V supply voltage

Type 5824
- 1 = Sine, 1 Vpp (with inverted signal) 5 V supply voltage
- 2 = Sine, 1 Vpp (with inverted signal) 10 ... 30 V supply voltage

Accessories

Corresponding mating connector to Type of connection 2,
12 pin: Order No. 8.0000.5012.0000
pin assignment cw

– Cables and connectors, also pre-assembled, can be found in the chapter Counting Technology
– Mounting attachments and couplings can be found in the Chapter Accessories

Mounting kit for hollow shaft encoder ø 58 mm:

Various mounting variations can be supplied
Delivery includes:
- 1 x parallel pin with thread
  Order No. 8.0010.4700.0000
- 1 x mounting flanges
  Order No. T.035.009
- Screw M3x5
  Order No N.630.305
- 1 x long torque support slot
  Order No. T.051.672

Complete set:
Order No. 8.0010.4600.0000

Stator coupling two wings

– For highly dynamic applications
Includes:
- 1x coupling two wings
- 2x 2 screws

Complete set:
Order No. 8.0010.4D00.0000

Tether arm short

Order No. 8.0010.4R00.0000

Economy Type 5810 (shaft)

- ø 58 mm housing
- Short-circuit proof outputs
- Customized versions also available
- High mechanical protection
- Push-pull output
  (10 ... 30 V supply voltage)

Mechanical characteristics:

Speed:	max. 6000 min^{-1}
Rotor moment of inertia:	approx. 0.6 x 10^{-6} kgm^2
Starting torque:	< 0.01 Nm
Radial load capacity of shaft:	40 N
Axial load capacity of shaft:	20 N
Weight:	approx. 0.4 kg
Protection acc. to EN 60 529:	IP 64
	Housing (IP 67 with cable, IP 50 with connector)
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature:	0° C ... +65 °C
Shaft:	stainless steel
Shock resistance acc. to DIN-IEC 68-2-27	1000 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	100 m/s^2, 10...2000 Hz

Electrical characteristics:

Output circuit:	Push-pull
Supply voltage:	10 ... 30 V DC
Power consumption (no load)	
without inverted signal:	max. 80 mA
Permissible load/channel:	max. ±30 mA
Pulse frequency:	max. 20 kHz
Signal level high:	min. U_B – 2.5 V
Signal level low:	max. 1.5V
Rise time t_r	max. 1 µs
Fall time t_f	max. 1 µs
Short circuit proof outputs:[1)]	yes
Reverse connection protection at UB:	yes
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3	
RoHS compliant acc. to EU guideline 2002/95/EG	

[1)] If supply voltage correctly applied

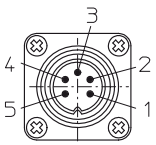
Terminal assignment

Signal:	0 V	$+U_B$	A	B	0 or. $\overline{0}$	Shield
5 pin plug, Pin:	1	2	3	4	5	PH[1)]
Colour	WH	BN	GN	YE	GY	

[1)] PH = Shield is attached to connector housing

Isolate unused outputs before initial startup.

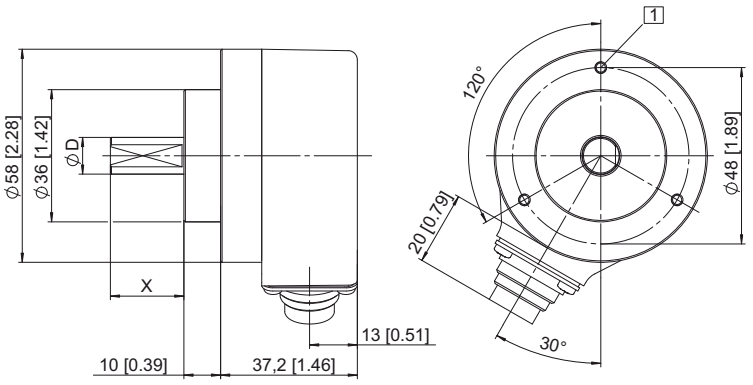
Top view of mating side, male contact base:
5-pin plug



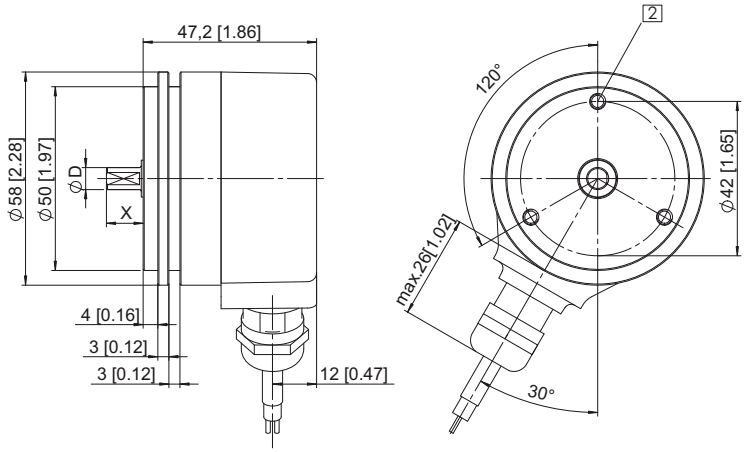
Economy Type 5810 (shaft)

Dimensions

Clamping flange ø 58



Synchronous flange ø 58



1 3xM3, 6 [0,24] deep

2 3xM4, 6 [0,24] deep

Mounting advice:

The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time! We recommend the use of suitable couplings (see Accessories section).

Order code:

8.5810.XXXX.XXXX

Type	
Flange	1 = Clamping flange ø 58 2 = Synchronous flange ø 58
Shaft	1 = ø 6 mm x 10 mm 2 = ø 10 mm x 20 mm
Output circuit	3 = Push-pull, Channel A and B
Pulse rate	10, 50, 100, 200, 360, 500, 512 (e.g.. 250 pulses => 0250) Other pulse rates on request
Type of connection	2 = Cable radial (1 m PVC-Cable) 5 = radial 5 pin plug without mating connector

Preferred types are indicated in ***bold***

Accessories:

Corresponding mating connector of connection type 5: Order-No. 8.0000.5022.0000

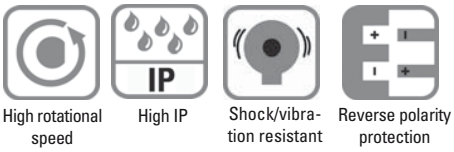
Cables and connectors, also pre-assembled, can be found in the chapter Connection Technology

Mounting attachments and couplings can be found in the chapter Accessories

New

Kübler

Rotary magnetic measurement system RI20/ LI20



High rotational speed | High IP | Shock/vibration resistant | Reverse polarity protection

Robust

- **Increased ability to withstand vibrations and rough installation**
  Eliminates machine downtime and repairs
  High shock and vibration resistance, thanks to non-contact technology.
- **Stays sealed even when subjected to harsh everyday use. Offers security against failures in the field.**
  Solid housing with up to IP 67 protection.

Compact

- **Installation depth only 16 mm, width of magnetic ring 10 mm**
- **Large hollow shaft up to 30 mm**
  Can be used even where space is very tight

Simple installation

- **Fast start-up of the measuring system**
  Easy fixing of the magnetic ring and the sensor head
- **Easy mounting with large tolerances possible**
  Distance of sensor head to magnetic ring from 0.1 to 1.0 mm
- Tolerates lateral misalignment + 1 mm
- Warning signal when magnetic field is too weak (LED)

Technical data magnetic sensor *LIMES* LI20:

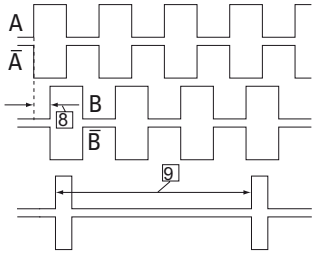
Output circuit:	Push-Pull	RS422
Supply voltage:	4,8 ... 30 V DC	4,8 ... 26 V DC
Load/channel, max. cable length:	±20 mA, max. 30 m	120 Ohm, RS422 standard
Current consumption (without load):	typ. 25 mA, max. 60 mA	
Short circuit proof outputs[1]:	yes	yes[2]
Min. Pulse interval:	1 µs (edge interval) corresp. to 4 µs/period (see signal figures below)	
Output signal:	A, $\overline{A}$, B, $\overline{B}$, I, $\overline{I}$	
Reference signal:	Index periodical	
Accuracy:		
System Accuracy:	typ. ±0,3 ° with shaft tolerance g6	
Repeat accuracy:	±1 increment	
Admissible Alignment tolerance	see draft „Mounting tolerances"	
Gap sensor / magnetic ring:	0.1 ... 1.0 mm (recommended 0,4 mm)	
Offset:	max. ±1 mm	
Tilting:	max. 3 °	
Torsion:	max. 3 °	
Environmental conditions:		
Working temperature:	–20 ... +80 °C	
Shock resistance:	30 g/10 ... 2000 Hz	
Protection class:	IP 67 according to DIN 60 529 (housing)	
Humidity:	100 %, condensation possible	
Housing:	Zinc die-cast	
General data:		
Cable:	2 m, PUR 8 x 0,14 mm², shielded, may be used in trailing cable installations	
Status-LED:	Green: Pulse-index; Red: Error, revs too high or magnetic field too weak (for 8.LI20.XXXX.X**020** and 8.LI20.XXXX.X**050**)	
CE-compliant according to:	EN 61 000-6-2, EN 61 000-6-4, EN 61 000-6-3 EN 61 000-4-8 (magnetic field)	
RoHS compliant acc. to EU guideline 2002/95/EG		

Technical data magnetic ring RI20:

Pole gap:	2 mm from pole to pole
Temperature ranges:	
Working temperature	–20 …+80 °C
Storage temperature	–20 …+80 °C
Mounting:	Screwed on shaft
System accuracy:	typ. ±0,3° (at 25 °C, Sensor/Magnetic ring Distance 0,5 mm and Drive shaft tolerance g6

Signal figures

with rotation of the magnetic ring in the CW-direction (see draft „Mounting tolerances")



9 periodic index signal (every 2mm) the logical assignment A, B and I-signal can change

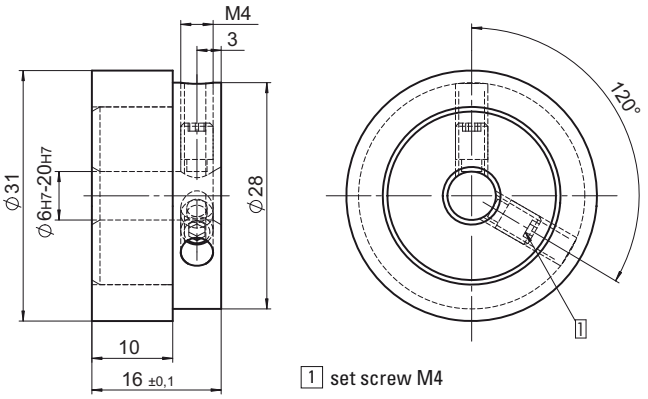
8 Min. Pulse interval: pay attention to the instructions in the technical data

[1] With supply voltage correctly applied

[2] A max. of one channel only may be short-circuited: (when UB=5 V, a short circuit to another channel, 0 V, or +UB is permissible.) (when UB=5-30 V, a short circuit to another channel or to 0 V is permissible.)

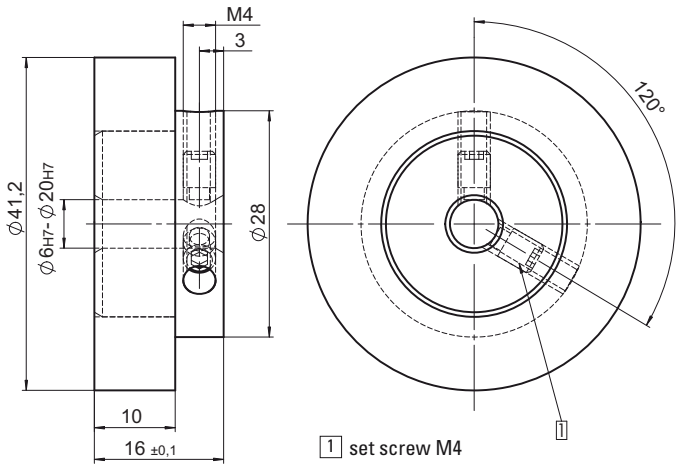
Rotary magnetic measurement system RI20/ LI20

Magnetic ring 8.RI20.**031**.XXXX.111, ø 31 mm



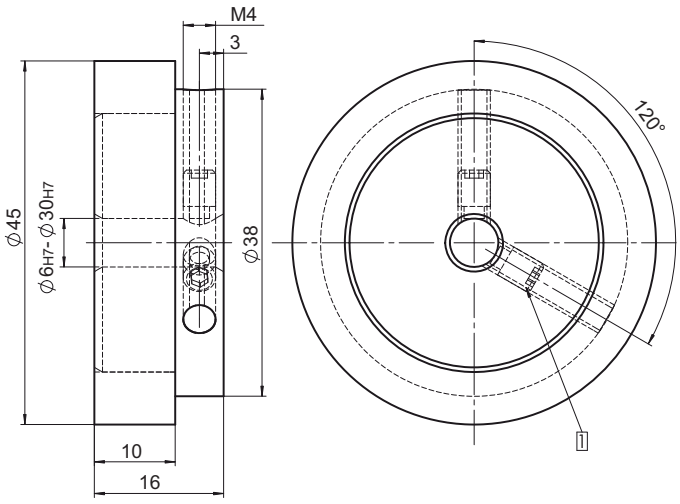
1 set screw M4

Magnetic ring 8.RI20.**041**.XXXX.111, ø 41,2 mm



1 set screw M4

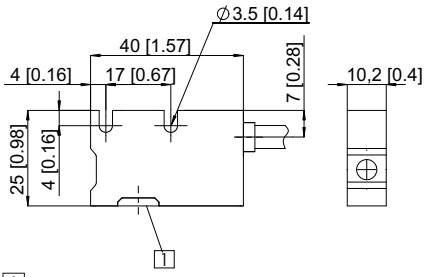
Magnetic ring 8.RI20.**045**.XXXX.111, ø 45 mm



1 set screw M4

Recommended tolerance of the drive shaft diameter: g6

Magnetic sensor *LIMES* LI20:



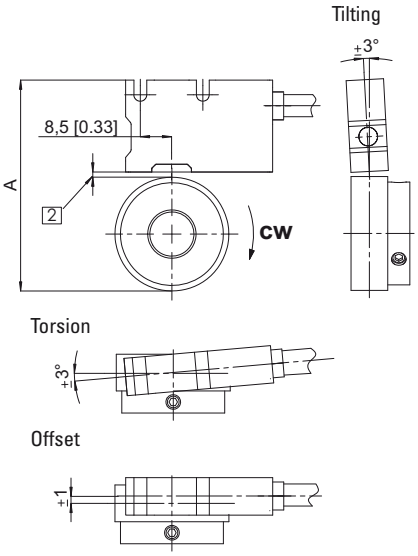
1 active measuring area

Pin assignment:

Signal	Wire colour
0 V, GND	white
U_B	brown
A	green
$\overline{A}$	yellow
B	gray
$\overline{B}$	pink
I	blue
$\overline{I}$	red

Shield is on the housing

Permissible mounting tolerances:



2 Distance Sensor / Magnetic ring: 0.1... 1.0 mm (0.4 mm recommended)

Magnetic ring	A
8.RI20.**031**.XXXX.111	56,4[1)]
8.RI20.**041**.XXXX.111	66,6[1)]
8.RI20.**045**.XXXX.111	70,4[1)]

1) With Distance Sensor / Magnetic ring = 0,4 mm

New

Rotary magnetic measurement system RI20/ LI20

Order code magnetic sensor *LIMES* LI20: 8.LI20.11X1.2XXX

- Model
- Design
  - 1 = standard
- Supply voltage
  - 1 = standard
- Interface and supply voltage
  - 1 = RS422/4,8 ... 26 V DC
  - 2 = Push-Pull/4,8 ... 30 V DC
- Code*
  - 005
  - 016
  - 020
  - 050

  * Annotations see table "selection guide", col 3
- Reference signal
  - 2 = index periodic
- Type of connection
  - 1 = cable (PUR), 2 m

Order code magnetic ring RI20:

Order code/type	Outer-diameter	Bore diameter
8.RI20.031.0800.111	31 mm	8 mm
8.RI20.031.1000.111	31 mm	10 mm
8.RI20.031.1200.111	31 mm	12 mm
8.RI20.031.1500.111	31 mm	15 mm
8.RI20.031.1587.111	31 mm	15,875 mm (5/8")
8.RI20.031.2000.111	31 mm	20 mm
8.RI20.041.0800.111	41,2 mm	8 mm
8.RI20.041.1500.111	41,2 mm	15 mm
8.RI20.045.0800.111	45 mm	8 mm
8.RI20.045.0952.111	45 mm	9,525 mm (3/8")
8.RI20.045.1200.111	45 mm	12 mm
8.RI20.045.1500.111	45 mm	15 mm
8.RI20.045.1800.111	45 mm	18 mm
8.RI20.045.2500.111	45mm	25 mm
8.RI20.045.2540.111	45 mm	25,4 mm (1")
8.RI20.045.3000.111	45 mm	30 mm

Selection guide:
***LIMES* LI20/magnetic ring RI20**

Pulses/ ppr	Order code for Magnetic ring RI20	Order code for magnetic sensor Limes LI20	max. rpm
250	8.RI20.031.XXXX.111	8.LI20.11X1.2**005**	12000
1000	8.RI20.031.XXXX.111	8.LI20.11X1.2**020**	2400
2500	8.RI20.031.XXXX.111	8.LI20.11X1.2**050**	3900
1024	8.RI20.041.XXXX.111	8.LI20.11X1.2**016**	7000
360	8.RI20.045.XXXX.111	8.LI20.11X1.2**005**	12000
3600	8.RI20.045.XXXX.111	8.LI20.11X1.2**050**	2700

*At the listed rotational speed the min. pulse interval is 1 µs, this corresponds to 250 kHz. For the max. rotational speed range a counter with a count input frequency of not less then 250 kHz. should be provided.

Stock types

Magnetic sensor LI20:	Magnetic ring RI20:	
8.LI20.1111.2005	8.RI20.031.0800.111	8.RI20.045.1500.111
8.LI20.1111.2016	8.RI20.031.1000.111	8.RI20.045.2500.111
8.LI20.1111.2020	8.RI20.031.1200.111	
8.LI20.1111.2050	8.RI20.031.1587.111	
8.LI20.1121.2005	8.RI20.041.0800.111	
8.LI20.1121.2016	8.RI20.045.0800.111	
8.LI20.1121.2020	8.RI20.045.0925.111	
8.LI20.1121.2050	8.RI20.045.1200.111	

Display Type 572 for *LIMES* LI20:

Counter series for demanding applications, with two individually scalable encoder inputs. HTL or TTL in each case A, $\overline{A}$, B, $\overline{B}$ for count frequencies up to 1 MHz per channel. Operating modes can be selected for position or event counter, total counter, difference counter, cut-to-length display, diameter calculator, batch counter and more.

- 2 separate freely scalable count inputs - HTL or TTL; also with inverted inputs
- Max. input frequency 1 MHz/ channel
- 4 freely programmable fast solid-state outputs, each with 350 mA output current
- Step or tracking preset
- AC and DC supply voltage
- Can be used as a counter or position display with limit values
- Monitoring function, where 2 values are monitored or calculated with respect to each other
- 4 fast programmable inputs with various functions such as reset, gate, display memory , reference input or switching between the display values.
- Optional scalable analogue output 0/4 ... 20 mA, +/-10 V or 0 ... 10 V
- 2 auxiliary power supplies for sensors: 5.2 V DC and 24 V DC
- Standard interface RS 232

Order code specification:

Position display, 6 digits, with 4 fast switch outputs and serial interface:
6.572.0116.D05

Position display, 6 digits, with 4 fast switch outputs and serial interface and scalable analogue output:
6.572.0116.D95

Position display, 8 digits, with 4 fast switch outputs and serial interface:
6.572.0118.D05

Position display, 8 digits, with 4 fast switch outputs and serial interface and scalable analogue output:
6.572.0118.D95

Heavy duty Type 9000 / 9000 stainless steel

- Highly flexible, chemical resistant PUR cable (stands up to constant flexing at -20 °C … + 70 °C)
- Temperature and ageing compensation
- Large temperature range
- Short-circuit proof outputs

Type heavy duty:
- Designed for heavy duty
- Sealed connector

Applications: steel industry, forestry, road construction and wood industry

Type stainless steel:
- Stainless steel housing and shaft
- Precision graduation at high resolution

Applications: Food- and pharmaceutical industry, automatic packaging machines, bottling plants, chemical process technology

Mechanical characteristics:

Speed:	max. 6000 min^{-1}
Rotor moment of inertia:	approx. 15 x 10^{-6} kgm^2
Starting torque:	< 0.05 Nm
Radial load capacity of shaft*:	140 N
Axial load capacity of shaft:*:	70 N
Weight:	approx. 1.2 kg stainless steel: 2.8 kg

Protection acc. to EN 60 529:	IP 66
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature:	-20° C ... +85 °C[1)2)]
Shaft:	stainless steel
Shock resistance acc. to DIN-IEC 68-2-27	1000 m/s2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	100 m/s^2, 10...2000 Hz

1) 80 °C with cable
2) Non-condensing

Electrical characteristics:

Output circuit:	RS 422 (TTL-compatible)	Push-pull
Supply voltage:	5 V (±5 %) or 10 ... 30 V DC	10 ... 30 V DC
Power consumption (no load)	-	typ. 55 mA /
without inverted signal:		max. 125 mA
Power consumption (no load)	typ. 40 mA /	typ. 80 mA/
with inverted signals:	max. 90 mA	max.150 mA
Permissible load/channel:	max. ±20 mA	max. ±30 mA
Pulse frequency:	max. 300 kHz	max. 300 kHz
Signal level high:	min. 2.5 V	min. U_B–2.5 V
Signal level low:	max. 0.5 V	max. 2.0 V
Rise time t_r	max. 200 ns	max. 1 µs
Fall time t_f	max. 200 ns	max. 1 µs
Short circuit proof outputs:[1)]	yes[2)]	yes
Reverse connection protection at U_B:	5 V: no, 10 ... 30 V: yes	yes
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3		
RoHS compliant acc. to EU guideline 2002/95/EG		

1) If supply voltage correctly applied
2) Only one channel allowed to be shorted-out:
(If UB=5 V, short-circuit to channel, 0 V, or +UB is permitted)
(If UB=5-30 V, short-circuit to channel or 0 V is permitted)

Terminal assignment

Signal:	0V	0V Sensor[2)]	$+U_B$	$+U_B$ Sensor[2)]	A	$\overline{A}$	B	$\overline{B}$	0	$\overline{0}$	Shield
Colour:	WH 0,5 mm^2	WH	BN 0,5 mm^2	BN	GN	YE	GY	PK	BU	RD	

1) PH = Shield is attached to connector housing
2) Sensor cables are connected to the supply voltage internally if long feeder cables are involved they can be used to adjust or control the voltage at the encoder

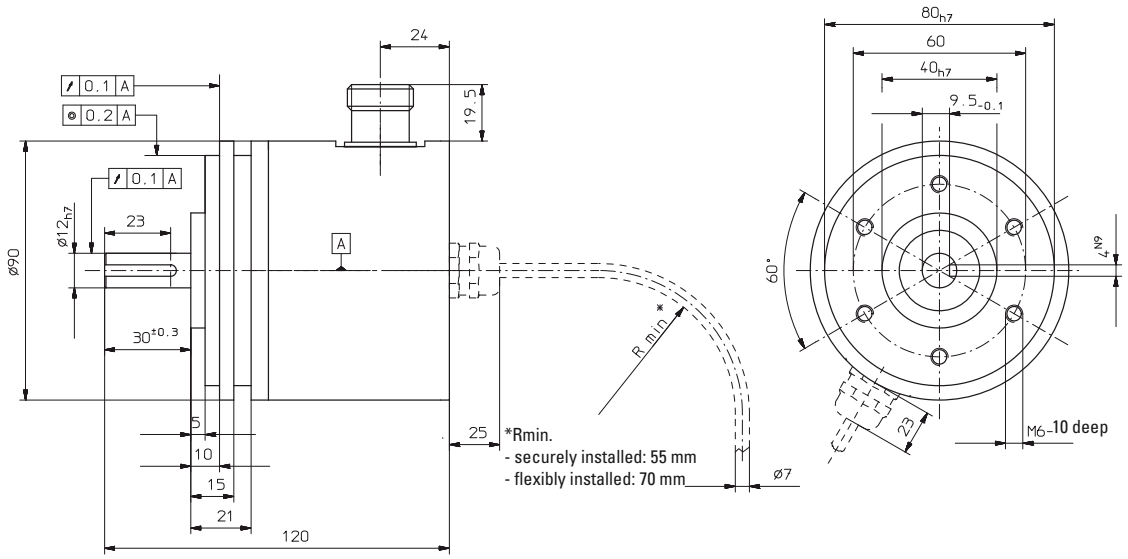
- If sensor cables are not in use, they have to be isolated or 0 V $_{Sensor}$ has to be connected to 0 V and $U_{BSensor}$ has to be connected to U_B

- Using RS 422 outputs and long cable distances, a wave impedance has to be applied at each cable end.

Isolate unused outputs before initial startup.

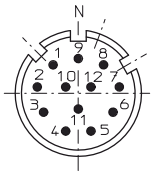
Heavy duty Type 9000 / 9000 stainless steel

Dimensions:



Top view of mating side, male contact base:

12 pin plug



Order code:

8.9000.11X1.XXXX.XXXX

Type

Output circuit and voltage display
- **4 = RS 422 (with inverted signal) 5 V supply voltage**
- 5 = RS 422 (with inverted signal) 10 ... 30 V supply voltage
- **6 = Push-pull (with inverted signal) 10 .. 30 V supply voltage**
- 7 = Push-pull (without inverted signal) 10 ... 30 V supply voltage

Version
- 0000 = Standard
- 5007 = Stainless steel version

Pulse rate
- 50, 500, 1000, 1024, 2000, 2048, 2500, 3000, 4096, 5000
- (e.g. 250 pulses=> 0250)
- Other pulse rates on request

Type of connection
- 1 = Cable axial (1 m PUR-cable)
- **2* = Cable radial (1 m PUR-cable)**
- 3* = axial 12 pin plug axial without mating connector
- **5* = radial 12 pin plug without mating connector**

*not with stainless steel version

Preferred types are indicated in ***bold***

Accessories:
Cables and connectors, also pre-assembled, can be found in the chapter Connection Technology
Mounting attachments and couplings can be found in the chapter Accessories

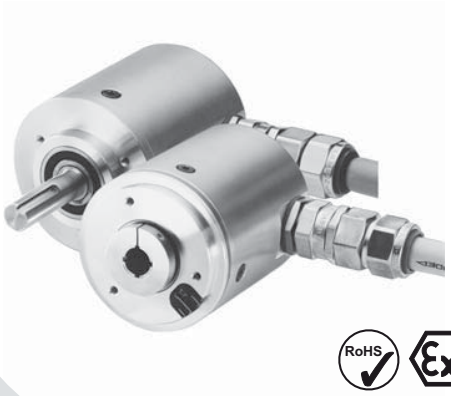
Accessories:
Corresponding mating connector to connection type of 3 or 5
Order No. 8.0000.5012.0000

Type 7030 with ATEX approval

Temperature | Shock/vibration resistant | Short-circuit proof | Reverse polarity protection

One type for every situation:

- **Version "flameproof-enclosure":** approval 1, 2 and 21, 22
- **Zone 1, 2 and 21, 22:**
  II 2G Ex d II C T6 and
  II 2D Ex tD A21 IP6x T85°C
- **High resolution:** max. 5000 ppr.
- **Choice of construction:** Through hollow shaft or solid shaft up to max. ø 12 mm.



Compact:

- **Can be used even where space is tight:** installation depth only 94 mm, minimal clearance required - thanks to through hollow shaft

Safe:

- **Easy start-up,** short-circuit proof outputs, reverse polarity protection, overvoltage protection
- **No malfunction if voltage is too high**

Mechanical characteristics:

Speed:	max. 6000 min^{-1}
Rotor moment of inertia:	approx. 15 x 10^{-6} kgm^2
Starting torque:	< 0.05 Nm
Radial load capacity of shaft:	80 N
Axial load capacity of shaft::	40 N
Weight:	approx. 1.2 kg
Protection acc. to EN 60 529:	IP 65
EX approval for hazardous areas:	ATEX, Explosion proof zone 1 and 21 II 2G Ex d II C T6 and II 2D Ex tD A21 IP6x T85°C
Working temperature:	-20° C ... +60 °C[1)]
Shaft:	stainless steel
Shock resistance acc. to DIN-IEC 68-2-27	1000 m/s2. 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	100 m/s2, 10 ... 2000 Hz

[1)] Non-condensing

Please note!

– All standards for installation of electrical systems in hazardous environments have to be observed.

– Manipulations (opening, mechanical treatment etc.) will cause the loss of the EX–license, warranty claims will not be accepted and the installer will be responsible for any consequential damages.

Type 7030 with ATEX approval

Electrical characteristics:

Output circuit:	RS 422 (TTL-compatible)	Push-pull
Supply voltage:	5 V (±5 %) or 10 ... 30 V DC	10 ... 30 V DC
Power consumption (no load) without inverted signal:	-	typ. 55 mA / max. 125 mA
Power consumption (no load) with inverted signals:	typ. 70 mA / max. 90 mA	typ. 80 mA/ max.150 mA
Permissible load/channel:	max. ±20 mA	max. ±30 mA
Pulse frequency:	max. 300 kHz	max. 300 kHz
Signal level high:	min. 2.5 V	min. U_B –2.5 V
Signal level low:	max. 0.5 V	max. 2.0 V
Rise time tr	max. 200 ns	max. 1 µs
Fall time tf	max. 200 ns	max. 1 µs
Short circuit proof outputs:[1)]	yes[2)]	yes
Reverse connection protection at UB:	no	yes
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3		
RoHS compliant acc. to EU guideline 2002/95/EG		

1) If supply voltage correctly applied
2) Only one channel allowed to be shorted-out:
(If UB=5 V, short-circuit to channel, 0 V, or +UB is permitted)
(If UB=5-30 V, short-circuit to channel or 0 V is permitted)

Terminal assignment

Signal:	0V	0V Sensor[2)]	$+U_B$	$+U_B$ Sensor[2)]	A	$\overline{A}$	B	$\overline{B}$	0	$\overline{0}$	Shield
Colour:	WH	GY PK	BN	RD BU	GN	YE	GY	PK	BU	RD	PH[1)]

1) PH = Shield is attached to connector housing

2) Sensor cables are connected to the supply voltage internally if long feeder cables are involved they can be used to adjust or control the voltage at the encoder

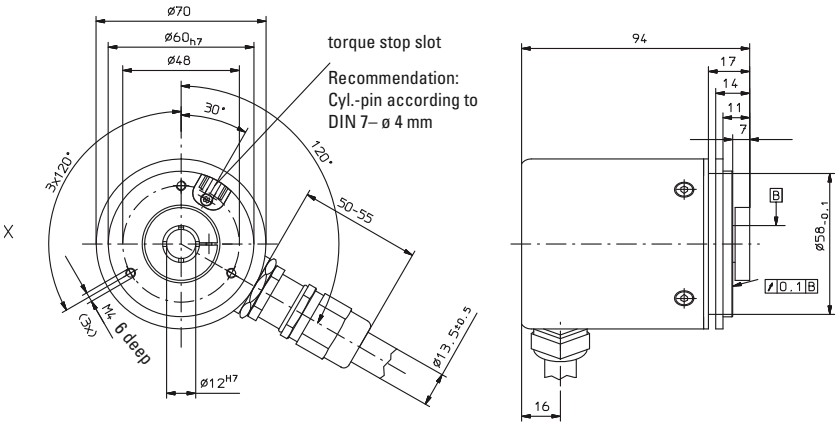
- If sensor cables are not in use, they have to be isolated or 0 V_{Sensor} has to be connected to 0 V and $U_{BSensor}$ has to be connected to U_B

- Using RS 422 outputs and long cable distances, a wave impedance has to be applied at each cable end.

Isolate unused outputs before initial startup.

Dimensions hollow shaft version:

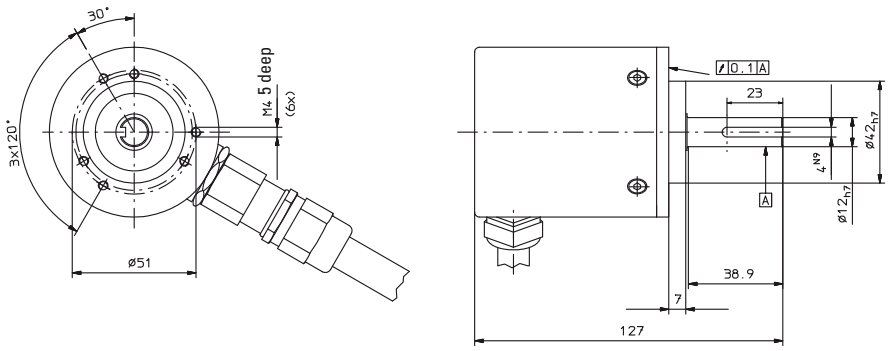
8.7030.14xx



Type 7030 with ATEX approval

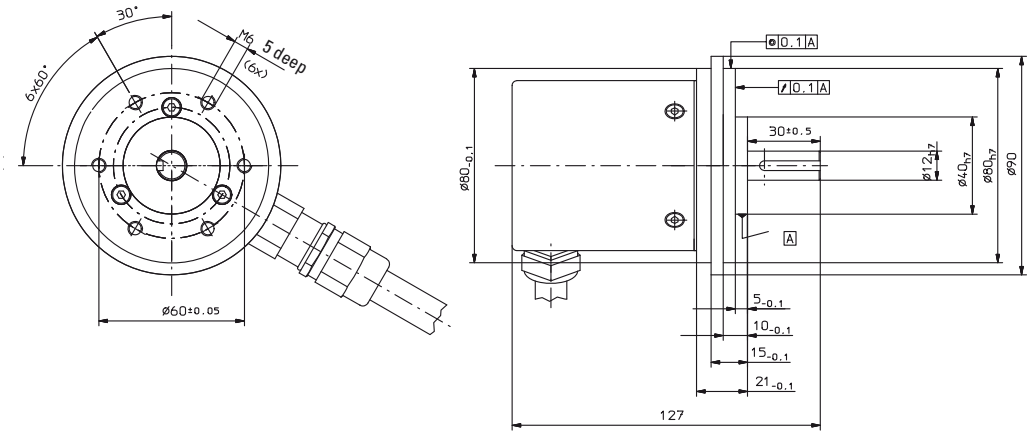
Dimensions shaft version:

8.7030.25xx



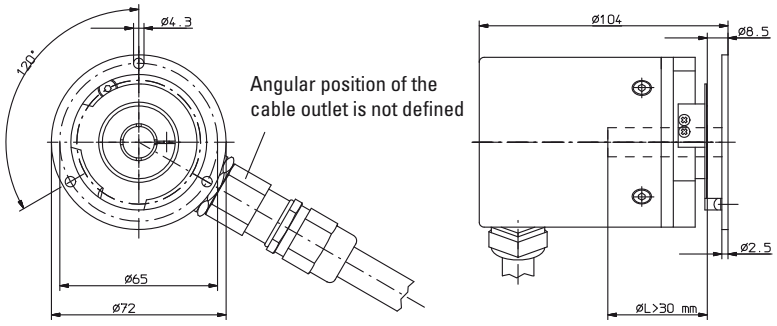
Dimensions shaft version:

8.7030.26xx



Dimensions hollow shaft version:

8.7030.27xx



Type 7030 with ATEX approval

Order code: 8.7030.XXXX.XXXX

Type

Flange and hollow shaft or shaft
- 14 = Synchronous flange with hollow shaft ø 12 mm
- **25 = Clamping flange with shaft ø 12 mm**
- 26 = Clamping flange with shaft ø 12 mm and mounted flange adapter
- **27 = Stator coupling with Hollow shaft ø 12 mm**

Pulse rate
- 25, 50, 60, 100, 125, 200, 250, 256, 300, 360, 500, 512, 600, 720, 800, 1000, 1024, 1200, 1250, 1500, 2000, 2048, 2500, 3000, 3600, 4000,
- (e.g. 250 pulses=> 0250)
- Other pulse rates on request

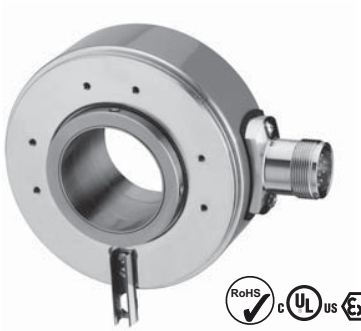
Type of connection
- **2 = Cable radial (2 m PVC-cable) other cable lengths on request**

Output circuit and voltage supply
- **1 = RS 422 (with inverted signal) 5 V supply voltage**
- 2 = Push-pull (without inverted signal) 10 ... 30 V supply voltage
- **3 = Push-pull (with inverted signal) 10 ... 30 V supply voltage**
- 4 = RS 422 (with inverted signal) 10 ... 30 V supply voltage

Preferred types are indicated in ***bold***

Accessories:
Cables and connectors, also pre-assembled, can be found in the chapter Connection Technology
Mounting attachments and couplings can be found in the chapter Accessories

Large diameter Type A020



- Only 43 mm clearance needed
- Hollow shaft diameter up to 42 mm
- Very easy mounting. The encoder is mounted directly on the drive shaft without couplings.
- Electronic temperature and ageing compensation
- RS 422, push-pull or sine wave output
- High scanning rate

Mechanical characteristics:

Speed:[1]	max. 3000 min^{-1}
Rotor moment of inertia:[3]	<150 x 10^{-6} kgm^2
Starting torque with sealing:	< 0.2 Nm
Weight:	app. 0.7 kg
Protection acc. to EN 60 529:	IP 65
EX approval for hazardous areas:	optional zone 2 and 22

Working temperature:	–20° C ... +70 °C[2] (optional up to -40 °C)
Shaft:	stainless steel H7
Shock resistance acc. to DIN-IEC 68-2-27:	1000 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	100 m/s^2, 10...2000 Hz

[1] Short term (app. 15 min. range) up to 3500 min^{-1} [2] Non-condensing [3] Depending on shaft diameter

Electrical characteristics sine wave output:

Output circuit:	Sine	Sine
	U = 1 Vss	U = 1 Vss
Supply voltage:	5 V (±5 %)	10 ... 30 V DC
Current consumption	typ. 65 mA /	typ. 65 mA /
(no load) with inverted signals:	max. 110 mA	max. 110 mA
-3 dB frequency:	≤180 kHz	≤180 kHz
Signal level channels A/B:	1 Vss (±20%)	1 Vss (±20 %)
Signal level channel 0:	0.1 ... 1.2 V	0.1 .... 1.2 V
Short circuit proof outputs[1]:	yes	yes
Reverse connection protection at U_B:	no	yes
UL certified	File 224618	
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3		
RoHS compliant acc. to EU guideline 2002/95/EG		

[1] If supply voltage correctly applied

Electrical characteristics RS 422 or push-pull output:

Output circuit:	RS 422 (TTL-compatible)	Push-pull	Push-pull (7272)[3]
Supply voltage:	5 V (±5 %) or 10 ... 30 V DC	10 ... 30 V DC	5 ... 30 V DC
Power consumption (no load)	not available	typ. 55 mA /	–
without inverted signal:		max. 125 mA	–
Power consumption (no load)	typ. 40 mA /	typ. 80 mA/	typ. 50 mA/
with inverted signal:	max. 90 mA	max.150 mA	max.100 mA
Permissible load/channel:	max. ±20 mA	max. ±30 mA	max. ±20 mA
Pulse frequency:	max. 300 kHz	max. 300 kHz	max. 300 kHz
Signal level high:	min. 2.5 V	min. U_B–3 V	min. U_B–2.0 V
Signal level low:	max. 0.5 V	max. 2.5 V	max. 0.5 V
Rise time tr	max. 200 ns	max. 1 µs	max. 1 µs
Fall time tf	max. 200 ns	max. 1 µs	max. 1 µs
Short circuit proof outputs[1]:	yes[2]	yes	yes
Reverse connection protection at U_B:	5 V: no, 10 ... 30 V: yes	yes	no
UL certified	File 224618		
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3			
RoHS compliant acc. to EU guideline 2002/95/EG			

[1] If supply voltage correctly applied

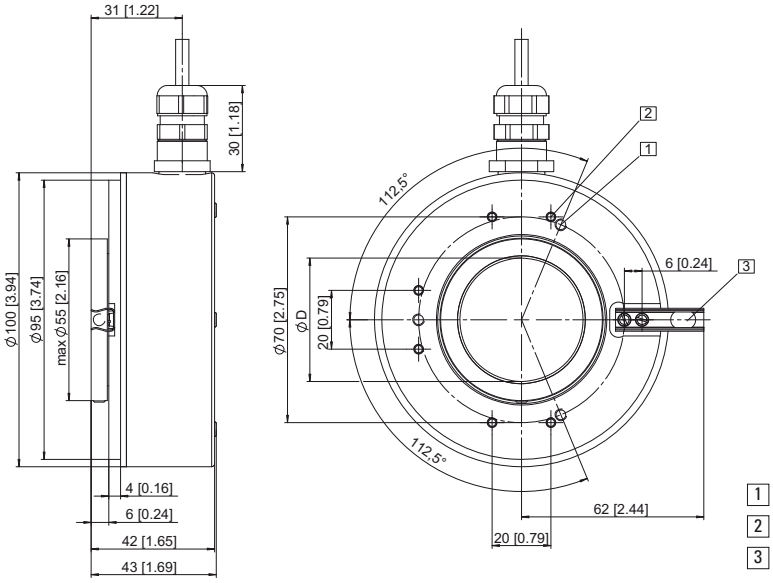
[2] Only one channel allowed to be shorted-out:
(If UB=5 V, short-circuit to channel, 0 V, or +UB is permitted)
(If UB=5-30 V, short-circuit to channel or 0 V is permitted)

[3] Max. recommended cable length 30 m

Large diameter Type A020

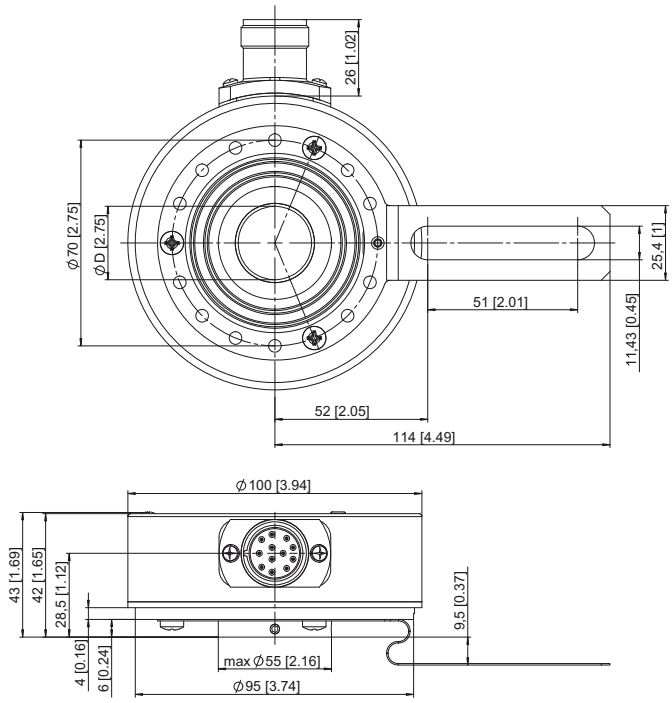
Dimensions

With spring element long (Flange type 3)



1 3 x M4, 7 [0,28] deep
2 6 x M3, 8 [0,31] deep
3 cylindrical pin DIN6325 ø6

With tether arm long (Flange type 5)



Recommended insertion depth min 31 mm

Large diameter Type A020

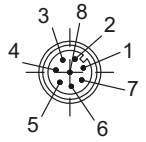
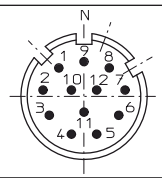
Terminal assignment:

Signal:	0 V GND	+U_B	0 V Sens	+Ub Sens	A	$\overline{A}$	B	$\overline{B}$	0	$\overline{0}$	Shield
M23 , 12 pin connector, Pin:	10	12	11	2	5	6	8	1	3	4	–[1]
M12, 8 pin connector, Pin:	1	2			3	4	5	6	7	8	–[1]
Cable colour:	WH	BN	GY PK	RD BU	GN	YE	GY	PK	BU	RD	Shield

1) Shield is attached to connector housing

Isolate unused outputs before initial startup

Top view of mating side, male contact base:

Type	8 pin M12 connector	12 pin M23 connector
View		
Corresponding mating connector:	05.CMB-8181-0	8.0000.5012.0000

Order code:

8.A020.XXXX.XXXX

Type

Flange
- 1 = without mounting aid
- 2 = with short spring element
- **3 = with long spring element**
- 5 = with tether arm long

Hollow shaft
- **1 = ø 42 mm**
- 2 = ø 38 mm
- 3 = ø 28 mm
- 4 = ø 25.4 mm (1")
- **5 = ø 25 mm**
- 6 = ø 24 mm
- **A = ø 30 mm**
- B = ø 40 mm
- C = ø 20 mm
- H = ø 35 mm
- M = ø 19 mm

Preferred types are indicated in ***bold***

Pulse rate
50*, 360*, 512*, 600*, 1000*, 1024, 1500, 2000, 2048, 2500, 4096, 5000
*not for SIN/COS version (SIN/COS version not available with pulses <1024)
(e.g. 360 pulses => 0360)
Other pulse rates on request

Type of connection
- 1 = Cable radial (1 m PVC-cable)
- **2 = radial 12 pin plug without mating connector**
- E = Connector M12 8pin, radial

Output circuit and voltage display
- **1 = RS 422 (with inverted signal) 5 V supply voltage**
- 2 = Push-pull (without inverted signal) 10 ... 30 V supply voltage
- **3 = Push-pull (with inverted signal) 10 ... 30 V supply voltage**
- 4 = RS 422 (with inverted signal) 10 ... 30 V supply voltage
- 5 = Push pull (with inverted signal) 5 ... 30 V supply voltage
- 8 = SIN/COS 1 Vpp (with inverted signal) 5 V supply voltage
- 9 = SIN/COS 1 Vpp (with inverted signal 10 .. 30 V supply voltage
- A = Line driver 7272 5 ... 30 V supply voltage

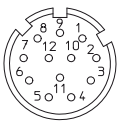
Accessories

Corresponding mating connector to Type of connection 3 or 5,
12 pin: Order No. 8.0000.5012.0000
pin assignment cw

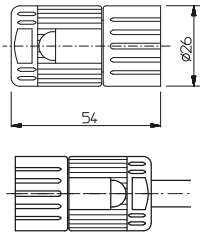
Corresponding mating connector with cable pre-assembled: Order No. 8.0000.6101.XXXX (XXXX = length [m])
Set includes connector type 8.0000.5012.0000 and cable type 8.0000.6100.XXXX
(Cable PUR 10 x 0.14 mm² + 2 x 0.5 mm²)

Accessories:
Cables and connectors, also pre-assembled, can be found in the chapter Connection Technology
Mounting attachments and couplings can be found in the chapter Accessories

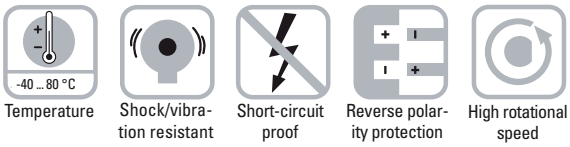
PIN allocation:



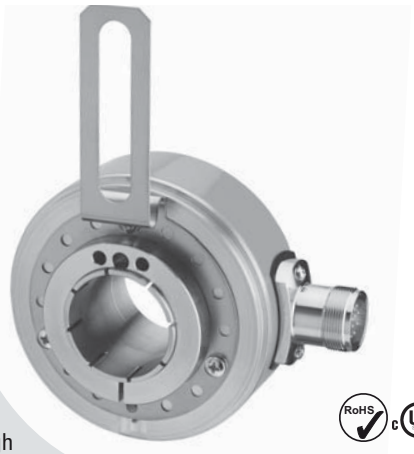
Dimensions:



Large diameter heavy duty Type A02H



Temperature | Shock/vibration resistant | Short-circuit proof | Reverse polarity protection | High rotational speed



Rugged

- Balanced, stainless-steel clamping rings, special bearing-shaft connection increases stability and vibration resistancet
- Optional plastic isolating inserts protect against damage from shaft currents
- Now with approval for dust
- New type of mechanical construction, ideal for handling tough mechanical stresses and strains

Economical

- Alternative to traditional heavy duty encoders that are often over-engineered and expensive

Versatile

- Very compact. Optional isolating inserts protect against damage from shaft currents, e.g. with AC vector motors
- Only 49 mm clearance needed
- Hollow shaft diameter up to ø 42 mm
- RS 422, push-pull or SIN/COS outputs
- Extended speed range up to 6000 min^{-1}
- High-quality hub/shaft fixing, balanced, stainless-steel - ensures quiet vibration-free running

Mechanical characteristics:

Speed:	max. 6000 min^{-1} at 70°C[1)]	Working temperature:	–20° C ... +80 °C[3)]
	max. 3500 min^{-1} at 80°C[1)]		(optional up to -40 °C)
Rotor moment of inertia:	<220 x 10^{-6} kgm^2 [2)]	Shaft:	stainless-steel H7
Starting torque with sealing:	< 0.2 Nm	Shock resistance acc. to DIN-IEC 68-2-27:	2000 m/s^2, 6 ms
Weight:	approx. 0.8 kg	Vibration resistance acc. to DIN-IEC 68-2-6:	100 m/s^2, 10...2000 Hz
Protection acc. to EN 60 529:	IP 65		
EX approval for hazardous areas:	optional zone 2 and 22		

1) During the run-in-phase of approx. 2 hours, reduce the limits for working temperature$_{max}$ or speed $_{max}$ by 1/3

2) Dependent on the shaft diameter

3) Non-condensing

Electrical characteristics sine wave output:

Output circuit:	Sine U = 1 Vss	Sine U = 1 Vss
Supply voltage:	5 V (±5 %)	10 ... 30 V DC
Current consumption (no load) with inverted signals:	typ. 65 mA / max. 110 mA	typ. 65 mA / max. 110 mA
-3 dB frequency:	≤180 kHz	≤180 kHz
Signal level channels A/B:	1 Vss (±20%)	1 Vss (±20 %)
Signal level channel 0:	0.1 ... 1.2 V	0.1 .... 1.2 V
Short circuit proof outputs[1)]:	yes	yes
Reverse connection protection at U_B:	no	yes
UL certified	File 224618	
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3		
RoHS compliant acc. to EU guideline 2002/95/EG		

1) If supply voltage correctly applied

Large diameter heavy duty Type A02H

Electrical characteristics RS 422 or push-pull output:

Output circuit:	RS 422 (TTL-compatible)	Push-pull	Push-pull (7272)[3]
Supply voltage:	5 V (±5 %) or 10 ... 30 V DC	10 ... 30 V DC	5 ... 30V DC
Power consumption (no load)	not available	typ. 55 mA /	–
without inverted signal:		max. 125 mA	–
Power consumption (no load)	typ. 40 mA /	typ. 80 mA/	typ. 50 mA/
with inverted signal:	max. 90 mA	max.150 mA	max.100 mA
Permissible load/channel:	max. ±20 mA	max. ±30 mA	max. ±20 mA
Pulse frequency:	max. 300 kHz	max. 300 kHz	max. 300 kHz
Signal level high:	min. 2.5 V	min. U_B–3 V	min. U_B–2.0 V
Signal level low:	max. 0.5 V	max. 2.5 V	max. 0.5 V
Rise time tr	max. 200 ns	max. 1 µs	max. 1 µs
Fall time tf	max. 200 ns	max. 1 µs	max. 1 µs
Short circuit proof outputs[1]:	yes[2]	yes	yes
Reverse connection protection at U_B:	5 V: no, 10 ... 30 V: yes	yes	no
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3			

1) If supply voltage correctly applied

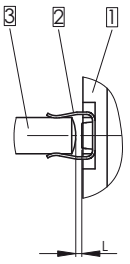
2) Only one channel allowed to be shorted-out:
(If UB=5 V, short-circuit to channel, 0 V, or +UB is permitted)
(If UB=5-30 V, short-circuit to channel or 0 V is permitted)

3) Max. recommended cable length 30 m

Mounting:

Mounting using the spring element - short

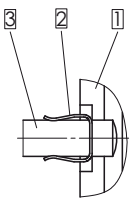
When mounting the encoder, ensure that dim. L is larger than the maximum axial play of the drive in the direction of the arrow.



1 Flange
2 Spring element - short
3 Cylindrical pin

Mounting using the spring element – long

Cylindrical pin fed through the bore of the spring



1 Flange
2 Spring element - long
3 Cylindrical pin

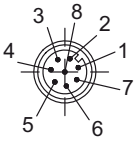
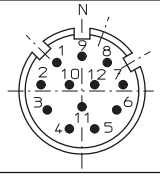
Terminal assignment:

Signal:	0 V GND	+U_B	0 V Sens	+Ub Sens	A	$\overline{A}$	B	$\overline{B}$	0	$\overline{0}$	Shield
M23 , 12 pin connector, Pin:	10	12	11	2	5	6	8	1	3	4	–[1]
M12, 8 pin connector, Pin:	1	2			3	4	5	6	7	8	–[1]
Cable colour:	WH	BN	GY PK	RD BU	GN	YE	GY	PK	BU	RD	Shield

1) Shield is attached to connector housing

Isolate unused outputs before initial startup

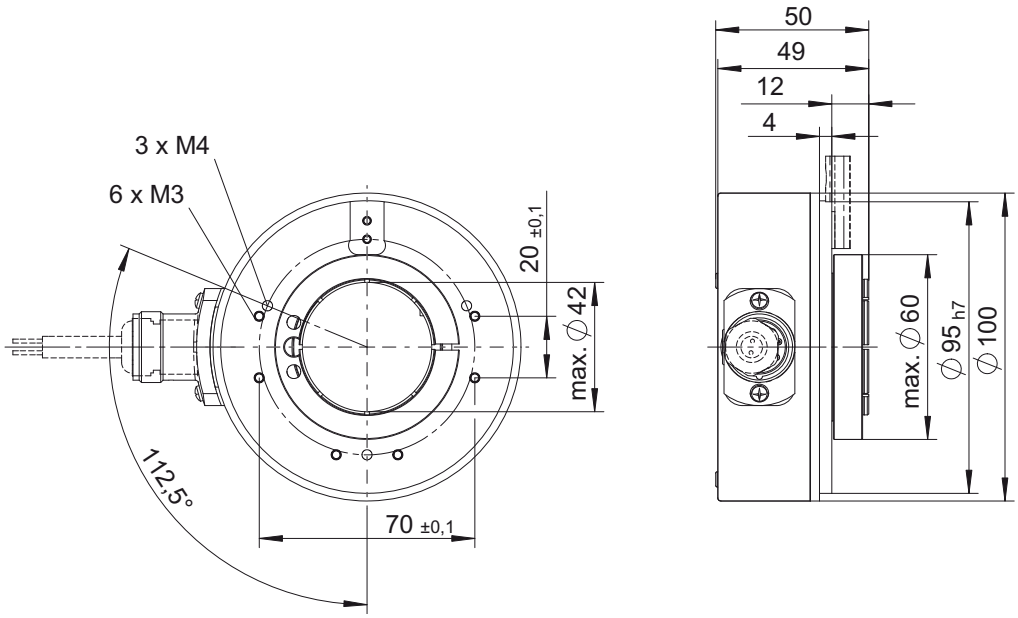
Top view of mating side, male contact base:

Type	8 pin M12 connector	12 pin M23 connector
View		
Corresponding mating connector:	05.CMB-8181-0	8.0000.5012.0000

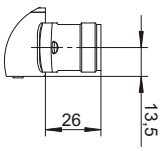
Corresponding mating connector to Type of connection 2 Art.-Nr. 8.0000.5012.0000 Ask our technical hotline 0049 7720 -3903-92

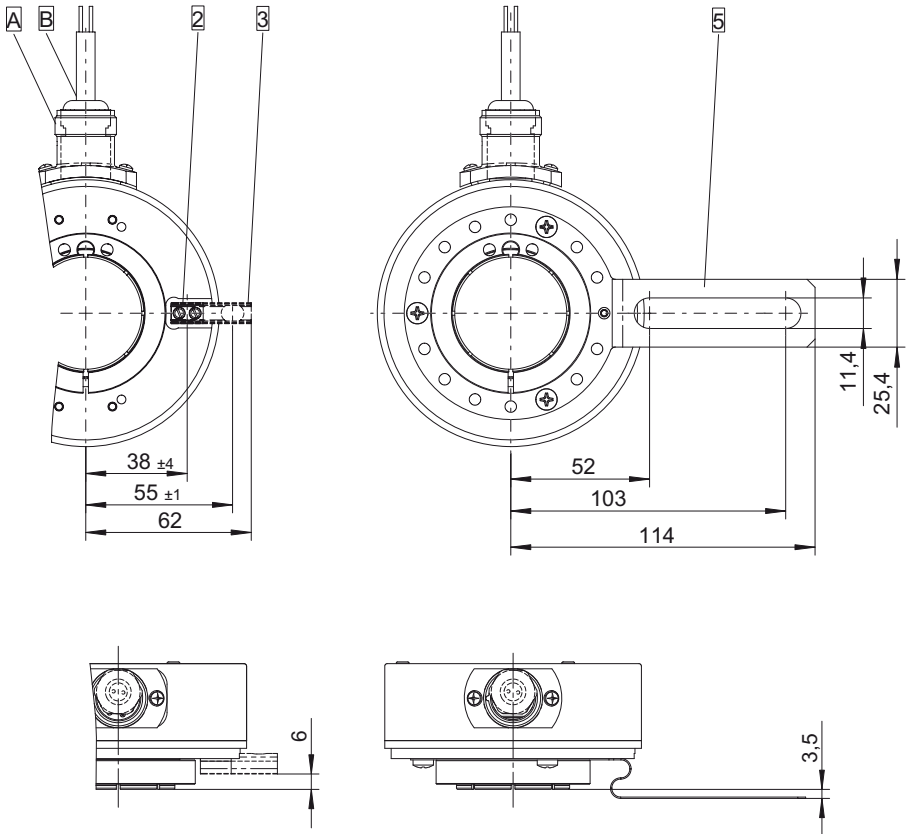
Large diameter heavy duty Type A02H

Dimensions:

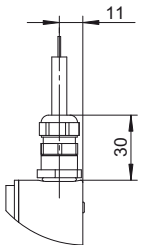


A Plug version





B Cable version



2 Spring element short (flange no. 2)

3 Spring element long (flange no. 3)

5 Tether arm long (flange no. 5)

Recommended insertion depth min 38 mm

Large diameter heavy duty Type A02H

Order code: **8.A02H.XXXX.XXXX**

Type

Flange
- 1 = without mounting aid
- 2 = with short spring device
- **3 = with long spring device**
- 5 = with tether arm long

Hollow shaft
- **1 = ø 42 mm**
- 2 = ø 38 mm
- 3 = ø 28 mm
- 4 = ø 25.4 mm (1")
- **5 = ø 25 mm**
- 6 = ø 24 mm
- **A = ø 30 mm**
- B = ø 40 mm
- C = ø 20 mm
- H = ø 35 mm
- M = ø 19 mm

Pulse rate
50*, 360*, 512*, 600*, 1000*, 1024, 1500, 2000, 2048, 2500, 4096, 5000
*not for SIN/COS version
(SIN/COS version not available with pulses <1024)
(e.g. 360 pulses => 0360)
Other pulse rates on request

Type of connection
- 1 = Cable radial (1 m PVC-cable)
- **2 = radial 12 pin plug without mating connector**
- E = Connector M12 8pin, radial

Output circuit and voltage display
- **1 = RS 422 (with inverted signal) 5 V supply voltage**
- 2 = Push-pull (without inverted signal) 10 ... 30 V supply voltage
- **3 = Push-pull (with inverted signal) 10 ... 30 V supply voltage**
- 4 = RS 422 (with inverted signal) 10 ... 30 V supply voltage
- 5 = Push pull (with inverted signal) 5 ... 30 V supply voltage
- 8 = SIN/COS 1 Vpp (with inverted signal) 5 V supply voltage
- 9 = SIN/COS 1 Vpp (with inverted signal 10 .. 30 V supply voltage
- A = Line driver 7272 5 ... 30 V supply voltage

Preferred types are indicated in ***bold***

Optional (on request)**:**
– special connector pin out
– special output signals formats

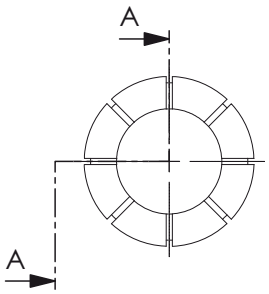
Accessories

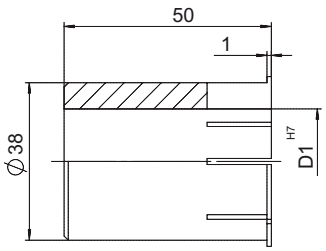
Corresponding mating connector to Type of connection 2,
12 pin: Order No. 8.0000.5012.0000
pin assignment cw

Corresponding mating connector with cable pre-assembled: Order No. 8.0000.6101.XXXX (XXXX = length [m])
Set includes Connector typ 8.0000.5012.0000 and cable type 8.0000.6100.XXXX
(Cable PUR 10 x 0.14 mm^2 + 2 x 0.5 mm^2)

Accessories

Isolation insert for hollow shaft ø 38 mm:





Diameter: D1	Order-no.:
12.7 mm (1/2")	8.0010.4013.0000
15.875 mm	8.0010.4070.0000
16	8.0010.4019.0000
18 mm	8.0010.4080.0000
19.05 mm (3/4")	8.0010.4090.0000
20 mm	8.0010.4011.0000
25 mm	8.0010.4012.0000
25.4 mm	8.0010.4050.0000
31.75 mm ($1^1/_4$")	8.0010.4060.000

Isolation inserts prevent currents from passing through the encoder bearings. These currents can occur when using inverter controlled three-phase or AC vector motors and considerably shorten the service life of the encoder bearings.

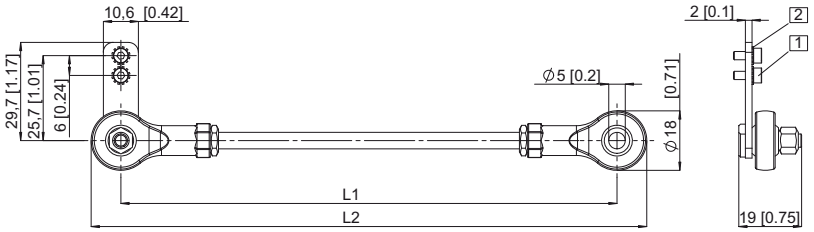
For more details please call our Technical Hotline (+49 7720 3903 92) or send us an e-mail (info@kuebler.com)

Isolation insert for hollow shaft ø 42 mm:

External diameter 42 mm
Internal diameter 38 H7
Order Number: 8.0010.4017.0000

Large diameter heavy duty Type A02H, Accessories

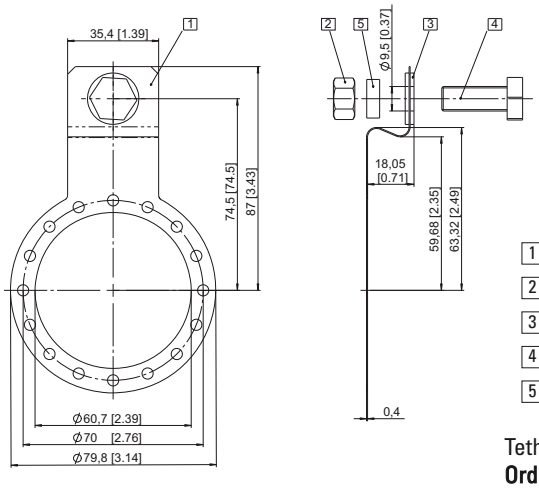
Tether arm large, flexible



Tether arm			
Length L	L1	L2	**Order code**
70 mm	70 [2.76]	88 [3.46]	**8.0010.40S0.0000**
100 mm	100 [3.94]	118 [4.65]	**8.0010.40T0.0000**
150 mm	150 [5.91]	168 [6.61]	**8.0010.40U0.0000**

1 Socket cap screw M2.6x6
2 Lock washer

Tether arm short

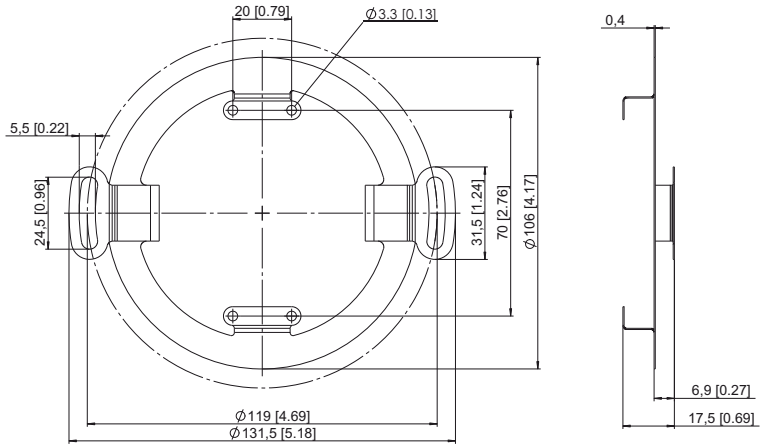


1 Curved spring element
2 Hexagonal nut 3/8 - 16 UNC
3 Washer (isolating)
4 Hexagonal screw3/8 16 UNC x 1"
5 Washer D10,4 x 15 x 15

Tether arm short
Order code: 8.0010.4T00.0000

Stator coupling

Stator coupling
Order code: 8.0010.40V0.0000



Large diameter heavy duty Type A02H, Accessories

Protective cover

Protective cover with tether arm, short
- Protects the shaft and hub ring against soiling

- Delivery includes:
  Protective cover
  Tether arm, short
  Fixing screws

Order code
for the set: 8.0010.40Y0.0001

Table of contents

Singleturn		Sendix® absolut											
		2450	**2470**	**3651**	**M3658**	**3671**	**M3678**	**5853**	**5873**	**5858**	**5878**	**5850**	**5870**
Interface	SSI	✗	✗	**3650**		**3670**		✗	✗			✗	✗
	SSI + Incremental track							✗	✗				
	SSI + SIN/COS track							✗	✗				
	BISS							✗	✗				
	BISS + Incremental track							✗	✗				
	BISS + SIN/COS track							✗	✗				
	Parallel											✗	✗
	Analogue output			✗		✗						✗	
	RS485												
	Profibus DP									✗	✗		
	CANopen				✗		✗			✗	✗		
	CANlift												
	EtherCAT									✗	✗		
	DeviceNet												
Mechanical characteristics	Shaft max.	6 mm	-	8 mm	8 mm	-	-	10 mm	-	10 mm	-	10 mm	-
	Blind hollow shaft max.	-	6 mm	-	-	10 mm	10 mm	-	-	-	15 mm	-	12 mm
	Through hollow shaft max.	-	-	-	-	-	-	-	15 mm	-	-	-	12 mm
Performance characteristics	Max. speed RPM	12000	12000	6000	6000	6000	6000	12000	9000	9000	9000	12000	6000
	Mechanical gears												
	Non-contact gears												
	Resolution max. in Bit	12	12	12*	14	12*	14	17	17	16	16	14	14
	Programmable									✗	✗		
	Control outputs												
	Set key (optional)							✗	✗	✗	✗		
	Status LED (optional)			✗	✗	✗	✗	✗	✗	✗	✗		
	Safety-Lock™			✗	✗	✗	✗	✗	✗	✗	✗		
	Temperature min.	–20° C	–20° C	–40° C	–40° C	–40° C	–40° C	–40° C	–40° C	–40° C	–40° C	–20° C	–20° C
	Temperature max.	+85° C	+85° C	+85° C	+85° C	+85° C	+85° C	+90° C	+90° C	+80° C	+80° C	+85° C	+80° C
	IP max.	64	64	69K	69K	69K	69K	67	67	67	67	65	66
	Catalogue page	78	78	84	88	84	110	92	92	110	110	99	99

*3650/3670: 9 Bit

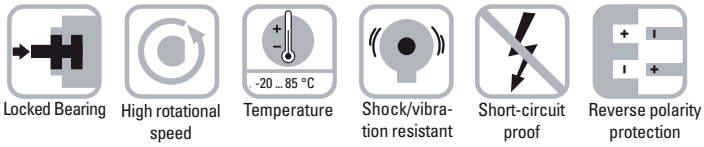
	Multiturn	Sendix® absolut								
		5863	5883	5868	5888	5860	5862	5882	9081	9080
Interface	SSI	✗	✗			✗	✗	✗	✗	
	SSI + incremental track	✗	✗				✗	✗	✗	
	SSI + SIN/COS track	✗	✗							
	BISS	✗	✗							
	BISS + incremental	✗	✗							
	BISS + SIN/COS track	✗	✗							
	Parallel									
	Analogue output									
	RS485						✗	✗	✗	
	Profibus DP			✗	✗					✗
	CANopen			✗	✗					✗
	CANlift			✗	✗					
	EtherCAT			✗	✗					
	DeviceNet					✗				✗
Mechanical characteri-stics	Shaft max.	10 mm	-	10 mm	-	10 mm	10 mm	-	12 mm	12 mm
	Blind hollow shaft max.	-	15 mm	-	15 mm	15 mm	-	-	-	-
	Through hollow shaft max.	-	14 mm	-	-		-	12 mm	28 mm	28 mm
Performance characteri-stics	Max. Speed RPM	12000	9000	9000	9000	6000	6000	6000	6000	6000
	Mechanical gears	✗	✗	✗	✗					
	Non-contact gears					✗	✗	✗	✗	✗
	Resolution max. in Bit	29	29	28	28	25	25	25	25	25
	Programmable			✗	✗	✗	✗	✗	✗	✗
	Control output	✗	✗	✗	✗	✗	✗	✗	✗	✗
	Set key (optional)	✗	✗	✗	✗					
	Status LED (optional)	✗	✗	✗	✗					
	Safety-Lock™	✗	✗	✗	✗					
	Temperature min.	–40° C	–40° C	–40° C	–40° C	–20 °C	–20° C	–20° C	–20° C	–10° C
	Temperature max.	+90° C	+90° C	+80° C	+80° C	+80 °C	+70° C	+70° C	+70° C	+70° C
	IP max.	67	67	67	67	65	65	65	65	65
	Catalogue page	141	141	154	154	176	148	148	181	185

New

Rotary Measuring Technology
Magnetic measurement system

Kübler

Absolute Singleturn Encoder Type 2450 (Shaft) / 2470 (Hollow shaft)



Locked Bearing | High rotational speed | Temperature | Shock/vibration resistant | Short-circuit proof | Reverse polarity protection

Rugged

- **Ensures long service life and reliability of the application, no wear**
  Non-contact measuring system
- **Can be used for a wide temperature range without additional expense.**
  Wide temperature range (-20 ... +85 °C)
- **Robust cable outlet**
  High strain-relief thanks to multiple clamping

Compact

- **Can be used where space is tight**
  Overall diameter of only 24 mm
  Shaft diameter min. 4 mm

Versatile

- **High resolution 12 Bit**
  4096 different positions at 360 °
- **Wide power supply range**
  5 V DC or 8 ... 30 V DC
- **Flexible connection of power supply**
  Radial or axial cable connection

Mechanical characteristics:

Speed:	max. 12 000min^{-1}
Rotor moment of inertia:	approx. 0.1 x 10^{-6} kgm^2
Starting torque:	<0.001 Nm
Radial load capacity of shaft:	10 N
Axial load capacity of shaft:.	20 N
Weight:	approx. 0.06 kg
Protection acc. to EN 60529:	IP 64 housing side, IP64 shaft side on request
Working temperature:	–20° C ... +85 °C[2)]
Shaft	stainless steel, clamping ring MS 58'
Shock resistance acc. to DIN-IEC 68-2-27	1000 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	100 m/s^2, 55 ... 2000 Hz

2) Non-condensing

Electrical characteristics SSI Interface:

Sensor:	
Supply voltage:	5 (±0,4) V DC or 8 ... 30 V DC[1)]
Current consumption (w/o output load):	< 40 mA
Reverse polarity protection at power supply (Ub):	Yes
Measuring range:	360°
Resolution/Code:	12 Bit/Grey
Linearity (25 °C):	<1.5 °
Repeat accuracy:	<0.1°
Data refresh rate:	typ 100 µs

SSI interface	
Clock speed:	100 kHz ... 750 kHz
Output driver:	RS 485
Monoflop time typ./max.:	16 µs/20 µs
Short circuit proof outputs:	Yes[2)]
Permissible load/channel	typ. 120 Ohm (corresponding RS 485)

1) The supply voltage at the encoder input must not be less than 4.75 V (5 V - 5%)
2) Short circuit to 0V or to output, only one channel at a time, supply voltage correctly applied

General characteristics:

Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4, EN 61000-6-3 and EN 61000-4-8 (behaviour under magnetic influence).
RoHS compliant acc. to EU guideline 2002/95/EG

Terminal assignment:

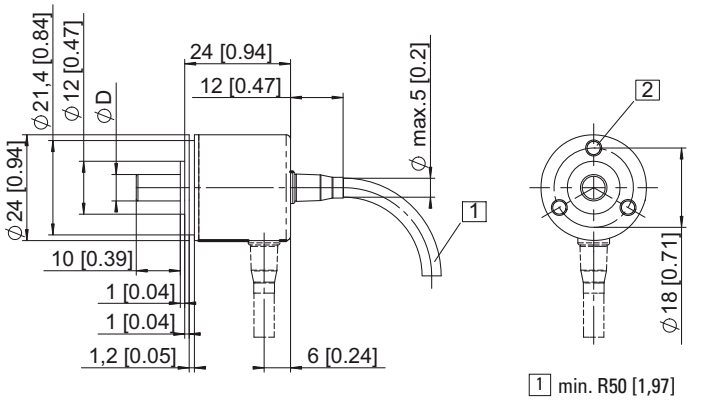
Sig.:	0V	+Ub	+T	-T	+D	-D
Col.:	WH	BN	GN	YE	GY	PK

New

Absolute Singleturn Encoder Type 2450 (Shaft) / 2470 (Hollow shaft)

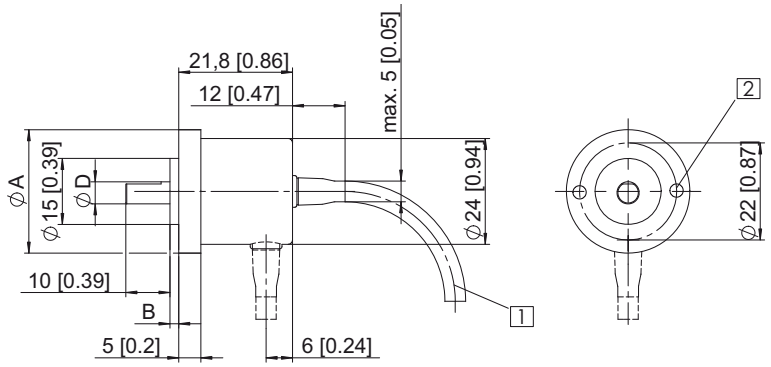
Dimensions shaft version:

Flange Type 1 (ø24 mm)



1 min. R50 [1,97]
2 3 x M3, 4 [0,16] deep

Flange Type 2 (ø 30 mm)
Flange Type 3 (ø 28 mm)



Flange Type	2	3
A	ø 30 mm	ø 28 mm
B	3 mm	2 mm

1 min. R50 [1,97]
2 3 x M3, 4 [0,16] deep

Mounting advice:

The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time! We recommend the use of suitable couplings (see Accessories section).

Order code shaft version:

8.2450.XXXX.G121

Type

Flange
1 = ø 24 mm
2 = ø 30 mm
3 = ø 28 mm
further on request

Shaft
1 = ø 4 mm x 10 mm
2 = ø 6 mm x 10 mm
3 = ø 5 mm x 10 mm with flattening

Gray Code 12 Bit resolution

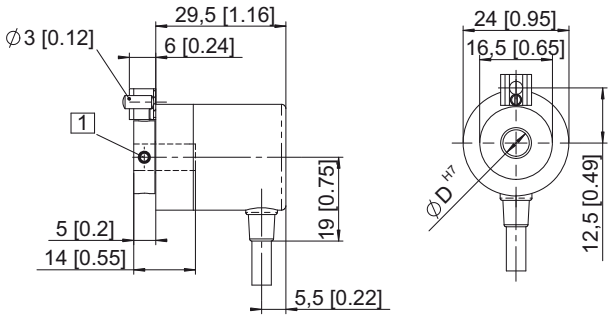
Type of connection
1 = cable axial (2 m PVC cable ø 4.5 mm)
2 = cable radial (2 m PVC cable ø 4.5 mm)

Output circuit / Power supply
1 = SSI/5 V DC
2 = SSI/8 ... 30 V DC

Accessories:
Cables and connectors, also pre-assembled, can be found in the chapter Connection Technology
Mounting attachments and couplings can be found in the chapter Accessories

Absolute Singleturn Encoder Type 2450 (Shaft) / 2470 (Hollow shaft)

Dimensions hollow shaft version:



1 4 x M3 DIN 915 - SW15

Mounting advice:
The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time! We recommend the use of suitable couplings (see Accessories section).

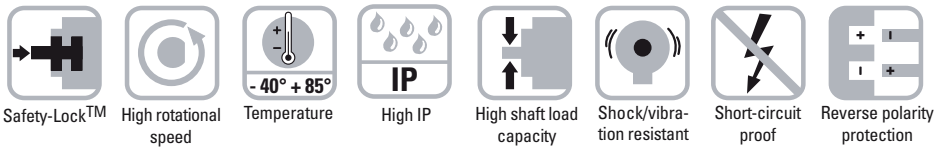
Order code hollow shaft version: 8.2470.1XXX.G121

Type	
Flange **1 = ø 24 mm**	
Blind hollow shaft (insertion depth max. 14 mm) 1 = ø 4 mm **2 = ø 6 mm**	
	Gray Code 12 Bit resolution
	Type of connection 1 = cable axial (2 m PVC cableø 4,5 mm) **2 = cable radial (2 m PVC- cable ø 4,5 mm)**
	Output circuit / Power supply **1 = SSI/5 V DC** **2 = SSI/8 ... 30 V DC**

Accessories:
Cables and connectors, also pre-assembled, can be found in the chapter Connection Technology
Mounting attachments and couplings can be found in the chapter Accessories

New

Sendix absolut, Singleturn Encoder Type 3650 (Shaft) / 3670 (Hollow shaft), SSI



Safety-Lock™ | High rotational speed | Temperature | High IP | High shaft load capacity | Shock/vibration resistant | Short-circuit proof | Reverse polarity protection

Rugged

- **Ensures long service life and reliability of the application, no wear**
  Non-contact measuring system
- **Stays sealed even when subjected to harsh everyday use. Offers security against failures in the field**
  Solid die-cast housing with up to IP 69K protection
- **Can be used for a wide temperature range without additional expense.** Wide temperature range (-40 °C ... +85 °C)
- **Increased ability to withstand vibration and installation errors. Eliminates machine downtime and repairs.**
  High shock resistance (> 500g) and vibration resistance (>30g)

Sendix® absolut RoHS Ex 2/22

Compact

- **Can be used where space is tight**
  Overall diameter of only 36 mm
- **Shaft version: can be mounted on a tight radius**
  Fixing holes on D26 mm
- **Hollow shaft version: compact encoder, ideal for large shafts**
  Blind hollow shaft up to 10 mm

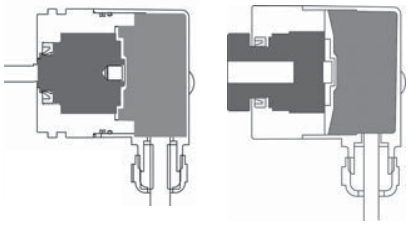
Versatile

- **Enables simple installation**
  Reference point can be identified via LED (green)
- **Can be fixed on various diameters**
  Fixing holes on D 26mm and D 30mm
- **Can be used in outdoor applications with large fluctuations in temperature.**
  Resistant against humidity and condensation
- also available in **seawater resistant** version, certified acc. to salt-spray test IEC 68-2-11 => 672 hours.

Mechanical characteristics:

Max. speed:	6000 min^{-1}
Starting torque	< 0,06 Nm
Radial load capacity of shaft:	40 N
Axial load capacity of shaft:	20 N
Weight:	approx. 0,2 kg
Protection acc. to EN 60 529/ DIN 40050-9:	IP 67 / IP69k
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature range:	–40 °C ... +85 °C
Materials:	Shaft: stainless steel, Flange: aluminium, Housing: die cast zinc, Cable: PUR
Shock resistance acc. to DIN-IEC 68-2-27:	5000 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	300 m/s^2, 10 ... 2000 Hz
Permanent shock resistance acc. to DIN-IEC 68-2-29	1000 m/s^2, 2 ms
Vibration (broad-band random) to DIN-IEC 68-2-64	5 ... 2500 Hz, 100 m/s^2 - rms

All-round protection thanks to Safety-Lock*plus*™ and Sensor-Protect™ technology



Safety-Lock*plus*™:
IP69k protection on the flange side, robust bearing assemblies with interlocking bearings, mechanically protected shaft seal

Sensor-Protect™:
Fully encapsulated electronics, separate mechanical bearing assembly

Sendix absolut, Singleturn Encoder Type 3650 (Shaft) / 3670 (Hollow shaft), SSI

Electrical characteristics SSI Interface:

Sensor:	
Supply voltage:	5 ... 30 V DC[1)]
Current consumption (w/o output load):	typ 22 mA, max. 41 mA
Reverse polarity protection at power supply (Ub):	Yes
Measuring range:	360°
Resolution/Code:	9 Bit/Binary
Linearity (25 °C)	<1.0 %
Repeat accuracy:	<0.2 %
Data refresh rate:	typ 100 µs
Status LED:	Green, reference point at 2,1°
RoHS compliant acc. to EU guideline 2002/95/EG	
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4, EN 61000-6-3 and EN 61000-4-8 (behaviour under magnetic influence).	

SSI interface	
Clock speed:	100 kHz ... 750 kHz
Output driver:	RS 485
Monoflop time typ./max.:	16 µs/20 µs
Short circuit proof outputs:	Yes[2)]
Permissible load/channel	typ. 120 Ohm (corresponding RS 485)

1) The supply voltage at the encoder input must not be less than 4.75 V (5 V - 5%)

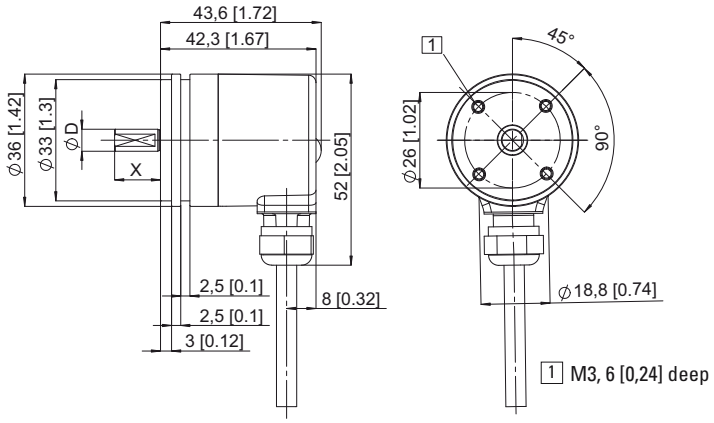
2) Short circuit to 0V or to output, only one channel at a time, supply voltage correctly applied

Terminal assignment:

Sig.:	0V	+Ub	0 V Sens	+Ub Sens	+T	-T	+D	-D
Col.:	WH	BN	BU	RD	GN	YE	GY	PK

Dimensions shaft version:

ø 36 mm, Synchro flange



Order code shaft version:

8.3650.XXXX.XXXX

Type	
Flange	**2 = Synchro flange**
Shaft (ø x L)	**3 = ø 6 mm x 12,5 mm** 5 = ø 6,35 (1/4") mm x 12,5 mm
Output circuit / Power supply	**2 = SSI/5 ... 30 V DC**
Option 1	**1 = IP67** 2 = IP69k
Option 2	**1 = Count direction cw*** 2 = Count direction ccw*
Code type and division	**B9 = 9 Bit binary**
Type of connection	**2 = cable radial (1 m PUR)**

*Preferred types are indicated in **bold***

*cw = increasing code values when shaft turning clockwise (cw). Top view on shaft
- seawater resistant version on request

Accessories:

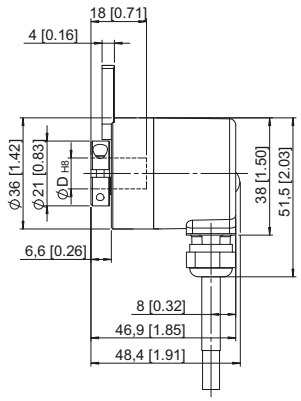
Cables and connectors, also pre-assembled, can be found in the chapter Connection Technology
Mounting attachments and couplings can be found in the chapter Accessories

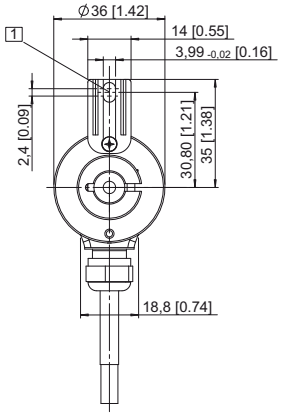
New

Sendix absolut, Singleturn Encoder Type 3650 (Shaft) / 3670 (Hollow shaft), SSI

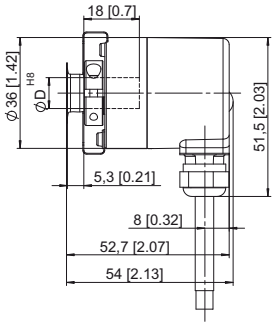
Diemensions hollow shaft version:

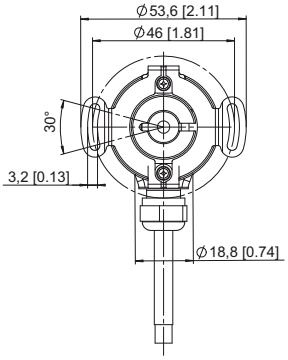
ø 36 mm, Flange with long torque stop





ø 36 mm, Stator coupling





1 Torque stop slot,
Recommendation: cyl. pin. acc. DIN 7 ø4

Order code hollow shaft version:

8.3670.XXXX.XXXX

10 by 10

Type	
Flange	2 = Flange with long torque stop **5 = Flange with stator coupling**
Hollow shaft	**2 = ø 6 mm** 3 = ø 6,35 (1/4") 4 = ø 8 mm 6 = ø 10 mm
Output circuit / Power supply	**2 = SSI/5 ... 30 V DC**
Option 1	**1 = IP 67** 2 = IP69k
Option 2	**1 = Count direction cw*** 2 = Count direction ccw*
Code type and division	**B9 = 9 Bit binary**
Type of connection	**2 = Cable radial (1 m PUR)**

*cw = increasing code values when shaft turning clockwise (cw). Top view on shaft

- seawater resistant version on request

*Preferred types are indicated in **bold***

Accessories:

Cables and connectors, also pre-assembled, can be found in the chapter Connection Technology

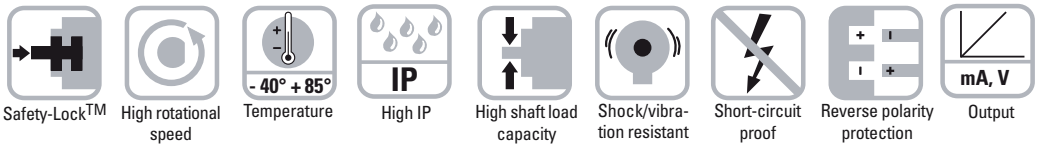
Mounting attachments and couplings can be found in the chapter Accessories

New

Rotary Measuring Technology
Magnetic measurement system

Kübler

Sendix absolut, Singleturn Encoder Type 3651 (Shaft) / 3671 (Hollow shaft), analogue



Safety-Lock™ | High rotational speed | Temperature | High IP | High shaft load capacity | Shock/vibration resistant | Short-circuit proof | Reverse polarity protection | Output

Rugged

- **Ensures long service life and reliability of the application, no wear**
  Non-contact measuring system
- **Stays sealed even when subjected to harsh everyday use. Offers security against failures in the field**
  Solid die-cast housing with up to IP 69K protection
- **Can be used for a wide temperature range without additional expense.**
  Wide temperature range (-40 °C ... +85 °C)
- **Increased ability to withstand vibration and installation errors. Eliminates machine downtime and repairs.**
  High shock resistance (> 500g) and vibration resistance (>30g)
- **Can be used in outdoor applications with large fluctuations in temperature.**
  Resistant against humidity and condensation.

Sendix® absolut RoHS Ex 2/22

Compact

- **Can be used where space is tight**
  Overall diameter of only 36 mm
- **Shaft version: can be mounted on a tight radius**
  Fixing holes on D26 mm
- **Hollow shaft version: compact encoder, ideal for large shafts**
  Blind hollow shaft up to 10 mm

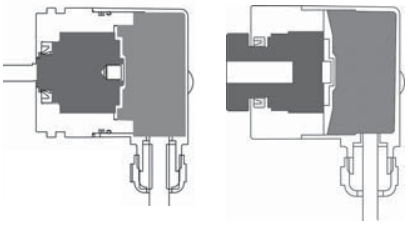
Versatile

- **Interface: 4 ... 20 mA, 0 ... 10 V**
  One size available for different applications
- **Measuring range: 45°; 90°; 180°; 360°:**
  Suitable measuring range available for different applications
- **Easy diagnosis in case of fault condition**
  Error indication via red LED (only current output)
- **Simple installation**
  Reference point can be identified via LED (green)
- **Hollow shaft version: can be fixed individually**
  Torque stop and stator coupling available
- also available in **seawater resistant** version, certified acc. to salt-spray test IEC 68-2-11 => 672 hours.

Mechanical characteristics:

Max. speed:	6000 min^{-1}
Starting torque	< 0,06 Nm
Radial load capacity of shaft:	40 N
Axial load capacity of shaft:	20 N
Weight:	approx. 0,2 kg
Protection acc. to EN 60 529/ DIN 40050-9:	IP 67 / IP69k
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature range:	–40 °C ... +85 °C
Materials:	Shaft: stainless steel, Flange: aluminium, Housing: die cast zinc, Cable: PUR
Shock resistance acc. to DIN-IEC 68-2-27:	5000 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	300 m/s^2, 10 ... 2000 Hz
Permanent shock resistance acc. to DIN-IEC 68-2-29	1000 m/s^2, 2 ms
Vibration (broad-band random) to DIN-IEC 68-2-64	5 ... 2500 Hz, 100 m/s^2 - rms

All-round protection thanks to Safety-Lock*plus*™ and Sensor-Protect™ technology



Safety-Lock*plus*™:
IP69k protection on the flange side, robust bearing assemblies with interlocking bearings, mechanically protected shaft seal

Sensor-Protect™
Fully encapsulated electronics, separate mechanical bearing assembly

New

Sendix absolut, Singleturn Encoder Type 3651 (Shaft) / 3671 (Hollow shaft), analogue

Electrical characteristics current interface 4 ... 20 mA:

Sensor:	
Supply voltage:	18 ... 30 V DC
Current consumption (w/o output load):	typ 32 mA, max. 38 mA
Reverse polarity protection at power supply (Ub):	Yes
Measuring range:	45°, 90°, 180° or 360°
Resolution:	12 Bit
Linearity (25 °C)	< 1° (360 ° measurement range)
Repeat accuracy:	< 0.1° (360 ° measurement range)
Status LED:	Red: sensor break detection , Monitoring of power supply Green: reference point, green LED is lightening between 0° and 1°

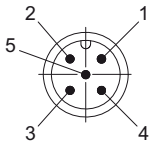
4 ... 20 mA current loop	
Output load:	max. 900 ohms at 24 V DC
Setting time:	< 1 ms (R_{load} = 400 Ohm, 25 °C)

Short-circuit proof outputs: when the supply voltage is correctly applied, then output to output is short-circuit protected. But not output to 0 V or to +Ub

Supply voltage and sensor output signal are not galvanically isolated.

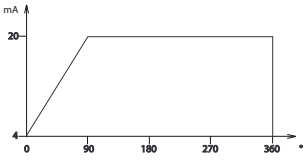
Terminal assignment:

Sig.:	0V	+Ub	+I	-I
Col.:	WH	BN	GN	YE
M12/Pin:	3	2	4	5

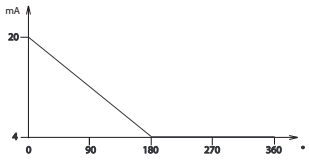


Example (output signal profile):

for range 90° cw



for range 180 ° ccw



Electrical characteristics voltage interface 0 ... 10 V:

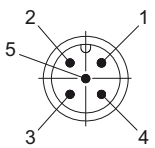
Sensor:	
Supply voltage:	18 ... 30 V DC
Current consumption: (w/o output load):	typ 29 mA, max. 35 mA
Reverse polarity protection at power supply (Ub):	Yes
Measuring range:	45°, 90°, 180° or 360°
Resolution:	12 Bit
Linearity(25 °C)	< 1° (360 ° measurement range)
Repeat accuracy:	< 0.1° (360 ° measurement range)

0 ... 10 V voltage output	
Current output:	max. 10 mA
Setting time:	< 1 ms ($R_{last} \geq$ 1 KOhm, 25 °C)
Short-circuit proof outputs:	Yes [2)]
Supply voltage and sensor output signal are not galvanically isolated.	
Reference point:	green LED is lightening between 0° and 1°

[2]Short-circuit proof outputs: when the supply voltage is correctly applied, then output to output is short-circuit protected. But not output to 0 V or to +Ub

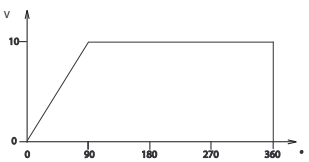
Terminal assignment:

Sig.:	0V	+Ub	+Uo	-Uo
Col.:	WH	BN	GN	YE
M12/Pin:	3	2	4	5

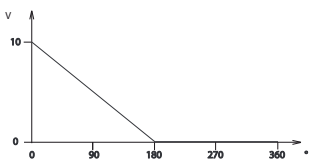


Example (output signal profile):

for range 90° cw



for range 180 ° ccw



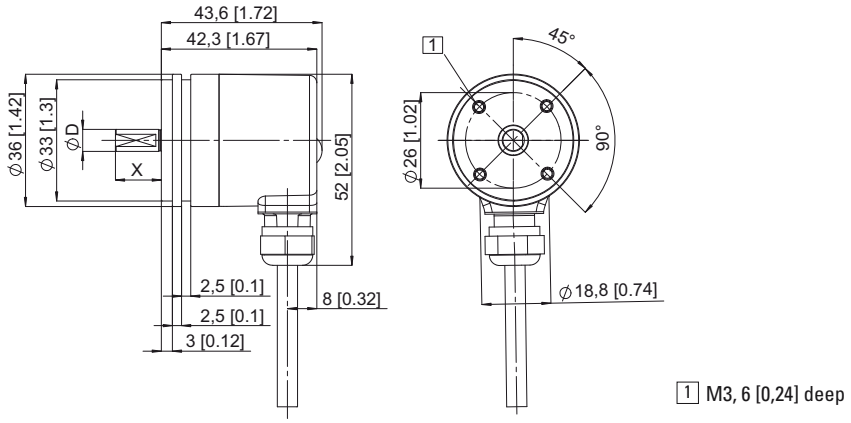
General characteristics:

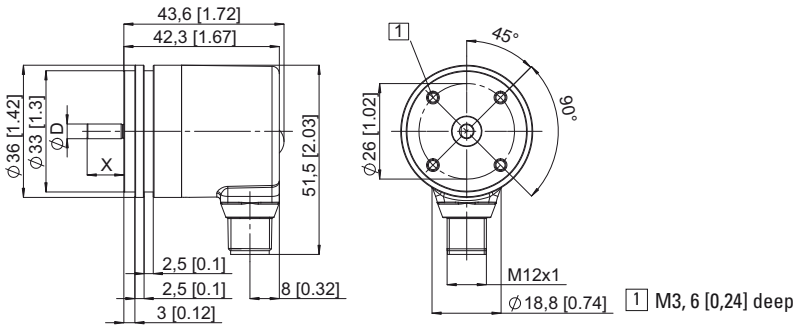
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4, EN 61000-6-3 and EN 61000-4-8 (behaviour under magnetic influence).

RoHS compliant acc. to EU guideline 2002/95/EG

Sendix absolut, Singleturn Encoder Type 3651 (Shaft) / 3671 (Hollow shaft), analogue

Dimensions shaft version:
ø 36 mm, Synchro flange





Order code shaft version:

8.3651.XXXX.XXXX 10 by 10

Type		
Flange	**2 = Synchro flange**	
Shaft (ø x L)	**3 = ø 6 x 12,5 mm** 5 = ø 6,35 x 12,5 mm 6 = ø 8 x 12,5 mm	
Output circuit / Power supply	**3 = Current output 18 ... 30 V DC** **4 = Voltage output 18 ... 30 V DC**	
		Option 1 **1 = IP67** 2 = IP69k
		Option 2 **1 = Count direction cw*** 2 = Count direction ccw*
		Output **3 = 4 ... 20 mA** **4 = 0 ... 10 V**
		Measurement range **1 = 1 x 360°** 2 = 1 x 180° 3 = 1 x 90° 4 = 1 x 45°
		Type of connection **2 = Cable radial (1 m PUR)** 4 = M12 connector radial

*Preferred types are indicated in **bold***

*cw = increasing code values when shaft turning clockwise (cw). Top view on shaft
- seawater resistant version on request

Accessories

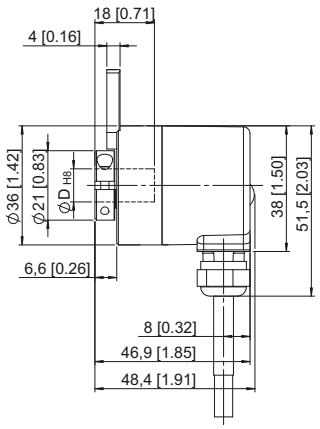
Corresponding mating connector:
05.B.8151-0/9

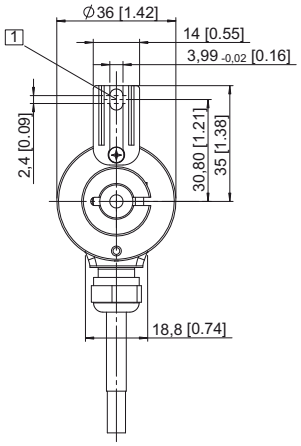
Cables and connectors, also pre-assembled, can be found in the chapter Connection Technology
Mounting attachments and couplings can be found in the chapter Accessories

New

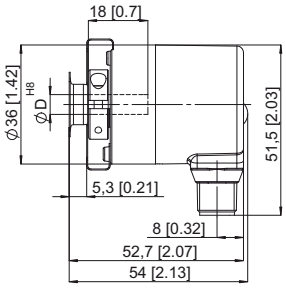
Sendix absolut, Singleturn Encoder Type 3651 (Shaft) / 3671 (Hollow shaft), analogue

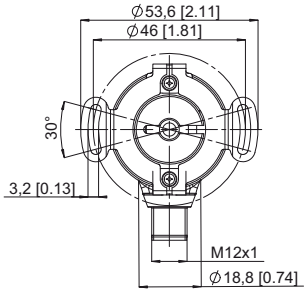
Dimensions hollow shaft version:
ø 36 mm, Flange with long torque stop





ø 36 mm, with stator coupling





1 Torque stop slot,
Recommendation: cyl. pin. acc. DIN 7 ø4

Order code hollow shaft version:

8 . 3 6 7 1 . X X X X . X X X X

Type

Flange
- 2 = Flange with long torque stop
- **5 = Flange with stator coupling**

Hollow shaft
- **2 = ø 6 mm**
- 3 = ø 6,35 (1/4")
- 4 = ø 8 mm
- 6 = ø 10 mm

Output circuit / Power supply
- **3 = Current output 18 ... 30 V DC**
- **4 = Voltage output 18 ... 30 V DC**

*Preferred types are indicated in **bold***

Option 1
- **1 = IP 67** (IP 69k on request)

Option 2
- **1 = Count direction cw***
- 2 = Count direction ccw*

Output
- **3 = 4 ... 20 mA**
- **4 = 0 ... 10 V**

Measurement range
- **1 = 1 x 360°**
- 2 = 1 x 180°
- 3 = 1 x 90°
- 4 = 1 x 45°

Type of connection
- **2 = Cable radial (1 m PUR)**
- 4 = M12 connector radial

*cw = increasing code values when shaft turning clockwise (cw). Top view on shaft
- seawater resistant version on request

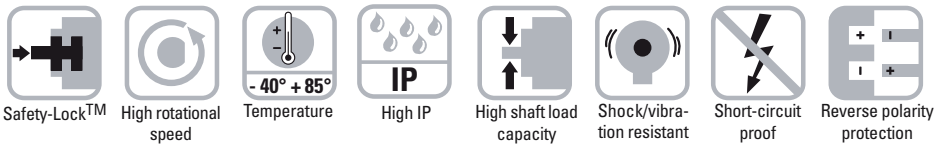
Cables and connectors, also pre-assembled, can be found in the chapter Connection Technology
Mounting attachments and couplings can be found in the chapter Accessories

New

Rotary Measuring Technology
Magnetic measurement system

Kübler

Sendix absolut, Singleturn Encoder Type M3658 (Shaft) / M3678 (Hollow shaft)



Safety-Lock™ | High rotational speed | Temperature | High IP | High shaft load capacity | Shock/vibration resistant | Short-circuit proof | Reverse polarity protection

Rugged

- **Ensures long service life and reliability of the application, no wear**
  Non-contact measuring system
- **Stays sealed even when subjected to harsh everyday use. Offers security against failures in the field**
  Solid die-cast housing with up to IP 69K protection
- **Can be used for a wide temperature range without additional expense.**
  Wide temperature range (-40 °C ... +85 °C)
- **Increased ability to withstand vibration and installation errors. Eliminates machine downtime and repairs.**
  High shock resistance (> 500g) and vibration resistance (>30g)
- **Can be used in outdoor applications with large fluctuations in temperature.**
  Resistant against humidity and condensation.

CANopen

Sendix® absolut RoHS Ex 2/22

Compact

- **Can be used where space is tight**
  Overall diameter of only 36 mm
- **<u>Shaft version:</u> can be mounted on a tight radius**
  Fixing holes on D26 mm
- **<u>Hollow shaft version:</u> compact encoder, ideal for large shafts**
  Blind hollow shaft up to 10 mm

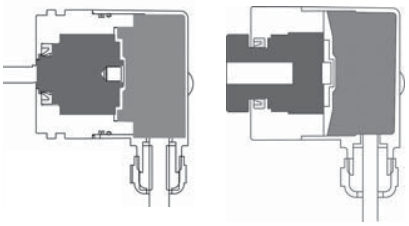
Versatile

- **Latest field bus performance for the applications**
  CANopen, with the latest profiles
- **The suitable connection variant for every specific case**
  M12 connector or cable connection or fixed connection with M12 connector,
- **Position, Speed, working area - The user decides which information is to be available in real-time**
  Variable PDO mapping in the memory
- **Fast, error-free start-up, no need to set switches**
  LSS services for configuration of the node address and baud rate via CIA DS 305 V2.0
  Node address, baud rate and termination can be programmed via the bus
- **<u>Hollow shaft version:</u> can be fixed individually**
  Torque stop and stator coupling available
- also available in **seawater resistant** version, certified acc. to salt-spray test IEC 68-2-11 => 672 hours.

Mechanical characteristics:

Max. speed:	6000 min^{-1}
Starting torque	< 0,06 Nm
Radial load capacity of shaft:	40 N
Axial load capacity of shaft:	20 N
Weight:	approx. 0,2 kg
Protection acc. to EN 60 529/ DIN 40050-9:	IP 67 / IP69k
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature range:	–40 °C ... +85 °C
Materials:	Shaft: stainless steel, Flange: aluminium, Housing: die cast zinc, Cable: PUR
Shock resistance acc. to DIN-IEC 68-2-27:	5000 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	300 m/s^2, 10 ... 2000 Hz
Permanent shock resistance acc. to DIN-IEC 68-2-29	1000 m/s^2, 2 ms
Vibration (broad-band random) to DIN-IEC 68-2-64	5 ... 2500 Hz, 100 m/s^2 - rms

All-round protection thanks to Safety-Lock*plus*™ and Sensor-Protect™ technology



Safety-Lock*plus*™:
IP69k protection on the flange side, robust bearing assemblies with interlocking bearings, mechanically protected shaft seal

Sensor-Protect™:
Fully encapsulated electronics, separate mechanical bearing assembly

New

Sendix absolut, Singleturn Encoder Type M3658 (Shaft) / M3678 (Hollow shaft)

General electrical characteristics:

Supply voltage:	8 ... 30 V DC
Current consumption (w/o output load):	24 V DC, max. 25 mA
Reverse polarity protection at power supply (Ub):	Yes
Measurement range:	360°
Linearity:	< 1°
Repeat accuracy:	< 0.1°
Data refresh:	400 µs
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4, EN 61000-6-3 and EN 61000-4-8 (behaviour under magnetic influence).	
RoHS compliant acc. to EU guideline 2002/95/EG	

Interface characteristics CANopen:

Resolution:	1 ... 16384 (14 bit), (scaleable: 1 ... 16384)
Default value:	16384 (14 bit)
Code:	Binary
Interface:	CAN High-Speed according to ISO 11898, Basic- and Full CAN CAN Specification 2.0 B
Protocol:	CANopen profile DS 406 V3.1 with manufacturer-specific add-ons LSS-Services DS305 V2.0
Baud rate:	10 ... 1000 kbit/s (Software configurable)
Node address:	1 ... 127 (Software configurable)
Termination switchable:	Software configurable
LSS Services:	CIA LSS protocol DS305 Global command support for node address and baud rate Selective commands via attributes of the identity object

Diagnostic LED (two-colour, red/green)

LED ON or blinking red: Error display
LED ON or blinking green: Status display

General information about CANopen

The CANopen encoders of the M3658 and M3678 series support the latest CANopen communication profile according to DS 301 V4.02 . In addition, device-specific profiles like the encoder profile DS 406 V3.1 are available.
The following operating modes may be selected: Polled Mode, Cyclic Mode, Sync Mode. Moreover, scale factors, preset values, limit switch values and many other additional parameters can be programmed via the CAN-Bus. When switching the device on, all parameters, which have been saved on a flash memory to protect them against power failure, are loaded again.
The following output values may be combined in a freely variable way as PDO (PDO mapping): **position,** as well as the **status of the working area**.
The encoders are available with a connector or a cable connection. The device address and baud rate can be set/modified by means of the software. The two-colour LED located on the back indicates the operating or fault status of the CAN bus, as well as the status of the internal diagnostics. Node address, baud rate and CANbus termination are programmable

CANopen Communication Profile DS301 V4.02

Among others, the following functionality is integrated:
Class C2 functionality
- NMT Slave
- Heartbeat Protocol
- Identity Object
- Error Behaviour Object
- Variable PDO Mapping self-start programmable (Power on to operational), 3 Sending PDO's
- Node address, baud rate and CANbus
- Programmable termination

CANopen Encoder Profile DS406 V3.1

The following parameters can be programmed:
- Event mode
- 1 work area with upper and lower limit and the corresponding output states
- Variable PDO mapping for position, speed, work area status
- Extended failure management for position sensing with integrated temperature control
- User interface with visual display of bus and failure status 1 LED two colours
- Customer-specific memory - 16 Bytes

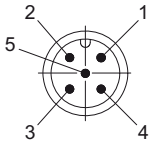
"Watchdog-controlled" device

LSS Layer Setting Services DS305 V2.0

- Global support of Node-ID and baud rate
- Selective protocol via identity object (1018h)

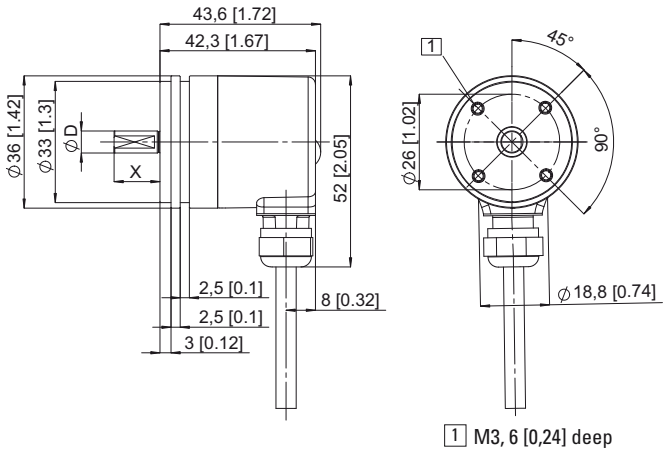
Terminal assignment:

Signal:	+Ub	0 V	CAN GND	CAN High	CAN Low
M12/Pin:	2	3	1	4	5
Col.:	BN	WH	GY	GN	YE

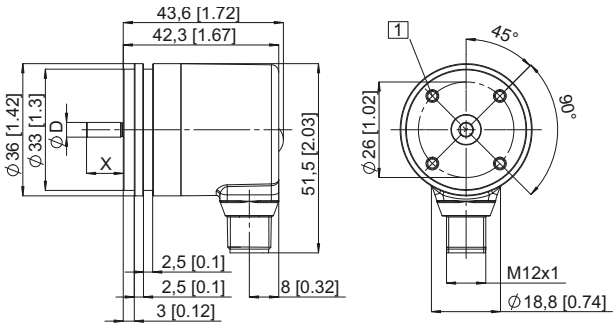


Sendix absolut, Singleturn Encoder Type M3658 (Shaft) / M3678 (Hollow shaft)

Dimensions shaft version:
ø 36 mm, Synchro flange



1 M3, 6 [0,24] deep



1 M3, 6 [0,24] deep

Order code shaft version:

8 . M 3 6 5 8 . X X X X . 2 1 X X

Type

Flange
2 = Synchro flange

Shaft (ø x L)
3 = ø 6 mm x 12,5 mm
5 = ø 6,35 (1/4") mm x 12,5 mm
6 = ø 8 x 12,5 mm

Output circuit / Power supply
C = CANopen DS301 V4.02 8 ... 30 V DC

Preferred types are indicated in ***bold***

Option 1
1 = IP67
2 = IP69k

Option 2
1 = Standard

Fieldbus profile
21 = CANopen encoder profile DS406 V3.1

Type of connection
2 = cable radial (1 m PUR)
4 = M12 connector radial
- seawater resistant version on request

Accessories

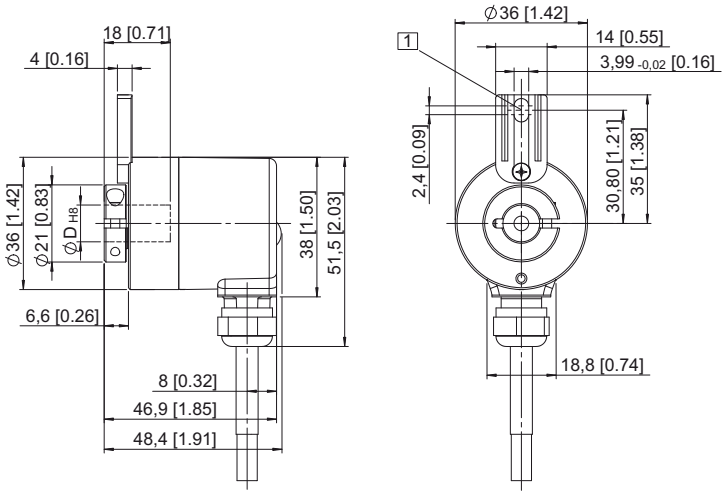
Corresponding mating connector:
05.B.8151-0/9

Cables and connectors, also pre-assembled, can be found in the chapter Connection Technology
Mounting attachments and couplings can be found in the chapter Accessories

New

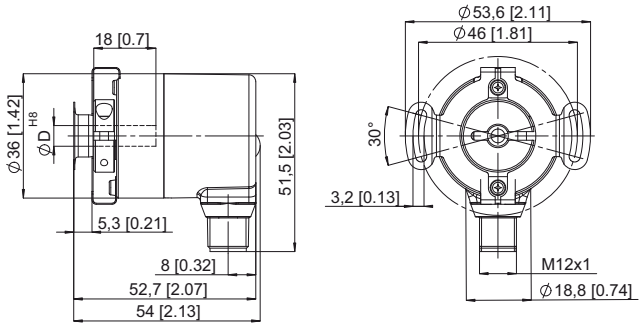
Sendix absolut, Singleturn Encoder Type M3658 (Shaft) / M3678 (Hollow shaft)

Dimensions hollow shaft version:
ø 36 mm, Flange with long torque stop



1 Torque stop slot,
Recommendation: cyl. pin. acc. DIN 7 ø4

ø 36 mm, Stator coupling



Order code hollow shaft version:

8 . M 3 6 7 8 . X X X X . 2 1 X X

10 by 10

Type

Flange
- 2 = Flange with long torque stop
- **5 = Flange with stator coupling**

Hollow shaft
- **2 = ø 6 mm**
- 3 = ø 6,35 (1/4")
- 4 = ø 8 mm
- 6 = ø 10 mm

Output circuit / Power supply
- **C = CANopen DS301 V4.02 8 ... 30 V DC**

Option 1
- **1 = IP67**
- 2 = IP69k

Option 2
- **1 = Standard**

Fieldbus profile
- **21 = CANopen encoder profile DS406 V3.1**

Type of connection
- 2 = cable radial (1 m PUR)
- **4 = M12 connector radial**

- seawater resistant version on request

Preferred types are indicated in ***bold***

Accessories

Corresponding mating connector:
05.B.8151-0/9

Cables and connectors, also pre-assembled, can be found in the chapter Connection Technology

Mounting attachments and couplings can be found in the chapter Accessories

Sendix absolut, Singleturn Type 5853 (Shaft) / 5873 (Hollow shaft), SSI/BiSS

Safety-Lock™ | High rotational speed | Temperature | High IP | HIgh shaft load capacity | Shock/vibration resistant | Magnetic field proof | Short-circuit proof | Reverse polarity protection | SIN/COS

Reliable

- **Increased ability to withstand vibration and installation errors. Eliminates machine downtime and repairs.**
  Sturdy "Safety-Lock™ Design" bearing structure
- **Fewer components and connection points increase the operational reliability**
  Kübler OptoASIC technology with highest integration density (Chip-on-Board)
- **Remains sealed even when subjected to harsh everyday use. Thus suitable also for outside use.**
  Resistant die cast housing and protection up to IP 67
- **Can be used in a wide temperature range without additional expense**
  Wide temperature range (-40°C...+90°C)
- **Easy diagnostic in case of trouble**
  Status indication by means of LED, sensor, voltage and temperature monitoring

Sendix® absolut

Fast

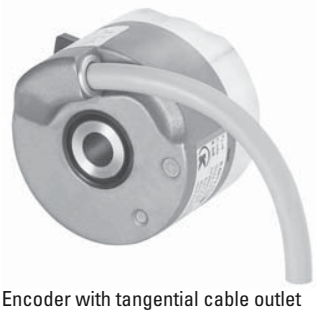
- **Can achieve particularly high accuracy in the applications**
  Update rate of the whole position value above 100 kHz for a max. jitter of 1 µs (real-time)
- **Allows high productivity thanks to very short regulation cycles**
  Clock rate with SSI up to 2 MHz, with BiSS up to 10 MHz
- **High-resolution feedback system achievable in real-time**
  SinCos incremental outputs

Versatile

- **The suitable connection variant for every specific case**
  Cable, M23 connector or M12 connector
- **Open interfaces ensure flexibility and independence**
  SSI or BISS with Sine-Cosine-Option
- **Reliable installation in a wide diversity of mounting application**
  Extensive choice of proven mounting options
- **Only the functionality really needed by the user is implemented**
  Status LED and Set key available as options
- **Fast and easy start-up on site**
  Set key or Preset by means of a control input
- **Hollow shaft version: direct mounting also on large diameter shafts**
  Through hollow shaft up to 15 mm
- also available in **seawater resistant** version, certified acc. to salt-spray test IEC 68-2-11 => 672 hours.

Mechanical characteristics:

Shaft version:	
Max. speed without shaft sealing (IP 65) up to 70 °C:	12 000 min^{-1}, continuous 10 000 min^{-1}
Max. speed without shaft sealing (IP 65) up to Tmax:	8 000 min^{-1}, continuous 5 000 min^{-1}
Max. speed with shaft sealing (IP 67) up to 70 °C:	11 000 min^{-1}, continuous 9 000 min^{-1}
Max. speed with shaft sealing (IP 67) up to Tmax:	8 000 min^{-1}, continuous 5 000 min^{-1}
Hollow shaft version:	
Max. speed without shaft sealing (IP 65) up to 70 °C:	9 000 min^{-1}, continuous 6 000 min^{-1}
Max. speed without shaft sealing (IP 65) up to Tmax:	6 000 min^{-1}, continuous 3 000 min^{-1}
Max. speed with shaft sealing (IP 67) up to 70 °C:	8 000 min^{-1}, continuous 4 000 min^{-1}
Max. speed with shaft sealing (IP 67) up to Tmax:	4 000 min^{-1}, continuous 2 000 min^{-1}
Starting torque without shaft sealing (IP65):	Shaft version: < 0.01 Nm Hollow shaft version: <0.03 Nm
Starting torque with shaft sealing (IP67):	< 0.05 Nm
Moment of inertia:	Shaft version: 3.0 x 10^{-6} kgm^2 Hollow shaft version: 6.0 x 10^{-6} kgm^2
Radial load capacity of shaft:	80 N
Axial load capacity of shaft:	40 N
Weight:	approx. 0.35 kg
Protection acc. to EN 60 529:	housing: IP 67, shaft: IP 65, opt. IP 67
EX approval for hazardous areas:	optional zone 2 and 22



Encoder with tangential cable outlet

Sendix absolut, Singleturn Type 5853 (Shaft) / 5873 (Hollow shaft), SSI/BiSS

Mechanical characteristics:

Working temperature:	–40° C ... +90 °C[1)]
Materials:	Shaft: stainless steel, Flange: aluminum, Housing: die cast zinc, Cable: PVC
Shock resistance acc. to DIN-IEC 68-2-27:	>2500 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	>100 m/s^2, 55 ... 2000 Hz

1) Cable versions: -30 °C ... + 75°C

General electrical characteristics:

Supply voltage:	5 V DC ± 5% or 10 ... 30 V DC
Current consumption (w/o output load):	5 V DC: max. 70 mA, 24 V DC: max. 20 mA
Reverse polarity protection at power supply (Ub):	Yes (only 10 ... 30 V DC)
UL certified	File 224618
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3	
RoHS compliant acc. to EU guideline 2002/95/EG	

General Interface characteristics:

Output driver:	RS 485 Transceiver type
Permissible load/channel:	max. ± 20 mA
Signal level high:	typ. 3.8 V
Signal level low at I_{load} = 20 mA:	typ. 1.3 V
Short circuit proof outputs:	Yes[2)]

Interface characteristics SSI:

Singleturn resolution:	10 … 14 bits and 17 bits[3)]
Code:	Binary or Gray
SSI clock rate:	≤ 14 bits: 50 kHz ... 2 MHz > 15 bits: 50 kHz ... 125 kHz
Monoflop time:	≥ 15 µs[3)]
Note:	
If clock starts cycling within monoflop time a second data transfer starts with the same data, useful for data verification. If clock starts cycling after monoflop time the data transfer starts with updated values. Max. update rate is depending on clock speed, data length and monoflop-time.	
Time jitter (data request to position latch):	< 1 µs up to 14 bits, 4 µs at 15 ... 17 bits
Status and Parity bit:	optional on request

Interface characteristics BiSS:

Singleturn resolution:	10…14 bits and 17 bits, customer programmable [3)]
Code:	Binary
Interfaces:	RS 485
Clock rate:	up to 10 MHz
Max. update rate:	< 10 µs, depending on clock speed and data length
Time jitter (data request to position latch):	≤ 1 µs
Note:	
– Bidirectional, programmable parameters are: resolution, code, direction, alarms and warnings	
– Multicycle data output, e.g. for temperature	
– CRC data verification	

2) Short circuit to 0V or to output, one channel at a time, supply voltage correctly applied

3) Other options upon request

SET (zero or defined value) and DIRection (CW/CCW) control inputs

Input characteristics:	High active
Receiver type:	Comparator
Signal level high:	min. 60 % of V+ (Supply voltage), max: V+
Signal level low:	max. 25% of V+ (Supply voltage)
Input current:	≤ 0.5 mA
Min. pulse duration (SET):	10 ms
Timeout after SET input:	14 ms
Reaction Time (DIR input):	1 ms

The encoder can be set to zero at any position by means of a HIGH signal on the SET input or by pressing the optional SET key. Other preset values can be factory-programmed. The SET input has a signal delay time of approx. 1 ms. Once the SET function has been triggered, the encoder requires an internal processing time of approx. 15 ms before the new position data can be read. During this time the LED is ON and the status output is at LOW.

Status output and LED

Output driver:	Open collector, internal pull up resistor 22 kOhm
Permissible load:	-20 mA
Signal level high:	+V
Signal level low:	< 1 V
Active at:	Low
The optional LED (red) and the status output serve to display various alarm or error messages. In normal operation the LED is OFF and the status output is HIGH (open-collector with int. pull-up 22k).	
If the LED is ON (status output LOW) this indicates:	
– Sensor error, singleturn or multiturn (soiling, glass breakage etc.)	
– LED error, failure or ageing	
– Over- or under-temperature	
– Undervoltage	
In the SSI mode, the fault indication can only be reset by switching off the power-supply to the device.	

DIR input

A HIGH signal switches the direction of rotation from the default CW to CCW. This inverted function can also be factory-programmed. If DIR is changed when the device is already switched on, then this will be interpreted as an error. The LED will come ON and the status output will switch to LOW.

Option incremental output (A/B), 2048 ppr

	Sin/Cos	RS422 (TTL compatible)
-3dB frequency:	400 kHz	400 kHz
Signal level:	1 Vpp (± 20%)	high: min. 2.5 V low: max. 0.5 V
Short circuit proof:	Yes[2)]	Yes[2)]

Power-on delay

After Power-ON the device requires a time of approx. 150 ms before valid data can be read.

Sendix absolut, Singleturn Type 5853 (Shaft) / 5873 (Hollow shaft), SSI/BiSS

Terminal assignment:
for output circuit 1 or 2 and type of connection 1, 2, 3 or 4 (2 control inputs, 1 status output)

Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	Stat	N/C	N/C	N/C	PE
Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	-	-	-	Shield
M23 PIN out:	1	2	3	4	5	6	7	8	9	10	11	12	PH

for output circuit 5 and type of connection 1, 2, 3 or 4 (2 control inputs, 1 status output, sensor outputs for voltage)

Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	Stat	N/C	0 V Sens	+Ub Sens	PE
Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	-	GY-PK	RD-BU	Shield
M23 PIN out:	1	2	3	4	5	6	7	8	9	10	11	12	PH

for output circuit 3, 4, 7 or 8 and type of connection 1, 2, 3 or 4 (2 control inputs, incremental track RS422 or sine/cosine)

Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	A	A inv	B	Binv	PE
Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU	Shield
M23 PIN out:	1	2	3	4	5	6	7	8	9	10	11	12	PH

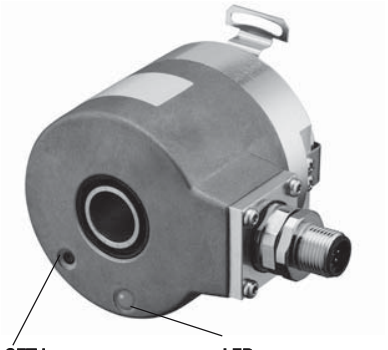
for output circuit 6 or 9 and type of connection 1, 2, 3 or 4 (Sine/cosine or incremental track, voltage sense outputs)

Signal:	GND	+V	+C	-C	+D	-D	A	A inv	B	B inv	0V Sens	+Ub Sens	PE
Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU	Shield
M23 PIN out:	1	2	3	4	5	6	7	8	9	10	11	12	PH

for output circuit 1 or 2 and type of connection 5 or 6 (2 control inputs)

Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	Shield/PE
M12 PIN out:	1	2	3	4	5	6	7	8	PH

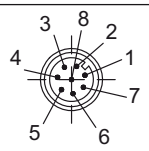
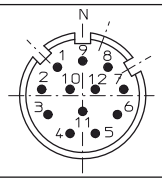
+V: Encoder Power Supply +V DC
GND: Encoder Power Supply Ground (0V)
+C, -C: Clock signal
+D, -D: Data signal
SET: Set input. The current position becomes defined as zero position
DIR: Direction input: If this input is active, output values are decreasing when shaft is turned clockwise.
Stat: Status output
PE: Protective earth
PH: Plug housing (shield)
A, Ainv: Sine output (incremental)
B, Binv: Cosine output (incremental)

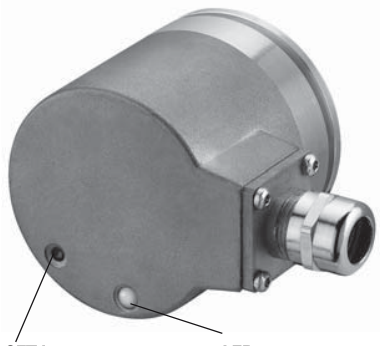


SET key:
For quick, simple on-site start-up

LED:
Status indication for sensor, voltage and temperature monitoring.

Top view of mating side, male contact base:

Type	8 pin M12 connector	12 pin M23 connector
View		
Corresponding mating connector:	05.CMB-8181-0	8.0000.5012.0000



SET key:
For quick, simple on-site start-up

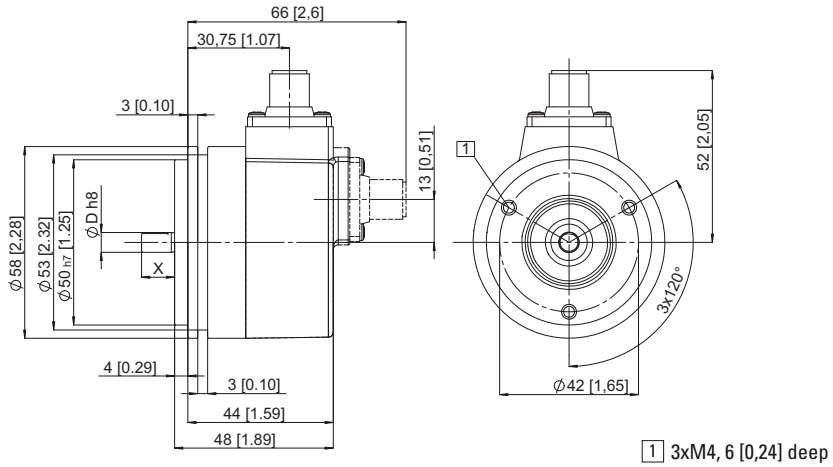
LED:
Status indication for sensor, voltage and temperature monitoring.

Sendix absolut, Singleturn Type 5853 (Shaft) / 5873 (Hollow shaft), SSI/BiSS

Dimensions shaft version:

Synchro flange

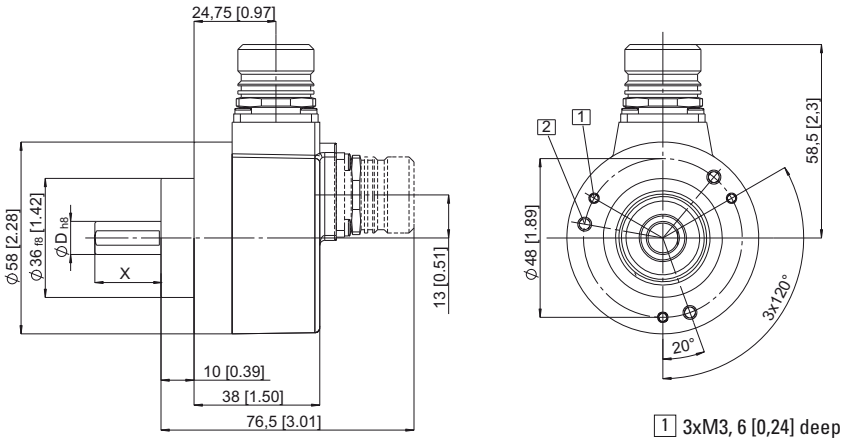
ø 58 mm, M12-, M23 Connector, cable versions
Flange type 2 and 4 (Drawing with M12 connector)



1 3xM4, 6 [0,24] deep

Clamping flange

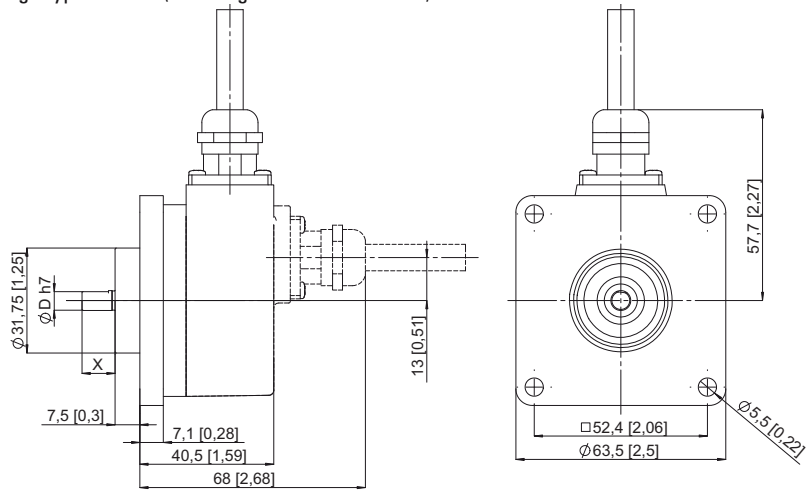
ø 58 mm, M12, M23 connector, cable versions
Flange type 1 and 3 (Drawing with M23 connector)



1 3xM3, 6 [0,24] deep
2 3xM4, 8 [0,32] deep

Square flange

63.5 mm □, M12, M23 connector, cable versions
Flange type 5 and 7 (Drawing with cable version)



Sendix absolut, Singleturn Type 5853 (Shaft) / 5873 (Hollow shaft), SSI/BiSS

Order code shaft version:

8.5853.XXXX.XXXX (10 by 10)

Type

Flange
- **1 = Clamping flange ø 58 IP 65**
- **2 = Synchro flange ø 58 mm, IP65**
- 3 = Clamping flange ø 58 mm, IP 67
- 4 = Synchro flange ø 58 mm, IP67
- 5 = Square flange 2,5" / 63,5 mm, IP 65
- 7 = Square flange 2,5" / 63,5 mm, IP 67

Shaft
- **1 = Shaft 6 mm x 10 mm (ø x L)[1]**
- **2 = Shaft 10 mm x 20 mm (ø x L)[2]**
- 3 = Shaft 1/4" x 7/8" (ø x L)
- 4 = Shaft 3/8" x 7/8" (ø x L)

Output circuit / Power supply
- 1 = SSI or BiSS interface, 5 V DC,
- **2 = SSI or BiSS, 10 … 30 V DC**
- 3 = SSI or BiSS, and 2048 ppr SinCos 5 V DC
- 4 = SSI or BiSS, and 2048 ppr SinCos 10 ... 30 V DC M23
- 5 = SSI or BiSS, 5 V DC, with sensor outputs for monitoring the supply voltage on the encoder
- 6= SSI or BiSS, and 2048 ppr SinCos 5 V DC, with sensor outputs for monitoring the supply voltage on the encoder
- 7 SSI or BiSS and 2048 ppr-incremental track RS422 (TTL-comp.), 5 V DC,
- 8 SSI or BiSS and 2048 ppr-incremental track RS422 (TTL-comp.), 10 ... 30 V DC,
- 9 = SSI or BiSS and 2048 ppr-incremental track RS422 (TTL-comp.), 5 V DC, with sensor outputs for monitoring the supply voltage on the encoder

[1] Preferred type with flange type 2
[2] Preferred type with flange type 1

Preferred types are indicated in ***bold***

Options (service)
- 1 = no option
- 2 = status LED
- **3 = SET button and status LED**

Input/output[3]
- **2 = SET, DIR inputs additional status output**

Resolution[3]
- A = 10 bits ST
- 1 = 11 bits ST
- 2 = 12 bits ST
- **3 = 13 bits ST**
- 4 = 14 bits ST
- 7 = 17 bits ST

Code
- B = SSI, binary
- C = BiSS, binary
- **G = SSI, Gray**

Type of connection
- 1 = axial cable (1 m PVC)
- 2 = radial cable (1 m PVC)
- 3 = 12 pin plug M23, axial
- **4 = 12 pin plug M23, radial**
- 5 = 8 pin plug M12, axial[4]
- 6 = 8 pin plug M12, radial[4]

- seawater resistant version on request
[3] Resolution, preset value and counting direction factory-programmable
[4] Can be combined only with output circuits 1 and 2

Accessories:

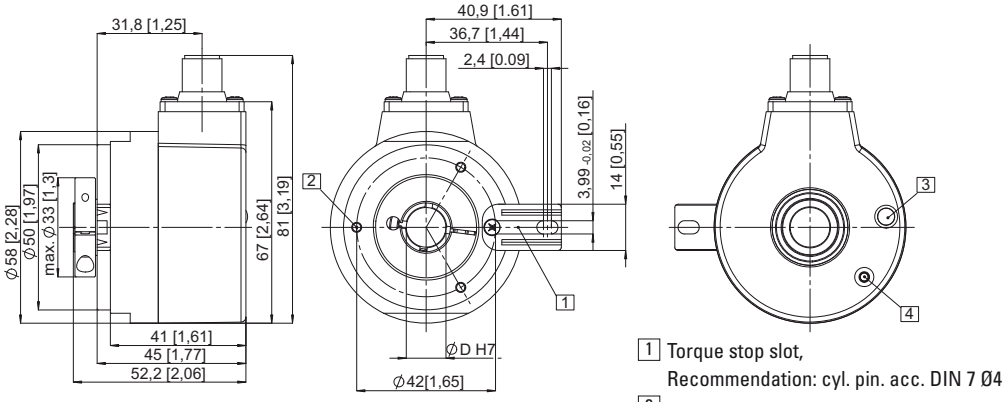
Cables / connectors: see Connection technology section
Mounting attachments / couplings: see Accessories section

Sendix absolut, Singleturn Type 5853 (Shaft) / 5873 (Hollow shaft), SSI/BiSS

Dimensions hollow shaft version:

Flange with long torque stop

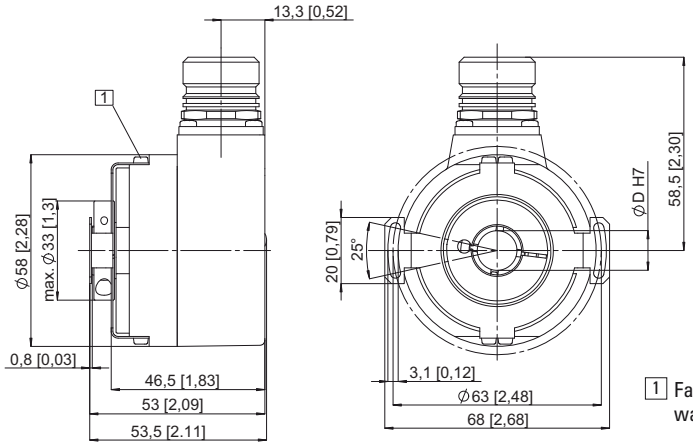
ø 58 mm, M12, M23 connector, cable versions
Flange type 1 and 2 (Drawing with M12 connector)



1 Torque stop slot, Recommendation: cyl. pin. acc. DIN 7 Ø4
2 M3, 6 [0,21] deep
3 Status LED
4 SET button

Flange with stator coupling

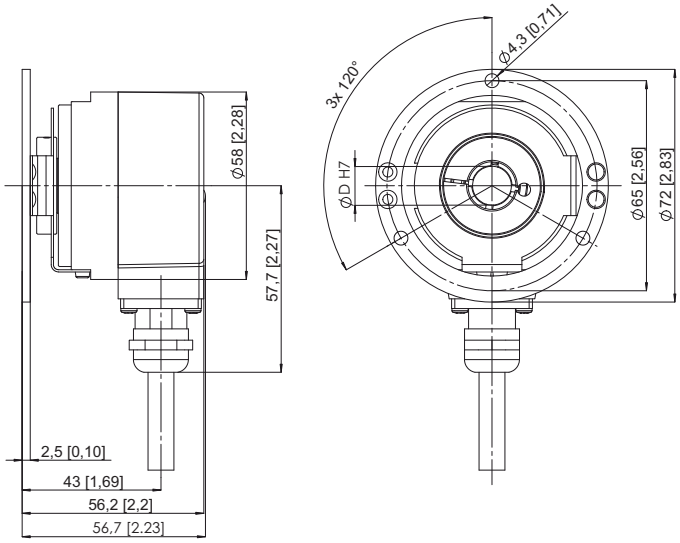
ø 58 mm, M12, M23 connector, cable versions
Flange type 5 and 6, pitch circle ø 63 mm (Drawing with M23 connector)



1 Fastening screw DIN 912 M3 x 8, washer included

Flange with stator coupling

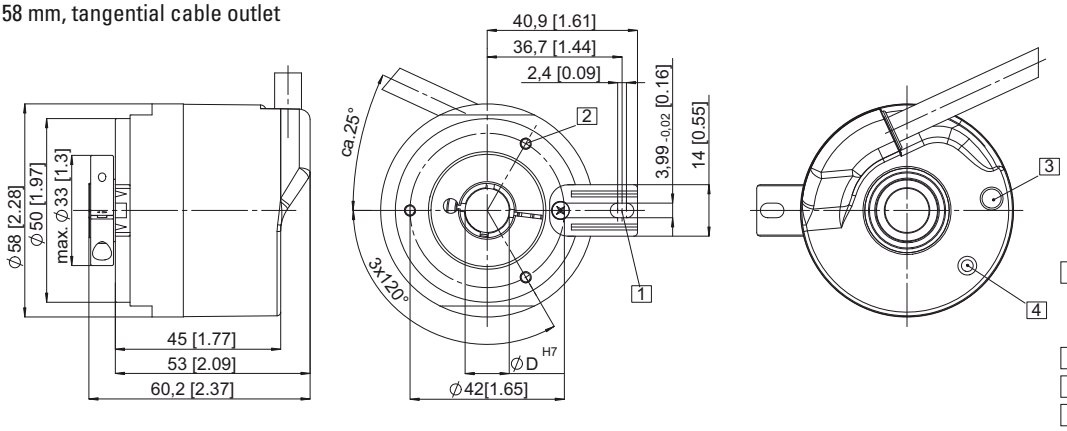
ø 58 mm, M12, M23 connector, cable versions
Flange type 3 and 4, pitch circle ø 65 mm (Drawing with cable version)



Sendix absolut, Singleturn Type 5853 (Shaft) / 5873 (Hollow shaft), SSI/BiSS

Dimensions hollow shaft version:
Flange with long torque stop

ø 58 mm, tangential cable outlet



1 Torque stop slot, Recommendation: cyl. pin. acc. DIN 7 ø4
2 M3, 5,5 [0,21] deep
3 Status LED,
4 SET button

Order code hollow shaft version:

8.5873.XXXX.XXXX

Preferred types are indicated in ***bold***

Type

Flange
- 1 = Flange with torque stop IP 65
- 2 = Flange with torque stop IP 67
- 3 = Flange with stator coupling pitch circle ø 65, IP 65
- 4 = Flange with stator coupling pitch circle ø 65, IP 67
- **5 = Flange with stator coupling pitch circle ø 63, IP 65**
- 6 = Flange with stator coupling pitch circle ø 63, IP 67

Hollow shaft
- 3 = ø 10 mm
- **4 = ø 12 mm**
- 5 = ø 14 mm
- 6 = ø 15 mm
- 8 = ø 9,52 mm [3/8"]
- 9 = ø 12,7 mm [1/2"]

Output circuit / Power supply
- 1 = SSI or BiSS interface, 5 V DC,
- **2 = SSI or BiSS, 10 … 30 V DC**
- 3 SSI or BiSS, and 2048 ppr SinCos 5 V DC
- 4 = SSI or BiSS, and 2048 ppr SinCos 10 ... 30 V DC M23
- 5 = SSI or BiSS, 5 V DC, with sensor outputs for monitoring the supply voltage on the encoder
- 6 = SSI or BiSS, and 2048 ppr SinCos 5 V DC, with sensor outputs for monitoring the supply voltage on the encoder
- 7 SSI or BiSS and 2048 ppr-incremental track RS422 (TTL-comp.), 5 V DC,
- 8 SSI or BiSS and 2048 ppr-incremental track RS422 (TTL-comp.), 10 ... 30 V DC,
- 9 = SSI or BiSS and 2048 ppr-incremental track RS422 (TTL-comp.), 5 V DC, with sensor outputs for monitoring the supply voltage on the encoder

Code
- B = SSI, binary
- C = BiSS, binary
- **G = SSI, Gray**

Input/output[3]
- **2 = SET, DIR inputs additional status output**

Resolution[3]
- A = 10 bits ST
- 1 = 11 bits ST
- 2 = 12 bits ST
- **3 = 13 bits ST**
- 4 = 14 bits ST
- 7 = 17 bits ST

Options (service)
- 1 = no option
- 2 = status LED
- **3 = SET button and status LED**

Type of connection
- 2 = radial cable (1 m PVC)
- **4 = 12 pin plug M23, radial**
- 6 = 8 pin plug M12, radial[4]
- E = Tangential cable outlet (1 m PVC cable)

- seawater resistant version on request
[3] Resolution, preset value and counting direction factory-programmable
[4] Can be combined only with output circuits 1 and 2

Accessories:

Cables / connectors: see Connection technology section
Mounting attachments / couplings: see Accessories section

Universal Type 5850 (Shaft) / 5870 (Hollow shaft), analogue, parallel

- Highest shock resistance on the market (≥2500 m/s^2, 6 ms acc. to DIN IEC 68-2-27)
- Parallel interface
- Divisions: up to 16384 (14 bits), singleturn
- Housing ø 58 mm
- Shaft version: IP 65
  Hollow shaft version: IP 66
- Various options (e.g. LATCH, SET...)
- Gray, Binary or BCD code
- Short-circuit proof outputs
- Patented new type of construction integrates all components; use of an opto-asic and 6-layer multilayer technology now on just a single PCB with resolution of up to 14 bits.
- Shaft version: Current interface 4 ... 20 mA

Mechanical characteristics:

Speed:	Shaft version: max. 12000 min^{-1} Hollow shaft version[1]: max. 6000 min^{-1}
Rotor moment of inertia:	Shaft version: approx. 1.8 x 10^{-6} kgm^2 Hollow shaft version: approx. 6 x 10^{-6} kgm^2
Starting torque:	Shaft version: < 0.01 Nm Hollow shaft version: <0.05 Nm
Radial load capacity of shaft:	80 N
Axial load capacity of shaft::	40 N
Weight:	approx. 0.4 kg
Protection acc. to EN 60 529:	Shaft version: IP 65 Hollow shaft verion: IP 66
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature:	-20° C ... +85 °C[2)3)]
Shaft:	stainless steel
Shock resistance acc. to DIN-IEC 68-2-27	2500 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	100 m/s^2, 10...2000 Hz

1) For continuous operation 1500 min^{-1}
2) 80 °C, shaft version and cable connection
3) 70 °C, hollow shaft version and cable connection

Electrical characteristics SSI or parallel interface:

Interface type:	Parallel	Parallel
Supply voltage (U_B):	5 V DC (± 5 %)	10 ... 30 V DC
Output driver:	Push-pull	Push-pull
Current consumption typ.:	109 mA	109 mA
(no load) max.:	169 mA	169 mA
Permissible load/channel:	max. +/- 10 mA	max. +/- 10 mA
Signal level high:	min.3.4 V	min. U_B – 2.8 V
Signal level low (I_{Load} = 10 mA):	max. 1.5 V	max. 1.8 V
(I_{Load} = 1 mA):	max. 0.3 V	-
Rise time t_r (without cable):	max. 0.2 µs	max. 1 µs
Fall time t_f (without cable):	max. 0.2 µs	max. 1 µs
Short circuit proof outputs:[1)]:	yes	yes
Reverse connection protection at U_B:	no	yes
UL certified	File 224618	
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3		
RoHS compliant acc. to EU guideline 2002/95/EG		

1) If supply voltage is correctly applied

Universal Type 5850 (Shaft) / 5870 (Hollow shaft), analogue, parallel

Terminal assignment (Parallel interface, up to 13 bits and max. 2 options, 17 pin plug):

Sig.:	0V	+UB	1	2	3	4	5	6	7	8	9	10	11	12	13	ST/ VR	VR/ LH		⏚	
Col.:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY PK	RD BU	WH GN	BN GN	WH YE	YE BN	WH GY			
Pin:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		PH	

Terminal assignment (Parallel interface, 14 bits and max. 2 options, cable version):

Sig.:	0V	+U_B	1	2	3	4	5	6	7	8	9	10	11	12	13	ST/ VR	VR/ LH	14	⏚	
Col.:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY PK	RD BU	WH GN	BN GN	WH YE	YE BN	WH GY	GY BN		

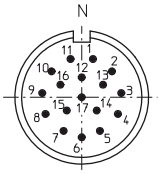
Terminal assignment (Parallel interface, 14 bits, 1 option, 17 pin plug):

Sig.:	0 V	+U_B	1	2	3	4	5	6	7	8	9	10	11	12	13	ST/ VR/ LH	14	⏚	
Pin:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	PH	

Sig.: 1 = MSB; 2 = MSB-1; 3 = MSB-2 etc.
ST: SET input. The current position value is stored as new zero position.
VR: Up/down input. As long as this input is active, decreasing code values are transmitted when shaft turning clockwise.
LH: LATCH input. High active. The current position is „frozen". It is statically available at the parallel output.
PH: Plug housing
Isolate unused outputs before initial start-up.

Top view of mating side, male contact base:

17 pin plug



Control inputs:

Up/down input to switch the counting direction

By default, if glancing at the shaft side, absolute encoders deliver increasing code values when shaft rotates clockwise (cw). When the shaft rotates counter-clockwise (ccw), the output delivers accordingly decreasing code values. The same applies to models with current interfaces. When the shaft rotates clockwise, the output delivers increasing current values, and decreasing values when it rotates counter-clockwise.

As long as the Up/down input receives the corresponding signal (high), this feature is reversed. Clockwise rotation will deliver decreasing code/current values while counter-clockwise rotation will delivers increasing code/current values.

The response time is :	for 5 V DC supply voltage, 0.4 ms for 10-30 V DC supply voltage, 2 ms.

Switching level of the control inputs:

Supply voltage:	5 V DC	10 ... 30 V DC
low	≤ 1.7 V	≤ 4.5 V
high	≥ 3.4 V	≥ 8.7 V

SET input

This input is used to reset (to zero) the encoder. A control pulse (high) sent to this input allows storing the current position value as new zero position in the encoder.
For models equipped with a current interface, the analogue output (4 ... 20 mA) will be set accordingly to the value 4 mA.
Note : before activating the SET input after supplying the encoder with the supply voltage, a counting direction (cw or ccw) must be defined univocally on the Up/down input!

The response time is :	for 5 V DC supply voltage, 0.4 ms for 10 ... 30 V DC supply voltage, 2 ms.

LATCH input

This input is used to „freeze" the current position value. The position value will be statically available on the parallel output as long as this input will remain active (high).

The response time is :	for 5 V DC supply voltage, 140 µs, for 10 ... 30 V DC supply voltage, 200 µs.

Universal Type 5850 (Shaft) / 5870 (Hollow shaft), analogue, parallel

Electrical characteristics current interface 4 ... 20 mA (Shaft version)

Sensor part		
Interface type:	4 ... 20 mA	4 ... 20 mA
Supply voltage (U_B):	10 ... 30 V DC	5 V DC
Current consumption typ.:	70 mA	70 mA
(no load) max.:	84 mA	84 mA

Current loop	
Supply voltage (Us):	10 ... 30 V DC
Analogue signal:	4 ... 20 mA
max. input resistance of the input circuit:	200 Ω (Us = 10 V), 1 kΩ (Us = 30 V)
Measuring range:	0 ... 360 °

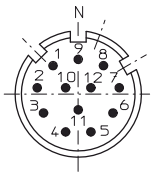
Max. Failure (25 °C):	0.2 °
Resolution:	13 Bit
Building up time:	max. 2 ms
Temperature coefficient:	0.1°/10 K
Current if detector error:	≤ 3.5 mA
Sensor and current loop are galvanically isolated	
UL certified	File 224618
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3	
RoHS compliant acc. to EU guideline 2002/95/EG	

Terminal assignment (Current interface 4 ... 20 mA, 12pin plug):

Sig.	0V	+UB	—	—	I+	I-	ST	VR					⏚
Col.:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY PK	RD BU	
Pin:	1	2	3	4	5	6	7	8	9	10	11	12	PH

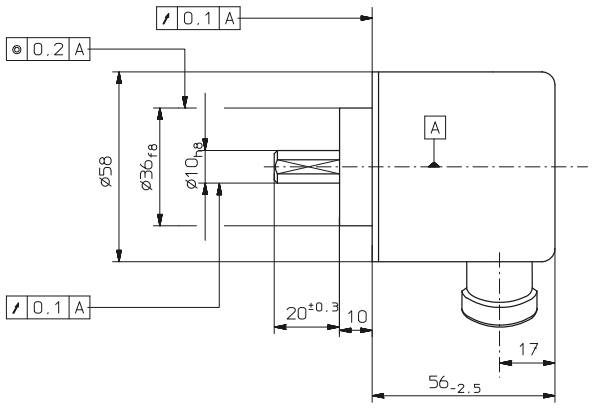
+I: Input of the current loop
-I: Output of the current loop
ST: SET input. The output current is set to 4 mA.
VR: Up/down input. As long as this input is active, decreasing current values are transmitted when shaft turning clockwise.
PH: Plug housing
Isolate unused outputs before initial start-up.

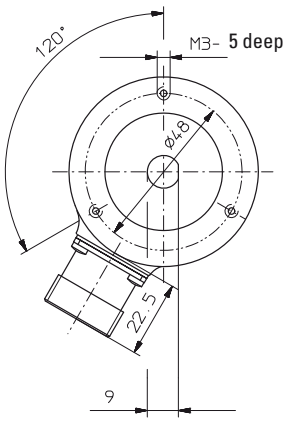
Top view of mating side, male contact base: 12 pin plug



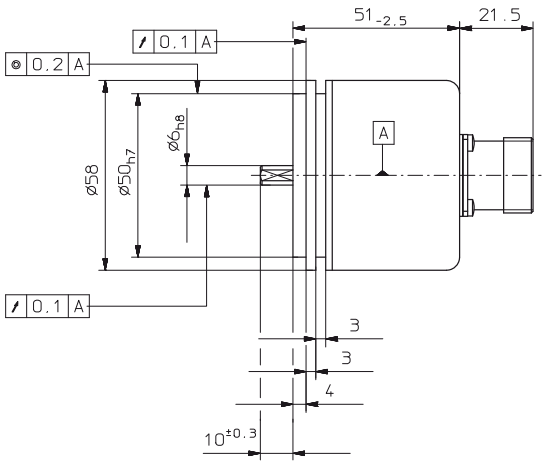
Dimensions shaft version

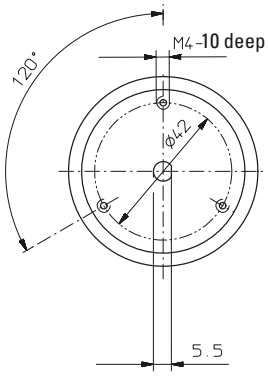
Clamping flange with shaft ø 10





Synchro flange with shaft ø 6 mm





Universal Type 5850 (Shaft) / 5870 (Hollow shaft), analogue, parallel

Order code shaft version: 8.5850.XXXX.XXXX

Type

Flange
- 1 = Clamping flange
- **2 = Synchronous flange**

Shaft (ø x L)
- **1 = ø 6 mm x 10 mm**
- 2 = ø 10 mm x 20 mm

Interface and supply voltage
- 3 = Parallel with 5 V supply voltage
- 4 = Parallel with 10 ... 30 V supply voltage
- 7 = 4 ... 20 mA with 5 V supply voltage
- **8 = 4 ... 20 mA with 10 ... 30 V supply voltage**

Options
- **2 = SET and V/R**
- 3 = SET and Latch[1)]
- 4 = V/R[1)] and Latch

ALARM output on request

[1)] for version with 14 bits parallel output and 17pin plug

Code type and division
- Gray/Binary
- 250, 360[1)], 500, 720[1)], 900, 1000[1)], 1024 (10 Bit)[1)], 1250, 1440, 1800, 2000, 2500, 2880, 3600[1)], 4000, 4096 (12 Bit)[1)], 5000, 7200, 8192 (13 Bit)[1)], 16384 (14 Bit)[1)]
- BCD
- 250, 360[1)], 500, 720[1)], 900, 1000[1)], 1024 (10 Bit)[1)], 1250, 1440, 1800, 2000
- Others on request
- [1)]Preferred types
- use corresponding table

Type of connection
- 1 = Cable axial (1 m PVC-cable)
- 2 = Cable radial(1 m PVC-cable)
- 3 = axial plug without mating connector
- **5 = radial plug without mating connector**

Accessories:
Corresponding mating connector
- with parallel interface, 17 pin
  Art.No 8.0000.5042.0000

Preferred types are indicated in ***bold***

Code type and division for encoder with parallel output
(Interface and supply voltage, version 3 or 4)

Division	Order code Gray/Gray-Excess	Order code Binary	Order code BCD
250	E02	B02	D02
360	**E03**	B03	D03
500	E05	B05	D05
720	E07	B07	D07
900	E09	B09	D09
1000	E01	B01	D01
1024 (10 Bit)	**G10**	**B10**	D10
1250	E12	BA2	DA2
1440	E14	BA1	DA1
1800	E18	B18	D18
2000	E20	B20	D20
2500	E25	B25	
2880	E28	B28	
3600	E36	B36	
4000	E40	B40	
4096 (12 Bit)	G12	B12	
5000	E50	B50	
7200	E72	B72	
8192 (13 Bit)	**G13**	B13	
16384 (14 Bit)	**G14**	**B14**	

Preferred divisions are indicated in bold

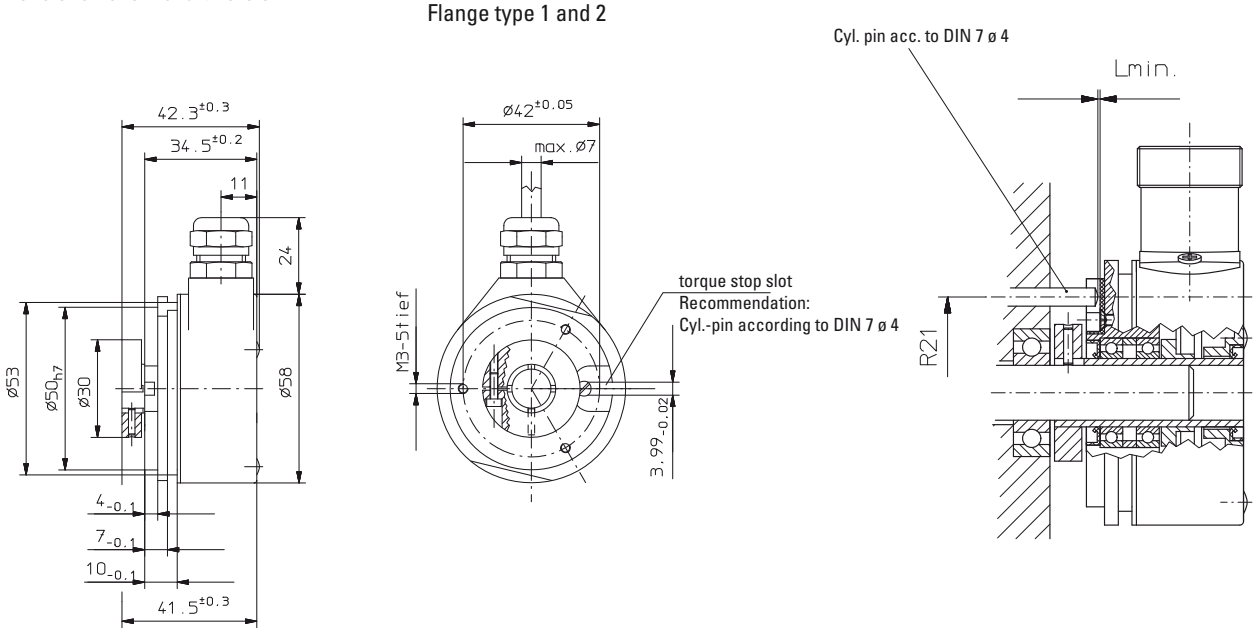
Code type and division for encoder with analogue output
Interface and supply voltage, version 7 or 8 (4 ... 20 mA)

8192 (13 Bit)	G13

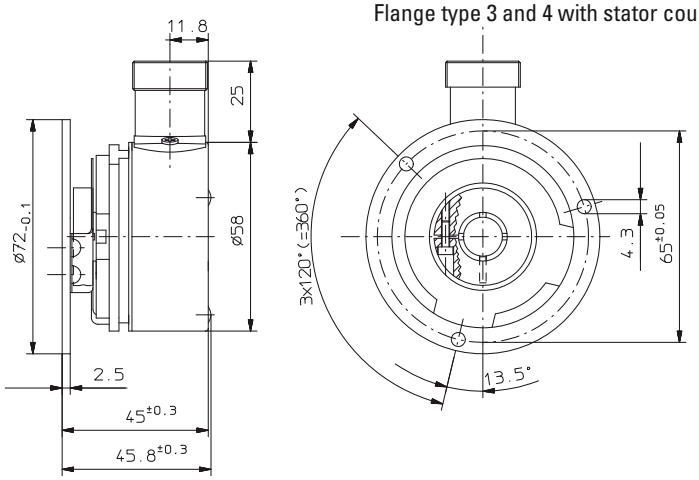
Universal Type 5850 (Shaft) / 5870 (Hollow shaft), analogue, parallel

Dimensions hollow shaft version

Flange type 1 and 2



Flange type 3 and 4 with stator coupling



Note: minimum insertion depth 1.5 x $D_{hollow\ shaft}$

Mounting advice:

1) The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time.

2) When mounting a hollow shaft encoder, we recommend using a torque stop pin or a stator coupling.

3) When mounting the encoder ensure that the dimension Lmin. is larger than the maximum axial play of the drive. Otherwise there is a danger that the device could mechanically seize up.

Universal Type 5850 (Shaft) / 5870 (Hollow shaft), analogue, parallel

Order code hollow shaft version: 8.5870.XXXX.XXXX

Type

Flange
- 1 = Flange type 1 with through shaft
- 2 = Flange type 1with blind hollow shaft
- **3 = Flange type 3 with stator coupling**
- 4 = Flange type 3 with blind hollow shaft

Hollow shaft
- **6 = ø 10 mm**
- **8 = ø 12 mm**

Interface and supply voltage
- 3 = Parallel with 5 V supply voltage
- **4 = Parallel with 10 ... 30 V supply voltage**

Preferred types are indicated in ***bold***

Options
- **2 = SET[1] and V/R**
- 3 = SET and Latch[1]
- 4 = V/R[1] and Latch

Alarm output on request

[1] for version with 14 bits parallel output and 17pin plug

Code type and division

Gray/Binary
250, 360[1], 500, 720[1], 900, 1000[1], 1024 (10 Bit)[1], 1250, 1440, 1800, 2000, 2500, 2880, 3600[1], 4000, 4096 (12 Bit)[1], 5000, 7200, 8192 (13 Bit)[1], 16384 (14 Bit)[1]

BCD
250, 360[1], 500, 720[1], 900, 1000[1], 1024 (10 Bit)[1], 1250, 1440, 1800, 2000

Others on request
[1]Preferred types
use corresponding table

Type of connection
- 1 = radial cable 1 m PVC-cable)
- **2 = radial plug without mating connector**

Code type and division with parallel output

Interface and supply voltage, version 3 or 4 (Parallel):

Division	Order code Gray/Gray-Excess	Order code Binary	Order code BCD
250	E02	B02	D02
360[1]	**E03**	B03	D03
500	E05	B05	D05
720[1]	E07	B07	D07
900	E09	B09	D09
1000[1]	E01	B01	D01
1024 (10 Bits)	**G10**	**B10**	D10
1250	E12	BA2	DA2
1440	E14	BA1	DA1
1800	E18	B18	D18
2000	E20	B20	D20
2500	E25	B25	
2880	E28	B28	
36001)	E36	B36	
4000	E40	B40	
4096 (12 Bits)	G12	B12	
5000	E50	B50	
7200	E72	B72	
8192 (13 Bits)	**G13**	B13	
16384 (14 Bit)	**G14**	**B14**	

Preferred divisions are indicated in bold

Accessories:
Corresponding mating connector
- with parallel interface, 17 pin
  Art.No 8.0000.5042.0000

Mounting set:
Ord.-No. 8.0010.4600.0000
Stator coupling two wings
for high dynamic application
Order-No.: 8.0010.4D00.0000
Tether arm short
Order-No.: 8.0010.4R00.0000

Standard Type 5852 (Shaft) / 5872 (Hollow shaft)

- Parallel interface
- Improved EMC characteristics
- Divisions: up to 2000 Gray-Excess or up to 16384 (14 bits) Gray, singleturn
- ø 58 mm shaft version
- Shaft version: IP 65
  Hollow shaft version: IP 66
- Count direction reversible
- Temperature and ageing compensation
- Short-circuit proof outputs
- Integrative Technology®
  Patented new type of construction integrates all components; use of an opto-asic and 6-layer multilayer technology now on just a single PCB:
  - Improved EMC characteristics
  - Highest shock resistance on the market (≥2500 m/s2, 6 ms acc. to DIN IEC 68-2-27)
- resolution up to 14 bits.

Mechanical characteristics:

Speed:	Shaft version: max. 12000 min^{-1} Hollow shaft version[1]: max. 6000 min^{-1}
Rotor moment of inertia:	Shaft version: approx. 1.8 x 10-6 kgm^2 Hollow shaft version: approx. 6 x 10^{-6} kgm^2
Starting torque:	Shaft version: < 0.01 Nm Hollow shaft version: < 0.05 Nm
Radial load capacity of shaft*:	80 N
Axial load capacity of shaft:*:	40 N
Weight:	approx. 0.4 kg
Protection acc. to EN 60 529:	Shaft version: IP 65 Hollow shaft version: IP66
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature:	-20° C ... +80 °C[2)3)]
Shaft:	stainless steel
Shock resistance acc. to DIN-IEC 68-2-27	2500 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	100 m/s^2, 10 ... 2000 Hz

1) For continuous operating 1500 min^{-1}
2) 70 °C for 14 bit version
3) Non-condensing

Electrical characteristics:

Interface type:	Parallel	Parallel
Supply voltage (U_B):	5 V DC (± 5 %)	10 ... 30 VD C
Output driver:	CMOS-TTL	Push-pull
Current consumption type.:	40 mA	100 mA
(no load) max.:	75 mA	159 mA
Permissible load/channel:	max. +0.5/–2 mA	max. +/-10 mA
Refresh rate of the position data:	40.000/s	40.000/s
Signal level high:	min.3.4 V	min. U_B – 2.8 V
Signal level low	max. 0.3 V	max. 1.8 V
Rise time t_r (without cable):	max. 0.2 µs	max.1 µs
Fall time t_f (without cable):	max. 0.2 µs	max. 1 µs
Short circuit proof outputs:[1)]:	yes	yes
Reverse connection protection at UB:	no	yes
UL certified File 224618		
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3		
RoHS compliant acc. to EU guideline 2002/95/EG		

1) If supply voltage correctly applied U_B

Reverse count direction:
(Only with output type 3 and up to 13 bits Gray code available)

Normal operation:
Rising code values when shaft turning clockwise (cw). Falling code values when shaft turning counterclockwise (ccw)

Reverse operation:
Output MSB inverted (pin 16) instead of output MSB (pin 3) connected. Falling code values when shaft turning clockwise (cw). Rising code values when shaft turning counterclockwise (ccw), top view of shaft.

Standard Type 5852 (Shaft) / 5872 (Hollow shaft)

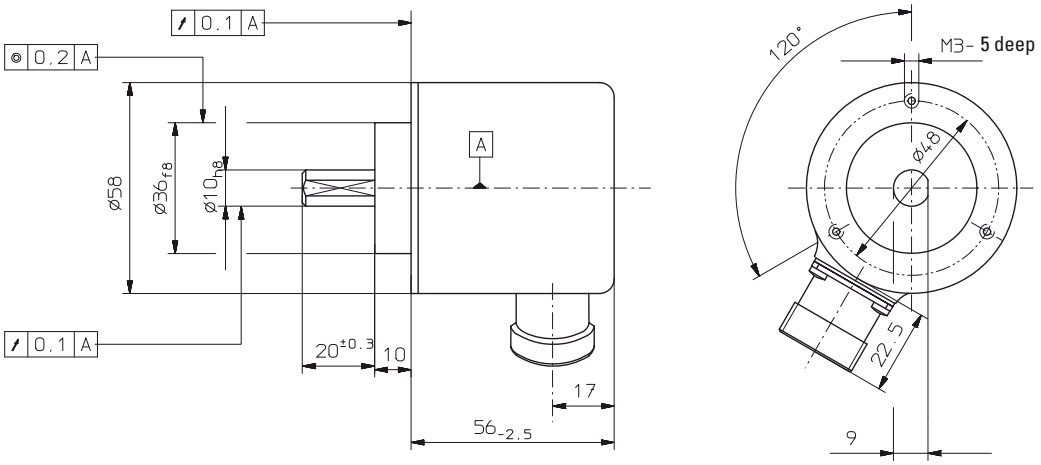
Terminal assignment

Sig.:	0V	+U_B	1	2	3	4	5	6	7	8	9	10	11	12	13	14/I		⏚	
Col.:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY PK	RD BU	WH GN	BN GN	WH YE	YE BN			
Pin:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	PH	

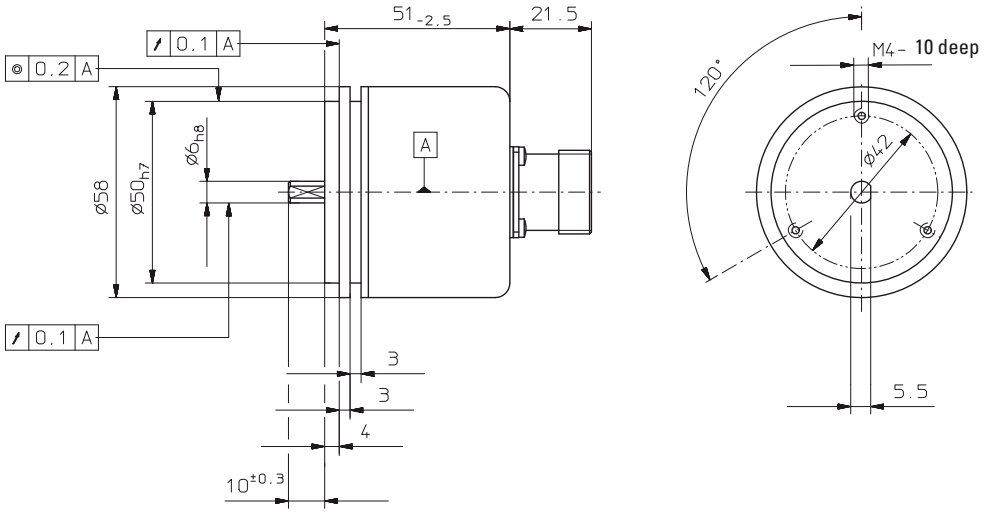
- Signal: 1 = MSB; 2 = MSB-1; 3 = MSB-2 etc.
- $\overline{1}$: Only for output type 3 up to 13 bits. $\overline{MSB}$ to reverse the count direction
- PH: Plug housing
- Isolate unused outputs before initial start-up

Dimensions shaft version:

Clamping flange with shaft ø 10



Synchronous flange with shaft ø 6 mm



Mounting advice:

The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time! We recommend the use of suitable couplings (see Accessories section).

Standard Type 5852 (Shaft) / 5872 (Hollow shaft)

Order code shaft version: 8.5852.XXXX.XXXX

Type

Flange
- 12 = Clamping flange with shaft ø 10 x 20 mm
- **21 = Synchronous flange with shaft ø 6 x 10 mm**

Interface and supply voltage
- 1 = Parallel (CMOS-TTL) with 5 V supply voltage
- **3 = Parallel with 10 ... 30 V supply voltage**

Options
- 1 = no options
- Available options on request

Division and code type
- **E03 = 360 Gray-Excess**
- E01 = 1000 Gray-Excess
- E14 = 1440 Gray-Excess
- E20 = 2000 Gray-Excess
- **G10 = 1024 (10 bits) Gray**
- G12 = 4096 (12 bits) Gray
- **G13 = 8192 (13 bits) Gray**
- G14 = 16384 (14 bits) Gray
- Others on request

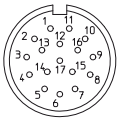
Type of connection
- 1 = axial cable (1 m PVC-cable)
- 2 = radial cable (1 m PVC-cable)
- 3 = axial plug without mating connector
- **5 = radial plug without mating connector**

Preferred types are indicated in ***bold***

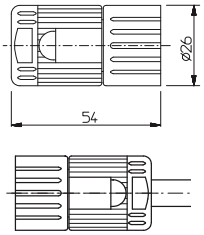
Accessories

Corresponding mating connector to Type of connection 3 or 5,
17 pin: Order-No. 8.0000.5042.0000
pin assignment ccw
Corresponding mating connector with cable pre-assembled: Order-No. 8.0000.6741.XXXX (XXXX = length [m])
Set includes Connector type 8.0000.5042.0000 and cable type 8.0000.6700.XXXX (Cable PVC 18 x 0.14 mm^2)

PIN allocation:

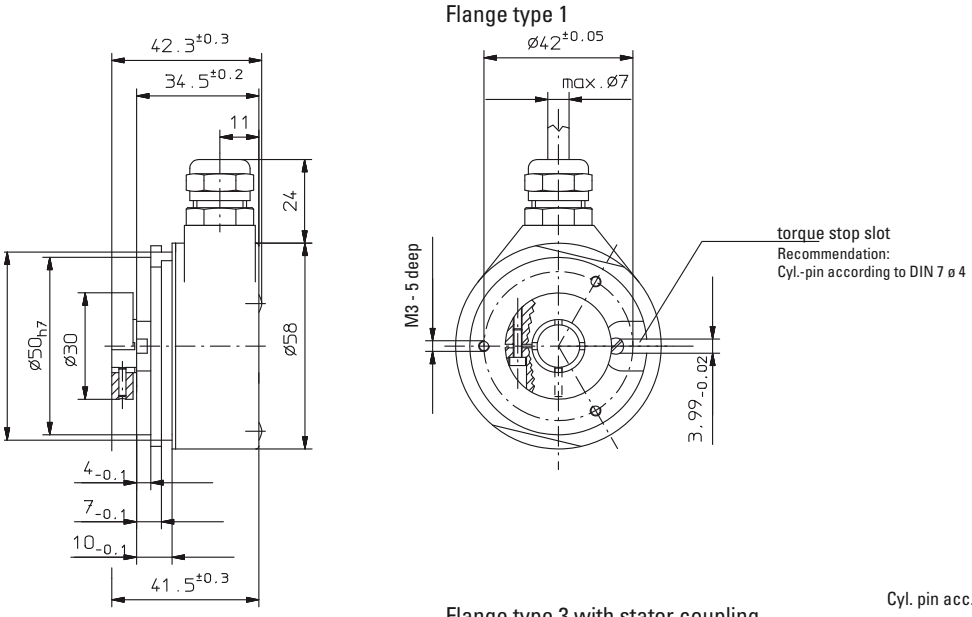


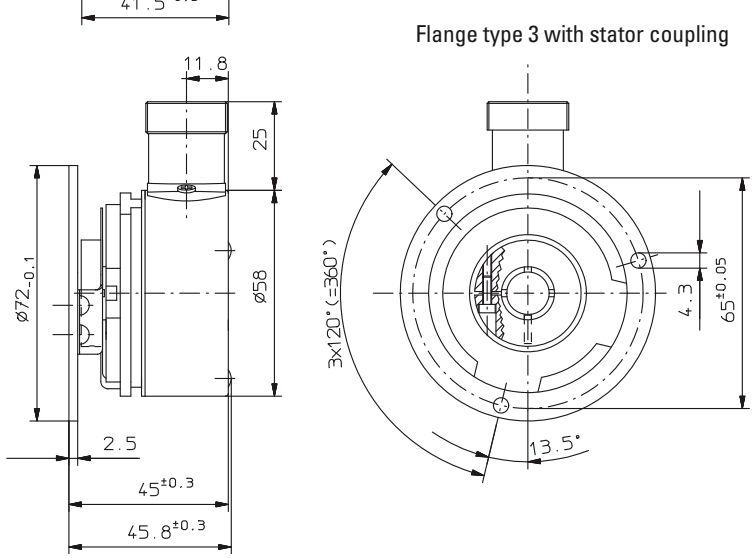
Dimensions:

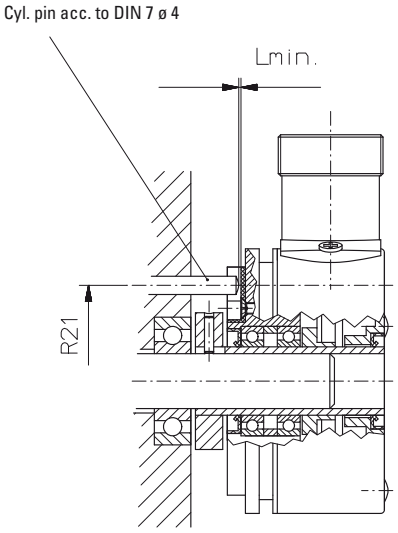


Standard Type 5852 (Shaft) / 5872 (Hollow shaft)

Dimensions hollow shaft version:







Note: minimum insertion depth 1.5 x $D_{hollow\ shaft}$

Mounting advice:

1) The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time.

2) Mounting a hollow shaft encoder, we recommend using a torque stop pin or a stator coupling.

3) When mounting the encoder ensure that the dimension Lmin. is larger than the maximum axial play of the drive. Otherwise there is a danger that the device could mechanically seize up.

Standard Type 5852 (Shaft) / 5872 (Hollow shaft)

Order code hollow shaft version: 8.5872.XXXX.XXXX

Type

Flange
- 1 = Flange type 1 with through shaft
- **3 = Flange type 3 with stator coupling**

Hollow shaft
- 6 = ø 10 mm
- **8 = ø 12 mm**

Interface and supply voltage
- 1 = Parallel (CMOS-TTL) with 5 V supply voltage
- **3 = Parallel with 10 ... 30 V supply voltage**

Options
- 1 = no options, available on request

Division and code type
- **E03 = 360 Gray-Excess**
- E01 = 1000 Gray-Excess
- E14 = 1440 Gray-Excess
- E20 = 2000 Gray-Excess
- **G10 = 1024 (10 Bit) Gray**
- G12 = 4096 (12 Bit) Gray
- **G13 = 8192 (13 Bit) Gray**
- G14 = 16384 (14 Bit) Gray
- Other on request

Type of connection
- 1 = radial cable (1 m PVC-cable)
- **2 = radial plug without mating connector**

Preferred types are indicated in ***bold***

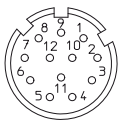
Accessories:

Cables and connectors, also pre-assembled, can be found in the chapter Connection Technology
Mounting attachments and couplings can be found in the chapter Accessories

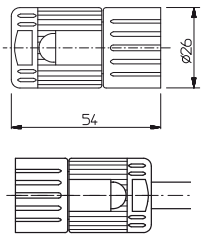
Accessories

Corresponding mating connector to Type of connection 2,
17 pin: Order-No. 8.0000.5042.0000
pin assignment ccw
Corresponding mating connector with cable pre-assembled: Art.- No. 8.0000.6741.XXXX (XXXX = length [m])
Set includes Connector typ 8.0000.5042.0000 and cable type 8.0000.6700.XXXX
(Cable PVC 18 x 0.14 mm²)

PIN allocation:



Dimensions:



Mounting kit for hollow shaft encoder ø 58 mm:
Various mounting variations can be supplied
Delivery includes:
- 1 x cylindric pin with thread
  Ord.-No. 8.0010.4700.0000
- 1 x mounting flanges
  Order-No.T.035.009
- Screw M3x5
  Ord.-No. N.630.305
- 1 x long torque support slot
  Ord.-No. T.051.672

Complete set:
Ord.-No. 8.0010.4600.0000

Stator coupling two wings
– For high dynamic application
Includes:
- 1x stator coupling two wings
- 2x 2 screws

Complete set:
Order-No.: 8.0010.4D00.0000

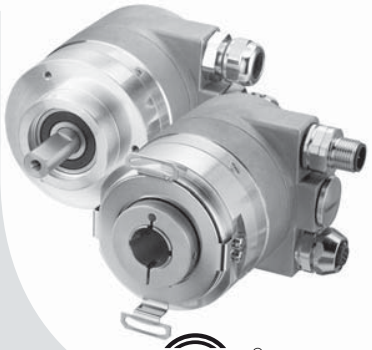
Tether arm short
Order-No.: 8.0010.4R00.0000

Sendix absolut, Singleturn Type 5858 (Shaft) / 5878 (Hollow shaft), Profibus-DP

Safety-Lock™ | High rotational speed | Temperature | High IP | High shaft load capacity | Shock/vibration resistant | Magnetic field proof | Short-circuit proof | Reverse polarity protection

Reliable

- **Increased ability to withstand vibration and installation errors. Eliminates machine downtime and repairs.**
  Sturdy "Safety-Lock™ Design" bearing structure
- **Fewer components and connection points increase the operational reliability**
  Kübler OptoASIC technology with highest integration density (Chip-on-Board)
- **Remains sealed, even in the roughest environments, ensures highest safety against field breakdowns**
  Resistant die cast housing and protection up to IP 67
- **Can be used in a wide temperature range without additional expense**
  Wide temperature range



Sendix® absolut

Fast

- **Fast data availability while reducing the load on the bus and the control**
  Intelligent functions like the transmission of speed, acceleration or exiting a working area
- **Fast, simple and error-free connection**

Versatile

- **Up-to-the minute field bus performance in the application**
  Profibus-DPV0 with the current encoder profile supports Class 1 and Class 2
  Enhanced programming possibilities
- **Connection options**
  Bus cover with M12 connector or cable connection
- **Fast start-up** with pre-defined GSD file
  A variety of scaling options for the most diverse applications
  16 bit singleturn resolution
  Comprehensive diagnostics, programmable to Class 2
- **Reliable installation in a wide diversity of mounting situations**
  Extensive choice of proven mounting options
- also available in **seawater resistant** version, certified acc. to salt-spray test IEC 68-2-11 => 672 hours.

Mechanical characteristics:

Max. speed without shaft seal (IP 65) up to 70 °C:	9 000 min^{-1}, continuous 7 000 min^{-1}
Max. speed without shaft seal (IP 65) up to Tmax:	7 000 min^{-1}, continuous 4 000 min^{-1}
Max. speed with shaft seal (IP 67) up to 70 °C:	8 000 min^{-1}, continuous 6 000 min^{-1}
Max. speed with shaft seal (IP 67) up to Tmax:	6 000 min^{-1}, continuous 3 000 min^{-1}
Starting torque without shaft seal (IP65):	< 0.01 Nm
Starting torque with shaft seal (IP67):	Shaft version: < 0,05 Nm Hollow shaft version: <0.03 Nm
Moment of inertia:	Shaft version: 3.0 x 10^{-6} kgm^2 Hollow shaft version: 6.0 x 10^{-6} kgm^2
Radial load capacity of shaft:	80 N
Axial load capacity of shaft:	40 N
Weight:	approx. 0.53 kg with bus terminal cover approx. 0.50 kg with fixed connection
Protection acc. to EN 60 529:	housing: IP 67, shaft: IP 65, opt. IP 67
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature:	–40° C ... +80 °C
Materials:	Shaft: stainless steel, Flange: aluminium, Housing: die cast zinc
Shock resistance acc. to DIN-IEC 68-2-27:	>2500 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	>100 m/s^2, 55 ... 2000 Hz

Sendix absolut, Singleturn Type 5858 (Shaft) / 5878 (Hollow shaft), Profibus-DP

General electrical characteristics:

Supply voltage:	10 ... 30 V DC
Current consumption (w/o output load):	24 V DC, max.90 mA
Reverse polarity protection at power supply (Ub):	Yes
UL certified	File 224618
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3	
RoHS compliant acc. to EU guideline 2002/95/EG	

SET control button (zero or defined value, option)

Protected against accidental activation, can only be pushed in with the tip of a ball pen or similar.

Diagnostic LED (yellow)

LED on with:
Sensor error: Profibus error

Interface characteristics Profibus-DP

Singleturn resolution (max, scaleable):	1 ... 65536 (16 bits), default scale value is set to 8192 (13 bits)
Code:	Binary
Interface:	Specification according to Profibus-DP 2.0 Standard (DIN 19245 part 3)
Protocol:	Profibus Encoder Profile V1.1 Class 1 and Class 2 with manufacturer-specific enhancements

Baud rate:	12 Mbits/s
Node address:	1 ... 127 (set by rotary switches)
Termination switchable:	Set by DIP switches

Profibus Encoder-Profile V1.1

The PROFIBUS-DP device profile describes the functionality of the communication and the user-specific component within the PROFIBUS field bus system. For encoders, the encoder profile is definitive. Here the individual objects are defined independent of the manufacturer. Furthermore, the profiles offer space for additional manufacturer-specific functions; this means that PROFIBUS-compliant device systems can be used now with the guarantee that they are ready for the future too.

The following parameters can be programmed:

- Direction of rotation
- Scaling/Number of steps per revolution
- Preset value
- Diagnostics mode

The following functionality is integrated:

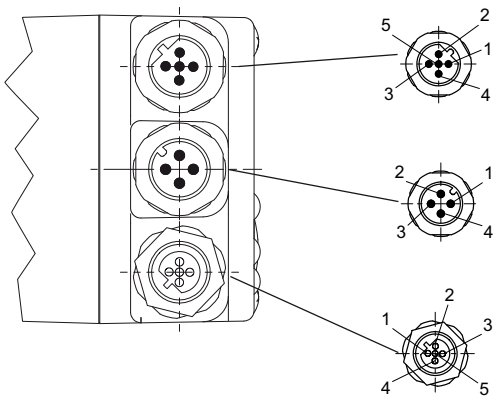
- Galvanic isolation of the bus stage with DC/DC converter
- Line driver acc. to RS 485 max. 12 MB
- Address programmable via DIP switches
- Diagnostics LED
- Full Class 1 and Class 2 functionality

Terminal assignment with terminal box:

Signal :	BUS IN				BUS OUT				
	B	A	0 V	+ V	0 V	+ V	B	A	
Pin :	1	2	3	4	5	6	7	8	

Shield must be connected to the cable gland (with the contact surface as large as possible)

Terminal assignment M12 connector version:



Bus in:

Signal :	–	BUS-A	–	BUS-B	Shield
Pin:	1	2	3	4	5

Power supply:

Signal :	U_B	–	0 V	–
Pin:	1	2	3	4

Bus out:

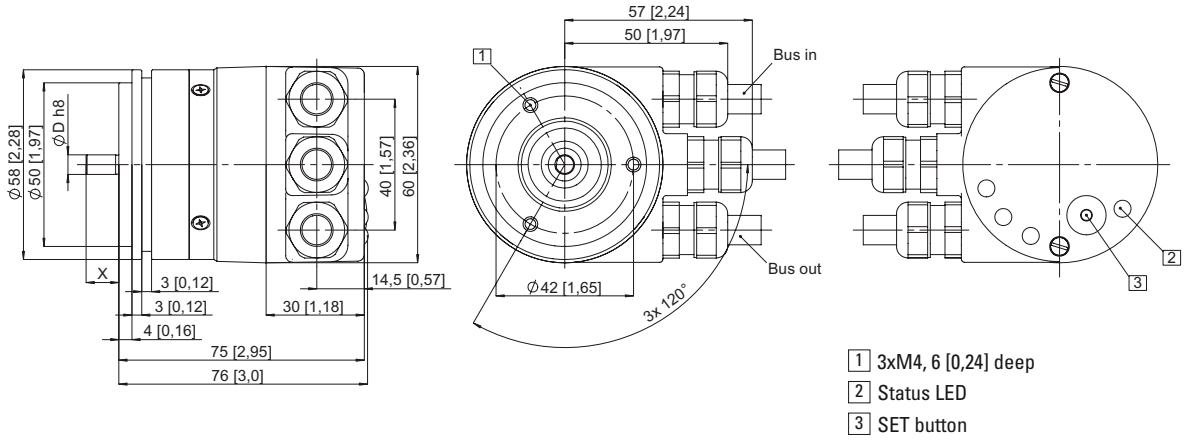
Signal :	BUS_VDC[1)]	BUS-A	BUS_GND[1)]	BUS-B	Shield
Pin:	1	2	3	4	5

1) for powering an external Profibus-DP terminating resistor

Sendix absolut, Singleturn Type 5858 (Shaft) / 5878 (Hollow shaft), Profibus-DP

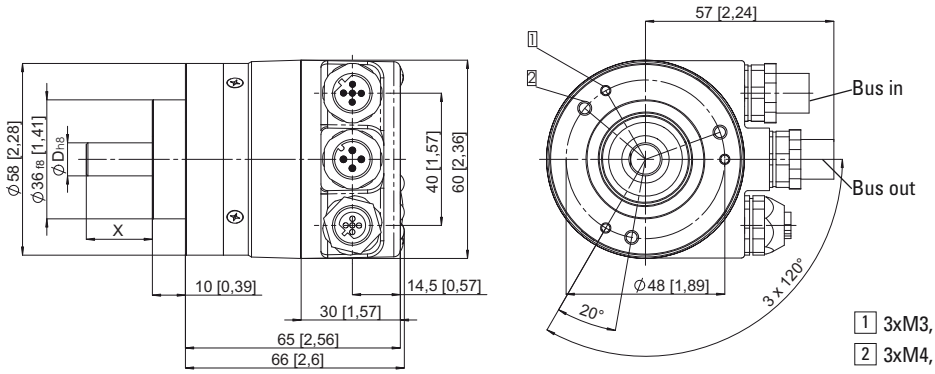
Dimensions shaft version:

With removable bus terminal cover:
ø 58 mm, Synchro flange
Flange type 2 and 4 (Drawing with cable version)



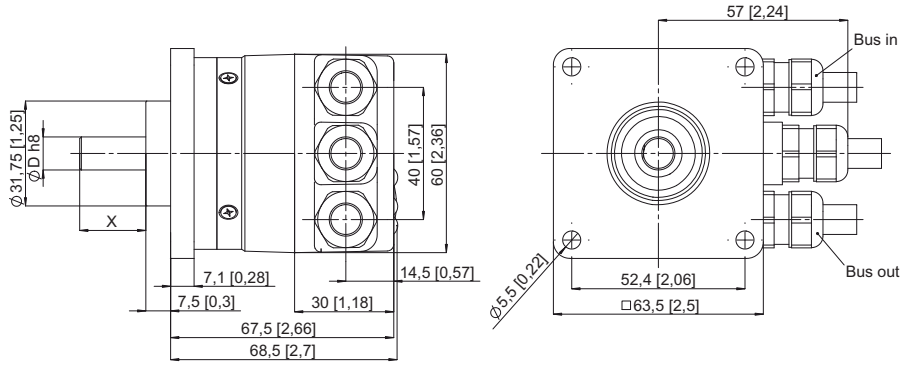
1 3xM4, 6 [0,24] deep
2 Status LED
3 SET button

ø 58 mm, Clamping flange
Flange type 1 and 3 (Drawing with 2 x M12 connector)



1 3xM3, 6 [0,24] deep
2 3xM4, 4 [0,31] deep

63,5 mm □, Square flange
Flange type 5 and 7 (Drawing with cable version)



Sendix absolut, Singleturn Type 5858 (Shaft) / 5878 (Hollow shaft), Profibus-DP

Order code shaft version:

8.5858.XXXX.XX1X

10 by 10

Type

Flange
- **1 = Clamping flange ø 58 IP 65**
- **2 = Synchro flange ø 58 mm, IP65**
- 3 = Clamping flange ø 58 mm, IP 67
- 4 = Synchro flange ø 58 mm, IP67
- 5 = Square flange 2,5" / 63,5 mm, IP 65
- 7 = Square flange 2,5" / 63,5 mm, IP 67

Shaft
- **1 = Shaft 6 mm x 10 mm (ø x L)[1)]**
- **2 = Shaft 10 mm x 20 mm (ø x L)[2)]**
- 3 = Shaft 1/4" x 7/8" (ø x L)
- 4 = Shaft 3/8" x 7/8" (ø x L)

Output circuit / Power supply
- **3 = Profibus DP V0**
  Encoder Profile V 1
  10 ... 30 V DC

[1)] Preferred type with flange type 2
[2)] Preferred type with flange type 1

Preferred types are indicated in ***bold***

Options (service)
- 2 = no Option
- **3 = SET**

Field bus profile
- **31 = Profibus DP-V0**
  Encoder profile Class 2

Type of connection
- 1 = with removable bus terminal cover, with radial screwed cable passage
- **2 = Removable bus terminal cover with 3 x M12 connector**

- seawater resistant version on request

Use Couplings for the connection BUS-IN and Connectors for the connection BUS-OUT.

Compatible self-assembly connectors:
Connector (BUS-OUT): 05.BMSWS.8151-8.5
Coupling (BUS-IN): 05.BM WS.8151-8.5

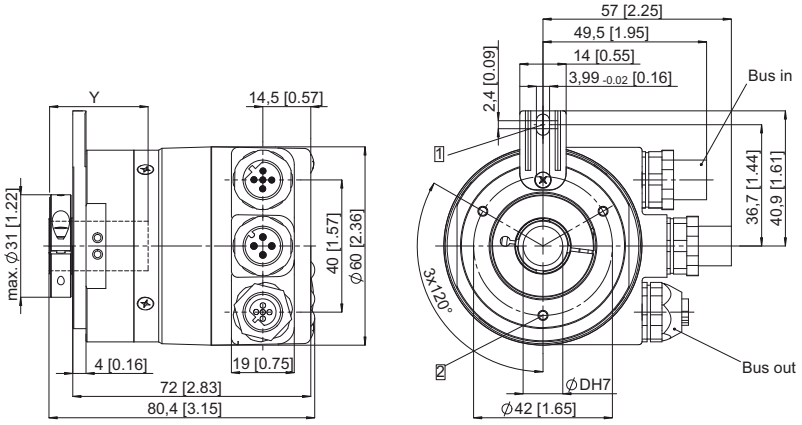
Accessories:

Cables and connectors, also pre-assembled, can be found in the chapter Connection Technology
Mounting attachments and couplings can be found in the chapter Accessories

Sendix absolut, Singleturn Type 5858 (Shaft) / 5878 (Hollow shaft), Profibus-DP

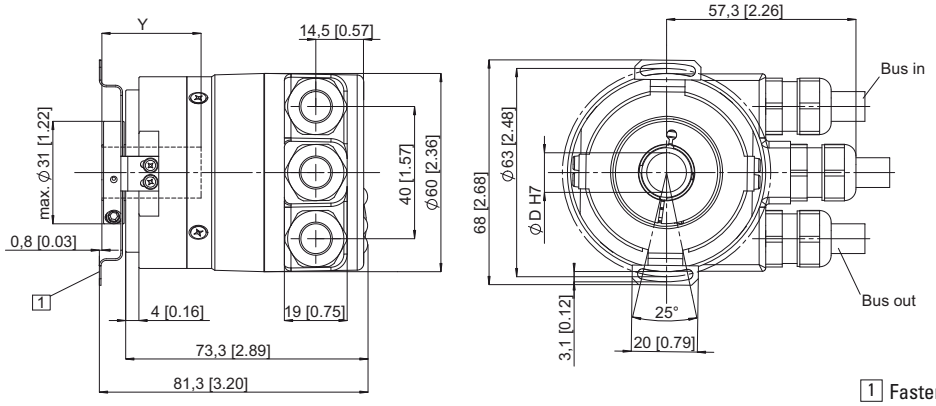
Dimensions hollow shaft version

With removable bus terminal cover:
ø 58 mm, Flange with long torque stop
Flange type 1 and 2 (Drawing with 2x M12 connector)



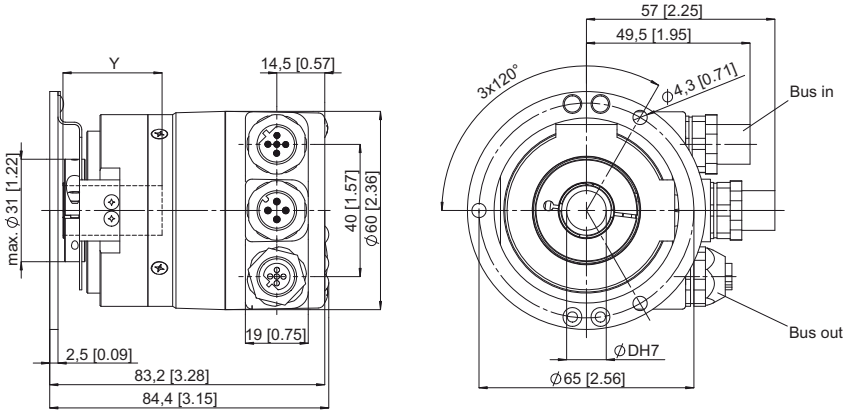
1 Torque stop slot,
Recommendation: cyl. pin. acc. DIN 7 Ø4
2 3xM3, 5,5 [0.21] deep

ø 58 mm, Flange with stator coupling
Flange type 5 and 6, pitch circle ø 63 mm (Drawing with cable version)



1 Fastening screw DIN 912 M3 x 8,
washer included

ø 58 mm, Flange with stator coupling
Flange type 3 and 4, pitch circle ø 65 mm (Drawing with 2x M12 connector)



Y: Depth for blind hollow shaft: 30 mm

Sendix absolut, Singleturn Type 5858 (Shaft) / 5878 (Hollow shaft), Profibus-DP

Order code hollow shaft version:

8.5878.XXXX.XX1X

10 by 10

Type

Flange
- 1 = Flange with torque stop IP 65
- 2 = Flange with torque stop IP 67
- 3 = Flange with stator coupling pitch circle ø 65, IP 65
- 4 = Flange with stator coupling pitch circle ø 65, IP 67
- **5 = Flange with stator coupling pitch circle ø 63, IP 65**
- 6 = Flange with stator coupling pitch circle ø 63, IP 67

Hollow shaft
- 3 = ø 10 mm
- **4 = ø 12 mm**
- 5 = ø 14 mm
- 6 = ø 15 mm
- 8= ø 9,52 mm [3/8"]
- 9 = ø 12,7 mm [1/2"]

Output circuit / Power supply
- **3 = Profibus DP V0 Encoder Profile V 1 10 ... 30 V DC**

Preferred types are indicated in ***bold***

Options (service)
- 2 = no option
- **3 = SET button**

Field bus profile
- **31 = Profibus DP-V0 Encoder profile Class 2**

Type of connection
- 1 = With removable bus terminal cover, with radial screwed cable passage
- **2 = Removable bus terminal cover with 3 x M12 connector**

- seawater resistant version on request

Use Couplings for the connection BUS-IN and Connectors for the connection BUS-OUT.

Compatible self-assembly connectors:
Connector (BUS-OUT): 05.BMSWS.8151-8.5
Coupling (BUS-IN): 05.BM WS.8151-8.5

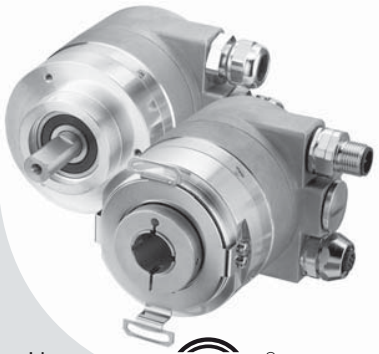
Cables and connectors, also pre-assembled, can be found in the chapter Connection Technology
Mounting attachments and couplings can be found in the chapter Accessories

Sendix absolut, Singleturn Type 5858 (shaft) / 5878 (Hollow shaft), CANopen

Safety-Lock™ | High rotational speed | Temperature | High IP | High shaft load capacity | Shock/vibration resistant | Magnetic field proof | Short-circuit proof | Reverse polarity protection

Reliable

- **Increased resistance against vibrations and installation mistakes. Avoids machine stops and repair work**
  Sturdy "Safety-Lock™ Design" bearing structure
- **Few components and connection points increase the operational reliability**
  Kübler OptoASIC technology with highest integration density (Chip-on-Board)
- **Remains sealed, even in roughest environments, ensures highest safety against field breakdowns**
  Resistant die cast housing and protection up to IP 67
- **Can be used in a wide temperature range without additional charge**
  wide temperature range



CANopen

Sendix® absolut RoHS c UL us Ex 2/22

Fast

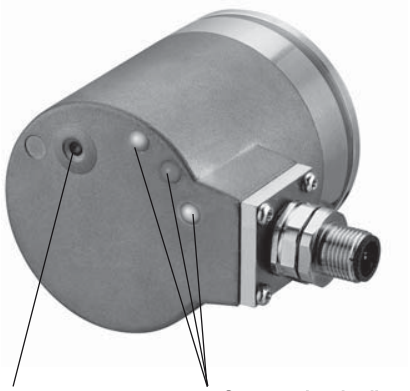
- **Genuine time-synchronous position detection of several axes**
  Extended CAN Sync Mode with real-time position acquisition
- **Fast data availability while reducing the load on the bus and the control**
  Intelligent functions like the transmission of speed, acceleration or exiting a working area

Versatile

- **Latest field bus performance for the applications**
  CANopen, with the latest profiles
- **The suitable connection variant for every specific case**
  Bus terminal cover with M12 connector or cable connection or fixed connection with M12, M23 or D-Sub connector, also easy point-to-point connections
- **Position, Speed, acceleration, working area - The user decides which information is to be available in real-time**
  Variable PDO mapping in the memory
- **Quick and error-free start-up, without setting any switches**
  Node address, baud rate and termination can be programmed via the bus
- **Reliable mounting in the most various installation cases**
  Comprehensive and proven mounting possibilities
- also available in **seawater resistant** version, certified acc. to salt-spray test IEC 68-2-11 => 672 hours.

Mechanical characteristics:

Max. speed without shaft seal (IP 65) up to 70 °C:	9 000 min^{-1}, continuous 7 000 min^{-1}
Max. speed without shaft seal (IP 65) up to Tmax:	7 000 min^{-1}, continuous 4 000 min^{-1}
Max. speed with shaft seal (IP 67) up to 70 °C:	8 000 min^{-1}, continuous 6 000 min^{-1}
Max. speed with shaft seal (IP 67) up to Tmax:	6 000 min^{-1}, continuous 3 000 min^{-1}
Starting torque without shaft seal (IP65):	< 0.01 Nm
Starting torque with shaft seal (IP67):	Shaft version: < 0.05 Nm Hollow shaft version: <0.03 Nm
Moment of inertia:	Shaft version: 3.0 x 10^{-6} kgm^2 Hollow shaft version: 6.0 x 10^{-6} kgm^2
Radial load capacity of shaft:	80 N
Axial load capacity of shaft:	40 N
Weight:	approx. 0.53 kg with bus terminal cover approx. 0.50 kg with fixed connection
Protection acc. to EN 60 529:	housing: IP 67, shaft: IP 65, opt. IP 67
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature:	–40° C ... +80 °C
Materials:	Shaft: stainless steel, Flange: aluminium, Housing: die cast zinc
Shock resistance acc. to DIN-IEC 68-2-27:	>2500 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	>100 m/s^2, 55 ... 2000 Hz



SET key:
For quick, simple on-site start-up

Green, red and yellow LEDs:
Failure-free operation immediately visible on the bus.

Sendix absolut, Singleturn Type 5858 (shaft) / 5878 (Hollow shaft), CANopen

General electrical characteristics:

Supply voltage:	10 ... 30 V DC
Current consumption (w/o output load):	24 V DC, max. 60 mA
Reverse polarity protection at power supply (Ub):	Yes
UL certified	File 224618
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3	
RoHS compliant acc. to EU guideline 2002/95/EG	

Interface characteristics CANopen:

Singleturn resolution (max, scaleable):	1 ... 65536 (16 bits), default scale value is set to 8192 (13 bits)
Code:	Binary
Interface:	CAN High-Speed according ISO 11898, Basic- and Full-CAN CAN Specification 2.0 B

SET control button (zero or defined value, option)

Protected against accidental activation, can only be pushed in with the tip of a ball pen or similar.

Diagnostic LED (yellow)

LED on with:
optical sensor path faulty (code error, LED error), low voltage and over-temperature

Protocol:	CANopen profile DS 406 V3.1 with manufacturer-specific add-ons
Baud rate:	10 ... 1000 kbit/s (set by DIP switches/software configurable)
Node address:	1 ... 127 (set by rotary switches / software configurable)
Termination switchable:	Set by DIP switches Software configurable

General information about CANopen

The CANopen encoders of the 5858 series support the latest CANopen communication profile according to DS 301 V4.02 . In addition, device-specific profiles like the encoder profile DS 406 V3.1 are available.
The following operating modes may be selected: Polled Mode, Cyclic Mode, Sync Mode and a High Resolution Sync Protocol. Moreover, scale factors, preset values, limit switch values and many other additional parameters can be programmed via the CAN-Bus. When switching the device on, all parameters, which have been saved on an EEPROM to protect them against power failure, are loaded again.
The following output values may be combined in a freely variable way as PDO (PDO mapping): **position, speed, acceleration**, as well as the status of the working area.

As a price-effective variant, encoders with a connector or a cable connection are available, for which the device address and baud rate are modified by means of software. The models with bus terminal cover and integrated T-shaped coupler allow a particularly easy installation: bus and power supply are connected very simply due to M12 connectors; the device address is set by means of two hexadecimal rotary switches. Furthermore, another DIP switch allows setting the baud rate and switching on a termination resistor. Three LED's located on the back indicate the operating or fault status of the CAN bus, as well as the status of an internal diagnostic.

CANopen Communication Profile DS 301 V4.02

Among others, the following functionality is integrated:
Class C2 functionality
- NMT Slave
- Heartbeat Protocol
- High Resolution Sync Protocol
  Identity Object
- Error Behaviour Object
- Variable PDO Mapping self-start programmable (Power on to operational), 3 Sending PDO's
- Node address, baud rate and CANbus
- Programmable termination

CANopen Encoder Profile DS 406 V3.1

The following parameters can be programmed:
- Event mode
- Units for speed selectable
  (Steps/Sec or RPM)
- Factor for speed calculation (e.g. measuring wheel periphery)
  Integration time for speed value of 1...32
- 2 work areas with 2 upper and lower limits and the corresponding output states
- Variable PDO mapping for position, speed, acceleration, work area status
- Extended failure management for position sensing with integrated temperature control
- User interface with visual display of bus and failure status
  - 3 LED's
- Optional - 32 CAM's programmable
- Customer-specific memory - 16 Bytes

All profiles stated here: **Key-features**
The object 6003h "Preset" is assigned to an integrated key, accessible from the outside
"Watchdog-controlled" device

Sendix absolut, Singleturn Type 5858 (shaft) / 5878 (Hollow shaft), CANopen

Terminal assignment:
Bus terminal cover with terminal box (type of connection 1)

Direction:	OUT					IN				
Signal:	CAN Ground	CAN_Low (-)	CAN_High (+)	0 Volt power supply	+UB power supply	0 V power supply	+UB power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
Abbreviation:	CG	CL	CH	0 V	+V	0 V	+V	CL	CH	CG

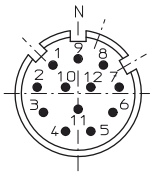
Terminal assignment:
Cable connection (type of connection A)

Direction:	IN				
Signal:	0 V power supply	+UB power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
Abbreviation :	0 V	+V	CL	CH	CG
Cable colour:	WH	BN	YE	GN	BK

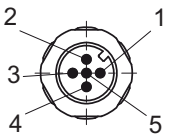
Terminal assignment::
M23 (type of connection I) or M12 (type of connection E) connector

Direction:	IN				
Signal:	0 V power supply	+UB power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
Abbreviation:	0 V	+V	CL	CH	CG
M23 PIN assignment:	10	12	2	7	3
M12 PIN assignment:	3	2	5	4	1

Bus in M23:



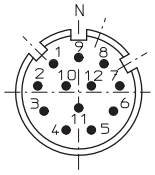
Bus in M12:



Terminal assignment:
Bus terminal cover with 2 x M12 connector (type of connection 2, F or J)

Direction:	OUT					IN				
Signal:	CAN Ground	CAN_Low (-)	CAN_High (+)	0 Volt power supply	+UB power supply	0 V power supply	+UB power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
Abbreviation:	CG	CL	CH	0 V	+V	0 V	+V	CL	CH	CG
M23 PIN assignment:	3	2	7	10	12	10	12	2	7	3
M12 PIN assignment:	1	5	4	3	2	3	2	5	4	1

Bus in and out M23:

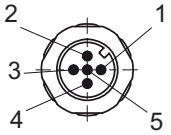


Corresponding mating connector:
8.0000.5012.0000

Bus out:

Corresponding mating connector:
05.B-8151-0/9

Bus in:



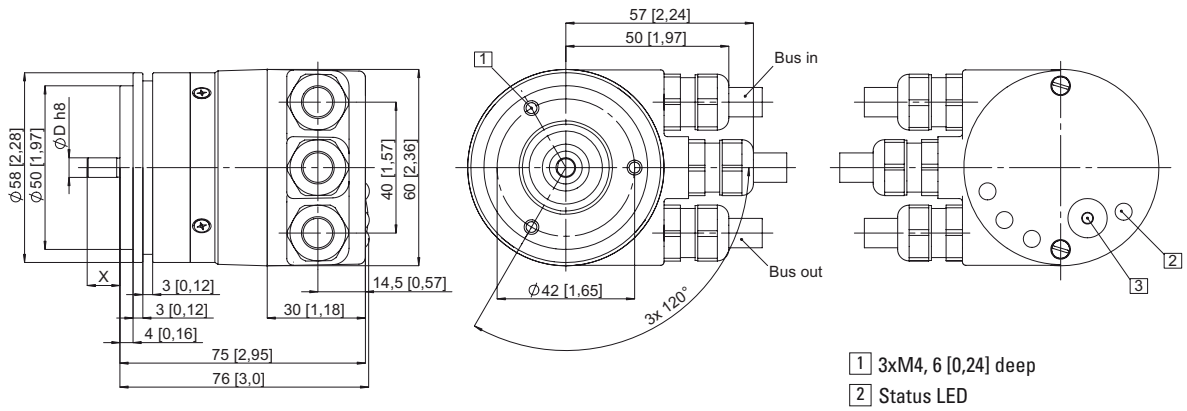
Corresponding mating connector:
05.BS-8151-0/9

Sendix absolut, Singleturn Type 5858 (shaft) / 5878 (Hollow shaft), CANopen

Dimensions shaft version:

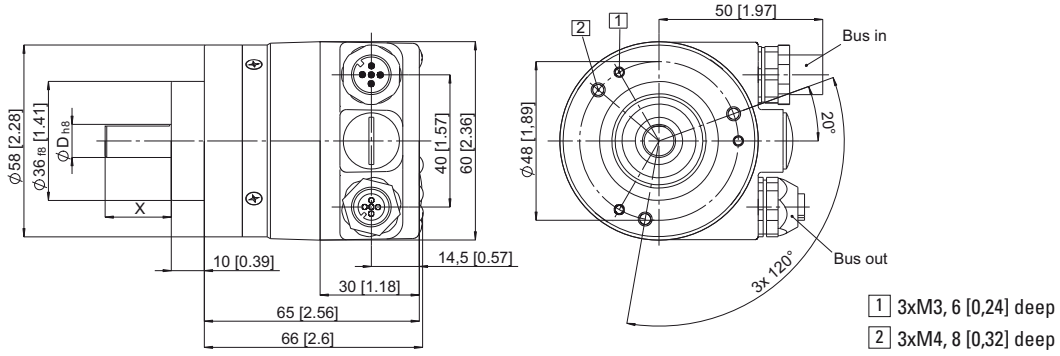
With removable bus terminal cover

ø 58 mm, Synchro flange
Flange type 2 and 4 (Drawing with cable version)



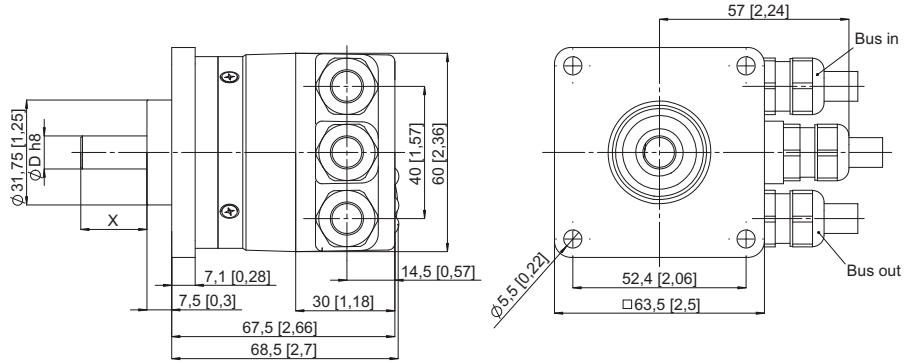
1 3xM4, 6 [0,24] deep
2 Status LED
3 SET button

ø 58 mm, Clamping flange
Flange type 1 and 3 (Drawing with 2 x M12 connector)



1 3xM3, 6 [0,24] deep
2 3xM4, 8 [0,32] deep

63.5 mm □, Square flange
Flange type 5 and 7 (Drawing with cable version)

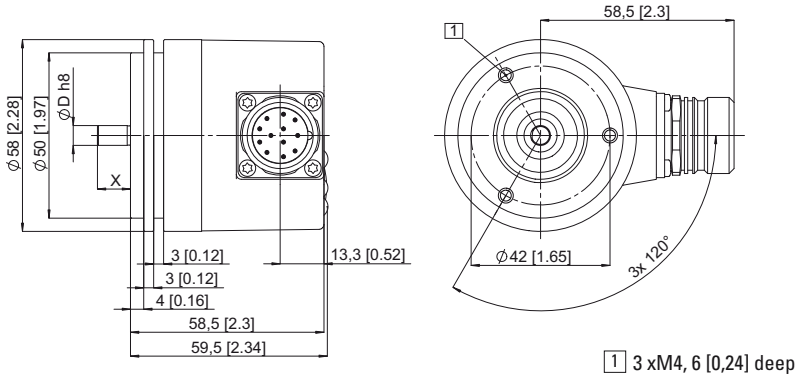


Sendix absolut, Singleturn Type 5858 (shaft) / 5878 (Hollow shaft), CANopen

Dimensions with shaft version:

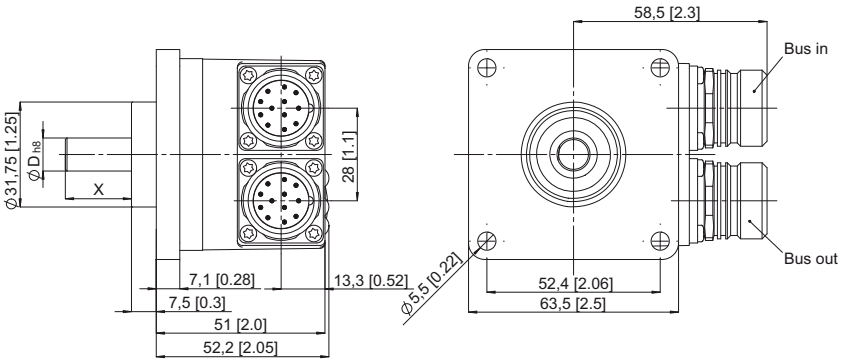
With fixed connection

ø 58 mm, Synchro flange
Flange type 2 and 4 (Drawing with M23 connector)



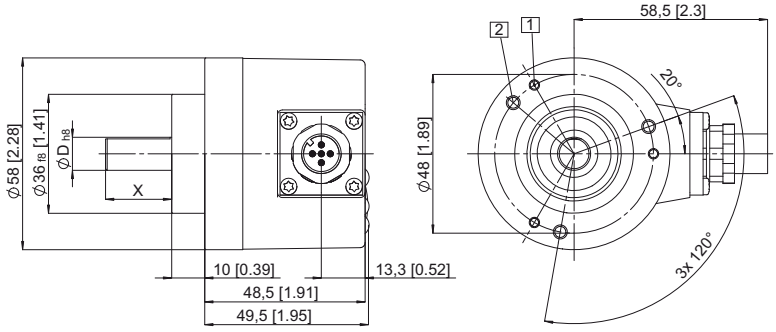
1 3 xM4, 6 [0,24] deep

63.5 mm □, Square flange
Flange type 5 and 7 (Drawing with 2 x M23 connector)



Clamping flange

ø 58 mm, Clamping flange
Flange type 1 and 3 (Drawing with 1 x M12 connector)



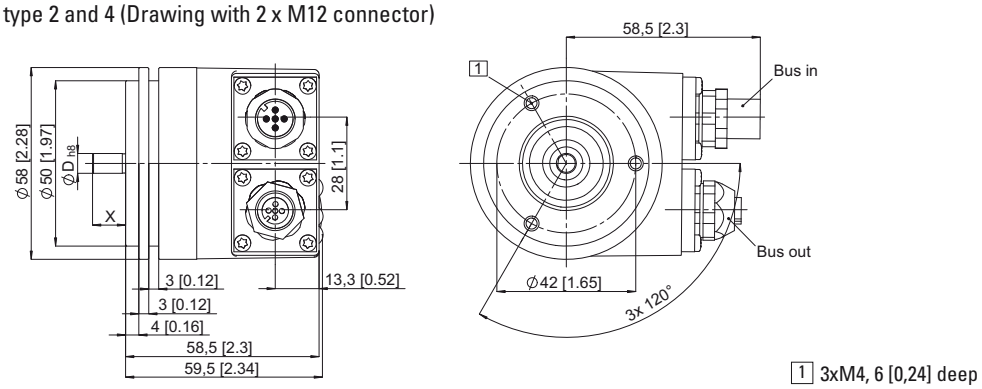
1 3xM3, 6 [0,24] deep
2 3xM4, 8 [0,32] deep

Sendix absolut, Singleturn Type 5858 (shaft) / 5878 (Hollow shaft), CANopen

Dimensions with shaft version:

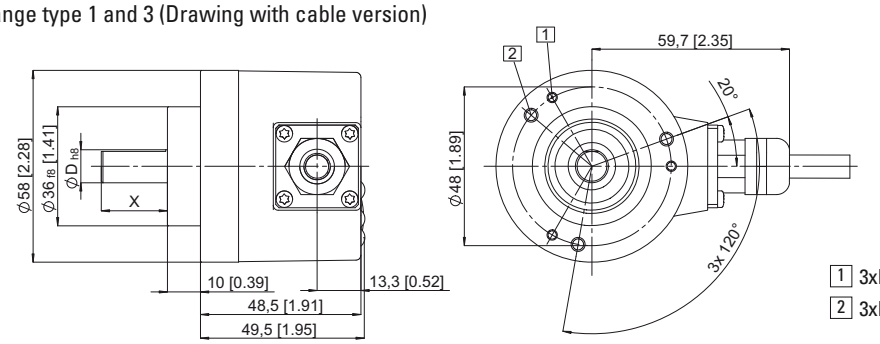
With fixed connection

ø 58 mm, Synchro flange
Flange type 2 and 4 (Drawing with 2 x M12 connector)



1 3xM4, 6 [0,24] deep

ø 58 mm, Clamping flange
Flange type 1 and 3 (Drawing with cable version)



1 3xM3, 6 [0,24] deep
2 3xM4, 8 [0,32] deep

Order code shaft version:

8.5858.XXXX.XX1X

10 by 10

Type

Flange
- **1 = Clamping flange ø 58 IP 65**
- **2 = Synchro flange ø 58 mm, IP65**
- 3 = Clamping flange ø 58 mm, IP 67
- 4 = Synchro flange ø 58 mm, IP67
- 5 = Square flange 2,5" / 63,5 mm, IP 65
- 7 = Square flange 2,5" / 63,5 mm, IP 67

Shaft
- **1 = Shaft 6 mm x 10 mm (ø x L)[1)]**
- **2 = Shaft 10 mm x 20 mm (ø x L)[2)]**
- 3 = Shaft 1/4" x 7/8" (ø x L)
- 4 = Shaft 3/8" x 7/8" (ø x L)

Output circuit / Power supply
- **2 = CANopen DS 301 V4.02 10 ... 30 V DC**

[1)] Preferred type with flange type 2
[2)] Preferred type with flange type 1

Preferred types are indicated in ***bold***

Options (service)
- 2 = no Option
- **3 = SET**

Field bus profile[3)]
- **21 = CANopen Encoder-Profile DS 406 V3.1**

Type of connection
- 1 = with removable bus terminal cover, with radial screwed cable passage
- **2 = Removable bus terminal cover with 2 x M12 connector**
- A = Fixed connection without bus terminal cover, with radial cable (2 m PVC)
- E = Fixed connection without bus terminal cover, with 1 x M12 radial connector
- F = Fixed connection without bus terminal cover, with 2 x M12 radial connector
- I = Fixed connection without bus terminal cover, with 1 x M23 radial connector
- J = Fixed connection without bus terminal cover, with 2 x M23 radial connector

- seawater resistant version on request

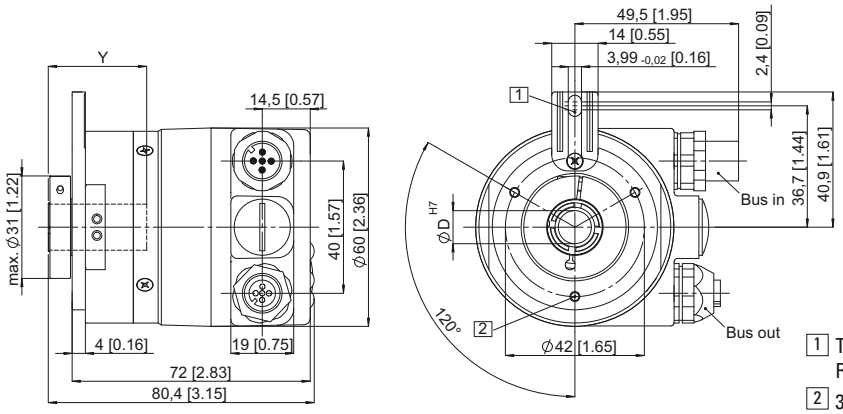
[3)] CAN parameters can also be factory-preset

Sendix absolut, Singleturn Type 5858 (shaft) / 5878 (Hollow shaft), CANopen

Dimensions hollow shaft version (blind hollow shaft):

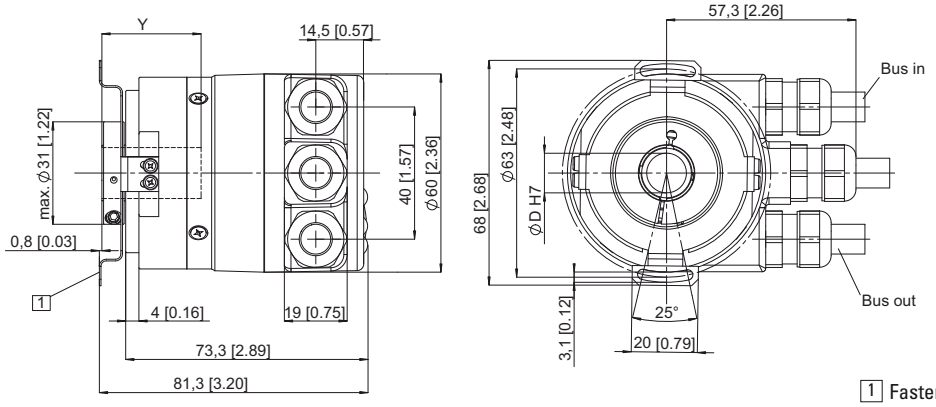
With removable bus terminal cover

ø 58 mm, Flange with long torque stop
Flange type 1 and 2 (Drawing with 2x M12 connector)



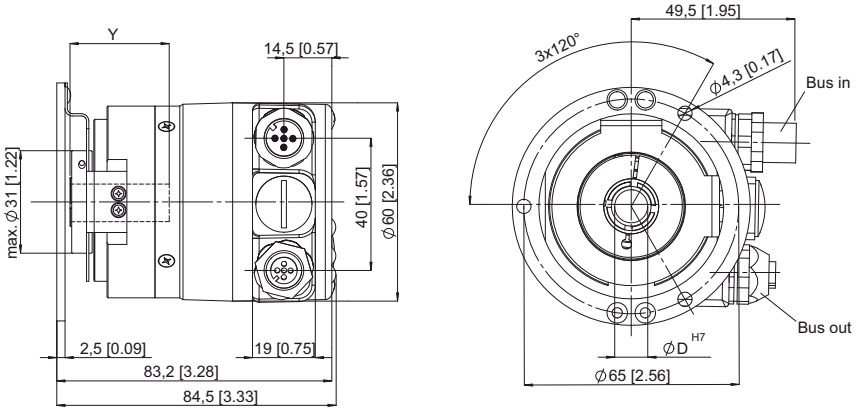
1 Torque stop slot,
Recommendation: cyl. pin. acc. DIN 7 Ø4
2 3xM3, 5,5 [0.22] deep

ø 58 mm, Flange with stator coupling
Flange type 5 and 6, pitch circle ø 63 mm (Drawing with cable version)



1 Fastening screw DIN 912 M3 x 8,
washer included

ø 58 mm, Flange with stator coupling
Flange type 3 and 4, pitch circle ø 65 mm (Drawing with 2x M12 connector)



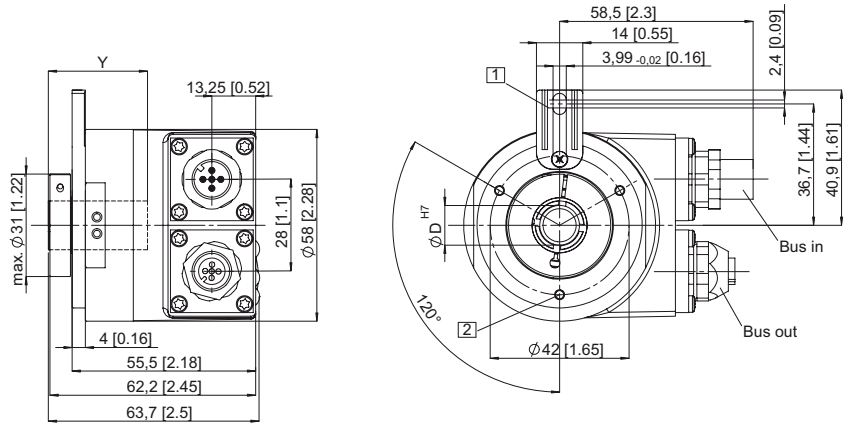
Y: Depth for blind hollow shaft: 30 mm

Sendix absolut, Singleturn Type 5858 (shaft) / 5878 (Hollow shaft), CANopen

Dimensions hollow shaft version (blind hollow shaft):

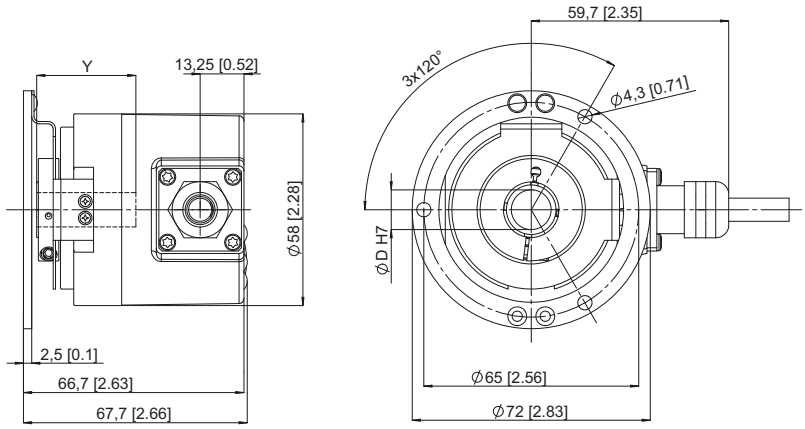
With fixed connection

ø 58 mm, Flange with long torque stop
Flange type 1 and 2 (Drawing with 2x M12 connector)



1 Torque stop slot,
Recommendation: cyl. pin. acc. DIN 7 Ø4
2 3xM3, 6 [0.24] deep

ø 58 mm, Flange with stator coupling
Flange type 3 and 4, pitch circle ø 65 mm (Drawing with cable version)



Y: Depth for blind hollow shaft: 30 mm

Sendix absolut, Singleturn Type 5858 (shaft) / 5878 (Hollow shaft), CANopen

Order code hollow shaft version:

8.5878.XXXX.XX1X

Type

Flange
- 1 = Flange with torque stop IP 65
- 2 = Flange with torque stop IP 67
- 3 = Flange with stator coupling pitch circle ø 65, IP 65
- 4 = Flange with stator coupling pitch circle ø 65, IP 67
- **5 = Flange with stator coupling pitch circle ø 63, IP 65**
- 6 = Flange with stator coupling pitch circle ø 63, IP 67

Hollow shaft
- 3 = ø 10 mm
- **4 = ø 12 mm**
- 5 = ø 14 mm
- 6 = ø 15 mm
- 8= ø 9.52 mm [3/8"]
- 9 = ø 12.7 mm [1/2"]

Output circuit / Power supply
- **2 = CANopen DS 301 V4.0 10 ... 30 V DC**

Options (service)
- 2 = No option
- **3 = SET button**

Field bus profile[3)]
- **21 = CANopen Encoder-Profile DS 406 V3.1**

Type of connection
- 1 = With removable bus terminal cover, with radial screwed cable passage
- **2 = Removable bus terminal cover with 2 x M12 connector**
- A = Fixed connection without bus terminal cover, with radial cable (2 m PVC)
- E = Fixed connection without bus terminal cover, with 1 x M12 radial connector
- F = Fixed connection without bus terminal cover, with 2 x M12 radial connector
- I = Fixed connection without bus terminal cover, with 1 x M23 radial connector
- J = Fixed connection without bus terminal cover, with 2 x M23 radial connector

- seawater resistant version on request

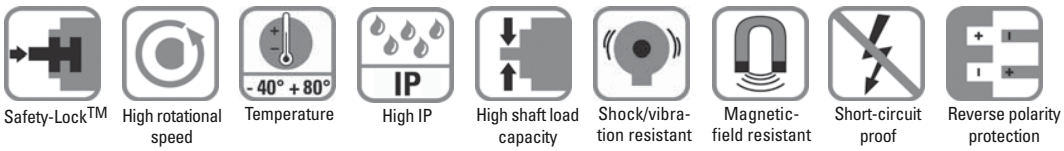
3) CAN parameters can also be factory-preset

Preferred types are indicated in ***bold***

Accessories:

Cables and connectors, also pre-assembled, can be found in the chapter Connection Technology
Mounting attachments and couplings can be found in the chapter Accessories

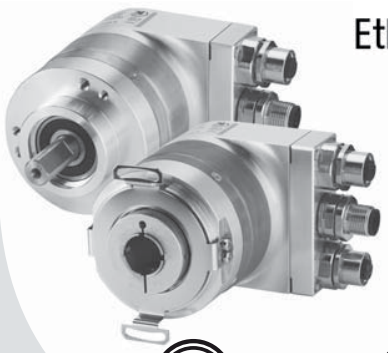
Sendix absolut, Singleturn Type 5858 (shaft) / 5878 (Hollow shaft), EtherCAT



Safety-Lock™ | High rotational speed | Temperature | High IP | High shaft load capacity | Shock/vibration resistant | Magnetic-field resistant | Short-circuit proof | Reverse polarity protection

Reliable

- **Increased resistance against vibrations and installation errors. Eliminates machine down-time and repairs.**
  Sturdy bearing construction 'Safety-LockTM Design'
- **Fewer components and connection points increase the operational reliability**
  Kübler OptoASIC technology with very high integration density (Chip-on-Board)
- **Remains sealed, even in the roughest environments, ensures the highest safety against field breakdowns**
  Resistant die-cast housing and protection up to IP 67
- **Can be used in a wide temperature range without additional charge**
  wide temperature range (-40 °C … +80 °C).



EtherCAT®

Sendix® absolut

Fast

- **Time-synchronous position detection of several axes**
  Distributed clock for real-time position detection
- **Fast data availability with reduced loading on the bus and controller**
  Intelligent functions such as transmission of speed/velocity, acceleration or leaving a working area
- **Fast, simple, error-free connection**
  Bus terminal cover with 3 x M12 connectors

Versatile

- **Up-to-the minute fieldbus performance in the CoE application**
  CAN over Ethernet
- **Whether position, speed/velocity, acceleration or working area – the user decides, which information is available in real-time.**
  PDO mapping in the memory
- **Fast, error-free start-up – no need to set switches**
  All parameters can be programmed via the bus
- **Reliable installation in a wide diversity of mounting situations**
  Extensive choice of proven mounting options
- **Numerous special functions**
  Temperature monitoring, operating time, customer data (e.g. installation location)
- also available in **seawater resistant** version, certified acc. to salt-spray test IEC 68-2-11 => 672 hours.

Mechanical characteristics:

Max. speed without shaft sealing (IP 65) up to 70 °C:	9 000 min^{-1}, continuous 7 000 min^{-1}
Max. speed without shaft sealing (IP 65) up to T_{max}:	7 000 min^{-1}, continuous 4 000 min^{-1}
Max. speed with shaft sealing (IP 67) up to 70 °C:	8 000 min^{-1}, continuous 6 000 min^{-1}
Max. speed with shaft sealing (IP 67) up to T_{max}:	6 000 min^{-1}, continuous 3 000 min^{-1}
Starting torque without shaft sealing (IP65):	< 0.01 Nm
Starting torque with shaft sealing (IP67):	Shaft version: < 0.05 Nm Hollow shaft version: <0.03 Nm
Moment of inertia:	Shaft version 3.0 $x10^{-6}$ kgm^2 Hollow shaft version 6.0 $x10^{-6}$ kgm^2
Radial load capacity of shaft:	80 N
Axial load capacity of shaft:	40 N
Weight:	approx. 0.50 kg
Protection acc. to EN 60 529:	housing: IP 67, shaft: IP 65, opt. IP 67
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature:	–40° C ... +80 °C
Materials:	Shaft: stainless steel, Flange: aluminium, Housing: die cast zinc
Shock resistance acc. to DIN-IEC 68-2-27:	>2500 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	>100 m/s^2, 55 ... 2000 Hz

Sendix absolut, Singleturn Type 5858 (shaft) / 5878 (Hollow shaft), EtherCAT

General electrical characteristics:

Supply voltage:	10 ... 30 V DC
Current consumption (w/o output load):	24 V DC, max. 60 mA
Reverse polarity protection at power supply (Ub):	Yes
UL certified	File 224618
Conform to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3	
RoHS compliant acc. to EU guideline 2002/95/EG	

Device characteristics:

Singleturn resolution	1 ... 65535 (16 bit), (scaleable: 1 ... 65535)
Default value:	8192 (13 bit)
Total resolution:	scaleable from 1 to 65535 (13 Bit)
Code:	EhterNet Frame binary
Protocol:	EtherNet/EtherCAT

General information about CoE (CAN over EtherCAT)

The EtherCAT encoders of the 58X8 series support the CANopen communication profile according to DS 301. In addition device-specific profiles like the encoder profile DS 406 are available.
Scaling, preset values, limit switch values and many other parameters can be programmed via the EtherCAT bus. When switching the device on, all parameters are loaded from an EEPROM, where they were saved to protect them against power-failure.
As output values, position, speed, acceleration and temperature as well as the working area state can be combined as PDO (PDO Mapping).

Diagnostic LED (Red)

LED is ON with the following fault conditions:
Sensor error (internal code or LED error), low voltage, over-temperature

Run LED (Green)

LED is ON with the following conditions:
Init-, Preop-, Safeop and Op-State

2 x Link LED (Yellow)

LED is ON with the following conditions (Port A and B)
Link detected

Modes

Freerun, Distributed Clock (cycle time for Sync 0 pulse min. 125 µs or 62.5 µs with restrictions), Sync-Mode

CANopen Encoder Profile CoE (CAN over EtherCAT)

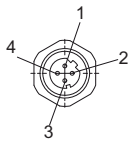
The following parameters are programmable:
- Units for speed selectable (Steps/Sec or RPM)
- Factor for speed calculation (e.g. circumference of measuring wheel)
- Integration time for the speed value from 1 … 32
- 2 working area with 2 upper and lower limits and the corresponding output states
- PDO mapping of position, speed/velocity, acceleration and working area
- Extended error management for position sensing with integrated temperature control
- User interface with visual display of bus and fault status – 4 LEDs
- Alarm and warning messages

Terminal assignment bus:

(Type of connection 2, D-coded):

Direction:	Port A				Port B			
Signal:	Transmit data+	Receive data+	Transmit data-	Receive data-	Transmit data+	Receive data+	Transmit data-	Receive data-
Abbreviation:	TxD+	RxD+	TxD-	RxD-	TxD+	RxD+	TxD-	RxD-
M12 PIN-connection:	1	2	3	4	1	2	3	4

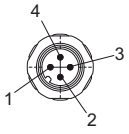
Port A and B

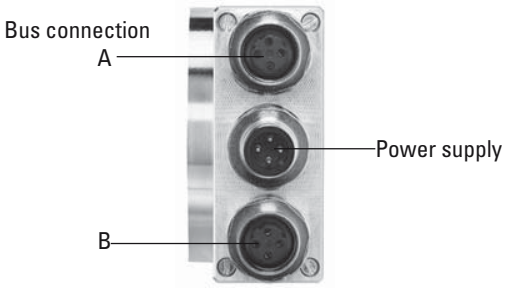


Terminal assignment power supply:

M12 connector

Signal:	+UB Power supply	n.c.	0 V	n.c.
Abbreviation:	+UB	-	0 V	-
M12 PIN-connection	1	2	3	4



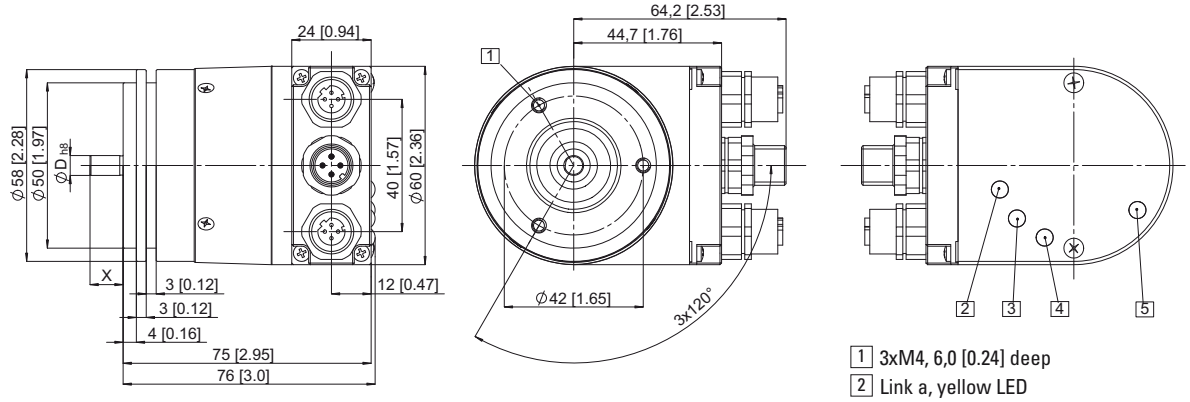


Sendix absolut, Singleturn Type 5858 (shaft) / 5878 (Hollow shaft), EtherCAT

Dimensions shaft version:

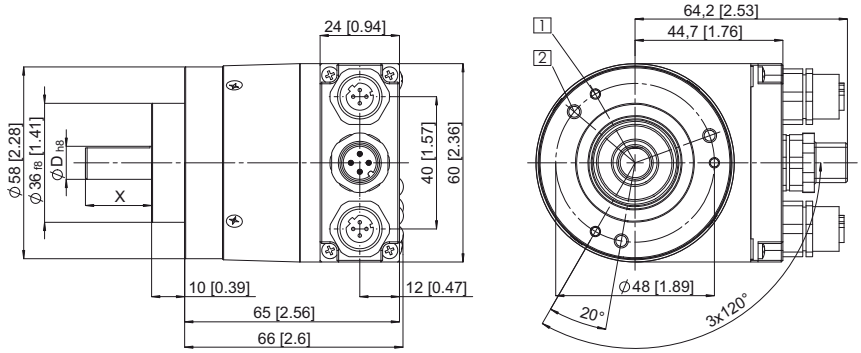
With removable bus terminal cover

ø 58 mm, Synchro flange
Flange type 2 and 4



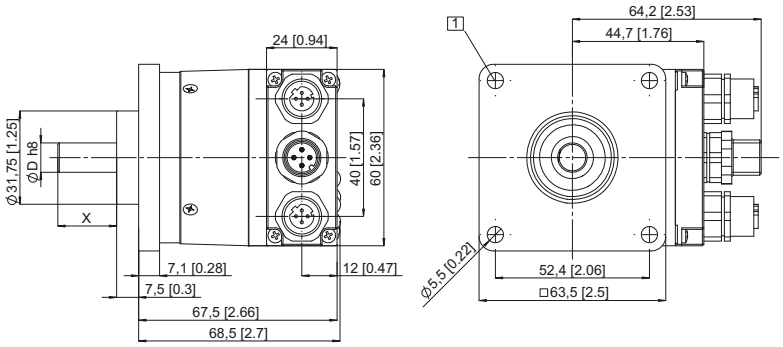
1 3xM4, 6,0 [0.24] deep
2 Link a, yellow LED
3 Link b, yellow LED
4 Run, green LED
5 Err, red LED

ø 58 mm, Clamping flange
Flange type 1 and 3



1 3xM3, 6,0 [0.24] deep
2 3xM4, 8,0 [0.31] deep

63,5 mm, □, Square flange
Flange type 5 and 7



Sendix absolut, Singleturn Type 5858 (shaft) / 5878 (Hollow shaft), EtherCAT

Order code shaft version:

8.5858.XXXX.XX12

Type

Flange
- **1 = Clamping flange ø 58 IP 65**
- **2 = Synchro flange ø 58 mm, IP65**
- 3 = Clamping flange ø 58 mm, IP 67
- 4 = Synchro flange ø 58 mm, IP67
- 5 = Square flange 2,5" / 63,5 mm, IP 65
- 7 = Square flange 2,5" / 63,5 mm, IP 67

Shaft
- **1 = Shaft 6 mm x 10 mm (ø x L)[1)]**
- **2 = Shaft 10 mm x 20 mm (ø x L)[2)]**
- 3 = Shaft 1/4" x 7/8" (ø x L)
- 4 = Shaft 3/8" x 7/8" (ø x L)

Output circuit / Power supply
- **B = EtherCAT**

[1)] Preferred type with flange type 2
[2)] Preferred type with flange type 1

Field bus profile
- **B1 = EtherCAT with CoE**
  (CAN over EtherNet)

Type of connection
- 2 = **Removable bus terminal cover with 3 x M12 connector**

- seawater resistant version on request

Accessories:

Cables and connectors, also pre-assembled, can be found in the chapter Connection Technology
Mounting attachments and couplings can be found in the chapter Accessories

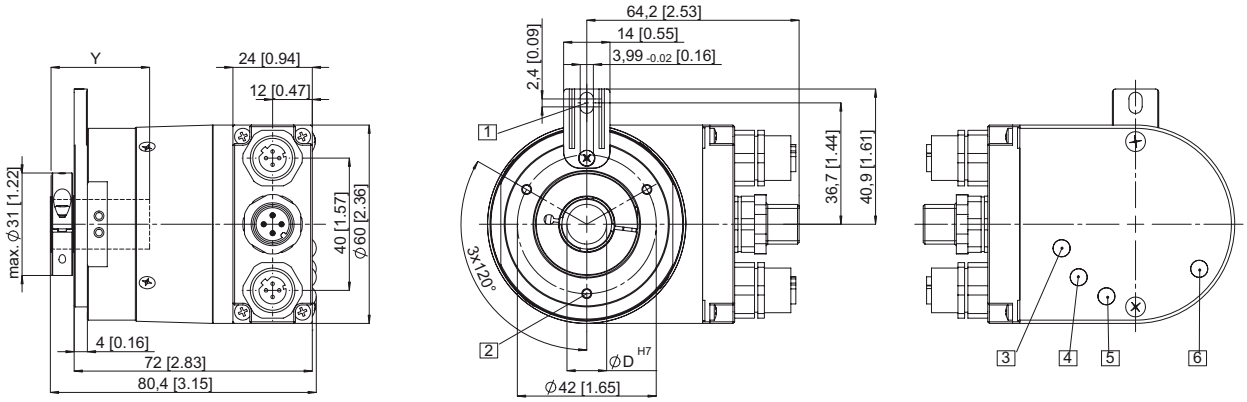
Preferred types are indicated in ***bold***

Sendix absolut, Singleturn Type 5858 (shaft) / 5878 (Hollow shaft), EtherCAT

Dimensions hollow shaft version:

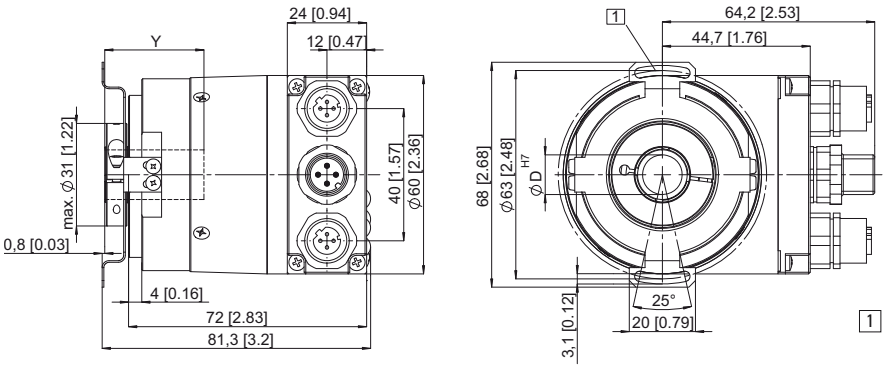
With removable bus terminal cover

ø 58 mm, Flange with long torque stop
Flange type 1 and 2



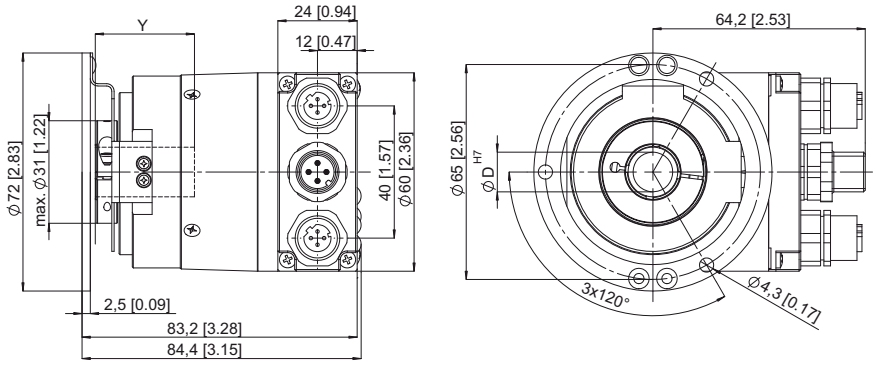
1 Torque stop slot
Recommendation: cyl. pin acc. DIN 7, ø 4 mm
2 3xM3, 5,5 [0.21] deep
3 Link a, yellow LED
4 Link b, yellow LED
5 Run, green LED
6 Err, red LED

ø 58 mm, Flange with stator coupling
Flange type 5 and 6



1 Fastening screw DIN 912 M3 x 8, washer included

ø 58 mm, Flange with stator coupling
Flange type 3 and 4



Y: Depth for blind hollow shaft: 30 mm

Sendix absolut, Singleturn Type 5858 (shaft) / 5878 (Hollow shaft), EtherCAT

Order code blind hollow shaft version: **8.5878.XXXX.XX12**

Type

Flange
- 1 = Flange with torque stop IP 65
- 2 = Flange with torque stop IP 67
- 3 = Flange with stator coupling pitch circle ø 65, IP 65
- 4 = Flange with stator coupling pitch circle ø 65, IP 67
- **5 = Flange with stator coupling pitch circle ø 63, IP 65**
- 6 = Flange with stator coupling pitch circle ø 63, IP 67

Hollow shaft
- 3 = ø 10 mm
- **4 = ø 12 mm**
- 5 = ø 14 mm
- 6 = ø 15 mm
- 8= ø 9,52 mm [3/8"]
- 9 = ø 12,7 mm [1/2"]

Output circuit / Power supply
- **B = EtherCAT**

Field bus profile
- **B1 = EtherCAT with CoE**
  (CAN over EtherNet)

Type of connection
- **2 = Removable bus terminal cover with 3 x M12 connector**

- seawater resistant version on request

Accessories:

Cables and connectors, also pre-assembled, can be found in the chapter Connection Technology
Mounting attachments and couplings can be found in the chapter Accessories

Preferred types are indicated in **bold**

Type 7031 with ATEX approval

Temperature

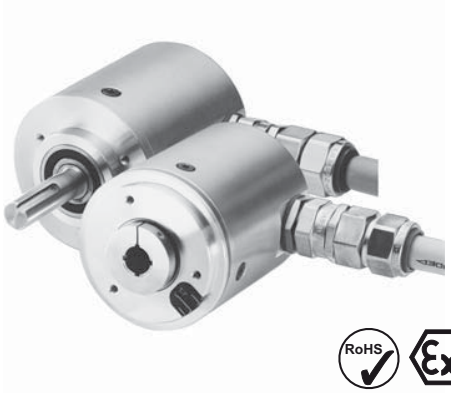

Shock/vibration resistant


Short-circuit proof


Reverse polarity protection

One type for every situation:

- **Version "flameproof-enclosure":** approval zones 1, 2 and 21, 22
- **Zones 1, 2 and 21, 22:**
  II 2G Ex d II C T6 and
  II 2D Ex tD A21 IP6x T85°C
- **High resolution:** max. 5000 ppr.
- **Choice of construction:** Through hollow shaft or solid shaft up to max. ø 12 mm.



Compact:

- **Can be used even where space is tight:** installation depth only 94 mm, minimal clearance required - thanks to through hollow shaft

Safe:

- **Easy start-up,** short-circuit proof outputs, reverse polarity protection, overvoltage protection
- **No malfunction if voltage is too high**

Mechanical characteristics:

Speed:	max. 6000 min^{-1}
Rotor moment of inertia:	approx. 8 x 10^{-6} kgm^2
Starting torque:	< 0.05 Nm
Radial load capacity of shaft*:	80 N
Axial load capacity of shaft:*:	40 N
Weight:	approx. 0.9 kg
Protection acc. to EN 60 529:	IP 65
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature:	-20° C ... +60 °C [1)]
Shaft:	stainless steel
Shock resistance acc. to DIN-IEC 68-2-27	1000 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	100 m/s^2, 10...2000 Hz

*) Shaft version: end of the shaft [1)] Non-condensing

Type 7031 with ATEX approval

Electrical characteristics:

Interface type:	Synchronous Serial (SSI)	Synchronous Serial (SSI)	Parallel	Parallel
Supply voltage (U_B):	5 V DC (± 5 %)	10 ... 30 V DC	5 V DC (± 5%)	10 ... 30 V DC
Output driver:	RS 485	RS 485	Push-pull	Push-pull
Current consumption typ.	89 mA	89 mA	109 mA	109 mA
(no load) max.:	138 mA	138 mA	169 mA	169 mA
Permissible load/channel max.:	+/- 20 mA	max. +/- 20 mA	max. +/- 10 mA	max. +/-10 mA
Word change frequency	max. 15.000/s	max.15.000/s	40.000/s	40.000/s
SSI pulse rate min./max.:	100 kHz/500 kHz	100 kHz/500 kHz	–	–
Signal level high:	type. 3.8 V	typ. 3.8 V	min. 3.4 V	min. U_B - 2.8 V
Signal level low				
(I_{Load} = 20 mA):	typ. 1.3 V	typ. 1.3 V	–	–
(I_{Load} = 10 mA):	–	–	max. 1.5 V	max. 1.8 V
(I_{Load} = 1 mA):	–	–	max. 0.3 V	–
Rise time t_r (without cable):	max. 100 ns	max. 100 ns	max. 0.2 µs	max. 1 µs
Fall time t_f (without cable):	max. 100 ns	max. 100 ns	max. 0.2 µs	max. 1 µs
Short circuit proof outputs:[1]:	yes	yes[2]	yes	yes
Reverse connection protection at U_B:	no	yes	no	yes
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3				

1) If supply voltage correctly applied
2) Only one channel allowed to be shorted-out:
(If UB=5 V, short-circuit to channel, 0 V, or +UB is permitted)
(If UB=5-30 V, short-circuit to channel or 0 V is permitted)

Electrical characteristics, current interface 4 ... 20 mA:

Sensor part		
Interface type:	4 ... 20 mA	4 ... 20 mA
Supply voltage (U_B):	10 ... 30 V DC	5 V DC
Current consumption typ.:	70 mA	70 mA
(no load) max.:	84 mA	84 mA
Word change frequency	max. 15.000/s	max. 15.000/s

Current loop		
Supply voltage:	10 ... 30 V DC	10 ...30 V DC
Analogue signal	4 ... 20 mA	4 ... 20 mA
Max. input resistance of the input circuit:	200 Ω	200 Ω
Measuring rage:	0 ... 360 °	0 ... 360 °
Max. failure (25 °C):	0.2 °	0.2 °
Resolution	13 Bit	13 Bit
Building up time:	max. 2 ms	max. 2 ms
Temperature coefficient 0,1°/10 K	0,1°/10 K	
Current if detector error:	≤ 3 mA	≤ 3 mA
Sensor and current loop are galvanically isolated		
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3		

Note:
All standards for installation of electrical systems in hazardous environments have to be observed.

Manipulations (opening, mechanical treatment etc.) will cause the loss of the EX- license,warranty claims will not be accepted and the installer will be responsible for any consequential damages.

Type 7031 with ATEX approval

Control inputs:

Up/down input to switch the counting direction

As a standard, absolute encoders deliver increasing code values when the shaft rotates clockwise (cw), when looking from the shaft side. When the shaft rotates counter-clockwise (ccw), the output delivers accordingly decreasing code values. The same applies to models with current interfaces. When the shaft rotates clockwise, the output delivers increasing current values, and decreasing values when it rotates counter-clockwise.

As long as the Up/down input receives the corresponding signal (high), this feature is reversed. Clockwise rotation will deliver decreasing code/current values while counter-clockwise rotation will deliver increasing code/current values.

The response time is : for 5 V DC supply voltage, 0.4 ms
for 10 ... 30 V DC supply voltage, 2 ms.

SET input

This input is used to reset (to zero) the encoder. A control pulse (high) sent to this input allows storing the current position value as new zero position in the encoder.
For models equipped with a current interface, the analogue output (4..20 mA) will be set accordingly to the value 4 mA.

Note :

Before activating the SET input after supplying the encoder with the supply voltage, a counting direction (cw or ccw) must be clearly defined on the Up/down input!

The response time is : for 5 V DC supply voltage, 0.4 ms
for 10 ... 30 V DC supply voltage, 2 ms.

LATCH input

This input is used to „freeze“ the current position value. The position value will be statically available on the parallel output as long as this input will remain active (high).

The response time is : for 5 V DC supply voltage, 140 µs,
for 10 ... 30 V DC supply voltage,
200 µs.

Switching level of the control inputs:

Supply voltage:	5 V DC	10-30 V DC
low	≤ 1,7 V	≤ 4,5 V
high	≥ 3,4 V	≥ 8,7 V

Terminal assignment (SSI interface):

Sig.:	0V	+UB	+T	-T	+D	-D	ST	VR					⏚
Col.:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY PK	RD BU	PH

T: Clock signal
D: Data signal
ST: SET input. The current position value is stored as new zero position.
VR: Up/down input. As long as this input is active, decreasing code values are transmitted when shaft turning clockwise.
PH: Plug housing
Isolate unused outputs before initial start-up.

Terminal assignment (Parallel interface, up to 14 bits and max. 2 options):

Sig.:	0V	+UB	1	2	3	4	5	6	7	8	9	10	11	12	13	ST/ VR	VR/ LH	14	⏚
Col.:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY PK	RD BU	WH GN	BN GN	WH YE	YE BN	WH GY	GY BN	PH

ST: SET input. The current position value is stored as new zero position.
VR: Up/down input. As long as this input is active, decreasing code values are transmitted when shaft turning clockwise.
LH: LATCH input. High active. The current position is „frozen“. It is statically available at the parallel output.
PH: Plug housing
Isolate unused outputs before initial start-up.

Type 7031 with ATEX approval

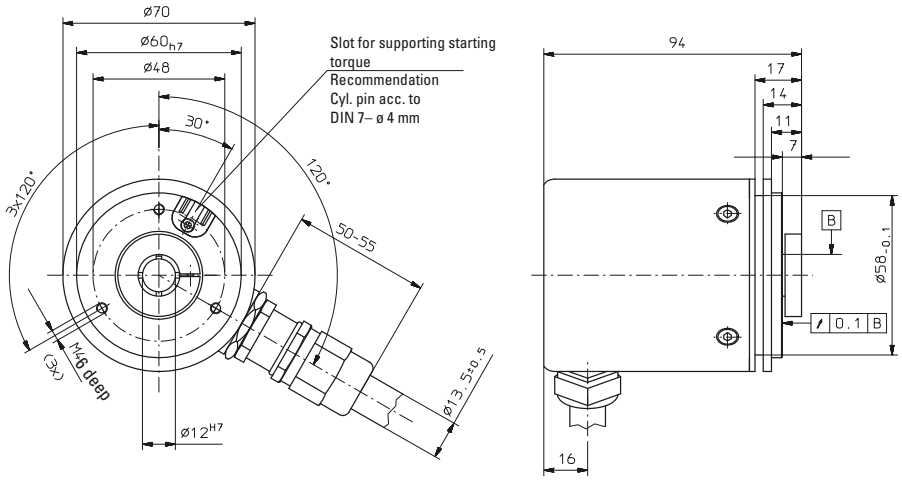
Terminal assignment (Current interface 4 ... 20 mA):

Sig.	0V	+UB	I+	I-	ST	VR		⏚
Col.:	WH	BN	GN	YE	GY	PK		PH

+I: Input of the current loop
-I: Output of the current loop
ST: SET input. The output current is set to 4 mA.
VR: Up/down input. As long as this input is active, decreasing current values are transmitted when shaft turning clockwise.
PH: Plug housing
Isolate unused outputs before initial start-up.

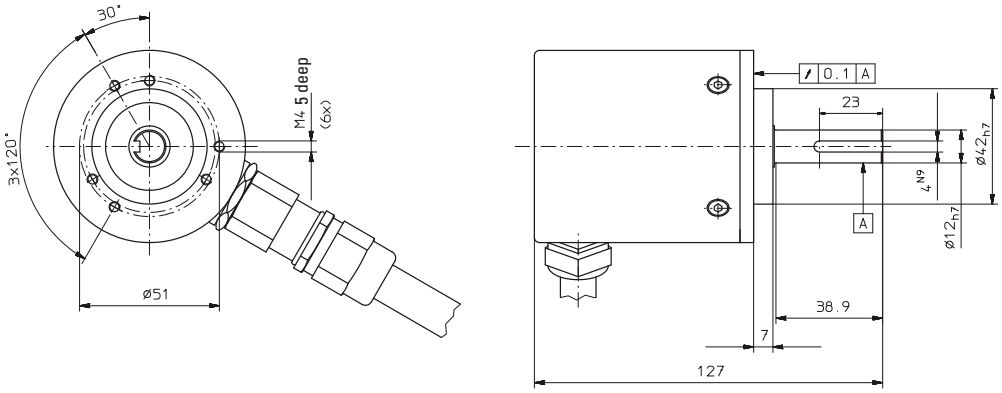
Dimensions hollow shaft version:

Synchronous flange with hollow shaft ø12



Dimensions shaft version:

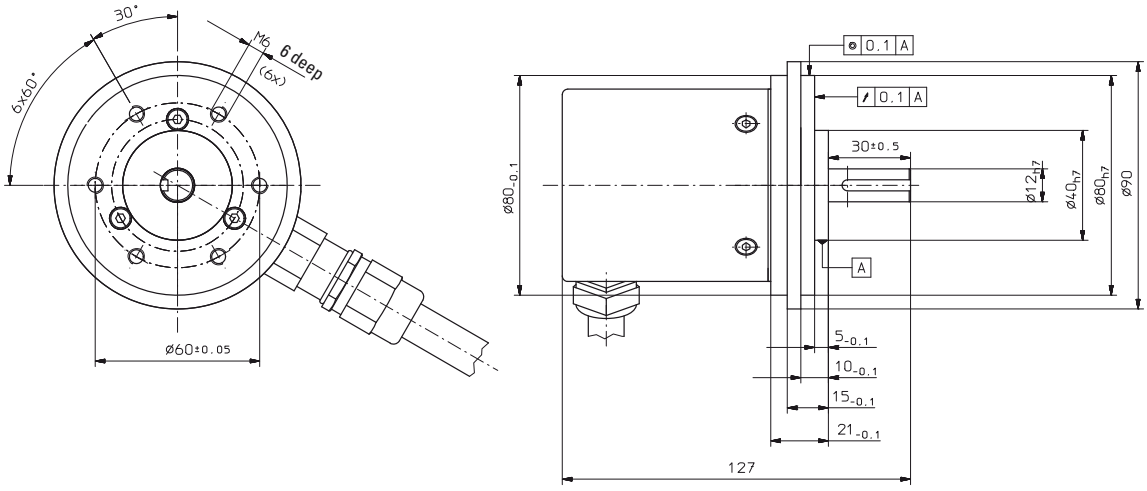
Clamping flange with shaft ø12



Type 7031 with ATEX approval

Dimensions shaft version:

Clamping flange with flange adapter and shaft ø 12



Code type and division
Interface and supply voltage,
version 3 or 4:

Division	Order code Gray/Gray-Excess	Order code Binary	Order code BCD
250	E02	B02	D02
360	**E03**	B03	D03
500	E05	B05	D05
720	E07	B07	D07
900	E09	B09	D09
1000	E01	B01	D01
1024 (10 Bit)	**G10**	**B10**	D10
1250	E12	BA2	DA2
1440	E14	BA1	DA1
1800	E18	B18	D18
2000	E20	B20	D20
2500	E25	B25	
2880	E28	B28	
3600	E36	B36	
4000	E40	B40	
4096 (12 Bit)	G12	B12	
5000	E50	B50	
7200	E72	B72	
8192 (13 Bit)	**G13**	B13	
16384 (14 Bit)	**G14**	**B14**	

Preferred divisions are indicated in bold

Code type and division for encoder with SSI-output
Interface and supply voltage, version 1 or 2:

Division	Order code Gray	Order code Binary
1024 (10 Bit)	G10	B10
4096 (12 Bit)	G12	B12
8192 (13 Bit)	G13	B13
16384 (14 Bit)	G14	B14

Code type and division for encoder with analogue output
Interface and supply voltage, version 7 or 8:

8192 (13 Bit)	G13

Type 7031 with ATEX approval

Order code: 8.7031.XXXX.XXXX

Type

Flange and hollow shaft/shaft
- 14 = Synchronous flange with hollow shaft ø 12 mm
- **25 = Clamping flange with shaft ø 12 mm**
- 26 = Clamping flange with shaft ø 12 mm and mounted flange adapter

Interface and supply voltage
- 1 = SSI with 5 V supply voltage
- **2 = SSI with 10 ... 30 V supply voltage**
- 3 = Parallel with 5 V supply voltage
- **4 = Parallel with 10 ... 30 V supply voltage**
- 7 = 4 ... 20 mA with 5 V supply voltage
- **8 = 4 ... 20 mA with 10 ... 30 V supply voltage**

Options
- **2 = SET[1] and V/R**
- 3[2] = SET and Latch[1]
- 4[2] = V/R[1] and Latch

Alarm output on request

[1] With 14 bits parallel output

[2] Not with SSI or current interface

Type of code and division

Gray/Binary
250, 360[1], 500, 720[1], 900, 1000[1], 1024 (10 Bit)[1], 1250, 1440, 1800, 2000, 2500, 2880, 3600[1], 4000, 4096 (12 Bit)[1], 5000, 7200, 8192 (13 Bit)[1], 16384 (14 Bit)[1]

BCD
250, 360[1], 500, 720[1], 900, 1000[1], 1024 (10 Bit)[1], 1250, 1440, 1800, 2000

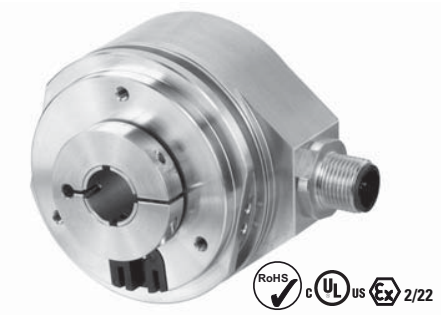
Others on request

[1]Preferred divisions use corresponding table

Type of connection
- **2 = radial cable (2 m PVC-Cable) other cable lengths on request**

Preferred types are indicated in ***bold***

Stainless steel (Niro) Type 5876



Your benefit
- Integrative Technology®
  Patented new type of construction integrates all components; use of an opto-asic and 6-layer multilayer technology now on just a single PCB
- resolution up to 14 bits.
- . Improved EMC-characteristics and highest shock resistance on the market (>2500 m/s^2, 6 ms acc. to DIN IEC 68-2-27).
- SSI or parallel interface
- Various options (e.g. LATCH, SET....)
- Temperature and ageing compensation
- Short-circuit proof outputs

Product features
- resolution up to 14 bits, singleturn
- ø 58 mm
- Housing ø 12 mm
- IP 66
- Gray, Binary or BCD code

Mechanical characteristics:

Speed with seal[1]:	max. 6000 min^{-1}
Rotor moment of inertia:	approx. 6 x 10^{-6} kgm^2
Starting torque:	< 0.05 Nm
Weight:	approx. 0.6 kg
Protection acc. to EN 60 529 with sea:	IP 67
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature with seal:	-20° C ... +80 °C[2)3)]
Shaft/body:	stainless steel H7
Shock resistance acc. to DIN-IEC 68-2-27:	2500 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	100 m/s^2, 10...2000 Hz

1) For continuous operation max. 1500 min-1
2) Non-condensing
3) 70 °C with cable

Electrical characteristics:

Interface type:	Synchronous Serial (SSI)	Synchronous Serial (SSI)	Parallel	Parallel
Supply voltage (U_B):	5 V DC (± 5 %)	10 ... 30 V DC	5 V DC (± 5 %)	10 ... 30 V DC
Output driver:	RS 485	RS 485	Push-pull	Push-pull
Current consumption typ.:	89 mA	89 mA	109 mA	109 mA
(no load) max.:	138 mA	138 mA	169 mA	169 mA
Permissible load/channel:	max. +/- 20 mA	max. +/- 20 mA	max. +/- 10 mA	max. +/- 10 mA
Word change frequency:	max. 15.000/s	max. 15.000/s	40.000/s	40.000/s
SSI pulse rate min./max.:	100 kHz/500 kHz	100 kHz/500 kHz	-	-
Signal level high:	typ. 3.8 V	typ. 3.8 V	min. 3.4 V	min. U_B – 2.8 V
Signal level low (I_{Load} = 20 mA):	typ. 1.3 V	typ. 1.3 V	-	-
(I_{Load} = 10 mA):	-	-	max. 1.5 V	max. 1.8 V
(I_{Load} = 1 mA):	-	-	max. 0.3 V	-
Rise time tr (without cable):	max. 100 ns	max. 100 ns	max. 0.2 µs	max. 1 µs
Fall time tf (without cable):	max. 100 ns	max. 100 ns	max. 0.2 µs	max. 1 µs
Short circuit proof outputs[1)]:	yes	yes[2)]	yes	yes
Reverse connection protection at U_B:	no	yes	no	yes
UL certified File 224618				
Conform to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3				
RoHS compliant acc. to EU guideline 2002/95/EG				

1) If supply voltage correctly applied
2) Only one channel allowed to be shorted-out:
(If UB=5 V, short-circuit to channel, 0 V, or +UB is permitted)
(If UB=5-30 V, short-circuit to channel or 0 V is permitted)

Stainless steel (Niro) Type 5876

Control Inputs:

Up/down input to switch the counting direction

By default, if glancing at the shaft side, absolute encoders deliver increasing code values when shaft rotates clockwise (cw). If the shaft rotates counter-clockwise (ccw), the output delivers accordingly decreasing code values.
As long as the Up/down input receives the corresponding signal (high), this feature is reversed. Clockwise rotation delivers decreasing code values while counter-clockwise rotation delivers increasing code values.

The response time is:
for 5 V DC supply voltage, 0.4 ms
for 10 ... 30 V DC supply voltage, 2 ms.

SET input

This input is used to reset (to zero) the encoder. A control pulse (high) sent to this input allows storing the current position value as new zero position in the encoder.

Note :

Before activating the SET input after supplying the encoder with the supply voltage, a counting direction (cw or ccw) must be defined univocally on the Up/down input!

The response time is : for 5 V DC supply voltage, 0.4 ms
for 10 ... 30 V DC supply voltage, 2 ms.

LATCH input

This input is used to „freeze“ the current position value. The position value will be statically available on the parallel output as long as this input will remain active (high).

The response time is : for 5 V DC supply voltage, 140 µs,
for 10 ... 30 V DC supply voltage, 200 µs.

Switching level of the control inputs

Supply voltage:	5 V DC	10 ... 30 V DC
low	≤ 1.7 V	≤ 4.5 V
high	≥ 3.4 V	≥ 8.7 V

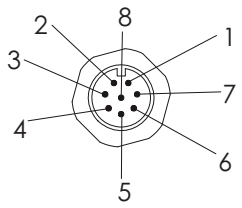
Terminal assignment (SSI interface with 8 pin plug):

Sig.:	0 V	$+U_B$	+T	-T	+D	-D	SET	V/R	
Pin:	1	2	3	4	5	6	7	8	
Col.:	WH	BN	GN	YE	GY	PK	BU	RD	

T: Clock signal
D: Data signal
ST: SET input. The current position value is stored as new zero position.
VR: Up/down input. As long as this input is active, decreasing code values are transmitted when shaft turning clockwise.
Isolate unused outputs before initial start-up

Top view of mating side, male contact base:

8-pin plug

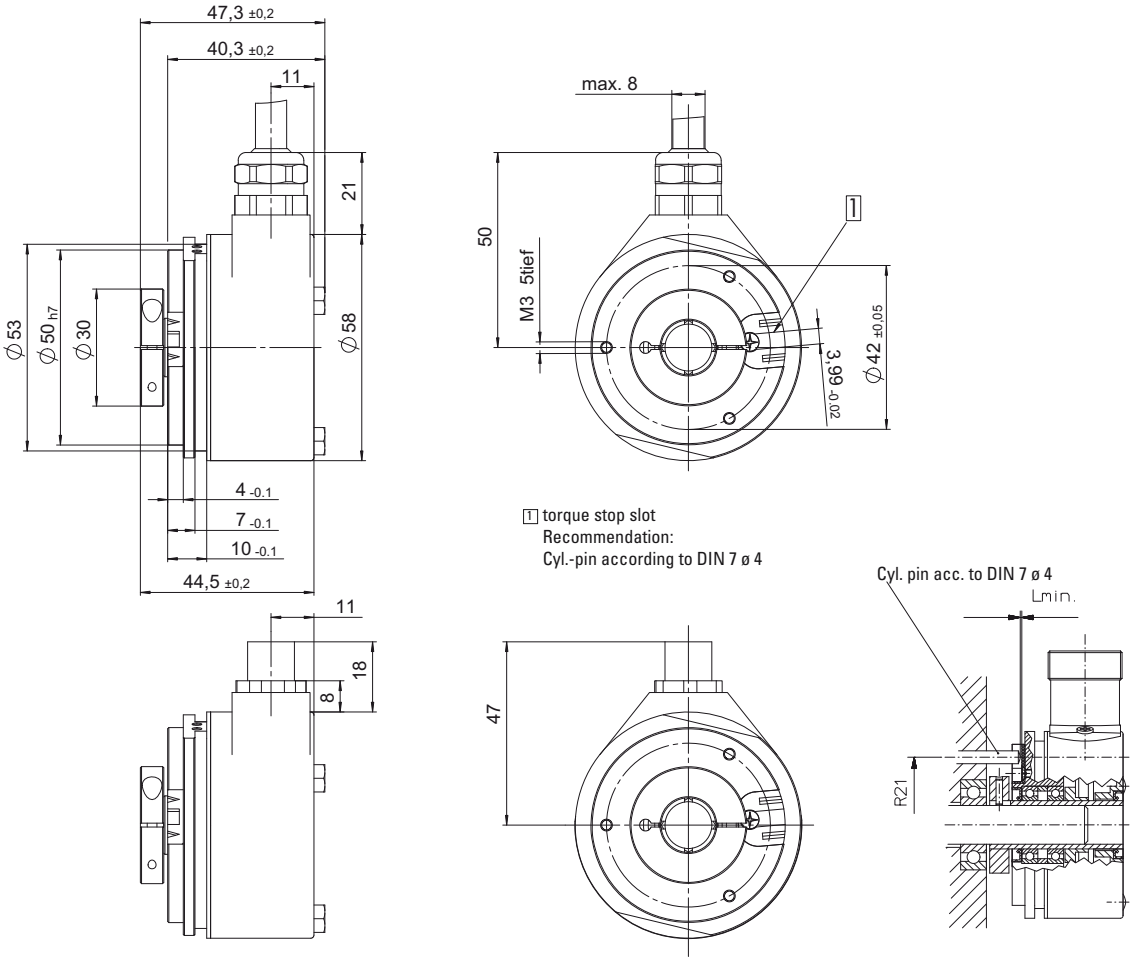


Terminal assignment (Parallel interface, 14 bits and max. 2 options, cable version):

Sig.:	0V	$+U_B$	1	2	3	4	5	6	7	8	9	10	11	12	13	SET V/R	V/R Latch	14	⏚	
Col.:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY PK	RD BU	WH GN	BN GN	WH YE	YE BN	WH GY	GY BN		

Stainless steel (Niro) Type 5876

Dimensions:



Mounting advice:

1) When mounting a hollow shaft encoder, we recommend using the torque stop slot or the stator coupling.

2) When mounting the encoder, ensure that the dimension Lmin is larger than the maximum axial play of the drive. Otherwise there is a danger that the device could mechanically seize up.

Stainless steel (Niro) Type 5876

Order code: **8.5876.XXXX.XXXX**

Type

Flange
- **1 = Flange with through shaft**
- 2 = Flange with blind hollow shaft

Hollow shaft
- 6 = ø 10 mm
- **8 = ø 12 mm**

Interface and supply voltage
- 1 = SSI with 5 V supply voltage
- **2 = SSI with 10 ... 30 V supply voltage**
- 3 = Parallel with 5 V supply voltage
- 4 = Parallel with 10 ... 30 V supply voltage

Preferred types are indicated in ***bold***

Options
- **2 = SET[1] and V/R**
- 3[2] = SET and Latch[1]
- 4[2] = V/R[1] and Latch
- Alarm output on request

[1] With 14 Bit parallel output and 17 pin plug

[2] Not with SSI interface

Code type and division

Gray/Binary
250, 360[1], 500, 720[1], 900, 1000[1], 1024 (10 Bit)[1], 1250, 1440, 1800, 2000, 2500, 2880, 36001), 4000, 4096 (12 Bit)[1], 5000, 7200, 8192 (13 Bit)[1], 16384 (14 Bit)[1]

BCD
250, 360[1], 500, 720[1], 900, 1000[1], 1024 (10 Bit)[1], 1250, 1440, 1800, 2000

Other on request'

[1] Preferred divisions use corresponding table

Type of connection
- 1[a] = radial cable 1 m PVC-cable)
- **2[b] = radial plug without mating connector**

[a] In connection with parallel- or SSI- output

[b] In connection with SSI-output

Accessories:

Corresponding mating connector to connection type 2
- at SSI interface
  8 pin plug 05.CMB8181-0

Mounting set:
  Ord.-No. 8.0010.4600.0000 coupling two wings
  for high dynamic application
  Order-No.: 8.0010.4D00.0000
Tether arm short
  Order-No.: 8.0010.4R00.0000

Code type and division with parallel output

Interface and supply voltage, version 3 or 4 (Parallel):

Division	Order code Gray/Gray-Excess	Order code Binary	Order code BCD
250	E02	B02	D02
360[1]	**E03**	B03	D03
500	E05	B05	D05
720[1]	E07	B07	D07
900	E09	B09	D09
1000[1]	E01	B01	D01
1024 (10 Bit)	**G10**	**B10**	D10
1250	E12	BA2	DA2
1440	E14	BA1	DA1
1800	E18	B18	D18
2000	E20	B20	D20
2500	E25	B25	
2880	E28	B28	
36001)	E36	B36	
4000	E40	B40	
4096 (12 Bit)	G12	B12	
5000	E50	B50	
7200	E72	B72	
8192 (13 Bit)	**G13**	B13	
16384 (14 Bit)	**G14**	**B14**	

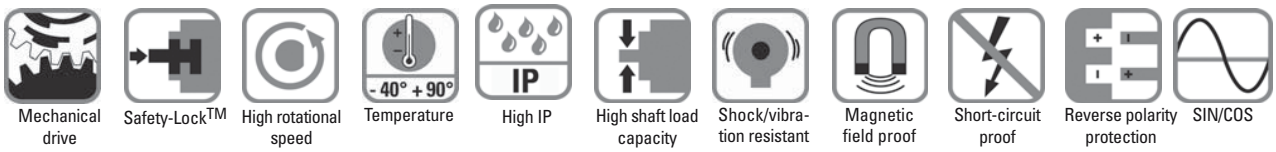
Preferred divisions are indicated in bold

Code type and division for encoder with SSI-Output

Interface and supply voltage, version 1 or 2 (SSI):

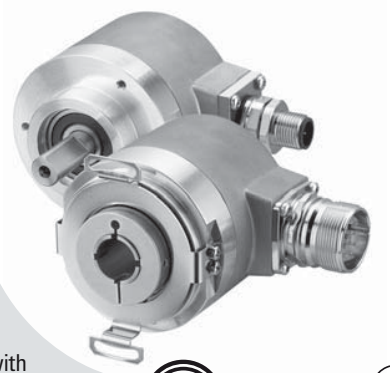
Division	Order code Gray	Order code Binary
1024 (10 Bit)	G10	B10
4096 (12 Bit)	G12	B12
8192 (13 Bit)	G13	B13
16384 (14 Bit)	G14	B14

Sendix absolut, Multiturn Type 5863 (Shaft) / 5883 (Hollow shaft), SSI/BiSS



Reliable

- **Increased ability to withstand vibration and installation errors. Eliminates machine downtime and repairs.**
  Sturdy "Safety-Lock™ Design" bearing structure
- **Fewer components and connection points increase the operational reliability**
  Kübler OptoASIC technology with highest integration density (Chip-on-Board)
- **Remains sealed, even in the roughest environments, ensures highest safety against field breakdowns**
  Resistant die cast housing and protection up to IP 67
- **Can be used in a wide temperature range without additional expense**
  Wide temperature range
- **Easy diagnosis in case of fault condition**
  Status indication by means of LED, sensor, voltage and temperature monitoring.



Sendix® absolut

Fast

- **Can achieve particularly high accuracy in the applications**
  Update rate of the whole position value above 100 kHz
- **Allows high productivity thanks to very short regulation cycles**
  Clock rate with SSI up to 2 MHz, with BiSS up to 10 MHz
- **High-resolution feedback system achievable in real-time**
  SinCos incremental outputs.

Versatile

- **The suitable connection variant for every specific case**
  Cable, M23 connector or M12 connector
- **Open interfaces ensure flexibility and independence**
  SSI or BISS with Sine-Cosine-Option
- **Reliable installation in a wide diversity of mounting application**
  Comprehensive and proven mounting possibilities
- **Only the functionality really needed by the user is implemented**
  Status LED and Set key available as options
- **Quick, simple on-site start-up**
  Set key or Preset by means of a control input.
- also available in **seawater resistant** version, certified acc. to salt-spray test IEC 68-2-11 => 672 hours.

Mechanical characteristics:

Shaft version:	
Max. speed without shaft seal (IP 65) up to 70 °C:	12 000 min^{-1}, continuous 10 000 min^{-1}
Max. speed without shaft seal (IP 65) up to T_{max}:	8 000 min^{-1}, continuous 5 000 min^{-1}
Max. speed with shaft seal (IP 67) up to 70 °C:	11 000 min^{-1}, continuous 9 000 min^{-1}
Max. speed with shaft seal (IP 67) up to T_{max}:	8 000 min^{-1}, continuous 5 000 min^{-1}
Hollow shaft version:	
Max. speed without shaft seal (IP 65) up to 70 °C:	9 000 min^{-1}, continuous 6 000 min^{-1}
Max. speed without shaft seal (IP 65) up to T_{max}:	6 000 min^{-1}, continuous 3 000 min^{-1}
Max. speed with shaft seal (IP 67) up to 70 °C:	8 000 min^{-1}, continuous 4 000 min^{-1}
Max. speed with shaft seal (IP 67) up to T_{max}:	4 000 min^{-1}, continuous 2 000 min^{-1}
Starting torque without shaft seal (IP 65):	Shaft version: < 0.01 Nm Hollow shaft version: <0.03 Nm
Starting torque with shaft seal (IP 67):	< 0.05 Nm
Moment of inertia:	Shaft version: 4.0 x 10^{-6} kgm^2 Hollow shaft version: 7.0 x 10^{-6} kgm^2
Radial load capacity of shaft:	80 N
Axial load capacity of shaft:	40 N
Weight:	approx. 0.45 kg
Protection acc. to EN 60 529:	housing: IP 67, shaft: IP 65, opt. IP 67
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature:	–40° C ... +90 °C[1)]

[1)] Cable versions: -30 °C ... + 75°C

Sendix absolut, Multiturn Type 5863 (Shaft) / 5883 (Hollow shaft), SSI/BiSS

Materials:	Shaft: stainless steel,Flange: aluminium, Housing: die cast zinc, Cable: PVC
Shock resistance acc. to DIN-IEC 68-2-27:	>2500 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	>100 m/s^2, 55 ... 2000 Hz

General electrical characteristics:

Supply voltage:	5 V DC ± 5% or 10 ... 30 V DC
Current consumption (w/o output load):	5 V DC: max. 75 mA, 24 V DC: max. 25 mA
Reverse polarity protection at power supply (Ub):	Yes (only 10 ... 30 V DC)
UL certified	File 224618
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3	
RoHS compliant acc. to EU guideline 2002/95/EG	

General Interface characteristics:

Output driver:	RS 485 Transceiver type
Permissible load/channel:	max. ± 20 mA
Signal level high:	typ. 3.8 V
Signal level low at I_{load} = 20 mA:	typ. 1.3 V
Short circuit proof outputs:	Yes[2)]

Interface characteristics SSI:

Singleturn resolution:	10…14 bits and 17 bits [3)]
Number of revolutions:	4096 (12 bits)
Code:	Binary or Gray
SSI clock rate:	≤ 14 bits: 50 kHz ... 2 MHz > 15 bis: 50 kHz ... 125 kHt
Monoflop time:	≥ 15 µs[3)]

Note:
If clock starts cycling within monoflop time a second data transfer starts with the same data, useful for data verification. If clock starts cycling after monoflop time the data transfer starts with updated values. Max. update rate is depending on clock speed, data length and monoflop-time.

Time jitter (data request to position latch):	< 1 µs up to 14 bits, 4 µs at 15 ... 17 bits
Status and Parity bit:	optional on request

Interface characteristics BiSS:

Singleturn resolution:	10…14 bits and 17 bits, customer programmable [3)]
Number of revolutions:	4096 (12 bits)
Code:	Binary
Clock rate:	up to 10 MHz
Max. update rate:	< 10 µs, depending on clock speed and data length
Time jitter (data request to position latch):	≤ 1 µs

Note:
– Bidirectional, programmable parameters are: resolution, code, direction, alarms and warnings
– Multicycle data output, e.g. for temperature
– CRC data verification

[2)] Short circuit to 0V or to output, one channel at a time, supply voltage correctly applied

[3)] Other options upon request

SET (zero or defined value) and DIRection (CW/CCW) control inputs

Input characteristics:	High active
Receiver type:	Comparator
Signal level high:	min. 60 % of V+ (Supply voltage), max: V+
Signal level low:	max. 25% of V+ (Supply voltage)
Input current:	≤ 0.5 mA
Min. pulse duration (SET):	10 ms
Timeout after SET input:	14 ms
Reaction Time (DIR input):	1 ms

The encoder can be set to zero at any position by means of a HIGH signal on the SET input or by pressing the optional SET key. Other preset values can be factory-programmed. The SET input has a signal delay time of approx. 1 ms. Once the SET function has been triggered, the encoder requires an internal processing time of approx. 15 ms before the new position data can be read. During this time the LED is ON and the status output is at LOW.

Status output and LED

Output driver:	Open collector, internal pull up resistor 22 kOhm
Permissible load:	-20 mA
Signal level high:	+V
Signal level low:	< 1 V
Active at:	Low

The optional LED (red) and the status output serve to display various alarm or error messages. In normal operation the LED is OFF and the status output is HIGH (open-collector with int. pull-up 22k).

If the LED is ON (status output LOW) this indicates:
– Sensor error, singleturn or multiturn (soiling, glass breakage etc.)
– LED error, failure or ageing
– Over- or under-temperature
– Undervoltage
In the SSI mode, the fault indication can only be reset by switching off the power-supply to the device.

DIR input

A HIGH signal switches the direction of rotation from the default CW to CCW. This inverted function can also be factory-programmed. If DIR is changed when the device is already switched on, then this will be interpreted as an error. The LED will come ON and the status output will switch to LOW.

Option incremental output (A/B), 2048 ppr

-3dB frequency:	400 kHz
Signal level:	1 Vpp (± 20%)
Short circuit proof:	Yes[2)]

Power-on delay

After Power-ON the device requires a time of approx. 150 ms before valid data can be read.

Sendix absolut, Multiturn Type 5863 (Shaft) / 5883 (Hollow shaft), SSI/BiSS

Terminal assignment:

for output circuit 1 or 2 and type of connection 1, 2, 3 or 4 (2 control inputs, 1 status output)

Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	Stat	N/C	N/C	N/C	PE
Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	-	-	-	Shield
M23 PIN out:	1	2	3	4	5	6	7	8	9	10	11	12	PH

for output circuit 5 and type of connection 1, 2, 3 or 4 (2 control inputs, 1 status output, sensor outputs for voltage)

Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	Stat	N/C	0 V Sens	+Ub Sens	PE
Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	-	GY-PK	RD-BU	Shield
M23 PIN out:	1	2	3	4	5	6	7	8	9	10	11	12	PH

for output circuit 3, 4, 7 or 8 and type of connection 1, 2, 3 or 4 (2 control inputs, incremental track RS422 or sine/cosine)

Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	A	A inv	B	Binv	PE
Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU	Shield
M23 PIN out:	1	2	3	4	5	6	7	8	9	10	11	12	PH

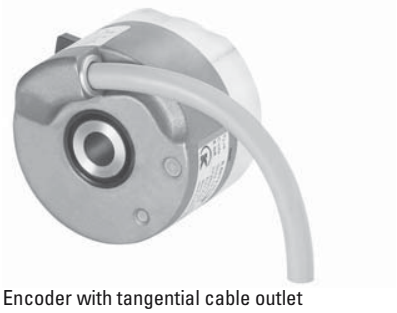
for output circuit 6 or 9 and type of connection 1, 2, 3 or 4 (Sine/cosine or incremental track, voltage sense outputs)

Signal:	GND	+V	+C	-C	+D	-D	A	A inv	B	B inv	0V Sens	+Ub Sens	PE
Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU	Shield
M23 PIN out:	1	2	3	4	5	6	7	8	9	10	11	12	PH

for output circuit 1 or 2 and type of connection 5 or 6 (2 control inputs)

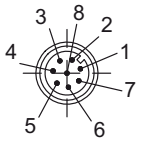
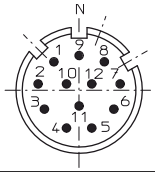
Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	Shield/PE
M12 PIN out:	1	2	3	4	5	6	7	8	PH

+V: Encoder Power Supply +V DC
GND: Encoder Power Supply Ground (0V)
+C, -C: Clock signal
+D, -D: Data signal
SET: Set input. The current position becomes defined as position zero
DIR: Direction input: If this input is active, output values are decreasing when shaft is turned clockwise.
Stat: Status output
PE: Protective earth
PH: Plug housing (shield)
A, Ainv: Sine output (incremental)
B, Binv: Cosine output (incremental)



Encoder with tangential cable outlet

Top view of mating side, male contact base:

Type	8 pin M12 connector	12 pin M23 connector
View		
Corresponding mating connector:	05.CMB-8181-0	8.0000.5012.0000

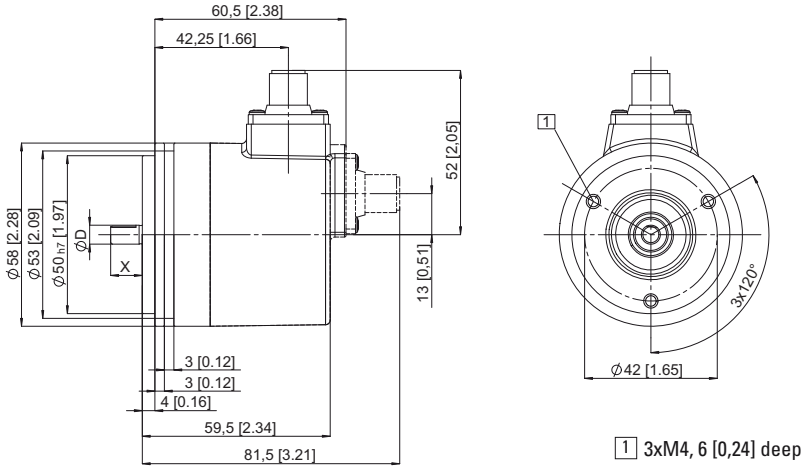
- Absolutely safe operation even in strong magnetic fields
- Over 40 years of experience in the field of precision mechanics
- Special gears with specific toothing

Sendix absolut, Multiturn Type 5863 (Shaft) / 5883 (Hollow shaft), SSI/BiSS

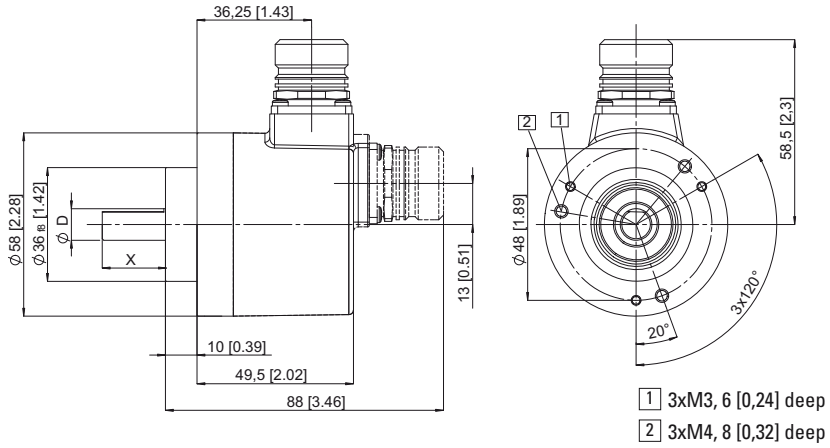
Dimensions shaft version:

Synchro flange

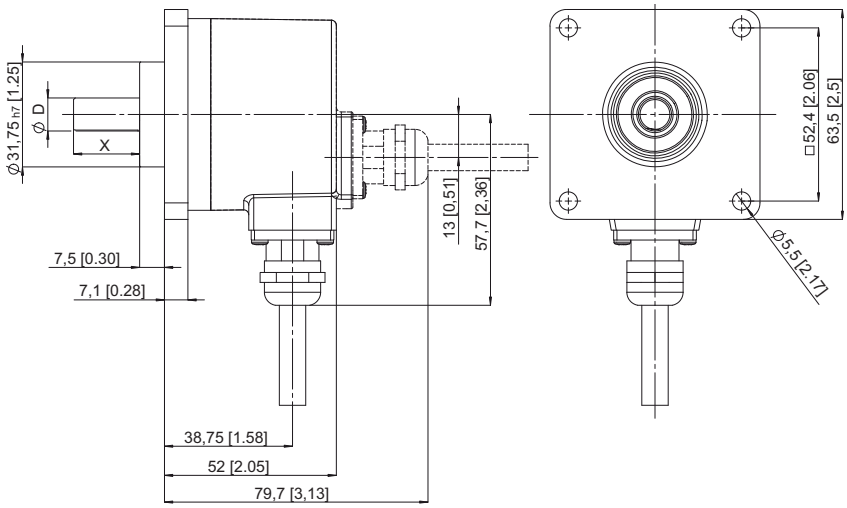
ø 58 mm, M12, M23 connector, cable versions
Flange type 2 and 4 (Drawing with M12 connector)



Clamping flange
ø 58 mm, M12, M23 connector, cable versions
Flange type 1 and 3 (Drawing with M23 connector)



Squqre flange
63.5 mm □, M12, M23 connector, cable versions
Flange type 5 and 7 (Drawing with cable version)



Sendix absolut, Multiturn Type 5863 (Shaft) / 5883 (Hollow shaft), SSI/BiSS

Order code shaft version:

8.5863.XXXX.XXXX (10 by 10)

Type

Flange
- **1 = Clamping flange ø 58 IP 65**
- **2 = Synchro flange ø 58 mm, IP65**
- 3 = Clamping flange ø 58 mm, IP 67
- 4 = Synchro flange ø 58 mm, IP67
- 5 = Square flange 2,5" / 63.5 mm, IP 65
- 7 = Square flange 2,5" / 63.5 mm, IP 67

Shaft
- **1 = Shaft 6 mm x 10 mm (ø x L)[1)]**
- **2 = Shaft 10 mm x 20 mm (ø x L)[2)]**
- 3 = Shaft 1/4" x 7/8" (ø x L)
- 4 = Shaft 3/8" x 7/8" (ø x L)

Output circuit / Power supply
- 1 = SSI or BiSS interface, 5 V DC,
- **2 = SSI or BiSS, 10 … 30 V DC**
- 3 SSI or BiSS, and 2048 ppr SinCos 5 V DC
- 4 = SSI or BiSS, and 2048 ppr SinCos 10 ... 30 V DC M23
- 5 = SSI or BiSS, 5 V DC, with sensor outputs for monitoring the supply voltage on the encoder
- 6= SSI or BiSS, and 2048 ppr SinCos 5 V DC, with sensor outputs for monitoring the supply voltage on the encoder
- 7 SSI or BiSS and 2048 ppr-incremental track RS422 (TTL-comp.), 5 V DC,
- 8 SSI or BiSS and 2048 ppr-incremental track RS422 (TTL-comp.), 10 ... 30 V DC,
- 9 = SSI or BiSS and 2048 ppr-incremental track RS422 (TTL-comp.), 5 V DC, with sensor outputs for monitoring the supply voltage on the encoder

[1)] Preferred type with flange type 2
[2)] Preferred type with flange type 1

Preferred types are indicated in ***bold***

Options (service)
- 1 = No option
- 2 = Status LED
- **3 = SET button and status LED**

Input/output[3)]
- **2 = SET, DIR inputs additional status output**

Resolution[3)]
- A = 10 bits ST + 12 bits MT
- 1 = 11 bits ST + 12 bits MT
- 2 = 12 bits ST + 12 bits MT
- **3 = 13 bits ST + 12 bits MT**
- 4 = 14 bits ST + 12 bits MT
- 7 = 17 bits ST + 12 bits MT

Code
- B = SSI, binary
- C = BiSS, binary
- **G = SSI, gray**

Type of connection
- 1 = axial cable (1 m PVC)
- 2 = radial cable (1 m PVC)
- 3 = 12 pin plug M23, axial
- **4 = 12 pin plug M23, radial**
- 5 = 8 pin plug M12, axial[4)]
- 6 = 8 pin plug M12, radial[4)]

- seawater resistant version on request

[3)] Resolution, preset value and counting direction factory-programmable
[4)] Can be combined only with output circuits 1 and 2

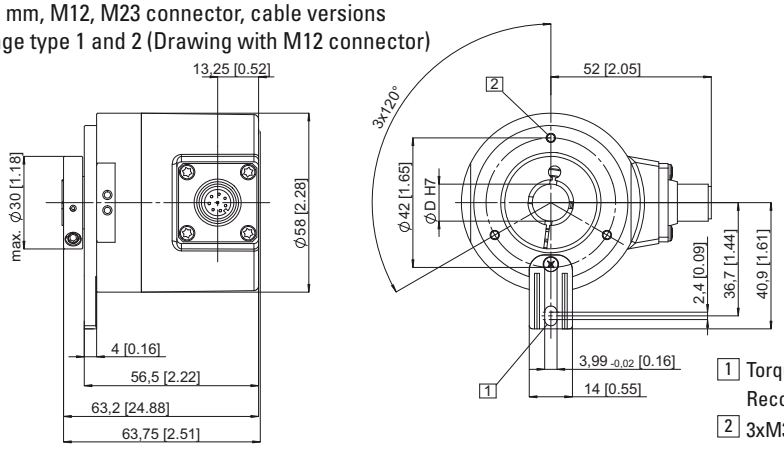
Accessories:
Cables / connectors: see Connection technology section
Mounting attachments / couplings: see Accessories section

Sendix absolut, Multiturn Type 5863 (Shaft) / 5883 (Hollow shaft), SSI/BiSS

Diemensions hollow shaft version:

Flange with long torque stop

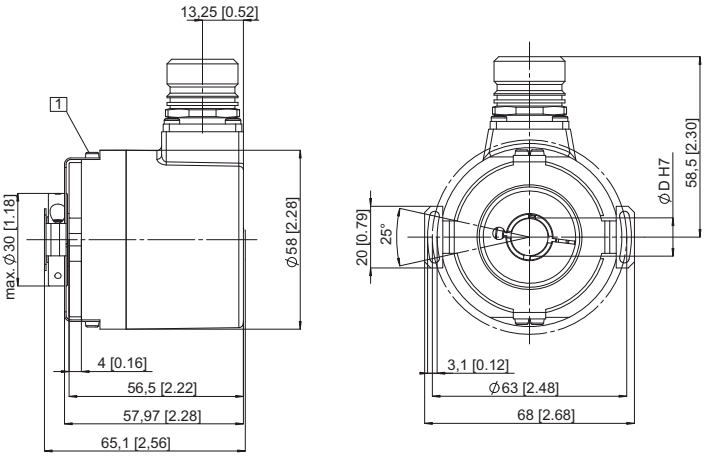
ø 58 mm, M12, M23 connector, cable versions
Flange type 1 and 2 (Drawing with M12 connector)



1 Torque stop slot,
Recommendation: cyl. pin. acc. DIN 7 Ø4
2 3xM3, 6 [0,24] deep

Flange with stator coupling

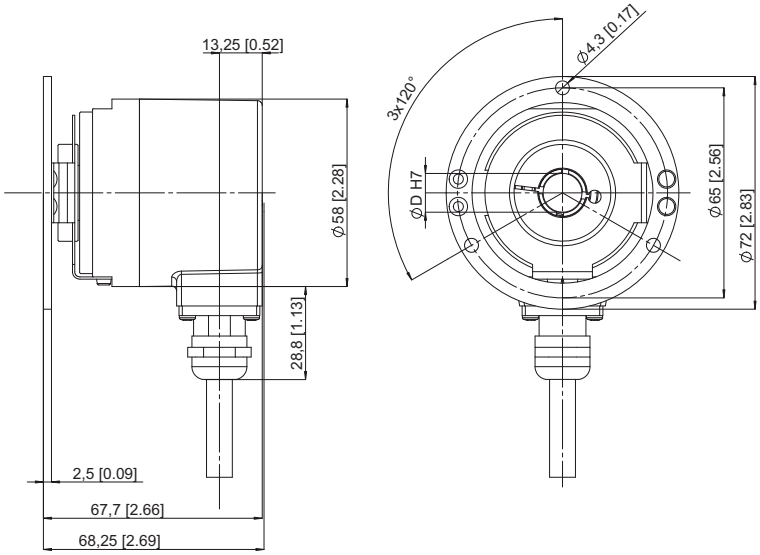
ø 58 mm, M12, M23 connector, cable versions
Flange type 5 and 6, pitch circle ø 63 mm (Drawing with M23 connector)



1 Fastening screw DIN 912 M3 x 8,
washer included

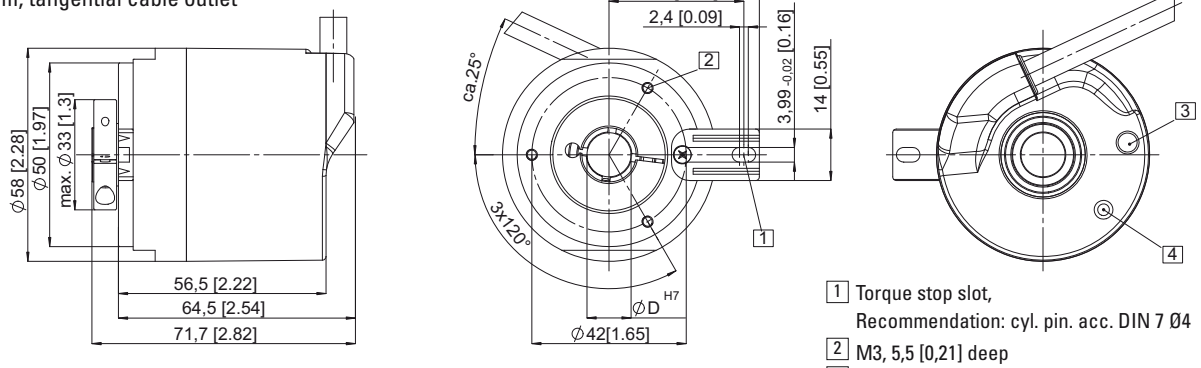
Flange with stator coupling

ø 58 mm, M12, M23 connector, cable versions
Flange type 3 and 4, pitch circle ø 65 mm (Drawing with cable version)



Sendix absolut, Multiturn Type 5863 (Shaft) / 5883 (Hollow shaft), SSI/BiSS

Dimensions hollow shaft version:
Flange with long torque stop
ø 58 mm, tangential cable outlet



1 Torque stop slot, Recommendation: cyl. pin. acc. DIN 7 Ø4
2 M3, 5,5 [0,21] deep
3 Status LED
4 SET button

Order code hollow shaft version:

8.5883.XXXX.XXXX

Type

Flange	
1 =	Flange with torque stop IP 65
2 =	Flange with torque stop IP 67
3 =	Flange with stator coupling pitch circle ø 65, IP 65
4 =	Flange with stator coupling pitch circle ø 65, IP 67
5 =	**Flange with stator coupling pitch circle ø 63, IP 65**
6 =	Flange with stator coupling pitch circle ø 63, IP 67

Hollow shaft	
3 =	ø 10 mm
4 =	**ø 12 mm**
5 =	ø 14 mm
6 =	ø 15 mm (blind hollow shaft)
8=	ø 9.52 mm [3/8"]
9 =	ø 12.7 mm [1/2"]

Preferred types are indicated in ***bold***

Output circuit / Power supply	
1 =	SSI or BiSS interface, 5 V DC,
2 =	**SSI or BiSS, 10 … 30 V DC**
3	SSI or BiSS, and 2048 ppr SinCos 5 V DC[4]
4 =	SSI or BiSS, and 2048 ppr SinCos 10 ... 30 V DC M23[4]
5 =	SSI or BiSS, 5 V DC, with sensor outputs for monitoring the supply voltage on the encoder
6=	SSI or BiSS, and 2048 ppr SinCos 5 V DC, with sensor outputs for monitoring the supply voltage on the encoder
7	SSI or BiSS and 2048 ppr-incremental track RS422 (TTL-comp.), 5 V DC,
8	SSI or BiSS and 2048 ppr-incremental track RS422 (TTL-comp.), 10 ... 30 V DC,
9 =	SSI or BiSS and 2048 ppr-incremental track RS422 (TTL-comp.), 5 V DC, with sensor outputs for monitoring the supply voltage on the encoder

Options (service)
1 = no option
2 = status LED
3 = SET button and status LED

Input/output[3]
2 = SET, DIR inputs additional status output

Resolution[3]
A = 10 bits ST + 12 bits MT
1 = 11 bits ST + 12 bits MT
2 = 12 bits ST + 12 bits MT
3 = 13 bits ST + 12 bits MT
4 = 14 bits ST + 12 bits MT
7 = 17 bits ST + 12 bits MT

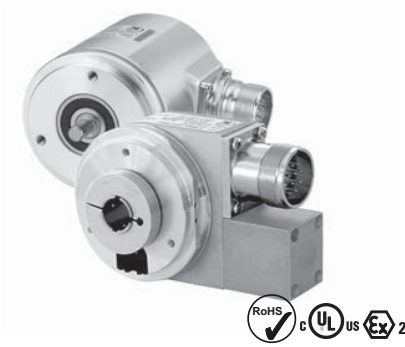
Code
B = SSI, binary
C = BiSS, binary
G = SSI, Gray

Type of connection
2 = radial cable (1 m PVC)
4 = 12 pin plug M23, radial
6 = 8 pin plug M12, radial[4]
E = tangential cable outlet (1 m PVC cable)

- seawater resistant version on request
[3] Resolution, preset value and counting direction factory-programmable
[4] Can be combined only with output circuits 1 and 2

Accessories:
Cables / connectors: see Connection technology section
Mounting attachments / couplings: see Accessories section

Multiturn Type 5862 (Shaft) / 5882 (Hollow shaft) SSI or RS 485, programmable



- Electronic multiturn gear with intelligent sensing technology (IST)
- Integrative Technology
- Max. 4 programmable outputs* for the SSI version
- Programmable parameters include*: code type, resolution per revolution, total resolution, direction of rotation (cw or ccw), zero point
- Resolution: up to 8192 (13 bits) per revolution, 4096 (12 bits) revolutions
- Protection IP 65
- Short-circuit proof at 5 V DC
- With optional incremental track 2048 ppr.
- Hollow shaft version: Only 40.5 mm clearance needed, thus lower profile than incremental encoders

* With optional programming kit (Ezturn®) see accessories

Mechanical characteristics:

Speed[1]:	max. 6 000 min^{-1}
Rotor moment of inertia:	Shaft version: approx. 1.8 x 10^{-6} kgm^2
	Hollow shaft version: approx. 6 x 10^{-6} kgm^2
Starting torque shaft version:	Shaft version: < 0.01 Nm
	Hollow shaft version: <0.05 Nm
Radial load capacity of shaft:[2]	80 N
Axial load capacity of shaft::[2]	40 N
Weight:	approx. 0.4 kg
Protection acc. to EN 60 529:	IP 65
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature:	–20° C ... +70 °C[3]
Shaft:	stainless steel
Shock resistance acc. to DIN-IEC 68-2-27	2500 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	100 m/s^2, 10 ... 2000 Hz

1) Hollow shaft version: continuous operation 3000 min^{-1}
2) For shaft version only (at shaft end)
3) Non-condensing

The programmable SSI versions are available in 3 variants:

Order code Interface 2:
Version with 4 programmable outputs
Order code Interface 4:
Version with incremental outputs A,$\overline{A}$,B,$\overline{B}$ (no programmable outputs)
Order code Interface 9:
Version with 2 programmable outputs and 2 sensor outputs for 0 V and +Ub for controlling the supply voltage on the encoder.

Electrical characteristics:

Interface type:		Synchronous-Serial (SSI) with outputs
General information		
Supply voltage (U_B):		5,0 ... 30 V DC[3]
Current consumption type (no load).:		89 mA
max (no load):		138 mA
Short circuit proof outputs:[1]:		yes[2]
Reverse connection protection at U_B:		yes
SSI-Interface:		
Output driver:		RS 485
Permissible load/channel:		max. +/-20 mA
Update rate for position data:		approx. 1600/s
SSI pulse rate min./max./pulse frequency:		100 kHz/500 kHz
Signal level high:		typ. 3.8 V
Signal level low (I_{Last} = 20 mA):		typ. 1.3 V
Rise time t_r (without cable):		max. 100 ns
Fall time t_f (without cable):		max. 100 ns
Control inputs: (V/R, SET)	Voltage:	5 ... 30 V DC = U_B
	response time:	10 ms
	Signal level: low	max. 25% U_B
	high	min. 60% U_B, max. U_B
	Max. current input	≤0.5 mA

Status outputs:	Output driver:	Push-Pull
	max. permissible load:	±9.0 mA
	Signal level high:	min. U_B –3.0 V
	low:	max. 1.5 V
	Rise time:	max. 240 µs
	Fall time:	max. 300 µs
Incremental outputs (A/B):		
	Output driver:	RS422 compatible
	Pulse frequency (max.):	200 kHz
	Signal level high:	4.5 V
	Signal level low (I_{Last} = 20 mA)	0.5 V
	Rise time (without cable):	max. 200 ns
	Fall time (without cable:	max. 200 ns

Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3
Performance against magnetic influence acc. to EN61000-4, 5

UL certified	File 224618

RoHS compliant acc. to EU guideline 2002/95/EG

1) If U_B supply voltage correctly applied U_B
2) Only one channel at a time:
If UB = 5 V DC, short-circuit to output, 0 V and + U_B is permitted.
If U_B < 5 V DC short-circuit to output and0 V is permitted.
3) The supply voltage at the encoder input must not be less than 4.75 V (5 V - 5%)

Multiturn Type 5862 (Shaft) / 5882 (Hollow shaft) SSI or RS 485, programmable

Control inputs:

F/R input for change of direction:
The encoder can output increasing code values when the shaft is rotated either clockwise or counter-clockwise (when looking from the shaft side).

There are two methods for selecting the appropriate option:

1. Via a hardware configuration of the F/R input BEFORE powering up the encoder
2. By programming the device using the Kübler "Ezturn®" programming tool.

The following table shows the function selection dependent on hardware and software settings:
Hardware configuration of the F/R input:

Hardware configuration of the F/R input	Programmed selection using the Ezturn® programming tool	Function: increasing code value when the shaft is in the following direction:
"low" (0V) on the F/R input (=cw)	cw	cw
"high" (+UB) on the F/R input (= ccw)	cw	ccw
"low" (0V) on the F/R input (=cw)	ccw	ccw
"high" (+UB) on the F/R input (= ccw)	ccw	ccw

Notes:
– Any hardware configuration of the F/R input must take place BEFORE powering up the encoder!
– If the F/R input is not configured, then a 0V configuration will apply (default condition)!
– If the direction of rotation is changed due to the F/R configuration, without activating the SET function again, and if the encoder is also then powered up again, a new position value may be outputted, even if the physical shaft position of the encoder has not moved! This is due to internal conversion processes.

The start-up procedure for the encoder should therefore follow this sequence:

1. Determine the count direction of the encoder either via the F/R input or via programming
2. Apply power to the encoder
3. Activate the SET function, if desired (see SET input below)

– If using a cable wire to configure the F/R input, then for EMC reasons the wire should not remain open but should be tied either to 0V or UB!
– The response time of the F/R input with UB = 5 … 30 V DC power supply is 10 ms.

SET input:
This input is used for a one-time alignment (zeroing) of the encoder immediately after installation. A high control pulse (+UB) applied to this input for a minimum of 10 ms will reset the current encoder position to the pre-programmed setpoint value.

The programming of the setpoint can be carried out with Kübler's Ezturn® programming software or can, on request, be done in advance at the factory. The default value is zero. However any value within the encoder's measuring range can be defined.

Notes:
- The SET function should only be implemented when the encoder shaft is at rest.
- For the duration of the SET pulse the SSI interface does not function and therefore does not output any valid position values! In order to avoid malfunctions, no SSI clock pulse should occur during the SET pulse.
- If a cable wire is used to configure the SET input, then for EMC reasons the wire should not remain open but should if at all possible be tied to 0 V, provided no SET pulse is triggered!
- The response time of the SET input with +UB = 5 … 30 V DC power supply is 10 ms.

Encoder outputs[1)]

Output	Default-function:
A1:	battery control[2)]
A2:	not activated[2)]
A3:	not activated[2)3)]
A4:	not activated[2)3)]

The outputs are not activated in the factory setting (default). They can be activated and defined with the optional Ezturn® programming software e.g. limit switch, overspeed and temperature control etc.

1) not available for versions with incremental track
2) programmable with the optional programming software Ezturn®
3) with the order code Interface 9 assigned to the sense outputs.

Functionality of the Ezturn® software

– Setting of the communication parameters
– RS232 encoder/PC interface
– Setting of a drive factor by means of the modification of the resolution per revolution, the number of revolutions and the total resolution
– Programming of the direction of rotation and code type
– Setting of a preset/electronic zero point
– Setting of diagnostic functions
– Setting of the outputs A1 … A4
  • Limit switch values, max. 2
  • Alarm and status information
  • Battery monitoring
–Limiting max. number of bits to interface with PLCs
– Diagnostics and information for the set-up operation
– Data transmission from the PC to the encoder and inversely, also during operation
– Print-out of the current data and set parameters
– Convenient position output with the current set data
– Terminal operation for direct instructions via the keyboard
– Diagnostics of the encoder connected

Multiturn Type 5862 (Shaft) / 5882 (Hollow shaft) SSI or RS 485, programmable

Terminal assignment SSI Synchronous Serial interface with 12pin plug

Signal :	0V	+UB	+T	-T	+D	-D	ST	VR	A1	A2	A3[1)]	A4[1)]	⏚
Interface 9:										0 V_{sense}	+UB_{sense}		
Pin:	1	2	3	4	5	6	7	8	9	10	11	12	PH
Col.:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY PK	RD BU	

T: Clock signal
D: Data signal
ST: SET input. The current position value is stored as new zero position (or the actual value is set to the preset value when using the programmable version).
VR: Up/down input. As long as this input is active, decreasing code values are transmitted when shaft turning clockwise.
PH: Plug housing
Isolate unused outputs before initial start-up

Interface 9
A1,A2,A3,A4: outputs, can be modified using Ezturn®
1)With the order code Interface 9 these outputs are assigned to the sense outputs. The sensor circuits are internally tied to the power supply. Special power supply units control the voltage drop in long cable runs via the voltage feedback. If the circuits are not being used, then they should be individually isolated and not connected.

Terminal assignment (RS485 interface 12 pin plug):

Signal :	0V	+UB	T/R-	T/R+	Term[2)]	Term[2)]		VR					⏚	
Pin	1	2	3	4	5	6	7[1)]	8	9	10	11	12	PH	
Col.:	WH	BN	GN	YE				RD						

R = Receive-channel
T = Transmit-channel
VR: Up/down input. As long as this input (High-Level = + U_B)is active, decreasing code values are transmitted when shaft turning clockwise.
PH = Plug housing

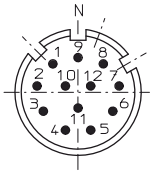
1) There is no SET input for the P3001 version but it can likewise be implemented using the command "<ESC> QP" (Write preset).

2)For the version with external termination: if the termination is desired (terminating resistor 120 Ohm), then both connections are to be tied together by means of a jumper (0 Ohm).

SSI interface with incremental track (A/B)):

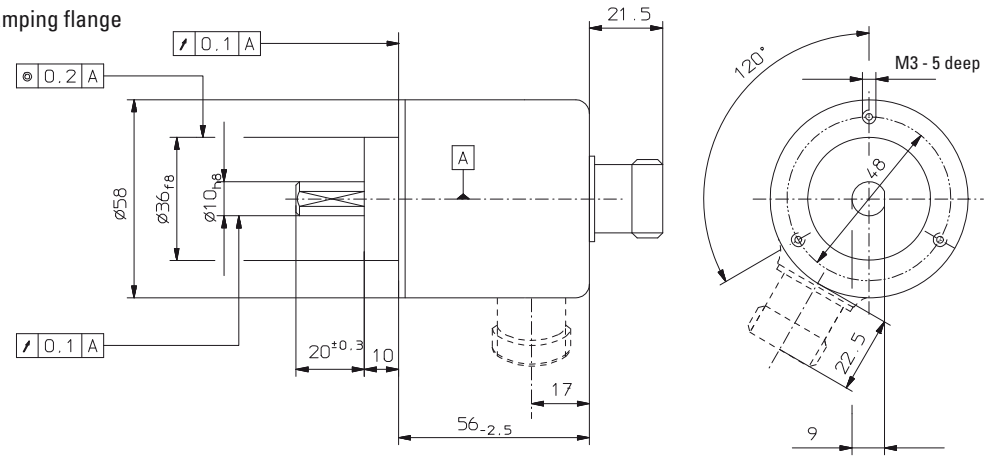
Signal :	0V	+UB	+T	–T	+D	–D	ST	VR	$\overline{B}$	B	$\overline{A}$	A	⏚	
Pin	1	2	3	4	5	6	7*	8	9	10	11	12	PH	

Top view of mating side::
12 pin plug



Dimensions shaft version

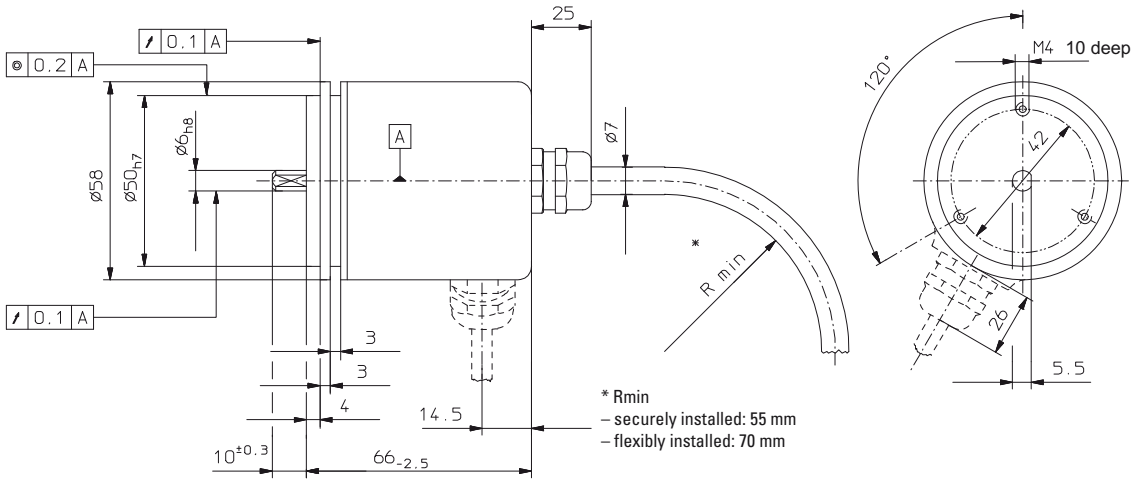
Clamping flange



Multiturn Type 5862 (Shaft) / 5882 (Hollow shaft) SSI or RS 485, programmable

Dimensions haft version:

Synchronous flange



Order code shaft version: 8.5862.XXXX.XXXX

Type

Flange
- 1 = Clamping flange
- **2 = Synchronous flange**

Shaft (ø x L)
- **1 = ø 6 mm x 10 mm**
- 2 = ø 10 mm x 20 mm

Interface
- **2 = SSI 5 ... 30 V DC, with 4 status outputs**
- 3 = RS 485, half-duplex 5 ... 30 V DC internal termination
- 5 = SSI, 5 ... 30 V DC, with incremental tracks A, B A\, B\, 2048 ppr.
- 7 = RS 485, half duplex 5 ... 30 V DC, external termination
- 9 = SSI 4.75 … 30 V DC. with 2 status outputs and 2 sensor outputs for monitoring the supply voltage on the encoder.

Type of connection
- 1 = Axial cable (1 m PVC-cable)
- 2 = Radial cable (1 m PVC-cable)
- 3 = Axial 12 pin plug
- **4 = Radial 12 pin plug**

Preferred types are indicated in ***bold***

SSI-Interface*
- 2001 = 4096 x 4096 (24-Bit), Binary
- 2002 = 8192 x 4096 (25-Bit), Binary
- 2003 = 4096 x 4096 (24-Bit), Gray
- **2004 = 8192 x 4096 (25-Bit), Gray**

RS 485-Interface, half-duplex
- 3001 = ESC protocol, max. 19200 baud

*This factory set (default) resolution can be re-programmed by using the Ezturn® software.

Accessories:

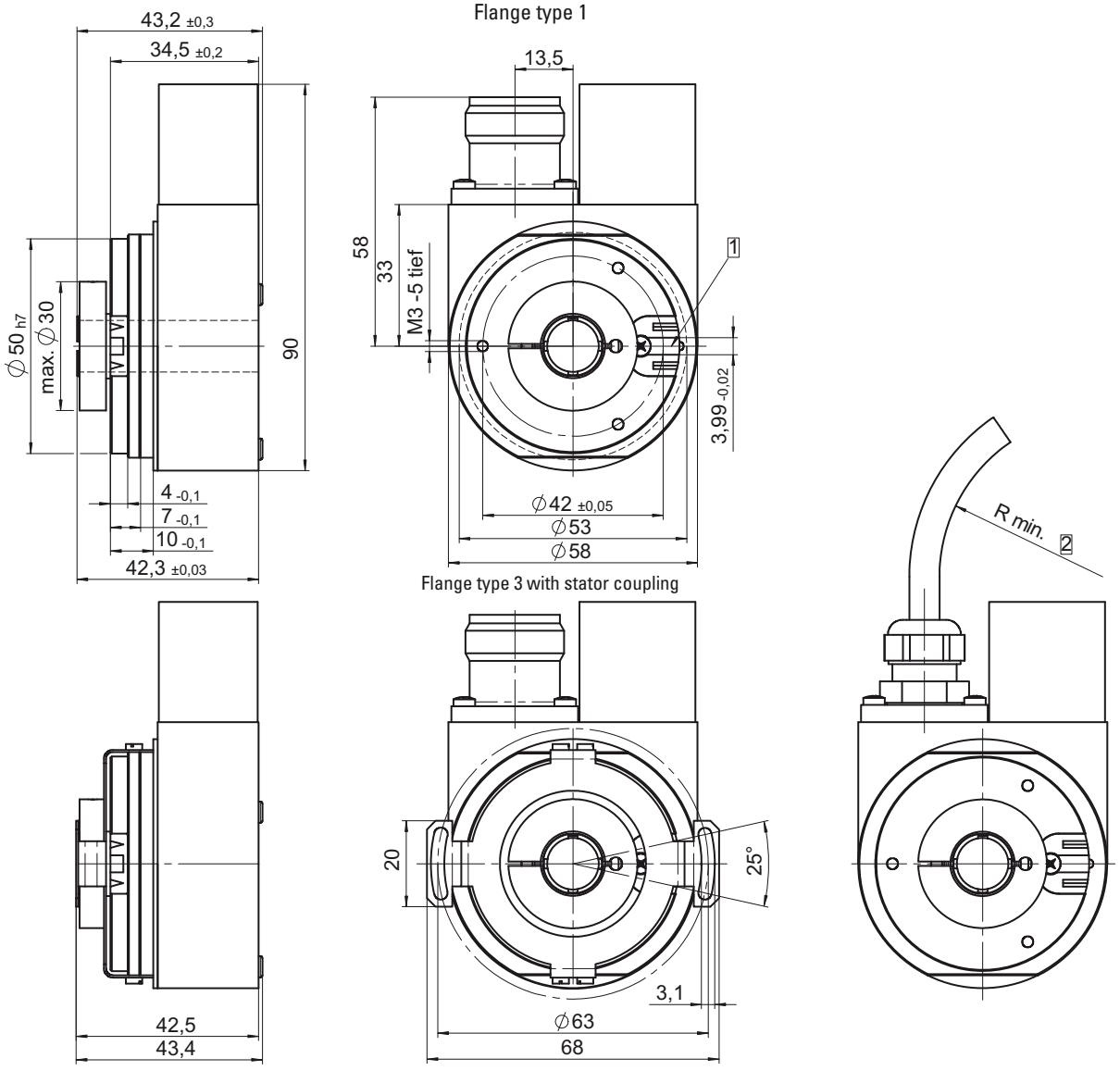
Corresponding mating connector to connection type 3 and 4
Order code 8.0000.5012.0000

Programming kit Ezturn® includes
- Interface converter
- Connection cable with the interface converter encoder – PC
- 90-250 V AC power supply
- CD-ROM with Ezturn® software

Order code 8.0010.9000.0004

Multiturn Type 5862 (Shaft) / 5882 (Hollow shaft) SSI or RS 485, programmable

Dimensions hollow shaft version:



1 torque stop slot
Recommendation: Cyl. pin. acc. to DIN 7-04

2 Cable,
– securely installed: 55 mm
– flexibly installed: 70 mm

Multiturn Type 5862 (Shaft) / 5882 (Hollow shaft) SSI or RS 485, programmable

Order code hollow shaft version: 8.5882.XXXX.XXXX

Type

Flange
- 1 = Flange type 1 with through shaft and torque support slot
- **3 = Flange type 3 with through shaft and stator coupling***

*Shaft clamping on other side on request

Hollow shaft
- 6 = Hollow shaft ø 10 mm
- **8 = Hollow shaft ø 12 mm**

Interface
- **2 = SSI 5 ... 30 V DC with 4 status outputs**
- 3 = RS 485, half-duplex 5 ... 30 V DC internal termination
- 5 = SSI, 5 ... 30 V DC with incremental track 2048 ppr (A, B, $\overline{A}$, $\overline{B}$)
- 7 = RS45, half-duplex 5 ... 30 V DC external termination
- 9 = SSI 4.75 … 30 V DC. with 2 status outputs and 2 sensor outputs for monitoring the supply voltage on the encoder.

Type of connection
- 1 = Radial cable (1 m PVC-cable)
- **2 = 12 pin plug radial**
- 5 = Radial cable (5 m PVC-Cable)

Preferred types are indicated in ***bold***

SSI-Interface *
- 2001 = 4096 x 4096 (24-Bit), Binary
- 2002 = 8192 x 4096 (25-Bit), Binary
- 2003 = 4096 x 4096 (24-Bit), Gray
- **2004 = 8192 x 4096 (25-Bit), Gray**

RS 485-Interface half-duplex
- 3001 = ESC protocol, max. 38400 Baud

*This factory set (default) resolution can be re-programmed by using the Ezturn® software.

Accessories:
Corresponding mating connector to connection type 2
Order code 8.0000.5012.0000

Programming kit Ezturn® includes
- Interface converter
- Connection cable with the interface converter encoder – PC
- 90-250 V AC power supply
- CD-ROM with Ezturn® software

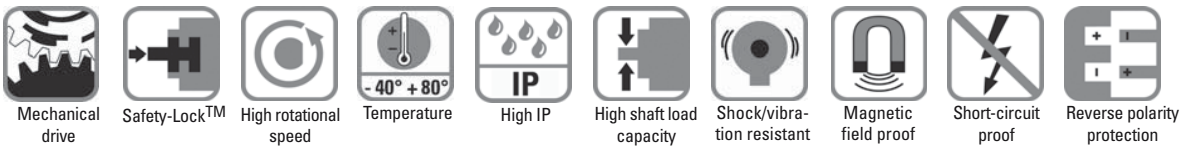
Order code 8.0010.9000.0004

Patented Intelligent-Sensing-Technology (IST)®

An innovative principle of operation based on a non-contact electronic multiturn stage overcomes system disadvantages previously associated with encoders that had mechanical gears or with traditional electronic gear technology.

Advantages:
- High operational reliability
- Logic filter and innovative principle of operation compensate for high EMC interference
- Free from wear

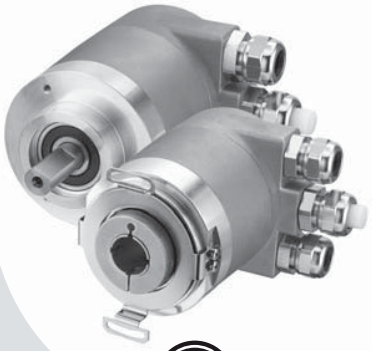
Sendix absolut, Multiturn Type 5868 (Shaft) / 5888 (Hollow shaft), Profibus-DP



Mechanical drive | Safety-Lock™ | High rotational speed | Temperature | High IP | High shaft load capacity | Shock/vibration resistant | Magnetic field proof | Short-circuit proof | Reverse polarity protection

Reliable

- **Increased ability to withstand vibration and installation errors. Eliminates machine downtime and repairs.**
  Sturdy "Safety-Lock™ Design" bearing structure
- **Fewer components and connection points increase the operational reliability**
  Kübler OptoASIC technology with highest integration density (Chip-on-Board)
- **Remains sealed, even in the roughest environments, ensures highest safety against field breakdowns**
  Resistant die cast housing and protection up to IP 67
- **Can be used in a wide temperature range without additional expense**
  Wide temperature range
- **Immediate recognition of error-free bus operation**



Sendix® absolut

Fast

- **Fast data availability while reducing the load on the bus and the control**
  Intelligent functions like the transmission of speed, acceleration or exiting a working area
- **Fast, simple and error-free connection**

Versatile

- **Up-to-the minute field bus performance in the application**
  Profibus-DPV0 with the current encoder profile supports Class 1 and Class 2
  Enhanced programming possibilities
- **Connection options**
  Bus cover with M12 connector or cable connection
- **Fast start-up** with pre-defined GSD file
  A variety of scaling options for the most diverse applications
  16 bit singleturn resolution
  12 bit multiturn resolution
  Comprehensive diagnostics, programmable to Class 2
- **Reliable installation in a wide diversity of mounting situations**
  Extensive choice of proven mounting options
- also available in **seawater resistant** version, certified acc. to salt-spray test IEC 68-2-11 => 672 hours.

Mechanical characteristics:

Max. speed without shaft seal (IP 65) up to 70 °C:	9 000 min^{-1}, continuous 7 000 min^{-1}
Max. speed without shaft seal (IP 65) up to T_{max}:	7 000 min^{-1}, continuous 4 000 min^{-1}
Max. speed with shaft seal (IP 67) up to 70 °C:	8 000 min^{-1}, continuous 6 000 min^{-1}
Max. speed with shaft seal (IP 67) up to T_{max}:	6 000 min^{-1}, continuous 3 000 min^{-1}
Starting torque without shaft seal (IP65):	< 0.01 Nm
Starting torque with shaft seal (IP67):	< 0.03 Nm
Moment of inertia:	Shaft version: 4.0 x10^{-6} kgm^2 Hollow shaft version: 7.5 x10^{-6} kgm^2
Radial load capacity of shaft:	80 N
Axial load capacity of shaft:	40 N
Weight:	approx. 0.57 kg with bus terminal cover approx. 0.52 kg with fixed connection
Protection acc. to EN 60 529:	housing: IP 67, shaft: IP 65, opt. IP 67
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature:	–40° C ... +80 °C
Materials:	Shaft: stainless steel, Flange: aluminium, Housing: die cast zinc
Shock resistance acc. to DIN-IEC 68-2-27:	>2500 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	>100 m/s^2, 55 ... 2000 Hz

- Absolutely safe operation even in strong magnetic fields
- Over 40 years of experience in the field of precision mechanics
- Special gears with specific toothing

Sendix absolut, Multiturn Type 5868 (Shaft) / 5888 (Hollow shaft), Profibus-DP

General electrical characteristics:

Supply voltage:	10 ... 30 V DC
Current consumption (w/o output load):	24 V DC, max.90 mA
Reverse polarity protection at power supply (Ub):	Yes
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3	
UL certified	File 224618
RoHS compliant acc. to EU guideline 2002/95/EG	

Interface characteristics Profibus-DP

Singleturn resolution (max, scaleable):	1 ... 65536 (16 bits), default scale value is set to 8192 (13 bits)
Total resolution:	28 Bit (scaleable 1 ... 2^{28} steps)
Number of Revolutions:	4096 (12 bits), (scaleable 1 ... 4096)
Code:	Binary
Interface:	Specification according to Profibus-DP 2.0 Standard (DIN 19245 Part 3) RS-485 driver galvanically isolated.

Profibus Encoder-Profile V1.1

The PROFIBUS-DP device profile describes the functionality of the communication and the user-specific component within the PROFIBUS field bus system. For encoders, the encoder profile is definitive. Here the individual objects are defined independent of the manufacturer. Furthermore, the profiles offer space for additional manufacturer-specific functions; this means that PROFIBUS-compliant device systems can be used now with the guarantee that they are ready for the future too.

The following parameters can be programmed:

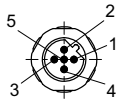
- Direction of rotation
- Scaling
- Number of steps per revolution
- Number of revolutions
- Total resolution over Singleturn/Multiturn
- Preset value
- Diagnostics mode

Terminal assignment with terminal box:

Signal :	BUS IN				BUS OUT				
	B	A	0 V	+ V	0 V	+ V	B	A	
Pin :	1	2	3	4	5	6	7	8	

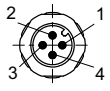
Shield must be connected to the cable gland (with the contact surface as large as possible).

Terminal assignment M12 connector version:



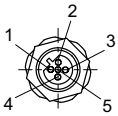
Bus in:

Signal :	–	BUS-A	–	BUS-B	Shield
Pin:	1	2	3	4	5



Power supply:

Signal :	U_B	–	0 V	–
Pin:	1	2	3	4



Bus out:

Signal :	BUS_VDC[1)]	BUS-A	BUS_GND[1)]	BUS-B	Shield
Pin:	1	2	3	4	5

[1)] for powering an external Profibus-DP terminating resistor

SET control button (zero or defined value, option)

Protected against accidental activation, can only be pushed in with the tip of a ball pen or similar.

Diagnostic LED (yellow)

LED on with:
optical sensor path faulty (code error, LED error), low voltage and over-temperature

Protocol:	Profibus Encoder Profile V1.1 Class 1 and Class 2 with manufacturer-specific enhancements
Baud rate:	12 Mbits/s
Node address:	1 ... 127 (set by rotary switches / software configurable)
Termination switchable:	Set by DIP switches

The following parameters can be configured

- Position 16/32 Bit
- Speed UPM or Unit/s (16/32) Bit

The following functionality is integrated:

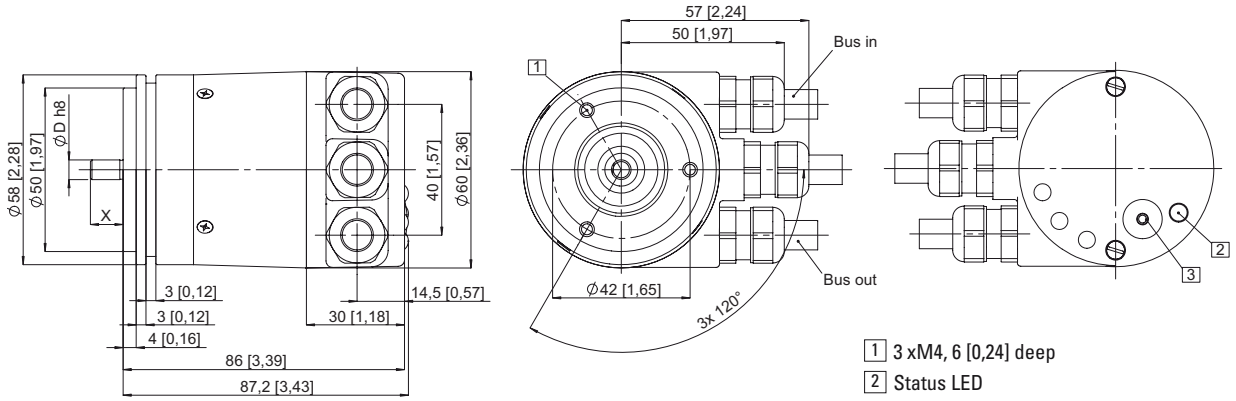
- Galvanic isolation of the bus stage with DC/DC converter
- Line driver acc. to RS 485 max. 12 MB
- Address programmable via DIP switches
- Diagnostics LED
- Full Class 1 and Class 2 functionality

Sendix absolut, Multiturn Type 5868 (Shaft) / 5888 (Hollow shaft), Profibus-DP

Dimensions shaft version

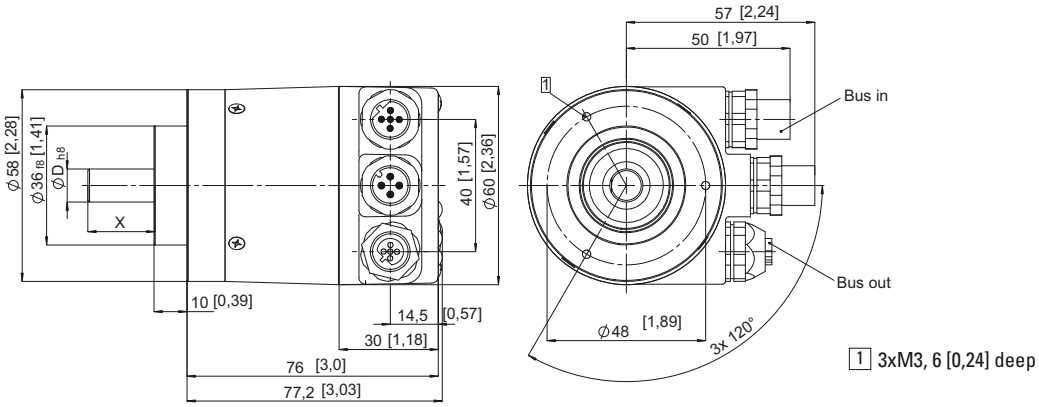
With removable bus terminal cover

ø 58 mm, Synchro flange
Flange type 2 and 4 (Drawing with cable version)



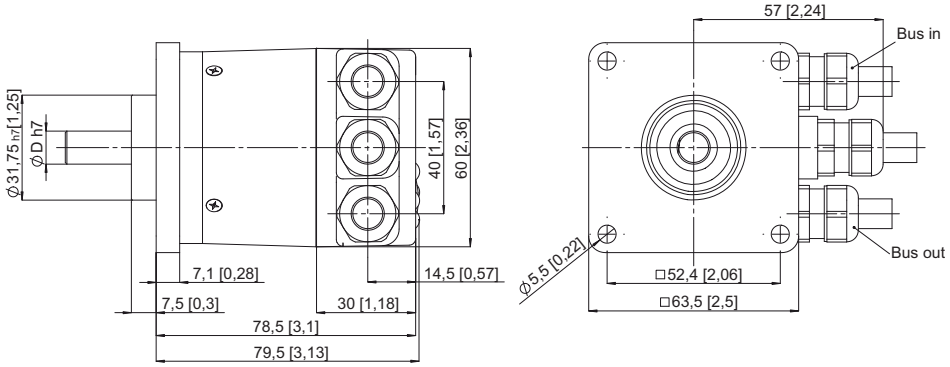
1 3 xM4, 6 [0,24] deep
2 Status LED
3 SET button

ø 58 mm, Clamping flange
Flange type 1 and 3 (Drawing with 2 x M12 connector)



1 3xM3, 6 [0,24] deep

63.5 mm □, Square flange
Flange type 5 and 7 (Drawing with cable version)



Sendix absolut, Multiturn Type 5868 (Shaft) / 5888 (Hollow shaft), Profibus-DP

Order code shaft version:

8.5868.XXXX.XX1X

Type

Flange
- **1 = Clamping flange ø 58 IP 65**
- **2 = Synchro flange ø 58 mm, IP65**
- 3 = Clamping flange ø 58 mm, IP 67
- 4 = Synchro flange ø 58 mm, IP67
- 5 = Square flange 2.5" / 63.5 mm, IP 65
- 7 = Square flange 2.5" / 63.5 mm, IP 67

Shaft
- **1 = Shaft 6 mm x 10 mm (ø x L)[1)]**
- **2 = Shaft 10 mm x 20 mm (ø x L)[2)]**
- 3 = Shaft 1/4" x 7/8" (ø x L)
- 4 = Shaft 3/8" x 7/8" (ø x L)

Output circuit / Power supply
- **3= Profibus-DP V0**
  Encoder Profile V 1.1
  10 ... 30 V DC

1) Preferred type with flange type 2

2) Preferred type with flange type 1

Preferred types are indicated in ***bold***

Options (service)
- 2 = no option
- **3 = SET button**

Field bus profile[3)]
- **31= Profibus DP-V0**
  Encoder profile Class 2

Type of connection
- 1 = With removable bus terminal cover, with radial screwed cable passage
- **2 = Removable bus terminal cover with 3 x M12 connector**

- seawater resistant version on request

Use Couplings for the connection BUS-IN and Connectors for the connection BUS-OUT.

Compatible self-assembly connectors:
Connector (BUS-OUT): 05.BMSWS.8151-8.5
Coupling (BUS-IN): 05.BM WS.8151-8.5

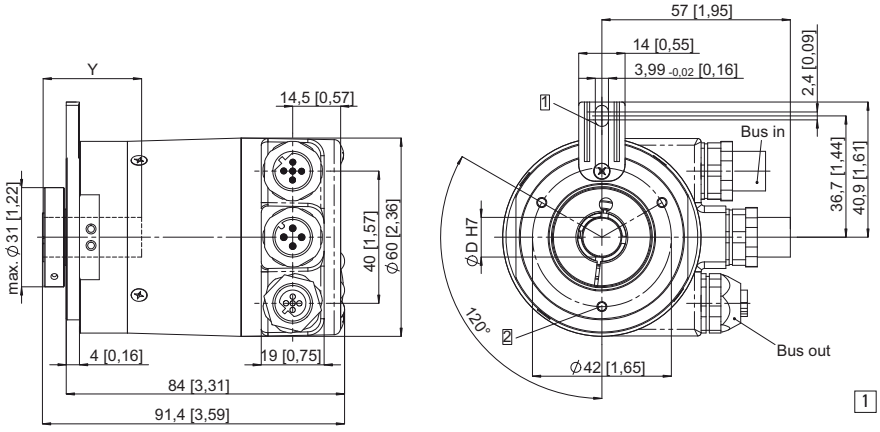
See also Connection Technology section

Accessories:
- Cables and connectors, also pre-assembled, can be found in Connection Technology section
- Mounting attachments and couplings can be found in Accessories section

Sendix absolut, Multiturn Type 5868 (Shaft) / 5888 (Hollow shaft), Profibus-DP

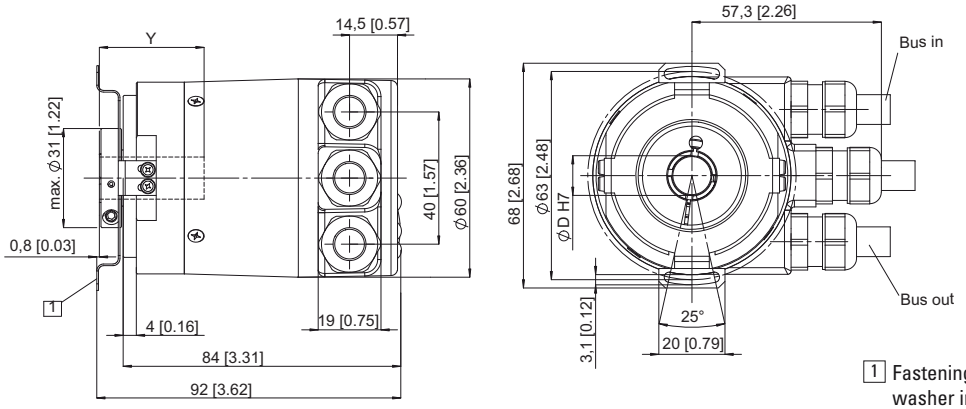
Dimensions hollow shaft version:

With removable bus terminal cover:
ø 58 mm, Flange with long torque stop
Flange type 1 and 2 (Drawing with 2x M12 connector)



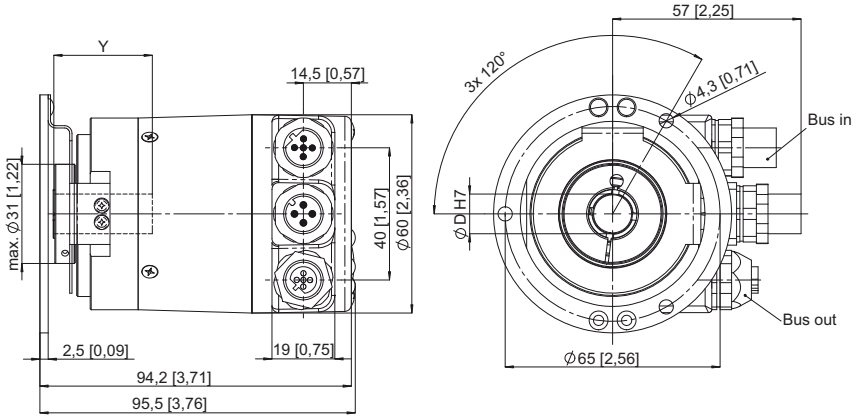
1 Torque stop slot,
Recommendation: cyl. pin. acc. DIN 7 Ø4
2 3xM3, 5.5 [0.21]deep

ø 58 mm, Flange with stator coupling
Flange type 5 and 6, pitch circle ø 63 mm (Drawing with cable versions)



1 Fastening screw DIN 912 M3 x 8,
washer included

ø 58 mm, Flange with stator coupling
Flange type 3 and 4, pitch circle ø 65 mm (Drawing with 2x M12 connector)



Y: Depth for blind hollow shaft: 30 mm

Sendix absolut, Multiturn Type 5868 (Shaft) / 5888 (Hollow shaft), Profibus-DP

Order code hollow shaft version:

8.5888.XXXX.XX1X

10 by 10

Type

Flange
- 1 = Flange with torque stop IP 65
- 2 = Flange with torque stop IP 67
- 3 = Flange with stator coupling pitch circle ø 65, IP 65
- 4 = Flange with stator coupling pitch circle ø 65, IP 67
- **5 = Flange with stator coupling pitch circle ø 63, IP 65**
- 6 = Flange with stator coupling pitch circle ø 63, IP 67

Hollow shaft
- 3 = Blind hollow shaft ø 10 mm
- **4 = Blind hollow shaft ø 12 mm**
- 5 = Blind hollow shaft ø 14 mm
- 6 = Blind hollow shaft ø 15 mm
- 8 = Blind hollow shaft ø 9.52 mm [3/8"]
- 9 = Blind hollow shaft ø 12.7 mm [1/2"]

Output circuit / Power supply
- **3= Profibus-DP V0 Encoder Profile V 1.1 10 ... 30 V DC**

Preferred types are indicated in **bold**

Options (service)
- 2 = no option
- **3 = SET button**

Field bus profile[3)]
- **31= Profibus DP-V0 Encoder profile Class 2**

Type of connection
- 1 = With removable bus terminal cover, with radial screwed cable passage
- **2 = Removable bus terminal cover with 3 x M12 connector**

- seawater resistant version on request

Use Couplings for the connection BUS-IN and Connectors for the connection BUS-OUT.

Compatible self-assembly connectors:
Connector (BUS-OUT): 05.BMSWS.8151-8.5
Coupling (BUS-IN): 05.BM WS.8151-8.5

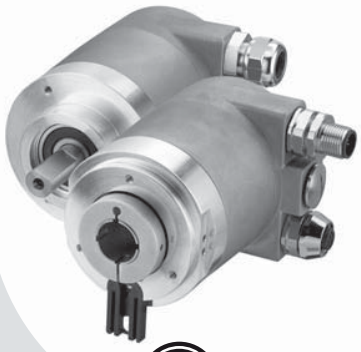
Accessories:
- Cables and connectors, also pre-assembled, can be found in Connection Technology section
- Mounting attachments and couplings can be found in Accessories section

Sendix absolut, Multiturn Type 5868 (Shaft) / 5888 (Hollow shaft), CANopen/CANlift

Mechanical drive | Safety-Lock™ | High rotational speed | Temperature | High IP | High shaft load capacity | Shock/vibration resistant | Magnetic field proof | Short-circuit proof | Reverse polarity protection

Reliable

- **Increased ability to withstand vibration and installation errors. Eliminates machine downtime and repairs.**
  Sturdy "Safety-Lock™ Design" bearing structure
- **Fewer components and connection points increase the operational reliability**
  Kübler OptoASIC technology with highest integration density (Chip-on-Board)
- **Remains sealed, even in the roughest environments, ensures highest safety against field breakdowns**
  Resistant die cast housing and protection up to IP 67
- **Can be used in a wide temperature range without additional expense**
  Wide temperature range



Sendix® absolut RoHS c UL us Ex 2/22

CANopen LIFT CANopen

Fast

- **Genuine time-synchronous position detection of several axes**
  Extended CAN Sync Mode with real-time position acquisition
- **Fast data availability while reducing the load on the bus and the control**
  Intelligent functions like the transmission of speed, acceleration or exiting a working area
- **Fast, simple and error-free connection**

Versatile

- **Latest field bus performance for the applications**
  CANopen, CANlift with the latest profiles
- **The suitable connection variant for every specific case**
  Bus terminal cover with M12 connector or cable connection or fixed connection with M12, M23 or D-Sub connector, also easy point-to-point connections
- **Position, Speed, acceleration, working area - The user decides which information is to be available in real-time**
  Variable PDO mapping in the memory
- **Quick and error-free start-up, without setting any switches**
  Node address, baud rate and termination can be programmed via the bus
- **Reliable mounting in the most various installation cases**
  Comprehensive and proven mounting possibilities

Hollow shaft version: Direct mounting also on large diameter standard shafts
Blind hollow shaft up to 15 mm

- also available in **seawater resistant** version, certified acc. to salt-spray test IEC 68-2-11 => 672 hours.

Mechanical characteristics:

Max. speed without shaft seal (IP 65) up to 70 °C:	9 000 min^{-1}, continuous 7 000 min^{-1}
Max. speed without shaft seal (IP 65) up to Tmax:	7 000 min^{-1}, continuous 4 000 min^{-1}
Max. speed with shaft seal (IP 67) up to 70 °C:	8 000 min^{-1}, continuous 6 000 min^{-1}
Max. speed with shaft seal (IP 67) up to Tmax:	6 000 min^{-1}, continuous 3 000 min^{-1}
Starting torque without shaft seal (IP65):	< 0.01 Nm
Starting torque with shaft seal (IP67):	< 0.03 Nm
Moment of inertia:	Shaft version: 4.0 x10^{-6} kgm^2 Hollow shaft version: 7.5 x10^{-6} kgm^2
Radial load capacity of shaft:	80 N
Axial load capacity of shaft:	40 N
Weight:	approx. 0.57 kg with bus terminal cover approx. 0.52 kg with fixed connection
Protection acc. to EN 60 529:	housing: IP 67, shaft: IP 65, opt. IP 67
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature:	–40° C ... +80 °C[1)]
Materials:	Shaft: stainless steel, Flange: aluminium, Housing: die cast zinc, Cable: PVC
Shock resistance acc. to DIN-IEC 68-2-27:	>2500 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	>100 m/s^2, 55 ... 2000 Hz

[1)] Cable versions: -30 °C ... + 75°C

- Absolutely safe operation even in strong magnetic fields
- Over 40 years of experience in the field of precision mechanics
- Special gears with specific toothing

Sendix absolut, Multiturn Type 5868 (Shaft) / 5888 (Hollow shaft), CANopen/CANlift

General electrical characteristics:

Supply voltage:	10 ... 30 V DC
Current consumption (w/o output load):	24 V DC, max. 65 mA
Reverse polarity protection at power supply (Ub):	Yes
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3	
UL certified	File 224618
RoHS compliant acc. to EU guideline 2002/95/EG	

Interface characteristics CANopen/CANlift:

Singleturn resolution (max, scaleable):	1 ... 65536 (16 bits), default scale value is set to 8192 (13 bits)
Total resolution:	1 ... 268 435 456 (28 Bit) Default: 25 Bit
Code:	Binary
Interface:	CAN High-Speed according ISO 11898, Basic- and Full-CAN CAN Specification 2.0 B
Protocol:	CANopen profile DS 406 V3.1 with manufacturer-specific add-on's

SET control button (zero or defined value, option)

Protected against accidental activation, can only be pushed in with the tip of a ball pen or similar.

Diagnostic LED (yellow)

LED on with:
optical sensor path faulty (code error, LED error), low voltage and over-temperature

	or CANlift profile DS 417 V1.1
Baud rate:	10 ... 1000 kbits/s (set by DIP switches/software configurable)
Node address:	1 ... 127 (set by rotary switches / software configurable)
Termination switchable:	Set by DIP switches
	Software configurable

General information about CAN/CANlift

The CANopen encoders of the 5868 series support the latest CANopen communication profile according to DS 301 V4.02. In addition, device-specific profiles like the encoder profile DS 406 V3.1 and the profile DS 417 V1.1 (for lift applications) are available.
The following operating modes may be selected: Polled Mode, Cyclic Mode, Sync Mode and a High Resolution Sync Protocol. Moreover, scale factors, preset values, limit switch values and many other additional parameters can be programmed via the CAN-Bus. When switching the device on, all parameters, which have been saved on an EEPROM to protect them against power failure, are loaded again.
The following output values may be combined in a freely variable way as PDO (PDO mapping): **position, speed, acceleration**, as well as the status of the working area.

As a price-effective variant, encoders with a connector or a cable connection are available, for which the device address and baud rate are modified by means of software. The models with bus terminal cover and integrated T-shaped coupler allow a particularly easy installation: bus and power supply are connected very simply thanks to M12 connectors; the device address is set by means of two hexadecimal rotary switches. Furthermore, another DIP switch allows setting the baud rate and switching on a termination resistor. Three LED's located on the back indicate the operating or fault status of the CAN bus, as well as the status of an internal diagnostic.

CANopen Communication Profile V4.02

Among others, the following functionality is integrated:
Class C2 Functionality
NMT Slave • Heartbeat Protocol • High Resolution Sync Protocol
Identity Object • Error Behaviour Object • Variable PDO Mapping
self-start programmable (Power on to operational)
3 Sending PDO's • Node address, baud rate and CANbus
Programmable termination

CANopen Encoder Profile V3.1

The following parameters can be programmed:
- Event mode
- Units for speed selectable (Steps/Sec or RPM)
- Factor for speed calculation (e.g. measuring wheel periphery)
- Integration time for speed value of 1...32
- 2 work areas with 2 upper and lower limits and the corresponding output states
- Variable PDO mapping for position, speed, acceleration, work area status
- Extended failure management for position sensing with integrated temperature control
- User interface with visual display of bus and failure status - 3 LED's
- optional - 32 CAM's programmable
- Customer-specific memory - 16 Bytes

CANopen Lift Profile DS 417 V1.1

Among others, the following functionality is integrated:
- Car Position Unit
- 2 virtual devices
- 1 virtual device delivers the posititon in absolute measuring steps (steps)
- 1 virtual device delivers the posititon as an absolute travel information in mm
- Lift number programmable
- Independent setting of the node address in relation with the CAN identifier
- Factor for speed calculation (e.g. measuring wheel periphery)
- Integration time for speed value of 1...32
- 2 work areas with 2 upper and lower limits and the corresponding output states
- Variable PDO mapping for position, speed, acceleration, work area status
- Extended failure management for position sensing with integrated temperature control
- User interface with visual display of bus and failure status - 3 LED's

All profiles stated here: **Key-features**
The object 6003h "Preset" is assigned to an integrated key, accessible from the outside
"Watchdog-controlled" device

Sendix absolut, Multiturn Type 5868 (Shaft) / 5888 (Hollow shaft), CANopen/CANlift

Terminal assignment:
Bus terminal cover with terminal box (type of connection 1)

Direction:	OUT					IN				
Signal:	CAN Ground	CAN_Low (-)	CAN_High (+)	0 Volt power supply	+UB power supply	0 V power supply	+UB power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
Abbreviation:	CG	CL	CH	0 V	+V	0 V	+V	CL	CH	CG

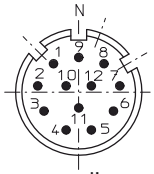
Terminal assignment:
Cable connection (type of connection A) and D-SUB-9 connector (type of connection K)

Direction:	IN				
Signal:	0 V power supply	+UB power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
Abbreviation:	0 V	+V	CL	CH	CG
Cable colour:	WH	BN	YE	GN	GY
D-SUB 9	6	9	2	7	3

Terminal assignment:
Bus terminal cover with 2 x M12 connector (type of connection 2, F or J)

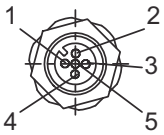
Direction:	OUT					IN				
Signal:	CAN Ground	CAN_Low (-)	CAN_High (+)	0 Volt power supply	+UB power supply	0 V power supply	+UB power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
Abbreviation:	CG	CL	CH	0 V	+V	0 V	+V	CL	CH	CG
M23 PIN assignment	3	2	7	10	12	10	12	2	7	3
M12 PIN assignment	1	5	4	3	2	3	2	5	4	1

Bus in and out M23:



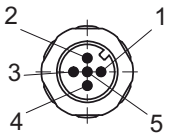
Corresponding mating connector:
8.0000.5012.0000

Bus out:



Corresponding mating connector:
05.BS-8151-0/9

Bus in:

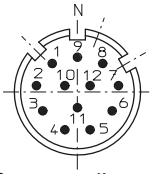


Corresponding mating connector:
05.B-8151-0/9

Terminal assignment:
M23 (type of connection I) or M12 (type of connection E) connector

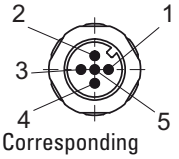
Direction:	IN				
Signal:	0 V power supply	+UB power supply	CAN_Low (-)	CAN_High (+)	CAN Ground
Abbreviation:	0 V	+V	CL	CH	CG
M23 PIN assignment	10	12	2	7	3
M12 PIN assignment	3	2	5	4	1

Bus in M23:



Corresponding mating connector:
8.0000.5012.0000

Bus in M12:



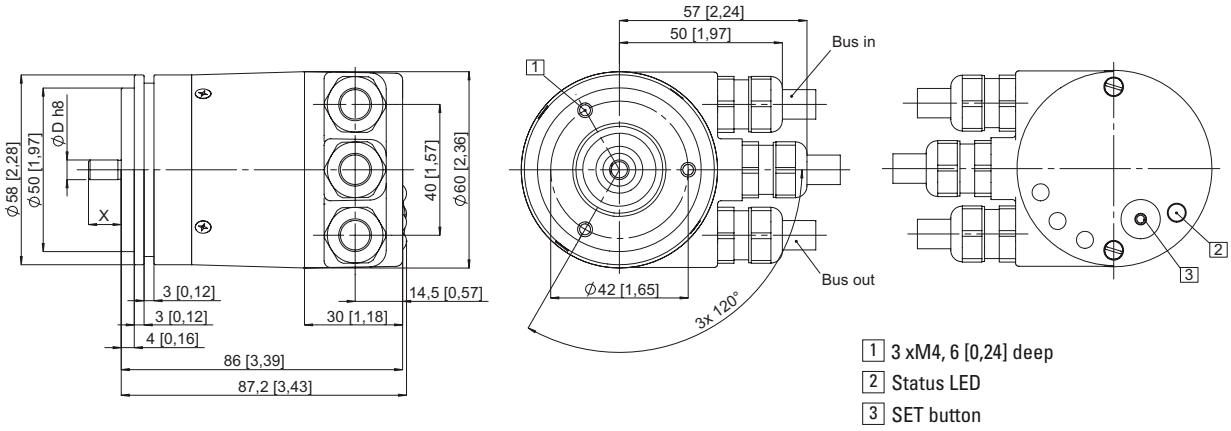
Corresponding mating connector:
05.B-8151-0/9

Sendix absolut, Multiturn Type 5868 (Shaft) / 5888 (Hollow shaft), CANopen/CANlift

Dimensions shaft version

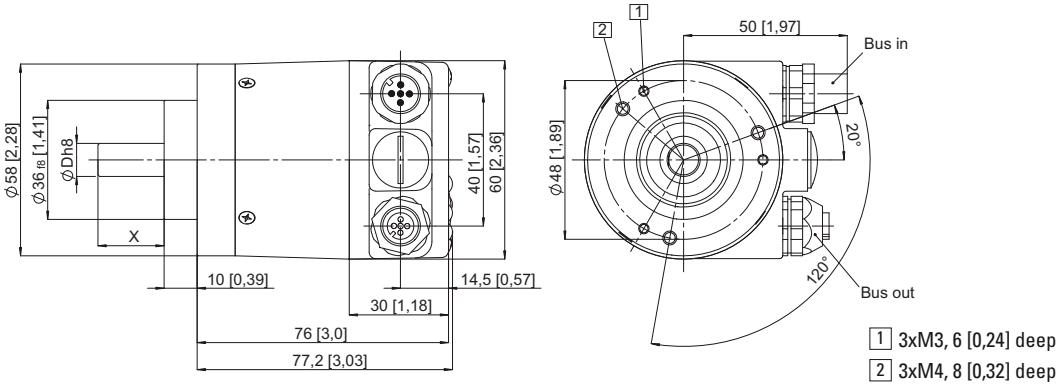
With removable bus terminal cover

ø 58 mm, Synchro flange
Flange type 2 and 4 (Drawing with cable version)



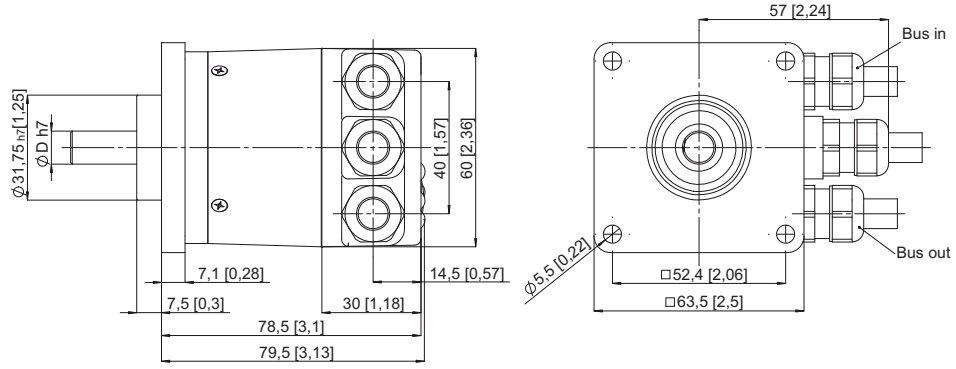
1 3 xM4, 6 [0,24] deep
2 Status LED
3 SET button

ø 58 mm, Clamping flange
Flange type 1 and 3 (Drawing with 2 x M12 connector)



1 3xM3, 6 [0,24] deep
2 3xM4, 8 [0,32] deep

63.5 mm □, Square flange
Flange type 5 and 7 (Drawing with cable version)

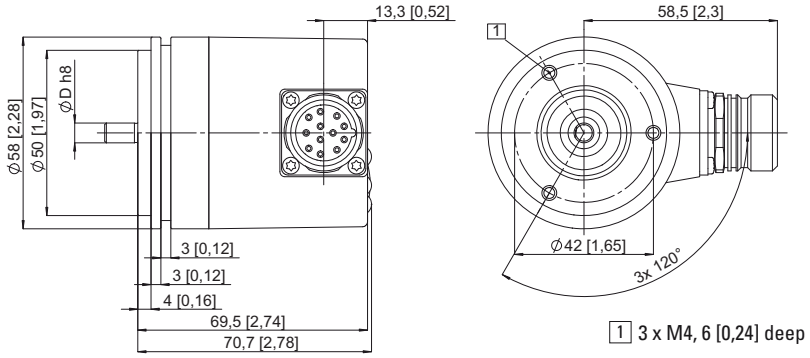


Sendix absolut, Multiturn Type 5868 (Shaft) / 5888 (Hollow shaft), CANopen/CANlift

Dimensions shaft version

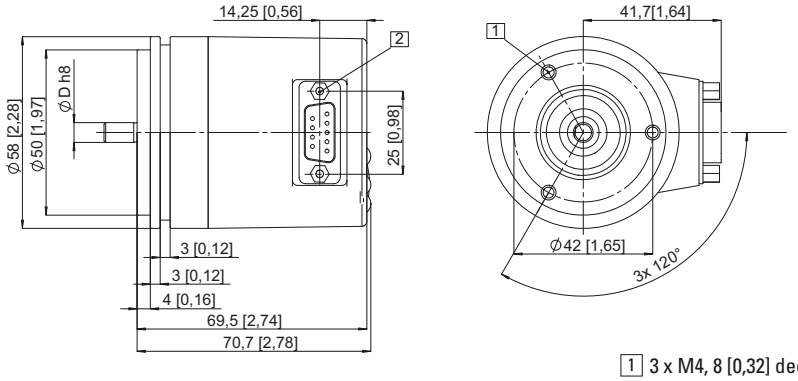
With fixed connection

ø 58 mm, Synchro flange
Flange type 2 and 4 (Drawing with M23 connector)



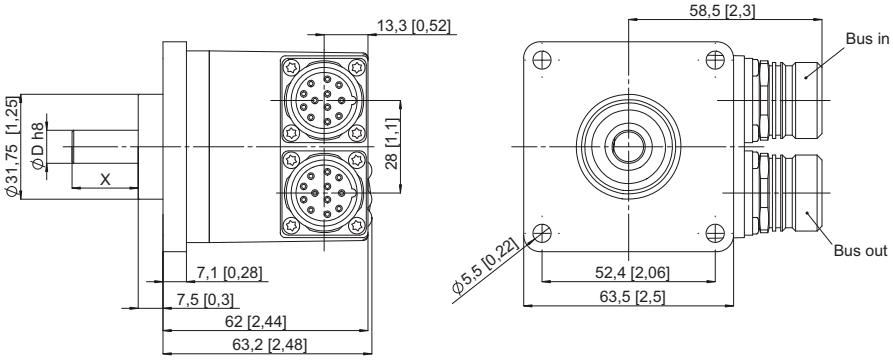
1 3 x M4, 6 [0,24] deep

ø 58 mm, Synchro flange
Flange type 2 and 4 (Drawing with D-SUB connector)



1 3 x M4, 8 [0,32] deep
2 2 x 4/40 UNC; 3,0 [0,12] deep

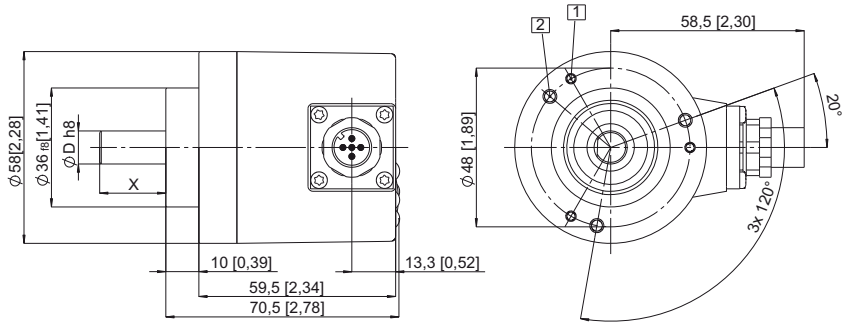
63.5 mm □, Square flange
Flange type 5 and 7 (Drawing with 2 x M23 connector)



Sendix absolut, Multiturn Type 5868 (Shaft) / 5888 (Hollow shaft), CANopen/CANlift

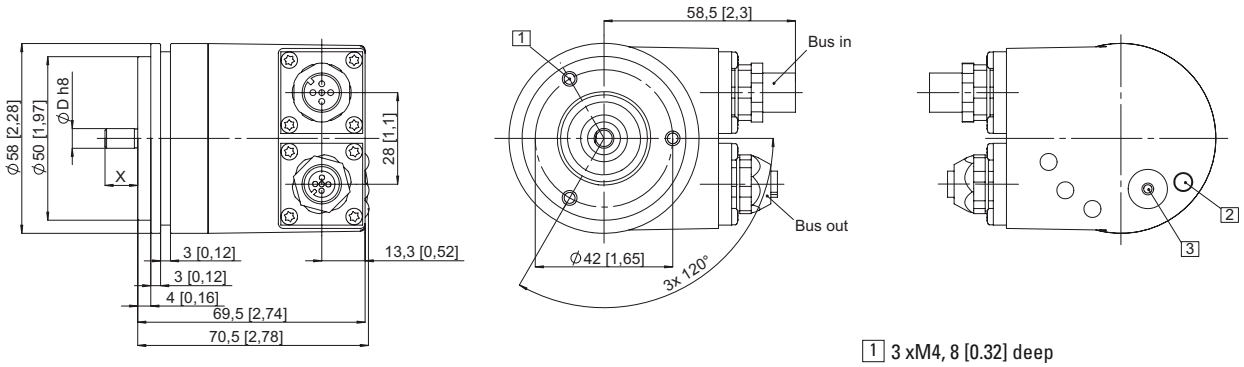
Dimensions shaft version:
With fixed connection

ø 58 mm, Clamping flange
Flange type 1 and 3 (Drawing with 1 x M12 connector)



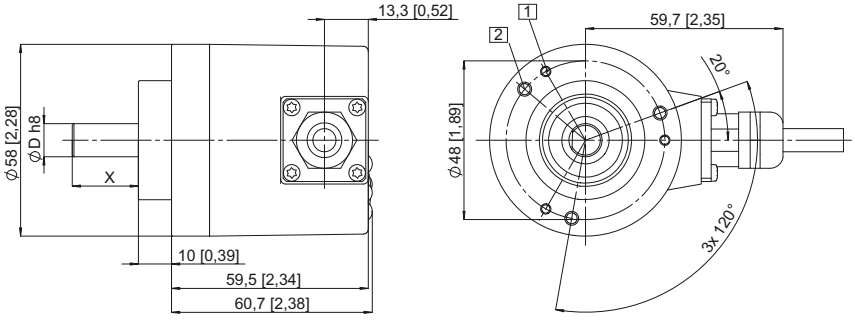
1 3xM3, 6 [0,24] deep
2 3xM4, 8 [0,32] deep

ø 58 mm, Synchro flange
Flange type 2 and 4 (Drawing with 2 x M12 connector)



1 3 xM4, 8 [0.32] deep
2 Status LED
3 SET button

ø 58 mm, Clamping flange
Flange type 1 and 3 (Drawing with cable version)



1 3xM3, 6 [0,24] deep
2 3xM4, 8 [0,32] deep

Sendix absolut, Multiturn Type 5868 (Shaft) / 5888 (Hollow shaft), CANopen/CANlift

Order code shaft version:

8.5868.XXXX.XX1X

Type

Flange
- **1 = Clamping flange ø 58 IP 65**
- **2 = Synchro flange ø 58 mm, IP65**
- 3 = Clamping flange ø 58 mm, IP 67
- 4 = Synchro flange ø 58 mm, IP67
- 5 = Square flange 2.5" / 63.5 mm, IP 65
- 7 = Square flange 2.5" / 63.5 mm, IP 67

Shaft
- **1 = Shaft 6 mm x 10 mm (ø x L)[1)]**
- **2 = Shaft 10 mm x 20 mm (ø x L)[2)]**
- 3 = Shaft 1/4" x 7/8" (ø x L)
- 4 = Shaft 3/8" x 7/8" (ø x L)

Output circuit / Power supply
- **2 = CANopen DS 301 V4.0 10 ... 30 V DC**
- **5[3)] = CANopen DS301 V4.0 with 2048 ppr incremental track (TTL-compatible), 10 ... 30 V DC**

Preferred types are indicated in ***bold***

[1)] Preferred type with flange type 2

[2)] Preferred type with flange type 1

[3)] only with type of connection 2

Options (service)
- 2 = no option
- **3 = SET button**

Field bus profile[3)]
- **21 = CANopen Encoder-Profile DS 406 V3.1**
- 22 = CANlift DS 417 V1.01

Type of connection
- 1 = With removable bus terminal cover, with radial screwed cable passage
- **2 = Removable bus terminal cover with M12 connector**
- A = Fixed connection without bus terminal cover, with radial cable (2 m PVC)
- E = Fixed connection without bus terminal cover, with 1 x M12 radial connector
- F = Fixed connection without bus terminal cover, with 2 x M12 radial connector
- I = Fixed connection without bus terminal cover, with 1 x M23 radial connector
- J = Fixed connection without bus terminal cover, with 2 x M23 radial connector
- K = Fixed connection without bus terminal cover, with 1 x D-SUB 9-pin connector

- seawater resistant version on request

[3)] CAN parameters can also be factory-preset

Accessories:
- Cables and connectors, also pre-assembled, can be found in the chapter Counting Technology
- Mounting attachments and couplings can be found in the Chapter Accessories

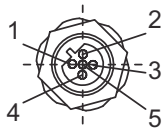
Supplementary details incremental track:

Characteristics:

Output driver:	RS 422 (TTL compatible)
Permissible load/channel:	± 20 mA
Signal level High:	typ. 3.8 V
Low:	typ. 1.3 V
Short-circuit proof outputs:	yes (short-circuit proof to 0 V or output, when supply voltage is correctly applied)
Resolution	2048 ppr

Terminal assignment incremental track:

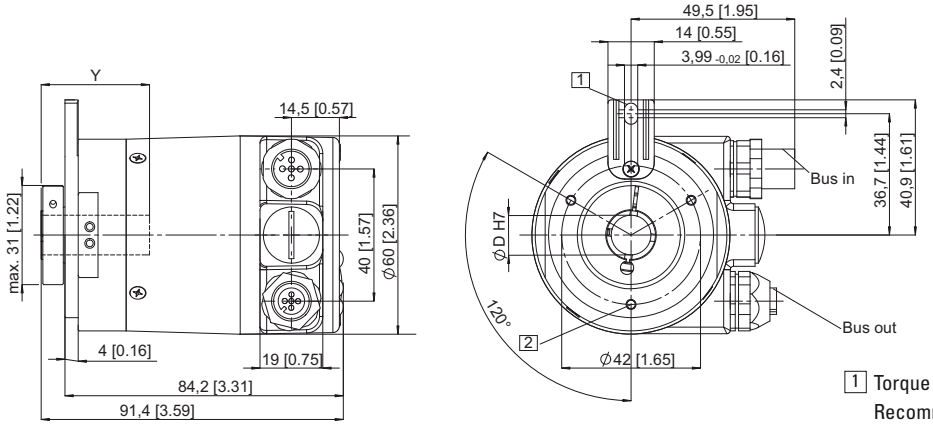
Signal:	A	$\overline{A}$	B	$\overline{B}$	0
Pin:	1	2	3	4	5



Corresponding mating connector: 05.BMSWS 8151-8.5

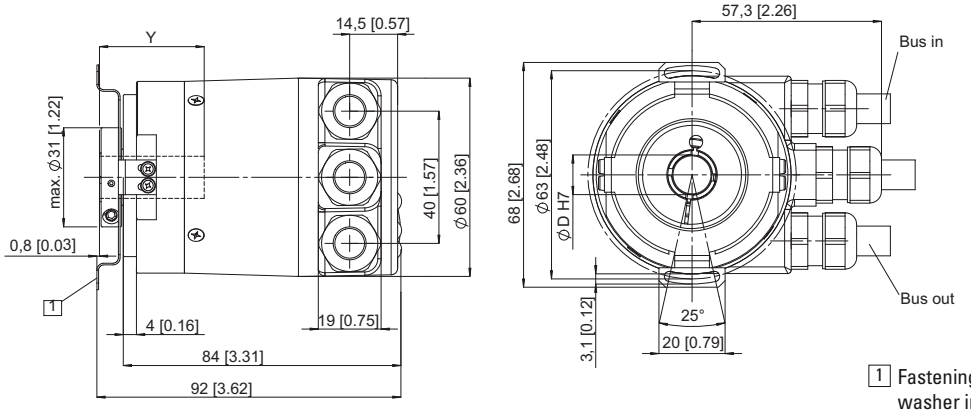
Sendix absolut, Multiturn Type 5868 (Shaft) / 5888 (Hollow shaft), CANopen/CANlift

Dimensions hollow shaft version (blind hollow shaft):
With removable bus terminal cover
ø 58 mm, Flange with long torque stop
Flange type 1 and 2 (Drawing with 2x M12 connector)



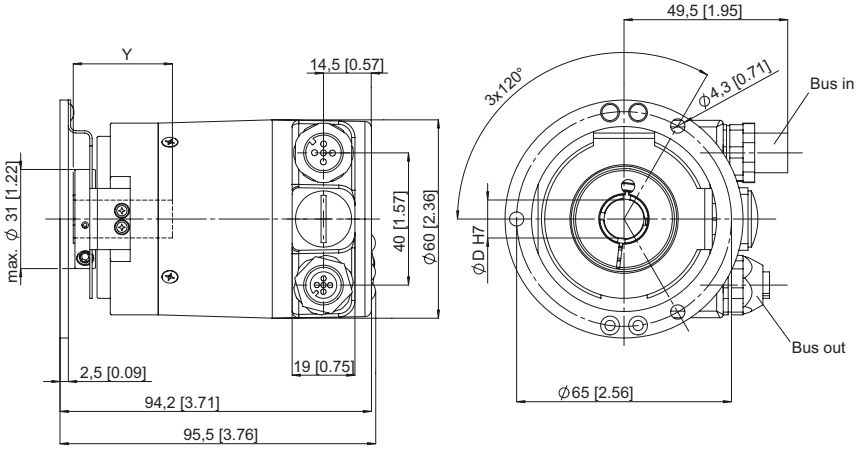
1 Torque stop slot,
Recommendation: cyl. pin. acc. DIN 7 Ø4
2 3xM3, 5.5 [0.21] deep

ø 58 mm, Flange with stator coupling
Flange type 5 and 6, pitch circle ø 63 mm (Drawing with cable versions)



1 Fastening screw DIN 912 M3 x 8,
washer included

ø 58 mm, Flange with stator coupling
Flange type 3 and 4, pitch circle ø 65 mm (Drawing with 2x M12 connector)



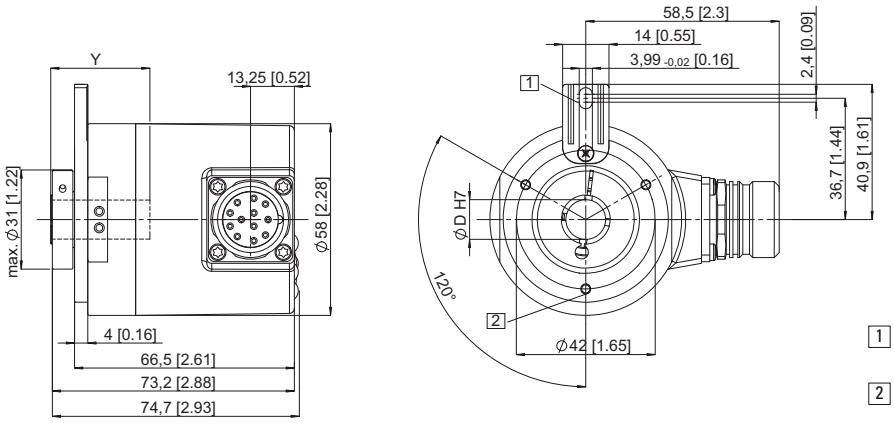
Y: Depth for blind hollow shaft: 30 mm

Sendix absolut, Multiturn Type 5868 (Shaft) / 5888 (Hollow shaft), CANopen/CANlift

Dimensions hollow shaft version (blind hollow shaft):

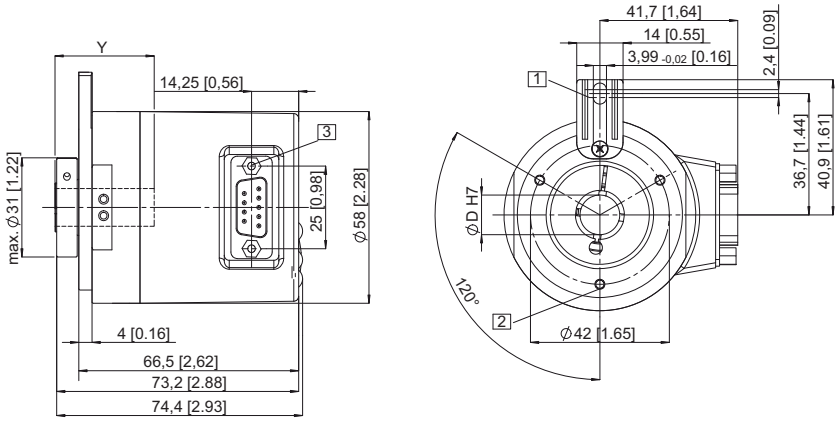
With fixed connection

ø 58 mm, Flange with long torque stop
Flange type 1 and 2 (Drawing with M23 connector)



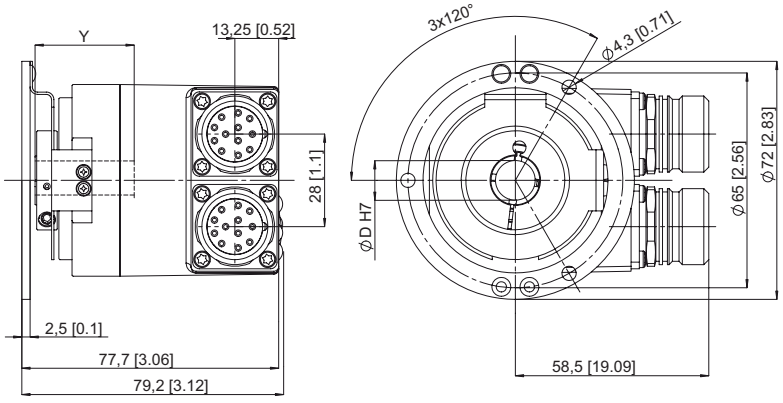
1 Torque stop slot,
Recommendation: cyl. pin. acc. DIN 7 Ø4.0
2 3xM3, 5.5 [0.21] deep

ø 58 mm, Flange with long torque stop
Flange type 1 and 2 (Drawing with D-SUB connector)



1 Torque stop slot,
Recommendation: cyl. pin. acc. DIN 7 Ø4,0
2 3xM3, 5,5 [0,21] deep
3 2 x 4/40 UNC; 3,0 [0,21] deep

ø 58 mm, Flange with stator coupling
Flange type 3 and 4, pitch circle ø 65 mm (Drawing with 2xM23 connector)



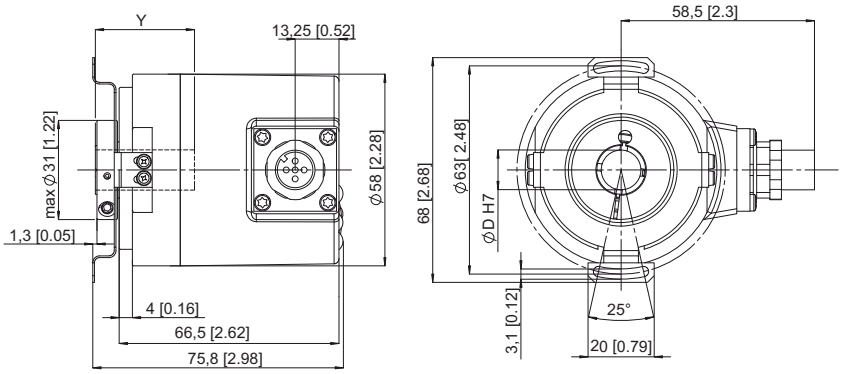
Y: Depth for blind hollow shaft: 30 mm

Sendix absolut, Multiturn Type 5868 (Shaft) / 5888 (Hollow shaft), CANopen/CANlift

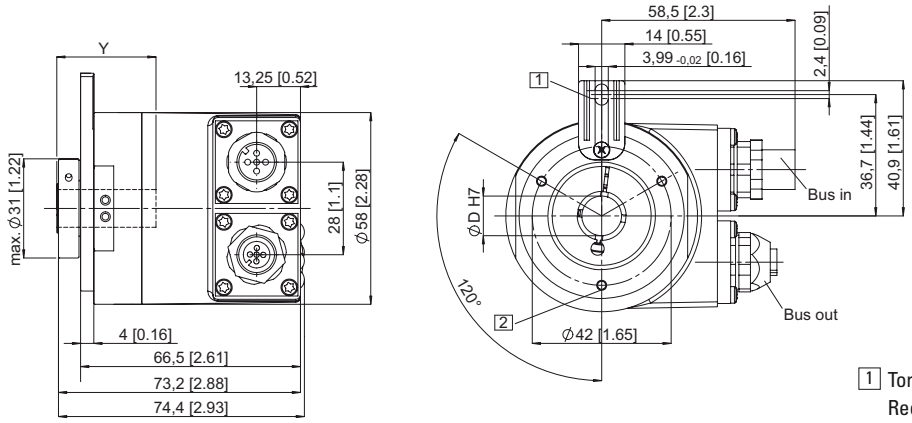
Dimensions hollow shaft version (blind hollow shaft):

With fixed connection

ø 58 mm, Flange with stator coupling
Flange type 5 and 6, pitch circle ø 63 mm (Drawing with M12 connector)

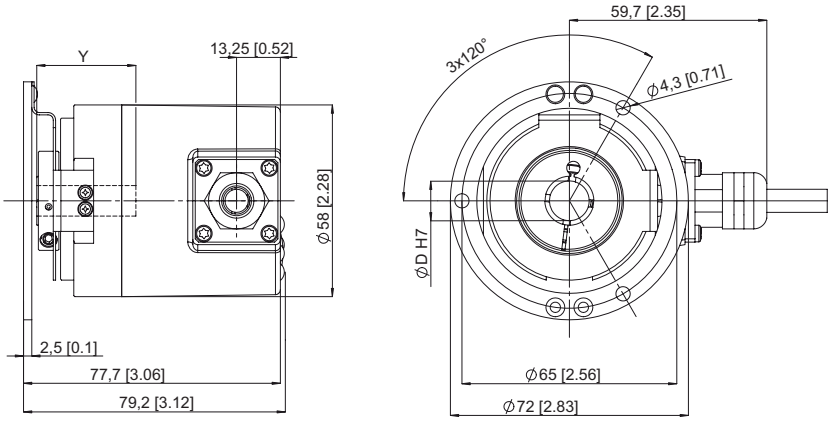


ø 58 mm, Flange with long torque stop
Flange type 1 and 2 (Drawing with 2xM12 connector)



1 Torque stop slot,
Recommendation: cyl. pin. acc. DIN 7 Ø4.0
2 3xM3, 5.5 [0.21] deep

ø 58 mm, Flange with stator coupling
Flange type 3 and 4, pitch circle ø 65 mm (Drawing with 2x M12 connector)



Y: Depth for blind hollow shaft: 30 mm

Sendix absolut, Multiturn Type 5868 (Shaft) / 5888 (Hollow shaft), CANopen/CANlift

Order code hollow shaft version:

8.5888.XXXX.XX1X

Type

Flange
- 1 = Flange with torque stop IP 65
- 2 = Flange with torque stop IP 67
- 3 = Flange with stator coupling pitch circle ø 65, IP 65
- 4 = Flange with stator coupling pitch circle ø 65, IP 67
- **5 = Flange with stator coupling pitch circle ø 63, IP 65**
- 6 = Flange with stator coupling pitch circle ø 63, IP 67

Hollow shaft
- 3 = Blind hollow shaft ø 10 mm
- **4 = Blind hollow shaft ø 12 mm**
- 5 = Blind hollow shaft ø 14 mm
- 6 = Blind hollow shaft ø 15 mm
- 8 = Blind hollow shaft ø 9.52 mm [3/8"]
- 9 = Blind hollow shaft ø 12.7 mm [1/2"]

Output circuit / Power supply
- **2 = CANopen DS 301 V4.0 10 ... 30 V DC**
- **5[1] = CANopen DS301 V4.0 with 2048 ppr incremental track (TTL-compatible), 10 ... 30 V DC**

[1] only with type of connection 2

Preferred types are indicated in ***bold***

Options (service)
- 2 = no option
- **3 = SET button**

Field bus profile[3]
- **21 = CANopen Encoder-Profile DS 406 V3.1**
- 22 = CANlift DS 417 V1.01

Type of connection
- 1 = With removable bus terminal cover, with radial screwed cable passage
- **2 = Removable bus terminal cover with M12 connector**
- A = Fixed connection without bus terminal cover, with radial cable (2 m PVC)
- E = Fixed connection without bus terminal cover, with 1 x M12 radial connector
- F = Fixed connection without bus terminal cover, with 2 x M12 radial connector
- I = Fixed connection without bus terminal cover, with 1 x M23 radial connector
- J = Fixed connection without bus terminal cover, with 2 x M23 radial connector
- K = Fixed connection without bus terminal cover, with 1 x D-SUB 9-pin connector

- seawater resistant version on request

[3] CAN parameters can also be factory-preset

Accessories:
- Cables and connectors, also pre-assembled, can be found in the chapter Counting Technology
- Mounting attachments and couplings can be found in the Chapter Accessories

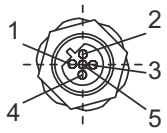
Supplementary details incremental track:

Characteristics:

Output driver:	RS 422 (TTL compatible)
Permissible load/channel:	± 20 mA
Signal level High:	typ. 3.8 V
Low:	typ. 1.3 V
Short-circuit proof outputs:	yes (short-circuit proof to 0 V or output, when supply voltage is correctly applied)
Resolution	2048 ppr

Terminal assignment incremental track:

Signal:	A	$\overline{A}$	B	$\overline{B}$	0
Pin:	1	2	3	4	5



Corresponding mating connector: 05.BMSWS 8151-8.5

Sendix absolut, Multiturn Type 5868 (Shaft) / 5888 (Hollow shaft), EtherCAT

Mechanical drive | Safety-Lock™ | High rotational speed | Temperature | High IP | High shaft load capacity | Shock/vibration resistant | Magnetic-field resistant | Short-circuit proof | Reverse polarity protection

Reliable

- **Increased resistance against vibrations and installation errors. Eliminates machine down-time and repairs.**
  Sturdy bearing construction 'Safety-LockTM Design'
- **Fewer components and connection points increase the operational reliability**
  Kübler OptoASIC technology with very high integration density (Chip-on-Board)
- **Remains sealed, even in the roughest environments, ensures the highest safety against field breakdowns**
  Resistant die-cast housing and protection up to IP 67
- **Can be used in a wide temperature range without additional charge**
  wide temperature range (-40 °C … +80 °C).

Fast

- **Time-synchronous position detection of several axes**
  Distributed clock for real-time position detection
- **Fast data availability with reduced loading on the bus and controller**
  Intelligent functions such as transmission of speed/velocity, acceleration or leaving a working area
- **Fast, simple, error-free connection**
  Bus terminal cover with 3 x M12 connectors

Versatile

- **Up-to-the minute fieldbus performance in the CoE application**
  CAN over Ethernet
- **Whether position, speed/velocity, acceleration or working area – the user decides, which information is available in real-time.**
  PDO mapping in the memory
- **Fast, error-free start-up – no need to set switches**
  All parameters can be programmed via the bus
- **Reliable installation in a wide diversity of mounting situations**
  Extensive choice of proven mounting options
- **Numerous special functions**
  Temperature monitoring, operating time, customer data (e.g. installation location)
- also available in **seawater resistant** version, certified acc. to salt-spray test IEC 68-2-11 => 672 hours.

Mechanical characteristics:

Max. speed without shaft seal (IP 65) up to 70 °C:	9 000 min^{-1}, continuous 7 000 min^{-1}
Max. speed without shaft seal (IP 65) up to Tmax:	7 000 min^{-1}, continuous 4 000 min^{-1}
Max. speed with shaft seal (IP 67) up to 70 °C:	8 000 min^{-1}, continuous 6 000 min^{-1}
Max. speed with shaft seal (IP 67) up to Tmax:	6 000 min^{-1}, continuous 3 000 min^{-1}
Starting torque without shaft seal (IP65):	< 0.01 Nm
Starting torque with shaft seal (IP67):	Shaft version: < 0.05 Nm
	Hollow shaft version: <0.03 Nm
Moment of inertia:	Shaft version: 3.0 x10^{-6} kgm^2
	Hollow shaft version: 7.5 x10^{-6} kgm^2
Radial load capacity of shaft:	80 N
Axial load capacity of shaft:	40 N
Weight:	approx. 0.54 kg
Protection acc. to EN 60 529:	housing: IP 67, shaft: IP 65, opt. IP 67
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature:	–40 °C ... +80 °C
Materials:	Shaft: stainless steel,Flange: aluminium,
	Housing: die cast zinc
Shock resistance acc. to DIN-IEC 68-2-27:	>2500 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	>100 m/s^2, 55 ... 2000 Hz

- Absolutely safe operation even in strong magnetic fields
- Over 40 years of experience in the field of precision mechanics
- Special gears with specific toothing

Sendix absolut, Multiturn Type 5868 (Shaft) / 5888 (Hollow shaft), EtherCAT

General electrical characteristics:

Supply voltage:	10 ... 30 V DC
Current consumption (w/o output load):	24 V DC, max. 90 mA
Reverse polarity protection at power supply (Ub):	Yes
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3	
UL certified	File 224618
RoHS compliant acc. to EU guideline 2002/95/EG	

Device characteristics:

Singleturn resolution	1 ... 65535 (16 bit), (scaleable: 1 ... 65535)
Default value:	8192 (13 bit)
Total resolution:	scaleable from 1 to 268435456 (28 Bit)
	12 Bit Multiturn
Code:	EhterNet Frame binary
Protocol:	EtherNet/EtherCAT

Diagnostic LED (Red)

LED is ON with the following fault conditions:
Sensor error (internal code or LED error), low voltage, over-temperature

Run LED (Green)

LED is ON with the following conditions:
Init-, Preop-, Safeop and Op-State

2 x Link LED (Yellow)

LED is ON with the following conditions (Port A and B)
Link detected

Modes

Freerun, Distributed Clock (cycle time for Sync 0 pulse min. 125 µs or 62.5 µs with restrictions), Sync-Mode

General information about CoE (CAN over EtherCAT)

The EtherCAT encoders of the 58X8 series support the CANopen communication profile according to DS 301. In addition device-specific profiles like the encoder profile DS 406 are available.
Scaling, preset values, limit switch values and many other parameters can be programmed via the EtherCAT bus. When switching the device on, all parameters are loaded from an EEPROM, where they were saved to protect them against power-failure.
As output values, position, speed, acceleration and temperature as well as the working area state can be combined as PDO (PDO Mapping).

CANopen Encoder Profile CoE (CAN over EtherCAT)

The following parameters are programmable:
- Units for speed selectable (Steps/Sec or RPM)
- Factor for speed calculation (e.g. circumference of measuring wheel)
- Integration time for the speed value from 1 … 32
- 2 working area with 2 upper and lower limits and the corresponding output states
- PDO mapping of position, speed/velocity, acceleration and working area

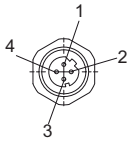
- Extended error management for position sensing with integrated temperature control
- User interface with visual display of bus and fault status – 4 LEDs
- Alarm and warning messages

Terminal assignment bus:

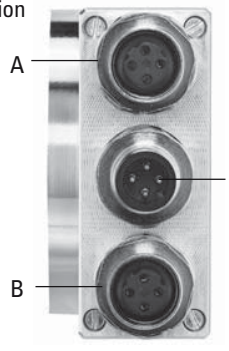
(Type of connection 2, D-coded):

Direction:	Port A				Port B			
Signal:	Transmit data+	Receive data+	Transmit data-	Receive data-	Transmit data+	Receive data+	Transmit data-	Receive data-
Abbreviation:	TxD+	RxD+	TxD-	RxD-	TxD+	RxD+	TxD-	RxD-
M12 PIN-connection:	1	2	3	4	1	2	3	4

Port A and B



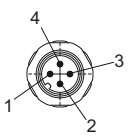
Bus connection



Terminal assignment power supply:

M12 connector

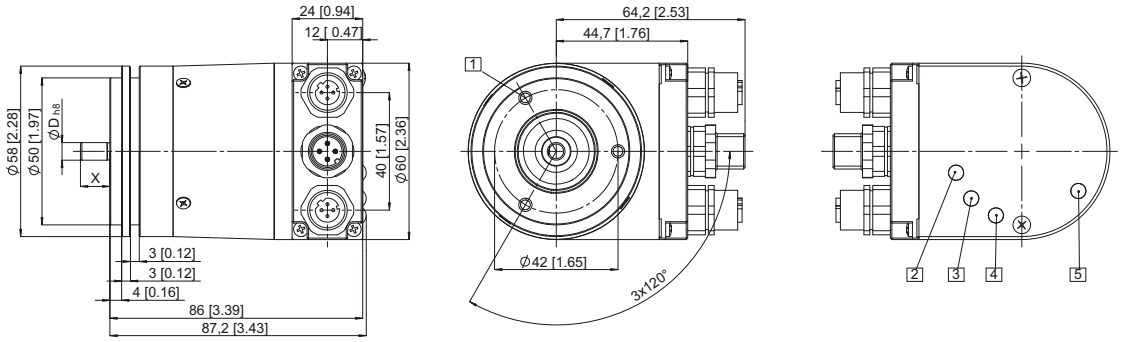
Signal:	+UB Power supply	n.c.	0 V	n.c.
Abbreviation:	+UB	-	0 V	-
M12 PIN-connection	1	2	3	4



Sendix absolut, Multiturn Type 5868 (Shaft) / 5888 (Hollow shaft), EtherCAT

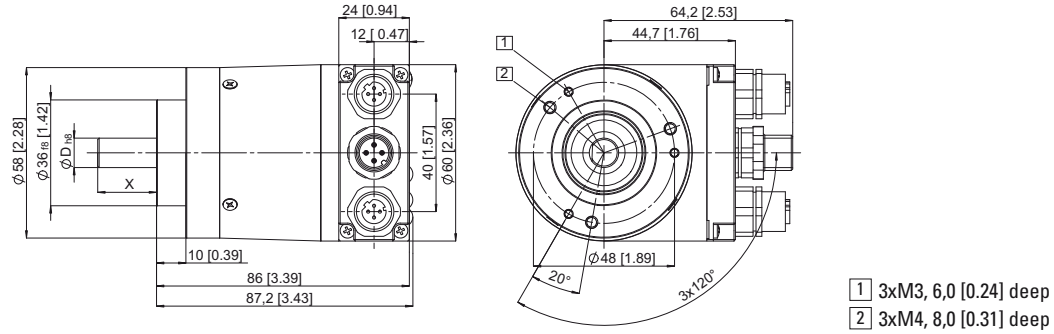
Dimensions shaft version:
With removable bus terminal cover:

ø 58 mm, Synchro flange
Flange type 2 und 4



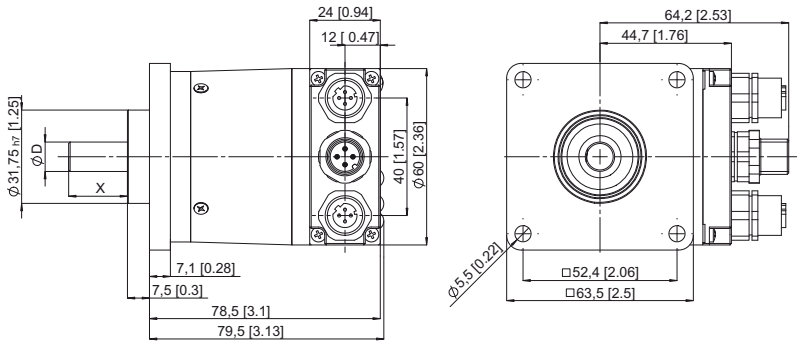
1 3xM4, 6,0 [0.24] deep
2 Link a, yellow LED
3 Link b, yellow LED
4 Run, green LED
5 Err, red LED

ø 58 mm, Clamping flange
Flange type 1 and 3



1 3xM3, 6,0 [0.24] deep
2 3xM4, 8,0 [0.31] deep

63,5 mm, Square flange □
Flange type 5 und 7



Sendix absolut, Multiturn Type 5868 (Shaft) / 5888 (Hollow shaft), EtherCAT

Order code shaft version:

8.5868.XXXX.XX12

Type

Flange
- **1 = Clamping flange ø 58 IP 65**
- **2 = Synchro flange ø 58 mm, IP65**
- 3 = Clamping flange ø 58 mm, IP 67
- 4 = Synchro flange ø 58 mm, IP67
- 5 = Square flange 2.5" / 63.5 mm, IP 65
- 7 = Square flange 2.5" / 63.5 mm, IP 67

Shaft
- **1 = Shaft 6 mm x 10 mm (ø x L)[1)]**
- **2 = Shaft 10 mm x 20 mm (ø x L)[2)]**
- 3 = Shaft 1/4" x 7/8" (ø x L)
- 4 = Shaft 3/8" x 7/8" (ø x L)

Output circuit / Power supply
- **B = EtherCAT**

Field bus profile
- **B1 = EtherCAT with CoE**
  (CAN over EtherNet)

Type of connection
- **2 = Removable bus terminal cover with 3 x M12 connector**

- seawater resistant version on request

Accessories:
– Cables and connectors, also pre-assembled, can be found in the chapter Counting Technology
– Mounting attachments and couplings can be found in the Chapter Accessories

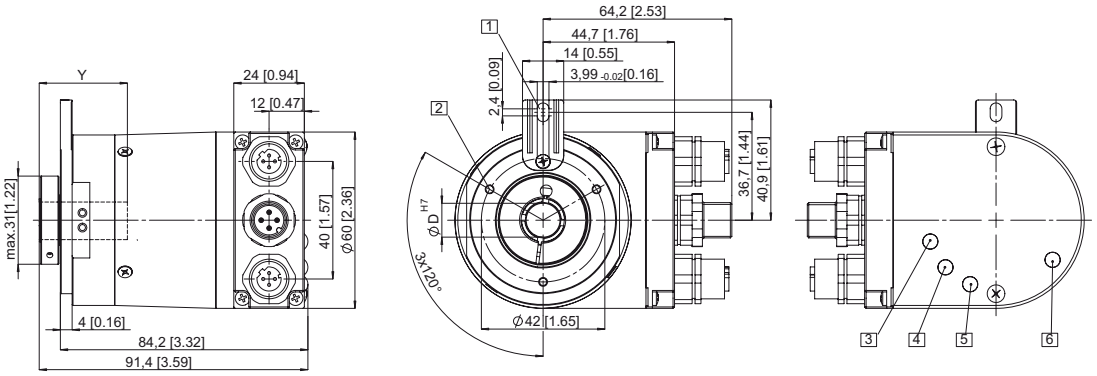
1) Preferred type with flange type 2

2) Preferred type with flange type 1

Preferred types are indicated in ***bold***

Dimensions hollow shaft version (blind hollow shaft):

With removable bus terminal cover
ø 58 mm, Flange with torque stop
Flange type 1 and 2



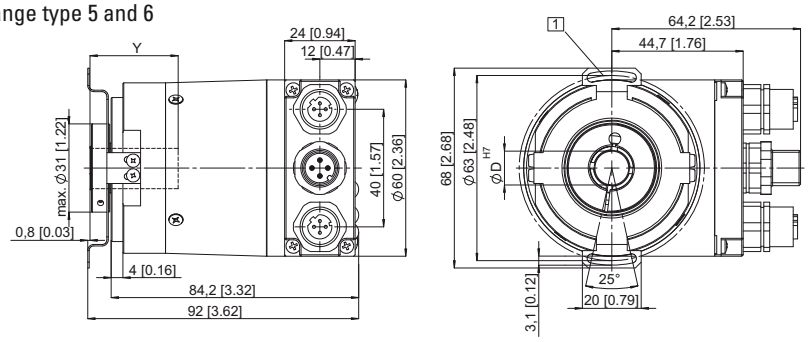
1 Torque stop slot
Recommendation cyl. pin
DIN 7, ø 4 mm
2 3xM3, 5,5 [0.21] deep
3 Link a, yellow LED
4 Link b, yellow LED
5 Run, green LED
6 Err, red LED

Sendix absolut, Multiturn Type 5868 (Shaft) / 5888 (Hollow shaft), EtherCAT

Dimensions hollow shaft version (blind hollow shaft):

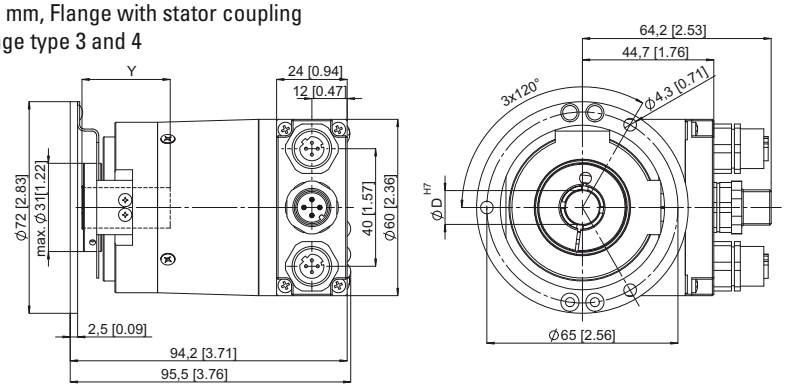
With removable bus terminal cover

ø 58 mm, Flange with stator coupling
Flange type 5 and 6



1 Fastening screw DIN 912 M3 x 8, washer included

ø 58 mm, Flange with stator coupling
Flange type 3 and 4



Y: Depth for blind hollow shaft: 30 mm

Order code hollow shaft version: **8.5888.XXXX.XX12**

Type

Flange
- 1 = Flange with torque stop IP 65
- 2 = Flange with torque stop IP 67
- 3 = Flange with stator coupling pitch circle ø 65, IP 65
- 4 = Flange with stator coupling pitch circle ø 65, IP 67
- **5 = Flange with stator coupling pitch circle ø 63, IP 65**
- 6 = Flange with stator coupling pitch circle ø 63, IP 67

Hollow shaft
- 3 = Blind hollow shaft ø 10 mm
- **4 = Blind hollow shaft ø 12 mm**
- 5 = Blind hollow shaft ø 14 mm
- 6 = Blind hollow shaft ø 15 mm
- 8 = Blind hollow shaft ø 9.52 mm [3/8"]
- 9 = Blind hollow shaft ø 12.7 mm [1/2"]

Output circuit / Power supply
- **B = EtherCAT**

Ex-proof zone 2, 22 on request

Field bus profile
- **B1 = EtherCAT with CoE** (CAN over EtherNet)

Type of connection
- **2 = Removable bus terminal cover with 3 x M12 connector**

- seawater resistant version on request

Accessories:
- Cables and connectors, also pre-assembled, can be found in the chapter Counting Technology
- Mounting attachments and couplings can be found in the Chapter Accessories

Preferred types are indicated in **bold**

Multiturn Type 5860 , DeviceNet

High IP


High shaft load capacity


Shock/vibration resistant


Short-circuit proof


Reverse polarity protection

Compact and Rugged:

- **Minimal installation depth**
- **High shock and vibration values**
- **Very compact (only 87.8 mm installation depth); Ideal for dynamic applications thanks to its non-contact multiturn stage**

DeviceNet

Versatile and Easy:

- **Many options** (no need for adapter sleeves)
- **Fully programmable**
- **Integrated Fieldbus node with T-Coupler**

Fast and safe:

- **Certificated connection technology**
- **Plug & Play cable assemblies**
- **Long service life thanks to high shock and vibration resistance**
- **Diagnostics and alarm functions**
- **Ex also available as explosion proof Zones 2 and 22**

Mechanical characteristics:

Speed[1]:	max. 6000 min^{-1}
Rotor moment of inertia:	approx. 1.8 x 10^{-6} kgm^2
Starting torque:	< 0.01 Nm
Load capacity of shaft at shaft extension[3]:	radial: 80 N, axial: 40 N
Weight:	approx. 0.7 kg
Protection acc. to EN 60 529:	IP 65
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature:	–20° C ... +80 °C[2]
Shaft:	stainless steel
Shock resistance acc. to DIN-IEC 68-2-27:	2500 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	100 m/s^2, 10 ... 2000 Hz

1) For continuous operation 3000 min^{-1} at the max. temperature
2) Non-condensing
3) Solid shaft version

Electrical characteristics:

Supply voltage (U_B):	10 ... 30 V DC
Current consumption:	max. 0.29 A
Recommended fuse:	T 0,315 A
Divisions:	up to 8192 (13 bits) per revolution, 4096 (12 bits) revolutions
Linearity:	± 1/2 LSB (±1 LSB at resolution 13, 14, 25 Bit)
Code:	Binary
Interface:	CAN HIGH-Speed to ISO/DIS 11898, Basic and Full-CAN;•CAN specification 2.0 B (11 and 29 Bit Identifier)
Protocols:	**DeviceNet Profile for Encoder Release V 2.0**
Baud rate:	programmable via DIP switches 10 ... 1000 Kbits/s CAN DNET 125/250/500 kBit/s
Basic identifier/node number:	programmable via DIP switches
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3	
Performance against magnetic influence acc. to EN61000-4, 8, severity of inspection 5	
UL certified File 224618	
RoHS compliant acc. to EU guideline 2002/95/EG	

Multiturn Type 5860 , DeviceNet

DeviceNet Encoder Profile:

General description:
The DeviceNet Device Profile describes the functionality of the communication and of that part of the DeviceNet fieldbus system specific to the manufacturer. The Encoder Profile applies to encoders and defines the individual objects independently of the manufacturer. In addition the profile makes provision for additional extended functions specific to the manufacturer.

The following parameters can be programmed:

- Direction of rotation
- Scaling factor
  - Number of pulses/rotation 1 ... 8192
  - Total resolution
- Number of revolutions 1 ... 4096
- Preset value
- Diagnostics mode

The following functionality is integrated:

- Galvanic isolation of the Fieldbus-stage with DC/DC converter
- Addressing via DIP switches or software
- Diagnostics LED network and mode
- Baud rate 125, 250 and 500 kbit/s programmable via DIP switches
- Node address 0 … 63 and baud rate programmable via DIP switches
- Polled mode
- Cyclic mode
- Change of state mode (COS)
- Combination of Polled mode and Cyclic mode
- Combination of Polled mode and COS mode
- Offline connection set
- Device heartbeat

"Out of box" Configuration

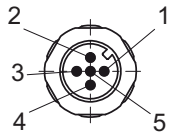
- MAC-ID and Baud rate preset value
  MAC-ID = 63
- Baud rate = 125 kBit/s
- 2 I/O Assembly
  Position value
  Position value and status

Fieldbus encoders can be used in the following applications:

Elevators, construction machines, cranes, agricultural vehicles, special-purposes vehicles, industrial automation

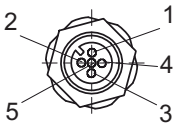
Terminal assignment M12:

Bus in:



Signal :	DRAIN	+ V DC	– V DC	CAN_H	CAN_L
Pin:	1	2	3	4	5
	GY	RD	BK	WH	BU

Bus out:

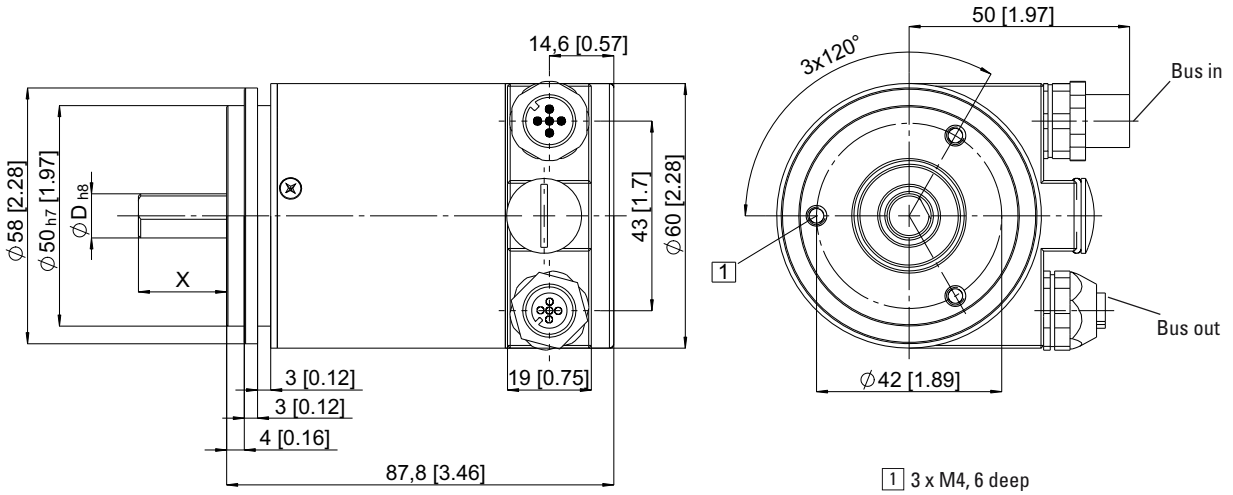


Signal :	DRAIN	+ V DC	– V DC	CAN_H	CAN_L
Pin:	1	2	3	4	5
	GY	RD	BK	WH	BU

Multiturn Type 5860 , DeviceNet

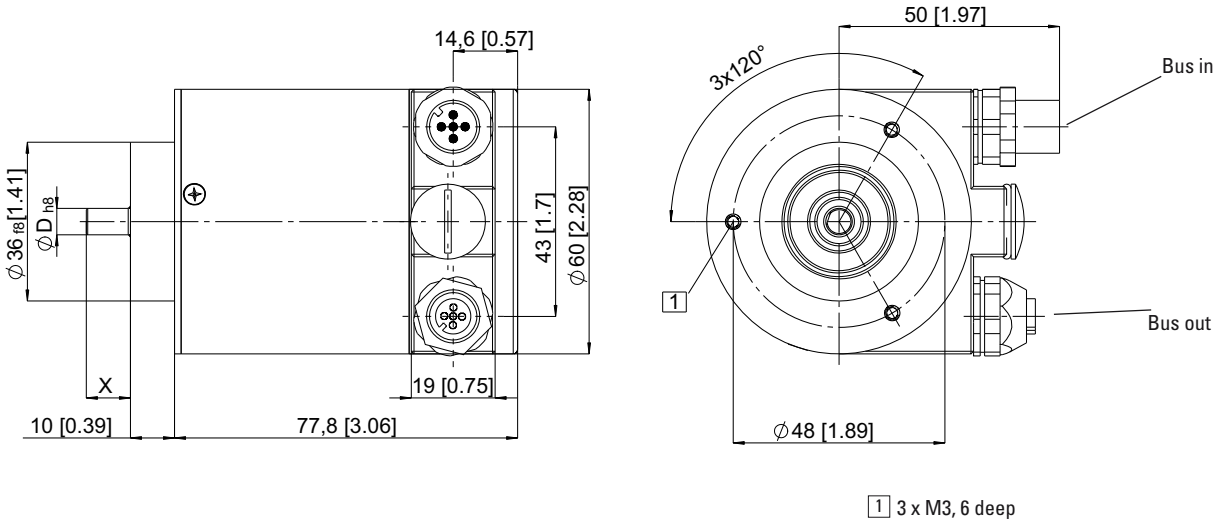
Dimensions:

Synchro flange



1 3 x M4, 6 deep

Clamping flange



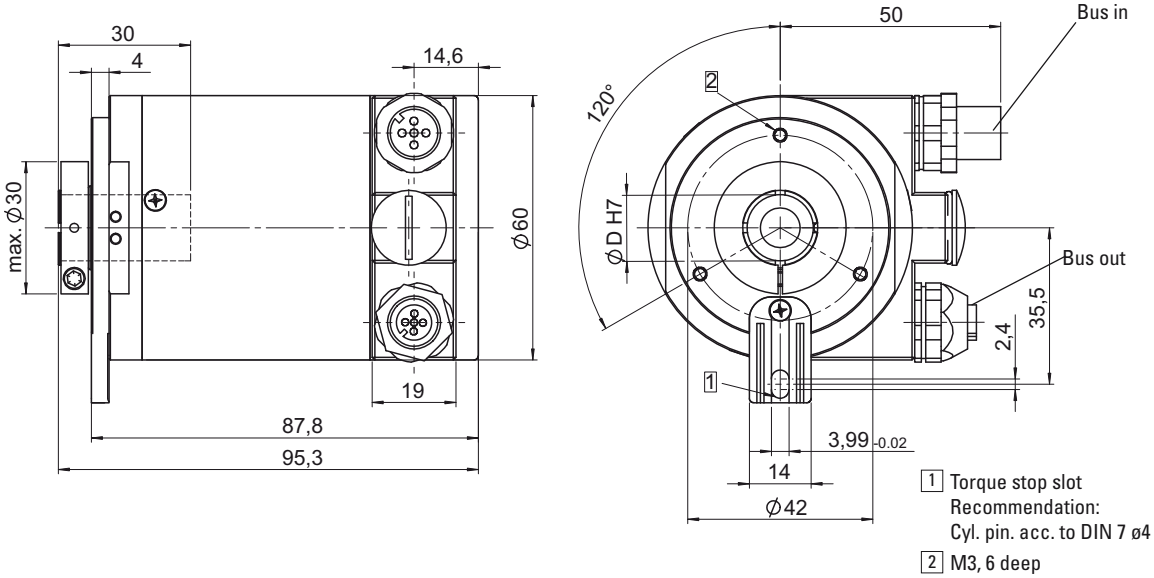
1 3 x M3, 6 deep

Suitable cable diameters:	
Supply voltage, cable diameter	4.5 ... 6.5 mm
Data transmission line, cable diameter	8 ... 10 mm

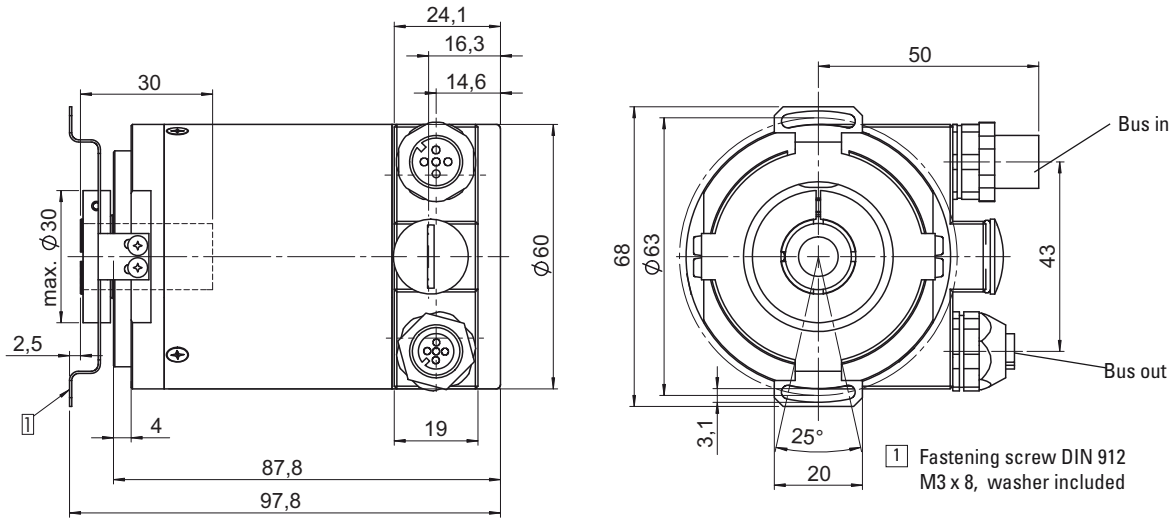
Multiturn Type 5860 , DeviceNet

Dimensions blind hollow shaft version:

Blind hollow shaft version
flat flange with spring element



Blind hollow shaft version
Flat flange with double-winged stator coupling



Multiturn Type 5860, DeviceNet

Kübler is working consistently **on high integration of all units** and intelligent sensing systems. The basics of our encoders are two patented technologies:

Patented Integrative Technology®:

Integrative Technology, developed and patented by Kübler, is a package of measures that ensures compact construction, high signal quality, high shock resistance - up to 2500 m/s2, high reliability and a high level of immunity to EMC.

This is achieved using an Opto ASIC, a multilayer board and an especially shock resistant and space-saving method of mounting the sensor unit. In addition the use of a highly optimized interface ASIC ensures the integration of several hundred individual components. Components that had previously been needed to balance the system, such as balancing potentiometers, can be dispensed with.

Patented Intelligent-Sensing-Technology (IST)®

An innovative principle of operation based on a non-contact electronic multiturn stage overcomes system disadvantages previously associated with encoders that had mechanical gears or with traditional electronic gear technology.

Advantages:
- High operational reliability
- Logic filter and innovative principle of operation compensate for high EMC interference
- Free from wear

Order code:

8.5860.XXXX.X001

Type	
Flange for shaft[1]	
	1 = Clamping flange
	2 = Synchro flange
Flange for blind hollow shaft[1]	
	A = with spring element
	B = with stator coupling
Shaft	
	1 = Shaft Ø 6 x 10 mm
	2 = Shaft Ø 10 x 20 mm
Blind hollow shaft[1]	
	A = ø 10 mm
	B = ø 12 mm
	C = ø 14 mm
	D = ø 15 mm
	E = ø 3/8" (9.525 mm)
	F = ø 1/2" (12.7 mm)
Interface and supply voltage	
	1 = DeviceNet 10 ... 30 V DC.

[1] Figures and letters can not be combined

Field bus profile	
1001 =	DeviceNet 2.0
Type of connection	
2 =	M12-connector

Preferred types are indicated in ***bold***

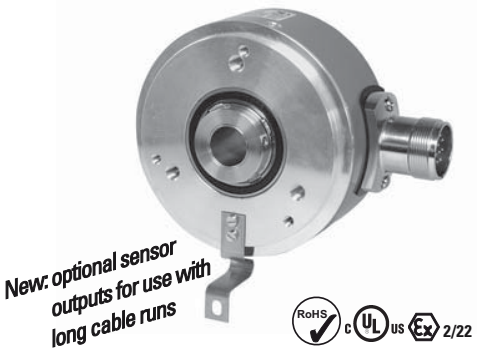
Includes:
EDS-file and documentation on CD

Use Couplings for the connection BUS-IN and Connectors for the connection BUS-OUT.

Compatible self-assembly connectors:
Connector (BUS-OUT): 05.B8251-0/9
Coupling (BUS-IN): 05.B8151-0/9

Accessories:
– Cables and connectors, also pre-assembled, can be found in the chapter Counting Technology
– Mounting attachments and couplings can be found in the Chapter Accessories

Multiturn Type 9081 SSI or RS 485, programmable



- Hollow shaft up to ø 28 mm or shaft ø12 mm
- Only 50 mm clearance needed
- Programming parameters include*: code type, resolution per revolution, total resolution, direction of rotation (cw or ccw), zero point.
- Very easy mounting of the hollow shaft version. The encoder is mounted directly on the drive shaft without couplings. This saves up to 30 % cost and 50 % clearance compared to shaft versions.
- Max. 4 programmable outputs* for the SSI version
- Divisions: 8192 (13 bits) per revolution, 4096 (12 bits) revolutions
- Electronic multiturn gear with patented intelligent sensing technology (IST)
- optional with incremental track 2048 ppr.

*with optional programming kit (Ezturn®) see accessories

Mechanical characteristics:

Speed: [1]	max. 6000 min^{-1}
Rotor moment of inertia:	approx. 65 x 10^{-6} kgm^2
Starting torque hollow shaft version:	< 0.2 Nm
Starting torque shaft version:	< 0.05 Nm
Radial load capacity of shaft (hollow shaft):[2]	80 N
Axial load capacity of shaft: (shaft):[2]	40 N
Weight:	approx. 0.7 kg
Protection acc. to EN 60 529:	IP 65
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature:	–20° C ... +70 °C[3]
Shaft:	stainless steel H7
Shock resistance acc. to DIN-IEC 68-2-27	2500 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	100 m/s^2, 10 ... 2000 Hz

1) For continuous operation 3000 min^{-1}
2) At shaft version only (at shaft end)
3) Non-condensing

The programmable SSI versions are available in 3 variants:

Order code Interface 2:
Version with 4 programmable outputs
Order code Interface 5:
Version with incremental outputs A,$\bar{A}$,B,$\bar{B}$ (no programmable outputs)
Order code Interface 9:
Version with 2 programmable outputs and 2 sensor outputs for 0 V and +Ub for controlling the supply voltage on the encoder.

Electrical characteristics:

Interface type:		Synchronous-Serial (SSI) with outputs
General:		
Supply voltage (U_B):		5,0 ... 30 V DC[3]
Current consumption type (no load).:		89 mA
max (no load):		138 mA
Short circuit proof outputs:[1]:		yes[2]
Reverse connection protection at U_B:		yes
SSI-Interface:		
Output driver:		RS 485
Permissible load/channel:		max. +/-20 mA
Update rate for position data:		approx. 1600/s
SSI pulse rate min./max./pulse frequency:		100 kHz/500 kHz
Signal level high:		typ. 3.8 V
Signal level low (I_{Last} = 20 mA):		typ. 1.3 V
Rise time t_r (without cable):		max. 100 ns
Fall time t_f (without cable):		max. 100 ns
Control inputs:	Voltage:	5 ... 30 V DC = U_B
(V/R, SET)	Response time:	10 ms
	Signal level: low	max. 25% U_B
	high	min. 60% U_B, max. U_B
	Max. current load	≤0.5 mA

Status outputs:	Output driver:	Push-Pull
	max. permissible load:	±9.0 mA
	Signal level high:	min. U_B –2.8 V
	low:	max. 1.5 V
	Rise time:	max. 1 µs
	Fall time:	max. 1 µs
Incremental outputs (A/B):		
	Output driver:	RS422 compatible
	Pulse frequency (max.):	200 kHz
	Signal level high:	4.5 V
	Signal level low (I_{Last} = 20 mA)	0.5 V
	Rise time (without cable):	max. 200 ns
	Fall time (without cable:	max. 200 ns
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3		
Performance against magnetic influence acc. to EN61000-4, 5		
UL certified	File 224618	
RoHS compliant acc. to EU guideline 2002/95/EG		

1) If U_B supply voltage correctly applied U_B
2) Only one channel allowed to be shorted-out:
If UB = 5 V DC, short-circuit to output, 0 V and + U_B is permitted.
If U_B < 5 V DC short-circuit to output and0 V is permitted.
3) The supply voltage at the encoder input must not be less than 4.75 V (5 V - 5%)

Multiturn Type 9081 SSI or RS 485, programmable

Control inputs:

F/R input for change of direction:
The encoder can output increasing code values when the shaft is rotated either clockwise or counter-clockwise (when looking from the shaft side).

There are two methods for selecting the appropriate option:

1. Via a hardware configuration of the F/R input BEFORE powering up the encoder
2. By programming the device using the Kübler "Ezturn®" programming tool.

The following table shows the function selection dependent on hardware and software settings:
Hardware configuration of the F/R input:

Hardware configuration of the F/R input	Programmed selection using the Ezturn® programming tool	Function: increasing code value when the shaft is in the following direction:
"low" (0V) on the F/R input (=cw)	cw	cw
"high" (+UB) on the F/R input (= ccw)	cw	ccw
"low" (0V) on the F/R input (=cw)	ccw	ccw
"high" (+UB) on the F/R input (= ccw)	ccw	ccw

Notes:
– Any hardware configuration of the F/R input must take place BEFORE powering up the encoder!
– If the F/R input is not configured, then a 0V configuration will apply (default condition)!
– If the direction of rotation is changed due to the F/R configuration, without activating the SET function again, and if the encoder is also then powered up again, a new position value may be outputted, even if the physical shaft position of the encoder has not moved! This is due to internal conversion processes.

The start-up procedure for the encoder should therefore follow this sequence:

1. Determine the count direction of the encoder either via the F/R input or via programming
2. Apply power to the encoder
3. Activate the SET function, if desired (see SET input below)

– If using a cable wire to configure the F/R input, then for EMC reasons the wire should not remain open but should be tied either to 0V or UB!
– The response time of the F/R input with UB = 5 … 30 V DC power supply is 10 ms.

SET input:
This input is used for a one-time alignment (zeroing) of the encoder immediately after installation. A high control pulse (+UB) applied to this input for a minimum of 10 ms will reset the current encoder position to the pre-programmed setpoint value.

The programming of the setpoint can be carried out with Kübler's Ezturn® programming software or can, on request, be done in advance at the factory. The default value is zero. However any value within the encoder's measuring range can be defined.

Notes:
- The SET function should only be implemented when the encoder shaft is at rest.
- For the duration of the SET pulse the SSI interface does not function and therefore does not output any valid position values! In order to avoid malfunctions, no SSI clock pulse should occur during the SET pulse.
- If a cable wire is used to configure the SET input, then for EMC reasons the wire should not remain open but should if at all possible be tied to 0 V, provided no SET pulse is triggered!
- The response time of the SET input with +UB = 5 … 30 V DC power supply is 10 ms.

Encoder outputs[1)]

Output	Default-function:
A1:	battery control[2)]
A2:	not activated[2)]
A3:	not activated[2)3)]
A4:	not activated[2)3)]

The outputs are not activated in the factory setting (default). They can be activated and defined with the optional Ezturn® programming software e.g. limit switch, overspeed and temperature control etc.

1) not available for versions with incremental track
2) programmable with the optional programming software Ezturn®
3) with the order code Interface 9 assigned to the sense outputs.

Functionality of the Ezturn® software

– Setting of the communication parameters
– RS232 encoder/PC interface
– Setting of a drive factor by means of the modification of the resolution per revolution, the number of revolutions and the total resolution
– Programming of the direction of rotation and code type
– Setting of a preset/electronic zero point
– Setting of diagnostic functions
– Setting of the outputs A1 … A4
  • Limit switch values, max. 2
  • Alarm and status information
  • Battery monitoring
–Limiting max. number of bits to interface with PLCs
– Diagnostics and information for the set-up operation
– Data transmission from the PC to the encoder and inversely, also during operation
– Print-out of the current data and set parameters
– Convenient position output with the current set data
– Terminal operation for direct instructions via the keyboard
– Diagnostics of the encoder connected

Multiturn Type 9081 SSI or RS 485, programmable

Terminal assignment (SSI Synchronous Serial interface with 12pin plug)

Signal :	0V	+UB	+T	-T	+D	-D	ST	VR	A1	A2	A3[1)]	A4[1)]	⏚
Interface 9:										0 V_{sense}	+UB_{sense}		
Pin:	1	2	3	4	5	6	7	8	9	10	11	12	PH
Col.:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY PK	RD BU	

T: Clock signal
D: Data signal
ST: SET input. The current position value is stored as new zero position (or the actual value is set to the preset value when using the programmable version).
VR: Up/down input. As long as this input is active, decreasing code values are transmitted when shaft turning clockwise.
PH: Plug housing
Isolate unused outputs before initial start-up.
A1, A2, A3, A4: outputs, can be modified using Ezturn

Terminal assignment (RS485 interface 12 pin plug):

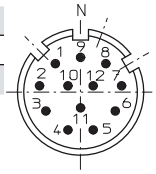
Signal :	0V	+UB	T/R-	T/R+	Term[2)]	Term[2)]		VR					⏚
Pin	1	2	3	4	5	6	7[1)]	8	9	10	11	12	PH
Col.:	WH	BN	GN	YE				RD					

R = Receive-channel
T = Transmit-channel
VR: Up/down input. As long as this input (High-Level = + U_B)is active, decreasing code values are transmitted when shaft turning clockwise.
PH = Plug housing

1) There is no SET input for the P3001 version but it can likewise be implemented using the command "<ESC> QP" (Write preset).

2)For the version with external termination: if the termination is desired (terminating resistor 120 Ohm), then both connections are to be tied together by means of a jumper (0 Ohm).

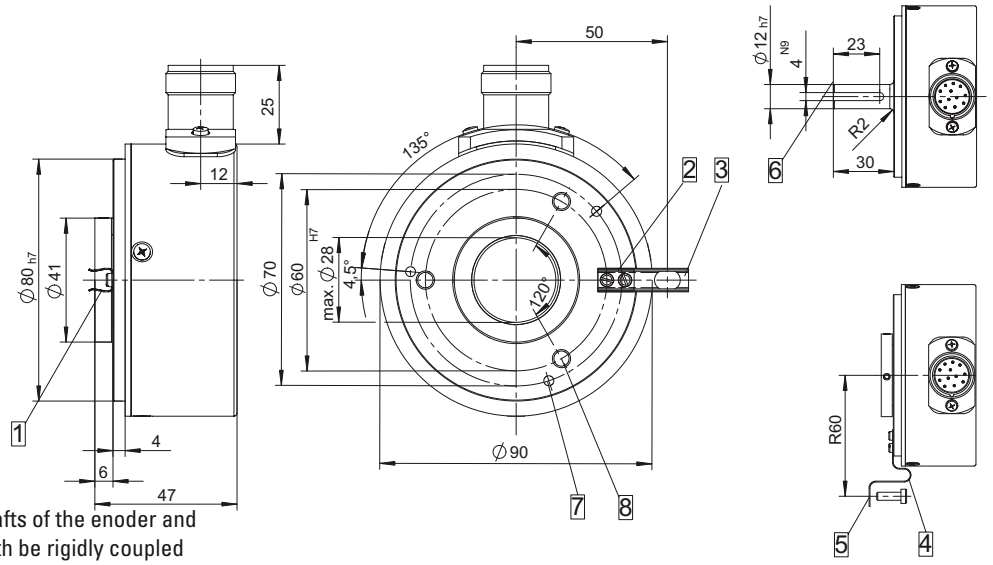
Top view of mating side:
12 pin plug



SSI interface with incremental track (A/B)):

Signal :	0V	+UB	+T	–T	+D	–D	ST	VR	$\overline{B}$	B	$\overline{A}$	A	⏚
Pin	1	2	3	4	5	6	7*	8	9	10	11	12	PH

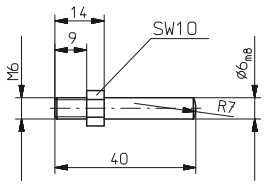
Dimensions:



Mounting advice:

1)The flanges and shafts of the enoder and drive should not both be rigidly coupled together at the same time! We recommend the use of suitable couplings (see Accessories section).

2)Delivery includes a corresponding cylindric pin (see drawing), when the encoder is ordered with flange type 2 (short spring device) or type 3 (long spring device).



1 Spring element for cyl. pin DIN 6325 ø 6
2 Spring element short (Flange No. 2)
3 Spring element long (Flange No. 3)
4 Flange (Flange No. 4)
5 Slotted hole for screw M4
6 2.5 mm deep
7 M4 - 7 deep
8 M6 -10 deep

Multiturn Type 9081 SSI or RS 485, programmable

Order code: 8.9081.XXXX.XXXX

Type

Flange
- 1 = without mounting aid
- 2 = with short spring device
- **3 = with long spring device**
- **4 = with mounting flange**
- **5 = with tether arm large**

Shaft/hollow shaft
- 1 = hollow shaft Ø 12 mm
- 2 = hollow shaft Ø 15 mm
- **3 = hollow shaft Ø 20 mm**
- 4 = hollow shaft Ø 24 mm
- **5 = hollow shaft Ø 28 mm**
- 6 = hollow shaft Ø 5/8"
- 7 = hollow shaft Ø 1"
- 8 = shaft Ø 12 x 30 mm

Interface and supply voltage
- **2 = SSI 5 ... 30 V DC with 4 status outputs**
- 3 = RS 485, half-duplex 5 ... 30 V DC internal termination
- 5 = SSI, 5 ... 30 V DC, with incremental track 2048 ppr (A, B)
- 7 = RS 485 half-duplex 5 ... 30 V DC external termination
- 9 = SSI 4.75 … 30 V DC. with 2 status outputs and 2 sensor outputs for monitoring the supply voltage on the encoder.

SSI-Interface*
- 2001 = 4096 x 4096 (24-Bit), Binary
- 2002 = 8192 x 4096 (25-Bit), Binary
- 2003 = 4096 x 4096 (24-Bit), Gray
- **2004 = 8192 x 4096 (25-Bit), Gray**

RS 485-Interface, half-duplex mode
- 3001 = ESC-protocol max. 38400 baud

Type of connection
- **2 = 12 pin plug without mating connector**

*This factory set (default) resolution can be re-programmed by using the Ezturn® software.

Preferred types are indicated in ***bold***

Accessories:

Mounting kit
Offers a wide variety of mounting options.

Complete kit
Order No. 8.0010.4A00.0000
The set includes the following individual items, which may also be ordered separately.
1 x parallel pin, long with fixing thread
1 x spring element, long
1 x spring element, short
2 x screws M2.5
Screw M4 x 10
Mounting flange
Washer
For detailed drawings and further information, see Accessories section.

Flexible mounting flange, large
Includes:
- Flexed spring element
- 3 mounting screws

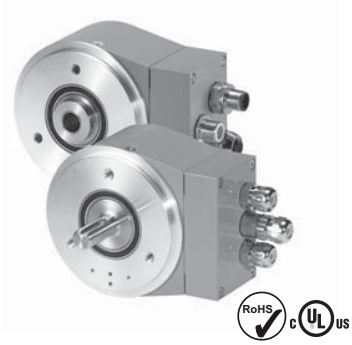
Order No. 8.0010.4E00.000

Accessories:
Corresponding mating connector to connection type 2
Order code 8.0000.5012.0000

Programming kit Ezturn® includes
- Interface converter
- Connection cable with the interface converter encoder – PC
- 90-250 V AC power supply
- CD-ROM with Ezturn® software

Order code 8.0010.9000.0004

Multiturn Type 9080 Profibus-DP



- Field bus interface: **PROFIBUS-DP**
- Hollow shaft up to Ø 28 or shaft Ø 12 mm
- Shock resistant up to 250 g
- Only 60 mm clearance needed
- Patented integrative technology ®
- Very easy mounting of the hollow shaft version. The encoder is mounted directly on the drive shaft without coupling. This saves up to 30 % cost and 50 % clearance compared to shaft versions.
- Divisions: up to 8192 (13 bits) per revolution, 4096 (12 bits) revolutions
- Non-contact multiturn gear with new Intelligent-Sensing-Technology (IST)
- Simple connection via connecting system (patent pending) - with removable socket box
- Integrated T-coupler
- Protection: IP 65

Mechanical characteristics:

Speed: 1)	max. 6000 min^{-1}
Rotor moment of inertia:	approx. 72 x 10^{-6} kgm^2
Starting torque hollow shaft version:	< 0.2 Nm
Starting torque shaft version:	< 0.05 Nm
Radial load capacity of shaft: 2)	radial: 80 N, axial 40 N
Weight:	approx. 0.9 kg
Protection acc. to EN 60 529:	IP 65
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature:	–10° C ... +70 °C 3)
Shaft:	stainless steel, hollow shaft H7
Shock resistance acc. to DIN-IEC 68-2-27	2500 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	100 m/s^2, 10 ... 2000 Hz

1) For continuous operation 3000 min^{-1}
2) Shaft version only (at shaft end)
3) Non-condensing

Specification to Profibus-DP 2.0 standard (DIN 19245 Part 3)

Electrical characteristics:

Supply voltage (U_B):	10 ... 30 V DC
Current consumption type:	max. 0.29 A
recommended fuse	T 0,315 A
Linearity	±1/2 LSB (± 1 LSB at 13, 14, 25 bit resolution)
Code	Binary
Interface	RS 485
Protocol	**Profibus-DP, encoder profile class 2**
Baud rate	max. 12 Mbit/s
Address	adjustable with DIP-switches
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3	
Performance against magnetic influence acc. to EN61000-4, 5	
UL certified	File 224618 (version with terminal box)
RoHS compliant acc. to EU guideline 2002/95/EG	

Profibus Encoder-Profile:
The basic functions of the PROFIBUS DP are only described in extracts in here. For additional information, please refer to the standards on PROFIBUS DP, i.e. DIN 19245-3 and EN 50170 respectively or see page 35-

The following parameters can be programmed:

- Direction of rotation
- Scaling factor
  – number of pulse/rotation
  – total resolution
- Preset value
- Diagnostics mode

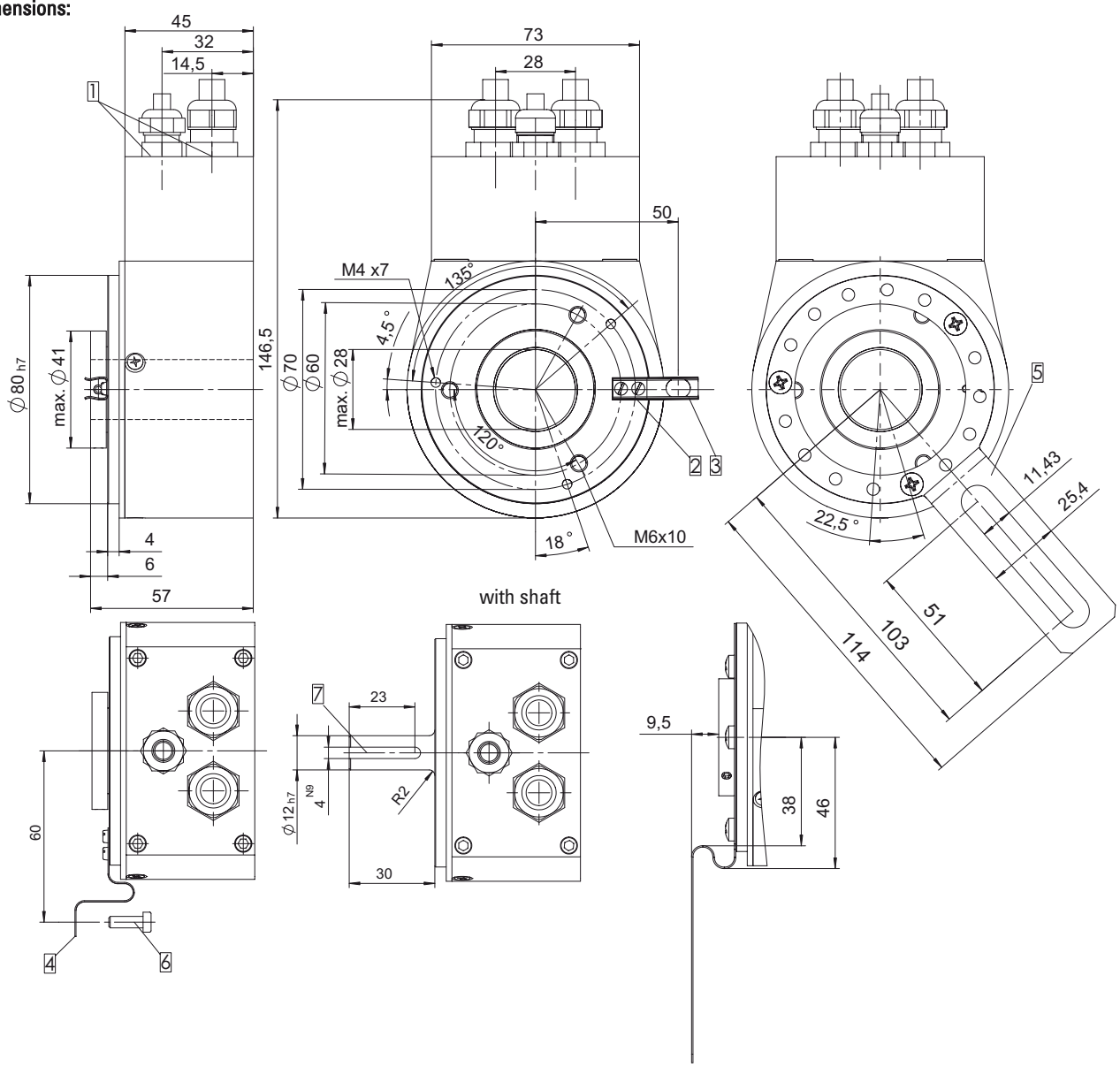
The following functionality is integrated:

- Galvanic isolation of the Fieldbus stage with DC/DC converter
- Line driver according to RS 485 max. 12 MB
- Addressing by means of rotary switches
- Diagnostics LED
- Full Class 1 and Class2 functionality

Multiturn Type 9080 Profibus-DP

Signal :	ENC.		BUS IN			BUS OUT			ENC.		Shield	
	+V DC	GND	GND	B	A	A	B	GND	GND	+V DC		
Pin:	1	2	3	4	5	6	7	8	9	10	11	12

Dimensions:

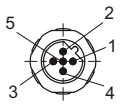


1 Socket box
2 Spring device for pin acc. to DIN 6325 Ø6
3 Spring device short (Flange No. 2)
4 Spring device long (Flange No. 3)
5 Slotted hole for screw M4
6 Mounting flange (Flange No. 4)
7 2,5 mm deep

Mounting advice:
The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time!

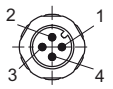
Multiturn Type 9080 Profibus-DP

Terminal assignment M12 Connector version:



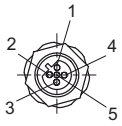
Bus in:

Signal :	–	BUS-A	–	BUS-B	–
Pin:	1	2	3	4	5



Power supply:

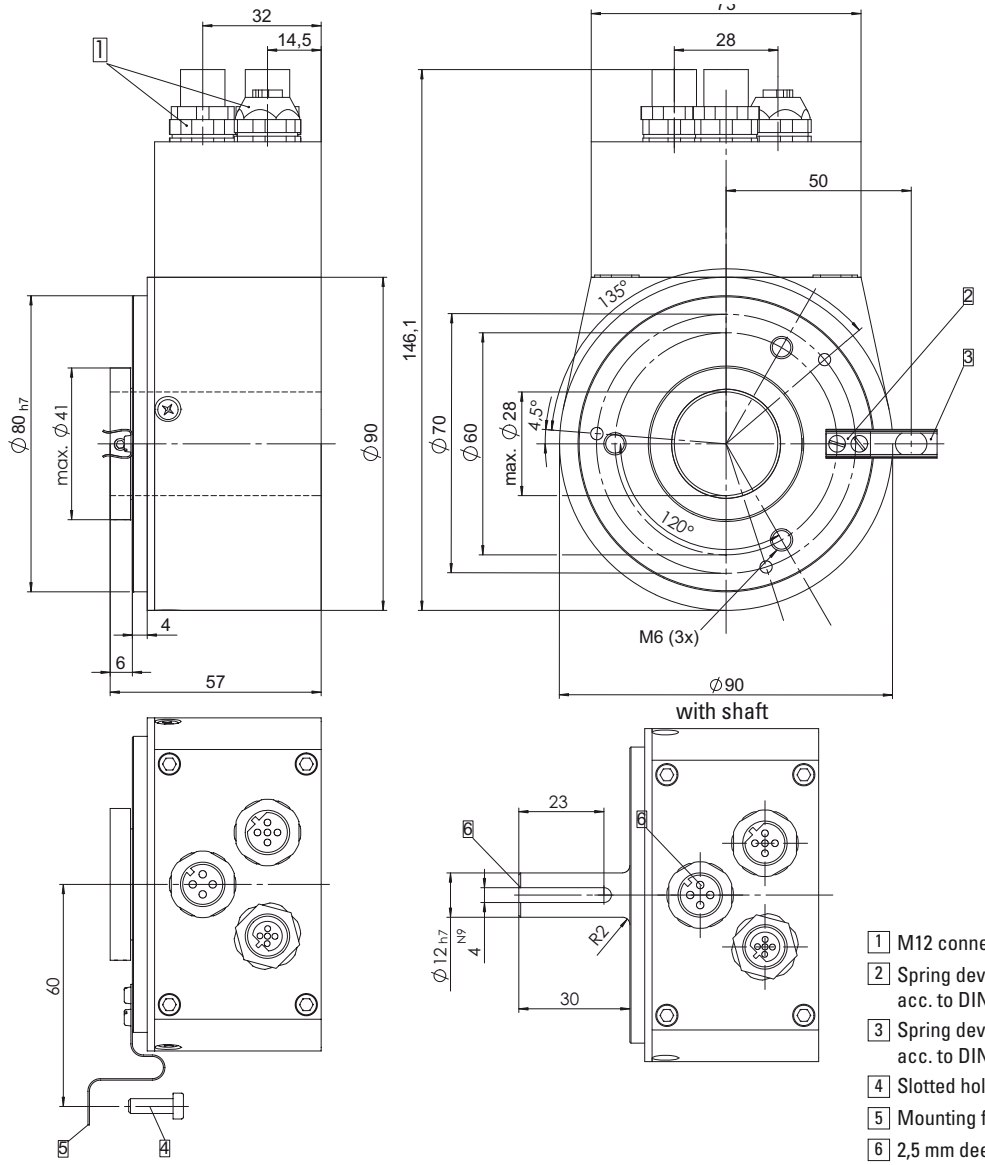
Signal :	U_B	–	0 V	–
Pin:	1	2	3	4



Bus out:

Signal :	BUS_VDC	BUS-A	BUS_GND	BUS-B	Shield
Pin:	1	2	3	4	5

Dimensions (M12 connector version):



1 M12 connector
2 Spring device short (Flange No. 2) for pin acc. to DIN 6325 ø 6
3 Spring device long (Flange No. 3) for pin acc. to DIN 6325 ø 6
4 Slotted hole for screw M4
5 Mounting flange (Flange No. 4)
6 2,5 mm deep

Multiturn Type 9080 Profibus-DP

Integrative Technology®
Compact construction, higher resistance to shock and EMI together with greater reliability due to:
- Integration of all components on just one PCB board instead of a sandwich structure
- Innovative assembly techniques
- Use of self-balancing Opto ASICs instead of potentiometers

Intelligent-Sensing-Technology (I-S-T)
An innovative principle of operation based on a non-contact electronic multiturn stage overcomes system disadvantages previously associated with encoders that had mechanical gears or with traditional electronic gear technology.

Advantages:
- High operational reliability
- Logic filter and innovative principle of operation compensate for high EMC interference
- Free from wear

Order code: 8.9080.XXXX.XXXX

Type

Flange
- 1 = without mounting aid
- 2 = with short spring device
- **3 = with long spring device**
- **4 = with mounting flange**

Shaft/hollow shaft
- **1 = hollow shaft Ø 12 mm**
- 2 = hollow shaft Ø 15 mm
- **3 = hollow shaft Ø 20 mm**
- 4 = hollow shaft Ø 24 mm
- **5 = hollow shaft Ø 28 mm**
- 6 = hollow shaft Ø 5/8"
- 7 = hollow shaft Ø 1"
- 8 = shaft Ø 12 x 30 mm
- 9 = hollow shaft ø 16 mm
- C = hollow shaft ø 25 mm

Interface and supply voltage
- **3 = Profibus-DP 10 ... 30 V DC**

Profibus DP
- 3001 = Profibus Class 2

Type of connection
- 1 = socket box with PG7 screwed connections and integrated T–coupler
- 2 = M12-Connector

Delivery includes:
GSD-file and documentation on CD
Use Couplings for the connection BUS-IN and Connectors for the connection BUS-OUT.
Compatible self-assembly connectors:
Connector (BUS-OUT): 05.BMSWS.8151-8.5
Coupling (BUS-IN): 05.BMWS.8151-8.5
See also Connection Technology section for cable assemblies.

Stock types
8.9080.4131.3001

Accessories:

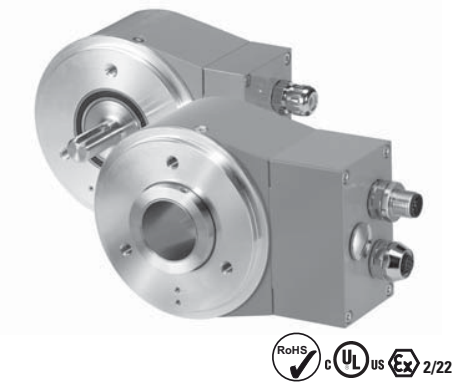
Mounting kit
Offers a wide variety of mounting options.

Complete kit
Order No. 8.0010.4A00.0000
The set includes the following individual items, which may also be ordered separately.
1 x parallel pin, long with fixing thread
1 x spring element, long
1 x spring element, short
2 x screws M2.5
Screw M4 x 10
Mounting flange
Washer
For detailed drawings and further information, see Accessories section.

Flexible mounting flange, large
Includes:
- Flexed spring element
- 3 mounting screws

Order No. 8.0010.4E00.000

Multiturn Type 9080 CANopen/DeviceNet



Your benefit
- Only 60 mm clearance needed
- Patented integrative technology
- Very easy mounting of the hollow shaft version. The encoder is mounted directly on the drive shaft without coupling. This saves up to 30 % cost and 50 % clearance compared to shaft versions.
- Divisions: up to 8192 (13 bits) per revolution, 4096 (12 bits) revolutions
- Non-contact multiturn gear with new Intelligent-Sensing-Technology (IST)
- Simply connection patent pending connecting system with removable socket box
- Protection: IP 65

Product features
- CANopen according to profile DSP 406 with additional features
- DeviceNet 2.0 protocol
- Divisions: up to 8192 bits per revolution, up to 4096 revolutions (13x12 bit)
- IP 65
- Extensive M12 accessories program

CANopen
DeviceNet

Mechanical characteristics:

Speed: [1]	max. 6000 min^{-1}
Rotor moment of inertia:	approx. 72 x 10^{-6} kgm^2
Starting torque shaft hollow shaft version :	< 0.2 Nm
Starting torque shaft shaft version :	< 0.05 Nm
Load capacity of shaft (using solid shaft) [2]	radial: 80 N, axial 40 N
Weight:	approx. 0.9 kg
Protection acc. to EN 60 529:	IP 65
EX approval for hazardous areas:	optional zone 2 and 22
Working temperature:	–10° C ... +70 °C [3]
Shaft:	stainless steel, hollow shaft H7
Shock resistance acc. to DIN-IEC 68-2-27:	2500 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	100 m/s^2, 10 ... 2000 Hz

1) For continuous operation 3000 min^{-1}
2) Shaft version only (at shaft end)
3) Non-condensing

Electrical characteristics:

Supply voltage (U_B):	10 ... 30 V DC
Current consumption:	max. 0.29 A
recommended fuse:	T 0,315 A
Linearity:	± 1/2 LSB (±1 LSB with resolution 13, 14, 25 Bit)
Code:	Binary
Interface:	CAN HIGH-Speed to ISO/DIS 11898, Basic and Full-CAN; CAN-specification 2.0 B (11 and 29 Bit Identifier)
Protocol:	**CANopen to Profile DSP 406** **DeviceNet Profile for Encoder Release V 2.0**
Baud rate:	programmable via DIP switches 10 ... 1000 Kbits/s
Basic identifier/node:	programmable via DIP switches
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3	
Performance against magnetic influence acc. to EN61000-4, 5	
UL certified	File 224618 (version with terminal box)
RoHS compliant acc. to EU guideline 2002/95/EG	

Multiturn Type 9080 CANopen/DeviceNet

CANopen - Device Profile:
General description

The CANopen Device Profiles describe the functionality of the communication and of that part of the CANopen fieldbus system specific to the manufacturer. Device Profile 406 applies to encoders and defines the individual objects independently of the manufacturer. In addition the profile makes provision for additional extended functions specific to the manufacturer; using devices that interface with CANopen offers the advantage of acquiring systems today that are prepared for the needs of the future.

The following functionality is integrated:

- Class C2 functionality
- NMT Slave
- Diagnostics (internal) 2 Bit
- CAN-LED for Bus status
- CAN-LED for operating mode

The following parameters can be programmed:

- Polling mode or auto mode with adjustable time
- Direction
- Number of pulses/rotation 1 ... 8192
- Number of revolutions 1 ... 4096
- Total resolution
- Preset
- Offset

DeviceNet Encoder Profile:
General description:
The DeviceNet Device Profile describes the functionality of the communication and of that part of the DeviceNet fieldbus system specific to the manufacturer. The Encoder Profile applies to encoders and defines the individual objects independently of the manufacturer. In addition the profile makes provision for additional extended functions specific to the manufacturer.

The following parameters can be programmed:

- Direction of rotation
- Scaling factor
  - Number of pulses/rotation
  - Total resolution
- Number of revolutions
- Preset value
- Diagnostics mode
- Resolution

The following functionality is integrated:

- Galvanic isolation of the Fieldbus-stage with DC/DC converter
- Addressing via DIP switches or software
- Diagnostic LED for network and mode Baud rate 125, 250 and 500 kbit/s programmable via DIP switches
- Node address 0 … 63 and baud rate programmable via DIP switches
- Polled mode
- Cyclic mode
- Change of state mode (COS)
- Combination of Polled mode and Cyclic mode
- Combination of Polled mode and COS mode
- Offline connection set
- Device heartbeat
- “Out of box” Configuration
- MAC-ID and Baud rate preset value MAC-ID = 63
- Baud rate = 125 kBits/s
- 2 I/O Assembly
  Position value
  Position value and status

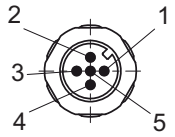
Fieldbus encoders can be used in following applications:

CANopen:
Elevators, construction and mobile plant, cranes, agricultural vehicles, special-purposes vehicles.

DeviceNet:
especially suitable for applications in the USA.

Multiturn Type 9080 CANopen/DeviceNet

Bus in:



Signal :	DRAIN	+ V DC	– V DC	CAN_H	CAN_L
Pin:	1	2	3	4	5
	GY	RD	BK	WH	BU

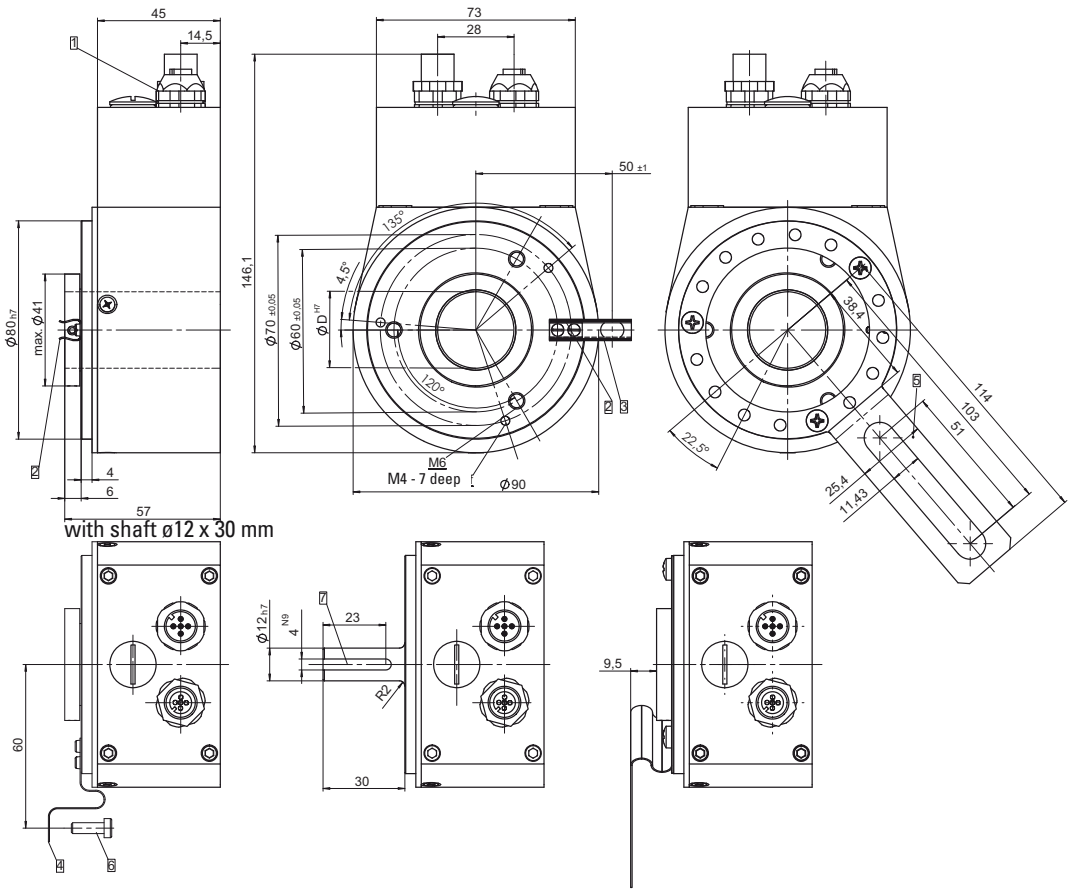
Bus out:

Signal :	DRAIN	+ V DC	– V DC	CAN_H	CAN_L
Pin:	1	2	3	4	5
	GY	RD	BK	WH	BU

Use Couplings for the connection BUS-IN and Connectors for the connection BUS-OUT.
Compatible self-assembly connectors:

Connector (BUS-OUT): 05.B8251-0/9
Coupling (BUS-IN): 05.B8151-0/9
See also Connection Technology section for cable assemblies.

Dimensions:



1 M12 Connectors/Coupling
2 Spring device short (FlangeNo. 2) for pin acc. to DIN 6325 ø 6
3 Spring device long (Flange No. 3) for pin acc. to DIN 6325 ø 6
4 Mounting Flange (Flange No. 4)
5 Mounting Flange (Flange No. 5)
6 Slotted hole for screw M4
7 2,5 mm deep

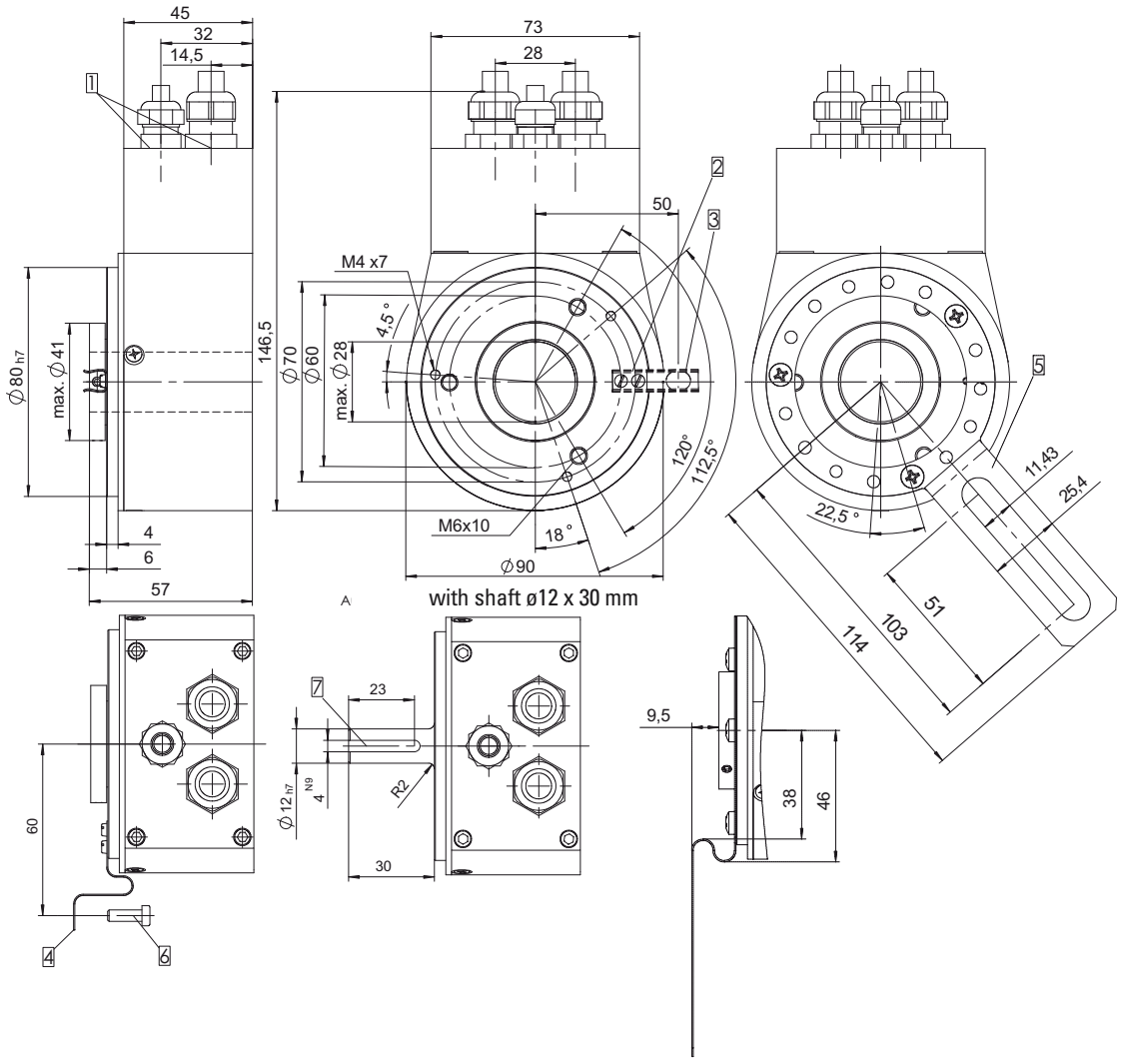
Multiturn Type 9080 CANopen/DeviceNet

Terminal assignment with terminal box:

Signal :	ENC.		BUS IN			BUS OUT			ENC.		Shield[1)]	
	+V DC	GND	GND	CAN_H	CAN_L	CAN_L	CAN_H	GND	GND	+V DC		
Pin:	1	2	3	4	5	6	7	8	9	10	11	12

1) only DeviceNet version

Dimensions (terminal box version):

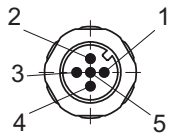


1 Socket box
2 Spring device short (Flange No. 2) for pin acc. to DIN 6325 ø 6
3 Spring device long (Flange No. 3) for pin acc. to DIN 6325 ø 6
4 Mounting flange (Flange No. 4)
5 Mounting flange (Flange No. 5)
6 Slotted hole for screw M4
7 2,5 mm deep

Mounting advice:
The flanges and shafts of the encoder and drive should not both be rigidly coupled together at the same time!

Multiturn Type 9080 CANopen/DeviceNet

Bus in:



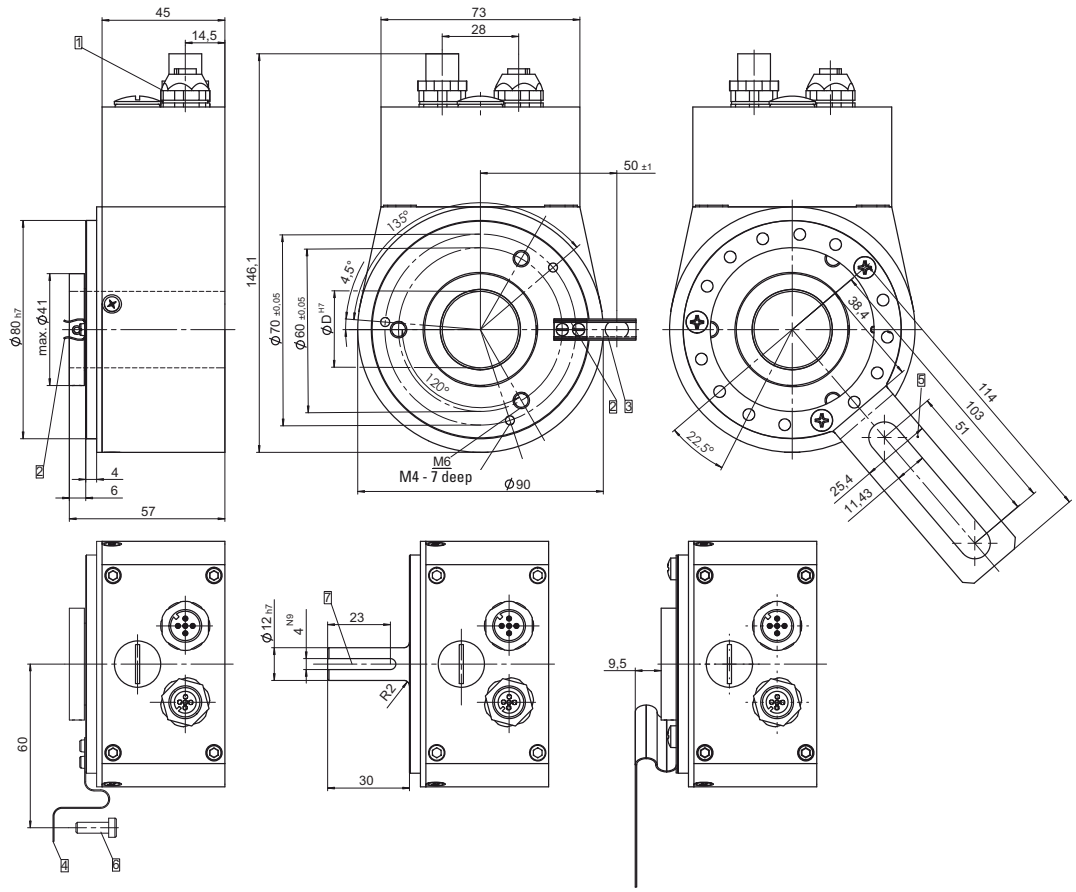
Signal :	DRAIN	+ V DC	– V DC	CAN_H	CAN_L
Pin:	1	2	3	4	5
	GY	RD	BK	WH	BU

Bus out:

Signal :	DRAIN	+ V DC	– V DC	CAN_H	CAN_L
Pin:	1	2	3	4	5
	GY	RD	BK	WH	BU

Use Couplings for the connection BUS-IN and
Connectors for the connection BUS-OUT.

Dimensions (M12 connector version):



1 M12 Connectors/Coupling
2 Spring device short (Flange No. 2)
3 Spring device long (Flange No. 3)
4 Flange (Flange No. 4)
5 Tether arm (Flange No. 5)
6 Slotted hole for screw M4
7 2,5 mm deep

Multiturn Type 9080 CANopen/DeviceNet

Patented "Integrated Technology®" uses single board construction, deliberate assembly techniques, and two ASIC design:
- Shock up to 250gs
- Higher vibration specs and thermal shock performance
- Lower parts count, elimination of potentiometers
- Higher resistance to EMI

Electronic multiturn increases performance, eliminates gears
- Reliability - No backlash errors, resistant to EMI, lower parts count
- Higher life - No mechanical wear, lower internal temperature
- Higher performance - Higher operating speeds
- Lower profile - compact size, hollow shaft
- Economical - Lower cost

Patented "Intelligent Sensing Technology®"
- The battery outlasts both application requirements and system components (LEDs & bearings)
- Redundant multiturn sensors and counters increase reliability & life
- Active system output monitoring using digital filters to compare data to logical & target bits.

Order code:

8.9080.XXXX.X001

Type

Flange
- 1 = without mounting aid
- 2 = with short spring device
- **3 = with long spring device**
- **4 = with mounting flange**
- **5 = with tether arm**

Shaft/Hollow shaft
- **1 = Hollow shaft Ø 12 mm**
- 2 = Hollow shaft Ø 15 mm
- **3 = Hollow shaft Ø 20 mm**
- 4 = Hollow shaft Ø 24 mm
- **5 = Hollow shaft Ø 28 mm**
- 6 = Hollow shaft Ø 5/8"
- 7 = Hollow shaft Ø 1"
- 8 = Shaft Ø 12 x 30 mm
- 9 = Hollow shaft Ø 16 mm

Interface and supply voltage
- 1 = DeviceNet 10 ... 30 V DC
- **2 = CANopen 10 ... 30 V DC**

Field bus profile
- 1001 = DeviceNet
- **2001 = CANopen Encoder Profile DSP 406**

Type of connection
- 1 = Terminal box with cable connection M16[1)]
- 2 = M12-Connector

1) only in conjunction with CANopen

Includes:

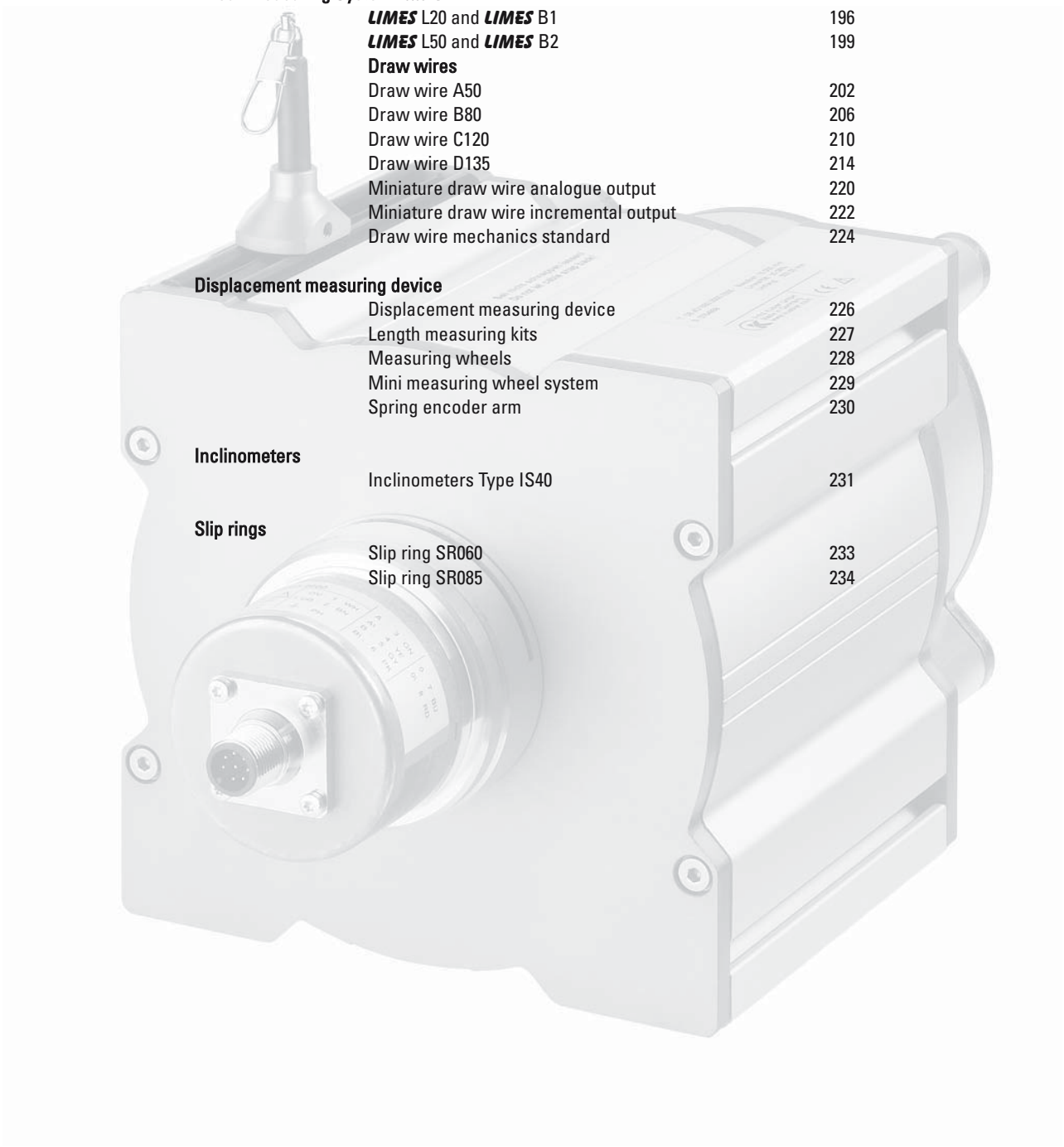
EDS-file and documentation on CD

Use Couplings for the connection BUS-IN and Connectors for the connection BUS-OUT.

Compatible self-assembly connectors:
Connector (BUS-OUT): 05.B8251-0/9
Coupling (BUS-IN): 05.B8151-0/9

Accessories:
- Cables and connectors, also pre-assembled, can be found in the chapter Counting Technology
- Mounting attachments and couplings can be found in the Chapter Accessories

Table of contents

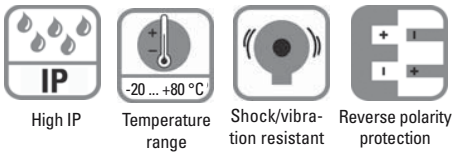


NEW

Linear Measuring Technology
Linear magnetic measurement system

Kübler

Linear magnetic measurement system *LIMES* LI20/B1



High IP | Temperature range | Shock/vibration resistant | Reverse polarity protection

Robust

- **Increased ability to withstand vibrations and rough installation**
  Eliminates machine downtime and repairs
  High shock and vibration resistance, thanks to non-contact technology.
- **Stays sealed even when subjected to harsh everyday use. Offers security against failures in the field.**
  Solid housing with up to IP 67 protection.

Compact

- **Installation depth only 10 mm, width of magnetic band 10 mm**
- **Installation height only 28 mm**
  Can be used even where space is very tight

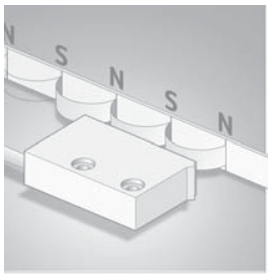
Simple installation

- **Fast start-up of the measuring system**
  Easy fixing of the magnetic band and the sensor head
- **Easy mounting with large tolerances possible**
  Distance of sensor head to magnetic band from 0.1 to 1.0 mm
  Tolerates lateral misalignment + 1 mm
  Warning signal when magnetic field is too weak (LED)

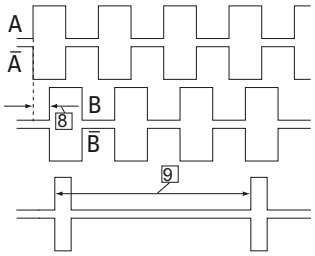
Technical data magnetic sensor *LIMES* LI20:

Output circuit:	Push-Pull	RS422
Supply voltage:	4,8 ... 30 V DC	4,8 ... 26 V DC
Load/channel, max cable length:	±20 mA, max. 30 m	120 Ohm, RS422 standard
Current consumption (without load):	typ. 25 mA, max. 60 mA	
Short circuit proof outputs[1]:	yes	yes[2]
Min. Pulse interval:	1 µs (edge interval) corresponds to 4 µs/cycle (see signal figures below)	
Output signal:	A, $\overline{A}$, B, $\overline{B}$, I, $\overline{I}$	
Reference signal:	Index periodical	
System Accuracy:	typ. ±200 µm, max. ± (0.04 + 0.04 x L) mm, (L in [m], up to L = 50 m, at T = 20 °C)	
Repeat accuracy:	±1 increment	
Resolution and speed[3]:	100 µm (quadruple), max. 25 m/s 25 µm (quadruple), max. 4 m/s 10 µm (quadruple), max. 6,5 m/s	
Permissible alignment tolerance	see draft "Mounting tolerances"	
Gap sensor / magnetic band:	0.1 ... 1.0 mm (0,4 mm recommended)	
Offset:	max. ±1 mm	
Tilting:	max. 3 °	
Torsion:	max. 3 °	
Working temperature:	–20 ... +80 °C	
Shock resistance:	500g/1 ms	
Vibration strength:	30 g/10 ... 2000 Hz	
Protection class:	IP 67 according to DIN 60 529 (housing)	
Humidity:	100 %, condensation possible	
Housing:	Zinc die-cast	
Cable:	2 m, PUR 8 x 0,14 mm², shielded, may be used in trailing cable installations	
Status-LED:	Green: Pulse-index; Red: Error Speed too high or magnetic fields too weak (for sensors 8.LI20.XXXX.X**020** and 8.LI20.XXXX.X**050**)	
CE-compliant according to:	EN 61 000-6-2, EN 61 000-6-4, EN 61 000-6-3 EN 61 000-4-8 (magnetic field)	
RoHS compliant acc. to EU guideline 2002/95/EG		

Function principle:



Signal figures



9 periodic index signal (every 2 mm)
The logical assignment A, B and I-Signal can change

8 Min. Pulse interval: pay attention to the instructions in the technical data

[1] With supply voltage correctly applied

[2] A max. of one channel only may be short-circuited:
(when UB=5 V, a short circuit to another channel, 0 V, or +UB is permissible.)
(when UB=5-30 V, a short circuit to another channel or to 0 V is permissible.)

[3] At the listed rotational speed the min. pulse interval is 1µs, this corresponds to 250 kHz. For the max. rotational speed range a counter with a count input frequency of not less then 250 kHz. should be provided.

NEW

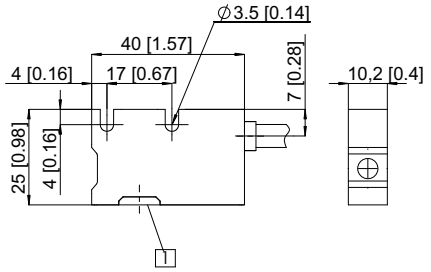
Linear magnetic measurement system *LIMES* LI20/B1

Technical data magnetic band *LIMES* B1:

Pole gap	2 mm from pole to pole
Dimensions:	Width: 10 mm, Thickness: 1.7 mm incl. masking tape
Temperature coefficient:	$(11\pm1)x10^{-6}/K$
Temperature ranges:	working temperature: –20 …+80 °C storage temperature: –40 …+80 °C
Mounting:	adhesive joint
Measuring:	0,1 m (to receive an optimal result of measurement, the magnetic band should be ca. 0.1 m longer than the desired measuring length)
Bending radius:	≤ 50 mm

Dimensions:

Magnetic sensor *LIMES* LI20:



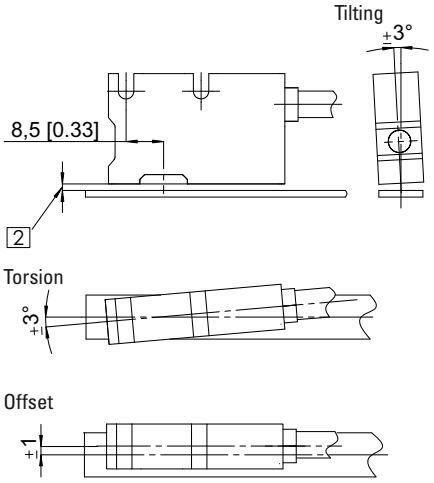
1 active measuring area

Pin assignment:

Signal	Wire colour
0 V, GND	white
U_B	brown
A	green
$\overline{A}$	yellow
B	grey
$\overline{B}$	pink
I	blue
$\overline{I}$	red

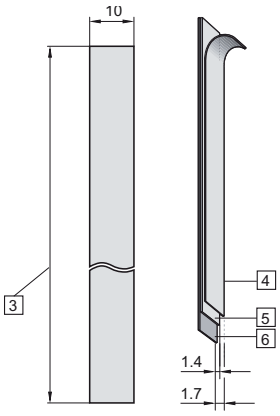
Shield is on the housing

Permissible Mounting tolerances:



2 Distance Sensor / Magnetic band:
0.1... 1.0 mm (0.4 mm recommended)

Magnetic band *LIMES* B1:



3 length L, max. 50 m
4 masking tape
5 magnetic band
6 carrier band

NEW

Linear Measuring Technology
Linear magnetic measurement system

Linear magnetic measurement system *LIMES* LI20/B1

Order code magnetic sensor *LIMES* LI20: 8.LI20.11X1.2XXX

- Model
- Design
  - 1 = standard
- Pulse interval
  - 1 = standard
- Interface and supply voltage
  - 1 = RS422/4.8 ... 26 V DC
  - 2 = Push-Pull/4.8 ... 30 V DC
- Code (Resolution*)
  - 005 (100 µm)
  - 020 (25 µm)
  - 050 (10 µm)

  (only connected with magnetic band Limes B1)
- Reference signal
  - 2 = index periodic
- Type of connection
  - 1 = cable (PUR), 2 m

* with quadruple evaluation

Standard stock types:

8.LI20.1111.2005	8.LI20.1121.2005
8.LI20.1111.2020	8.LI20.1121.2020
8.LI20.1111.2050	8.LI20.1121.2050

Order code magnetic band *LIMES* B1: 8.B1.10.010.XXXX

- Model
- Width
  - 10= 10 mm
- Length
  - 0010 = 1 m
  - 0020 = 2 m
  - 0040 = 4 m
  - 0050 = 5 m
  - 0060 = 6 m
  - 0100 = 10 m
  - 0200 = 20 m

Other lengths up to 50 m on request

Standard stock types:

8.B1.10.010.0010
8.B1.10.010.0020
8.B1.10.010.0050
8.B1.10.010.0100

Display Type 572 for *LIMES* LI20:

Counter series for demanding applications, with two individually scalable encoder inputs. HTL or TTL in each case A, $\overline{A}$, B, $\overline{B}$ for count frequencies up to 1 MHz per channel. Operating modes can be selected for position or event counter, total counter, difference counter, cut-to-length display, diameter calculator, batch counter and more.

- 2 separate freely scalable count inputs - HTL or TTL; also with inverted inputs
- Max. input frequency 1 MHz/ channel
- 4 freely programmable fast solid-state outputs, each with 350 mA output current
- Step or tracking preset
- AC and DC supply voltage
- Can be used as a counter or position display with limit values
- Monitoring function, where 2 values are monitored or calculated with respect to each other
- 4 fast programmable inputs with various functions such as reset, gate, display memory , reference input or switching between the display values.
- Optional scalable analogue output 0/4 ... 20 mA, +/-10 V or 0 ... 10 V
- 2 auxiliary power supplies for sensors: 5.2 V DC and 24 V DC
- Standard interface RS 232

Order code specification:

Position display, 6 digits, with 4 fast switch outputs and serial interface:
6.572.0116.D05

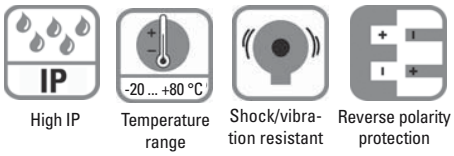
Position display, 6 digits, with 4 fast switch outputs and serial interface and scalable analogue output:
6.572.0116.D95

Position display, 8 digits, with 4 fast switch outputs and serial interface:
6.572.0118.D05

Position display, 8 digits, with 4 fast switch outputs and serial interface and scalable analogue output:
6.572.0118.D95

NEW

Linear magnetic measurement system *LIMES* LI50/B2



High IP | Temperature range | Shock/vibration resistant | Reverse polarity protection

Robust

- **Increased ability to withstand vibrations and rough installation**
  Eliminates machine downtime and repairs
  High shock and vibration resistance, thanks to non-contact technology.
- **Stays sealed even when subjected to harsh everyday use. Offers security against failures in the field.**
  Solid housing with up to IP 67 protection.

Compact

- **Installation depth only 10 mm, width of magnetic band 10 mm**
- **Installation height only 28 mm**
  Can be used even where space is very tight

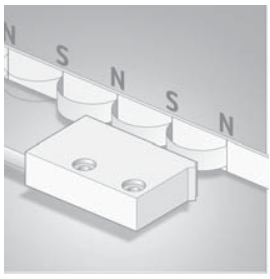
Simple installation

- **Fast start-up of the measuring system**
  Easy fixing of the magnetic band and the sensor head
- **Easy mounting with large tolerances possible**
  Distance of sensor head to magnetic band from 0.1 to 2.0 mm
  Tolerates lateral misalignment + 1 mm
  Warning signal when magnetic field is too weak (LED)

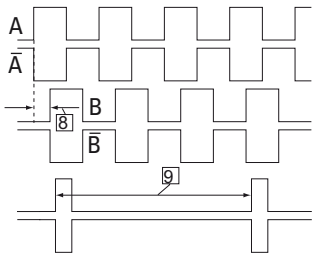
Technical data magnetic sensor *LIMES* LI50:

Output circuit:	Push-Pull	RS422
Supply voltage:	4,8 ... 30 V DC	4,8 ... 26 V DC
Load/channel, max cable length:	±20 mA, max. 30 m	120 Ohm, RS422 standard
Current consumption (without load):	typ. 25 mA, max. 60 mA	
Short circuit proof outputs[1]:	yes	yes[2]
Min. Pulse interval:	1 µs (edge interval) corresponds to4 µs/cycle (see signal figures below)	
Output signal:	A, $\overline{A}$, B, $\overline{B}$, I, $\overline{I}$	
Reference signal:	Index periodical	
System Accuracy:	typ. ± 200 µm, max. ± (0.06 + 0.04 x L) mm, (L [m] up to L = max. 50 m, at T = 20 °C)	
Repeat accuracy:	±1 increment	
Resolution and speed[3]:	25 µm (quadruple), max. 16.25 m/s 5 µm (quadruple), max. 3.25 m/s	
Permissible alignment tolerance	see draft "Mounting tolerances"	
Gap sensor / magnetic band:	0.1 ... 2.0 mm (1.0 mm recommended))	
Offset:	max. ±1 mm	
Tilting:	max. 3 °	
Torsion:	max. 3 °	
Working temperature:	–20 ... +80 °C	
Shock resistance:	500g/1 ms	
Vibration strength:	30 g/10 ... 2000 Hz	
Protection class:	IP 67 according to DIN 60 529 (housing)	
Humidity:	100 %, condensation possible	
Housing:	Zinc die-cast	
Cable:	2 m, PUR 8 x 0,14 mm², shielded, may be used in trailing cable installations	
Status-LED:	Green: Pulse-index; Red: Error Speed too high or magnetic fields too weak (for sensors 8.LI50.XXXX.X**050** and 8.LI50.XXXX.X**250**)	
CE-compliant according to:	EN 61 000-6-2, EN 61 000-6-4, EN 61 000-6-3 EN 61 000-4-8 (magnetic field)	
RoHS compliant acc. to EU guideline 2002/95/EG		

Function principle:



Signal figures



9 periodic index signal (every 2 mm)
The logical assignment A, B and I-Signal can change

8 Min. Pulse interval: pay attention to the instructions in the technical data

1) With supply voltage correctly applied

2) A max. of one channel only may be short-circuited:
(when UB=5 V, a short circuit to another channel, 0 V, or +UB is permissible.)
(when UB=5-30 V, a short circuit to another channel or to 0 V is permissible.)

3) At the listed rotational speed the min. pulse interval is 1 µs, this corresponds to 250 kHz. For the max. rotational speed range a counter with a count input frequency of not less then 250 kHz. should be provided.

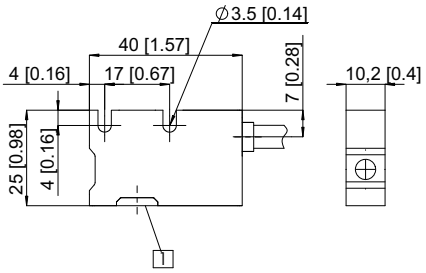
Linear magnetic measurement system *LIMES* LI50/B2

Technical data magnetic band *LIMES* B2:

Pole gap:	5 mm from pole to pole
Dimensions:	Width: 10 mm, Thickness: 1.7 mm incl. masking tape
Temperature coefficient:	$(11\pm1)x10^{-6}/K$
Temperature ranges:	working temperature: –20 …+80 °C storage temperature: –40 …+80 °C
Mounting:	adhesive joint
Measuring:	0,1 m (to receive an optimal result of measurement, the magnetic band should be ca. 0.1 m longer than the desired measuring length)
Bending radius:	≤ 50 mm

Dimensions:

Magnetic sensor *LIMES* LI50:



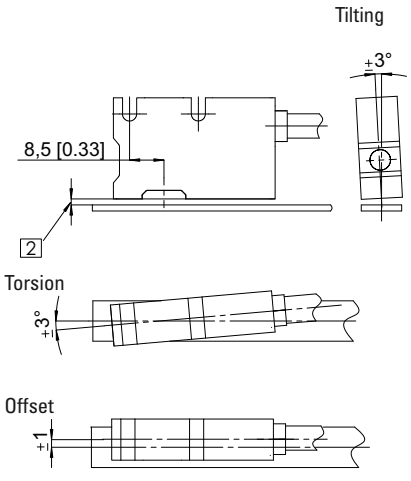
1 active measuring area

Pin assignment:

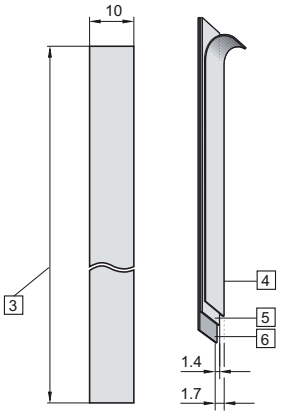
Signal	Wire colour
0 V, GND	white
U_B	brown
A	green
$\overline{A}$	yellow
B	grey
$\overline{B}$	pink
I	blue
$\overline{I}$	red

Shield is on the housing

Permissible Mounting tolerances:



Magnetic band *LIMES* B2:



3 length L, max. 50 m
4 masking tape
5 magnetic band
6 carrier band

2 Distance Sensor / Magnetic band:
0.1... 2.0 mm (1 mm recommended)

NEW

Linear magnetic measurement system *LIMES* LI50/B2

Order code magnetic sensor *LIMES* LI50: 8.LI50.11X1.2XXX

Model	
Design	1 = standard
Pulse interval	1 = standard
Interface and supply voltage	1 = RS422/4.8 ... 26 V DC 2 = Push-Pull/4.8 ... 30 V DC
Code (Resolution*)	050 (25 µm) 250 (5 µm) (only connected with magnetic band Limes B2)
Reference signal	2 = index periodic
Type of connection	1 = cable (PUR), 2 m

* with quadruple evaluation

Standard stock types:

8.LI50.1111.2050	8.LI50.1121.2050
8.LI50.1111.2250	8.LI50.1121.2250

Order code magnetic band *LIMES* B2: 8.B2.10.010.XXXX

Model	
Width	10= 10 mm
Length	0010 = 1 m 0020 = 2 m 0040 = 4 m 0050 = 5 m 0060 = 6 m 0100 = 10 m 0200 = 20 m

Other lengths up to 50 m on request

Standard stock types:

8.B2.10.010.0010
8.B2.10.010.0020
8.B2.10.010.0050
8.B2.10.010.0100

Display Type 572 for *LIMES* LIxx:

Counter series for demanding applications, with two individually scalable encoder inputs. HTL or TTL in each case A, $\overline{A}$, B, $\overline{B}$ for count frequencies up to 1 MHz per channel. Operating modes can be selected for position or event counter, total counter, difference counter, cut-to-length display, diameter calculator, batch counter and more.

- 2 separate freely scalable count inputs - HTL or TTL; also with inverted inputs
- Max. input frequency 1 MHz/ channel
- 4 freely programmable fast solid-state outputs, each with 350 mA output current
- Step or tracking preset
- AC and DC supply voltage
- Can be used as a counter or position display with limit values
- Monitoring function, where 2 values are monitored or calculated with respect to each other
- 4 fast programmable inputs with various functions such as reset, gate, display memory , reference input or switching between the display values.
- Optional scalable analogue output 0/4 ... 20 mA, +/-10 V or 0 ... 10 V
- 2 auxiliary power supplies for sensors: 5.2 V DC and 24 V DC
- Standard interface RS 232

Order code specification:

Position display, 6 digits, with 4 fast switch outputs and serial interface:
6.572.0116.D05

Position display, 6 digits, with 4 fast switch outputs and serial interface and scalable analogue output:
6.572.0116.D95

Position display, 8 digits, with 4 fast switch outputs and serial interface:
6.572.0118.D05

Position display, 8 digits, with 4 fast switch outputs and serial interface and scalable analogue output:
6.572.0118.D95

NEW

Linear Measuring Technology
Draw wire mechanics with encoder or analogue sensor

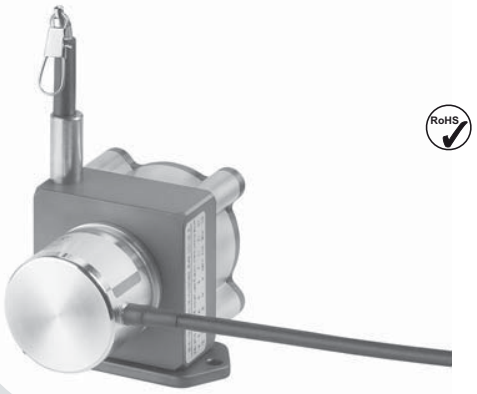
Kübler

Draw wire encoder A50

Wide temperature-range | Shock/vibration resistant | High IP protection rating | Reverse polarity protection

Robust

- **Insensitive to the environment**
  Titanium-anodised aluminium housing
- **High-resistance wire**
  Stainless steel wire
- **Wire exit free from wear**
  Diamond-polished ceramic guide
- **Can be used in a wide temperature range without extra charge**
  max. -20 ... +85 °C



Dynamic

- **High traverse speed**
- **High acceleration**
  Dynamic spring traction by means of a constant force spring, long service life,approx. 2 million complete cycles

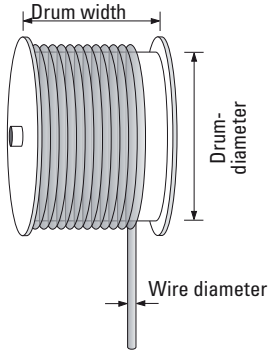
Versatile

- **Suitable for various sensors/encoders**
  – Incremental
  – Analogue
- **Quick mounting**
  Fastening by means of 2 screws
- **Flexible connection possibilities**
  Cable, M12 connector, radial, axial

Mechanical characteristics (draw wire mechanics):

Measuring range:	250 mm	500 mm	1250 mm
Extension force Fmin:	5.2 N	5.2 N	3.8 N
Fmax:	6.3 N	7.3 N	5.4 N
Max. speed:	8 m/s	8 m/s	10 m/s
Max. acceleration:	85 m/s^2	85 m/s^2	100 m/s^2
Linearity:	analogue output: 0.1 % (of the measuring range)		
	encoder: 0.05 % (of the measuring range)		
Weight:	approx. 330 g (depending on the sensor/encoder used)		
Materials:	housing: titanium-anodised aluminium wire: stainless steel ø 0.5 mm		
Protection (sensor):	IP65 (IP67 on request for encoders)		
Lifetime	> 2 million full cycles		

Operating principle:



Construction:
The core of a draw wire device is a drum mounted on bearings, onto which a wire is wound. Winding takes place via a spring-loaded device.

Note
Exceeding the maximum extension length of the draw wire will lead to damage to the wire and the mechanics.

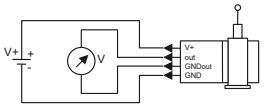
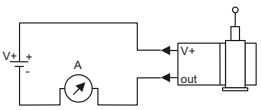
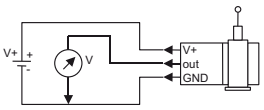
NEW

Draw wire encoder A50

Electrical characteristics (digital output):

The electrical characteristics of the draw wire mechanics with digital output can be found in the data sheets of the encoders.

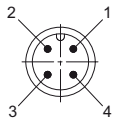
Electrical characteristics (analogue output):

Analogue output:	0 ... 10 V	4 ... 20 mA	Potentiometer
Output:	0 ... 10 V galvanically isolated, 4 conductors	4 ... 20 mA 2 conductors	1 kOhm
Supply voltage:	12 ... 30 V DC	12 ... 30 V DC	max. 30 V DC
Recommended slider current:	–	–	< 1 µA
Max. current consumption:	22.5 mA (no load)	50 mA	–
Reverse polarity protection:	yes	yes	–
Operating temperature:	-20 ... +60 °C	-20 ... +60 °C	-20 ... +85 °C
Connection diagrams:			
CE compliant according to:	EN 61000-6-2, EN 61000-6-4, EN 61000-6-3		

Terminal assignment (analogue output):

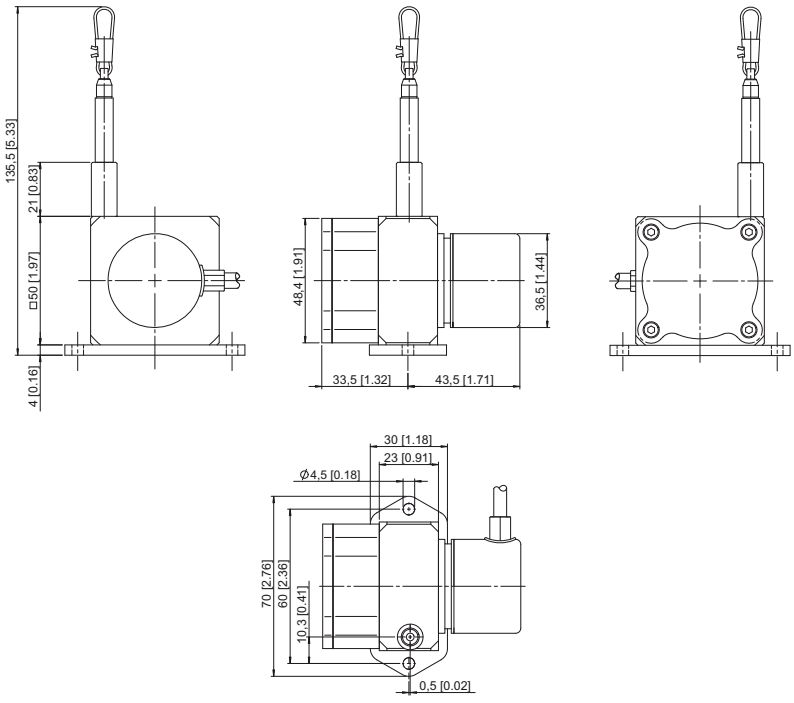
Pin	Cable colour	0 ... 10 V	4 ... 20 mA	1 kOhm
1	brown	V+	V+	V+
2	white	Signal	n. c.	Slider
3	blue	GND	Signal	GND
4	black	GND Sig.	n. c.	n. c.

Connector (analogue output):



Dimensions:

Draw wire mechanics with encoder



NEW

Linear Measuring Technology
Draw wire mechanics with encoder or analogue sensor

Draw wire encoder A50

Order code with encoder:

D8.6A1.XXXX.XXXX.XXXX

- Draw wire mechanics
- Measuring range*
  - 0025 = 250 mm
  - 0050 = 500 mm
  - 0125 = 1250 mm

*other measuring ranges on request

- Number of pulses
  - (e.g. 500 pulses => 0500)
- Type of connection:
  - 1 = Axial cable (2 m PVC cable)
  - 2 = Radial cable (2 m PVC cable)
- Output:
  - 4 = Push-pull with inverted signals, supply voltage 8 ... 30 V DC
- Encoder used
  - 36 = Encoder Type 3610

Available resolution, drum circumference 125 mm			
Pulses/revolution	125	1250	2500
Pulses/mm	1	10	20
Resolution [mm]	1	0.1	0.05

Recommended standard device with encoder:

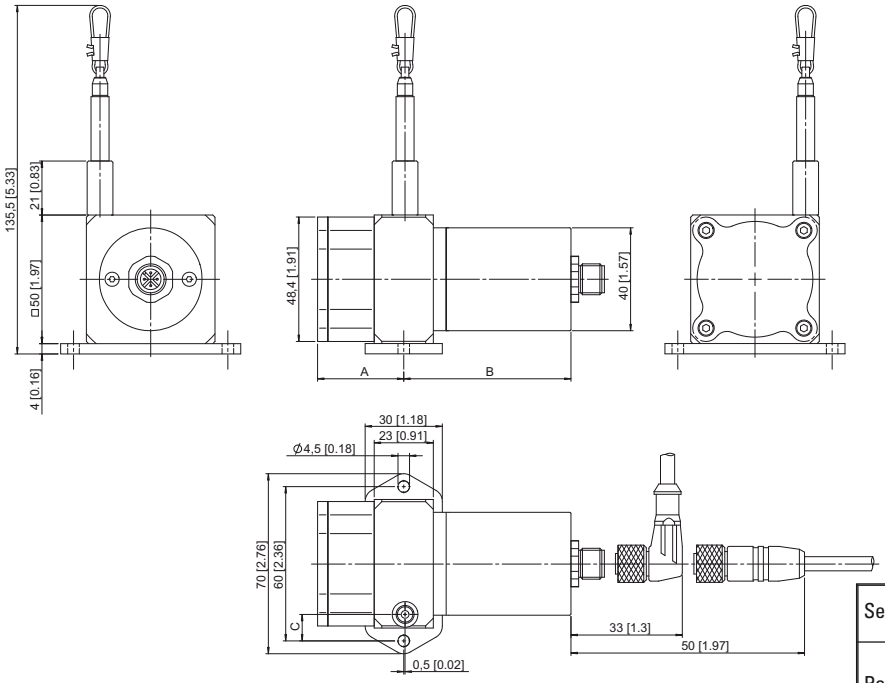
D8.6A1.0125.3642.1250

- Number of pulses
  - (e.g. 500 pulses => 0500)
- Type of connection:
  - 2 = Radial cable (2 m PVC cable)
- Output:
  - 4 = Push-pull with inverted signals, supply voltage 8 ... 30 V DC
- Encoder used
  - 36 = Encoder Type 3610
- Wire length
  - 0125 = 1250 mm

NEW

Draw wire encoder A50

Dimensions:
Draw wire mechanics with analogue sensor



Sensor type	Measuring length [mm]	A	B	C
Potentiometer	250	26.5	65	21.6
	500	26.5		21.6
	1250	33.5		10.3
0 ... 10 V 4 ... 20 mA	250	26.5	78.5	21.6
	500	26.5		21.6
	1250	33.5		10.3

Order code with analogue sensor:

D8.3A1.XXXX.XXXX.0000

Draw wire mechanics

Measuring range*
- 0025 = 250 mm
- 0050 = 500 mm
- 0125 = 1250 mm

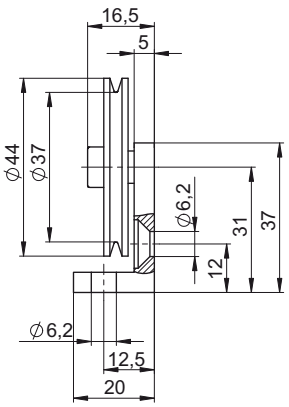
*other measuring ranges on request

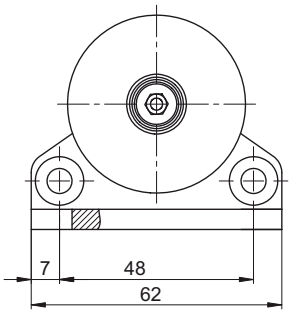
Type of connection:
- 1 = Axial cable, length 2 m
- 3 = 4-pole M12 connector

Analogue sensor output
- A11 = 4 ... 20 mA
  - Supply voltage 12 ... 30 V DC
- A22 = 0 ... 10 V
  - Supply voltage 12 ... 30 V DC
- A33 = Potentiometer 1 kOhm
  - Max. supply voltage 30 V DC

Accessories:
Guide pulley for draw-wire encoder

Order code for the set:
(Guide pulley, 2x countersunk screws for lateral fixing, 2x hexagonal screws for fixing on a flat surface)
8.0000.7000.0045





NEW

Linear Measuring Technology
Draw wire mechanics with encoder or analogue sensor

Kübler

Draw wire encoder B80

Wide temperature-range | Shock/vibration resistant | High IP protection rating | Reverse polarity protection

Robust

- **Insensitive to the environment**
  Titanium-anodised aluminium housing
- **High-resistance wire**
  Stainless steel wire
- **Wire exit free from wear**
  Diamond-polished ceramic guide
- **Can be used in a wide temperature range without extra charge**
  max. -20 ... +90 °C

RoHS

Dynamic

- **High traverse speed**
- **High acceleration**
  Dynamic spring traction by means of a constant force spring, long service life,approx. 2 million complete cycles

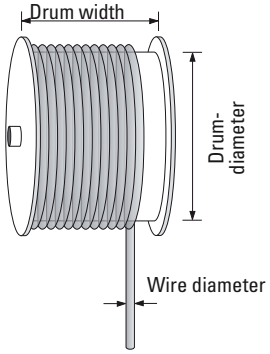
Versatile

- **Suitable for various sensors/encoders**
  – Absolute
  – Fieldbus
  – Incremental
  – Analogue
- **Quick mounting**
  Fastening by means of 2 screws
- **Flexible connection possibilities**
  Cable, connector, radial, axial
- **Linearity up to 0.05 %**

Mechanical characteristics (draw wire mechanics):

Measuring range:	1000 mm	2000 mm	3000 mm
Extension force Fmin:	5.4 N	5.4 N	5.4 N
Fmax:	6.6 N	7.8 N	9.1 N
Max. speed:	10 m/s	10 m/s	10 m/s
Max. acceleration:	140 m/s^2	140 m/s^2	140 m/s^2
Linearity:	analogue output: 0.1 % (of the measuring range)		
	encoder: 0.05 % (of the measuring range)		
Weight:	approx. 750 g (depending on the sensor/encoder used)		
Materials:	housing: titanium-anodised aluminium wire: stainless steel ø 0.5 mm		
Protection (sensor):	IP65 (IP67 on request for encoders)		
Lifetime	> 2 million full cycles		

Operating principle:



Construction:
The core of a draw wire device is a drum mounted on bearings, onto which a wire is wound. Winding takes place via a spring-loaded device.

Note
Exceeding the maximum extension length of the draw wire will lead to damage to the wire and the mechanics.

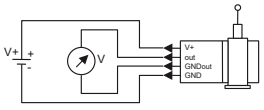
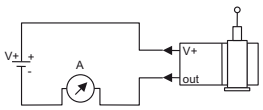
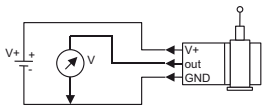
NEW

Draw wire encoder B80

Electrical characteristics (digital output):

The electrical characteristics of the draw wire mechanics with digital output can be found in the data sheets of the encoders.

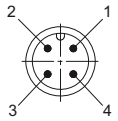
Electrical characteristics (analogue output):

Analogue output:	0 ... 10 V	4 ... 20 mA	Potentiometer
Output:	0 ... 10 V galvanically isolated, 4 conductors	4 ... 20 mA 2 conductors	1 kOhm
Supply voltage:	12 ... 30 V DC	12 ... 30 V DC	max. 30 V DC
Recommended slider current:	–	–	< 1 µA
Max. current consumption:	22.5 mA (no load)	50 mA	–
Reverse polarity protection:	yes	yes	–
Operating temperature:	-20 ... +60 °C	-20 ... +60 °C	-20 ... +85 °C
Connection diagrams:			
CE compliant according to:	EN 61000-6-2, EN 61000-6-4, EN 61000-6-3		

Terminal assignment (analogue output):

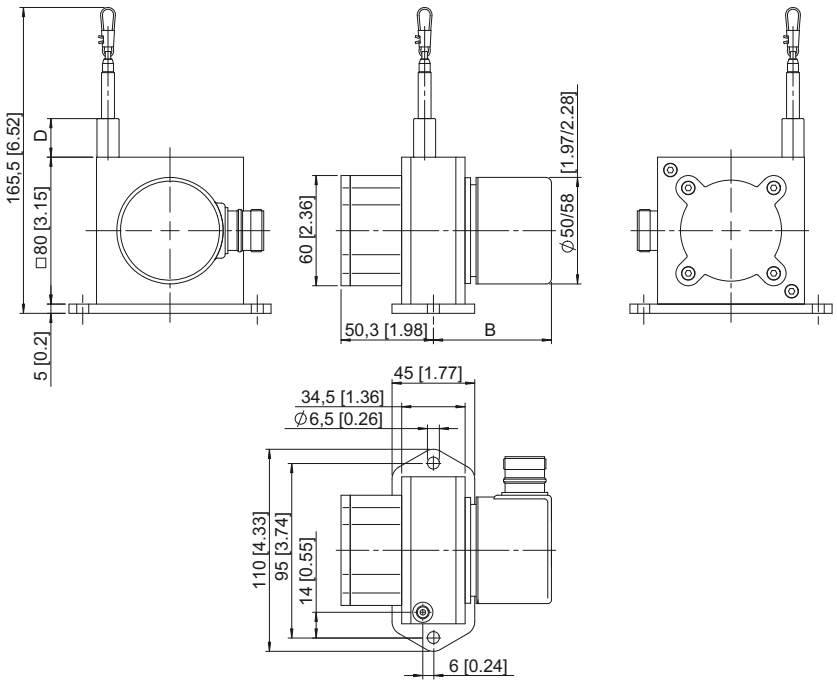
Pin	Cable colour	0 ... 10 V	4 ... 20 mA	1 kOhm
1	brown	V+	V+	V+
2	white	Signal	n. c.	Slider
3	blue	GND	Signal	GND
4	black	GND Sig.	n. c.	n. c.

Connector (analogue output):



Dimensions:

Draw wire mechanics with encoder



Measuring range [mm]	D
1000	21
2000	35
3000	35

Dimension **B** depends on the encoder used	
Encoder	B
Sendix incremental (5000) D8.4B1.XXXX.**00**XX.XXXX	54.25
Sendix absolut (5863) D8.4B1.XXXX.**63**XX.XXXX	66.75
Sendix absolut (5868) D8.4B1.XXXX.**68**XX.XXX	93.25

NEW

Linear Measuring Technology
Draw wire mechanics with encoder or analogue sensor

Kübler

Draw wire encoder B80

Order code with encoder: **D8.4B1.XXXX.XXXX.XXXX**

- Draw wire mechanics
- Measuring range*
  - 0100 = 1000 mm
  - 0200 = 2000 mm
  - 0300 = 3000 mm

*other measuring ranges on request

- Resolution/protocol/options
  depending on the encoder used
- Type of connection:*
  depending on the encoder used
- Output:*
  depending on the encoder used
- Encoder used*
  - 00 = Sendix incremental 5000
  - 63 = Sendix absolut 5863
  - 68 = Sendix absolut 5868

*You will find our recommended encoders below

Standard resolutions for draw wire with **incremental** encoder Sendix 5000, drum circumference 200 mm			
Pulses/revolution	200	2000	4000
Pulse/mm	1	10	20
Resolution [mm]	1	0.1	0.05

Standard resolutions for draw wire with **absolute** encoder Sendix 5863 or 5868, drum circumference 200 mm		
Absolute encoder	5863	5868
Pulse/revolution	2048/11 bits	4096, programmable via the bus/ 12 bits
Pulse/mm	10.24	20.48
Resolution [mm]	~0.1	~0.05

Recommended standard device
with **incremental** encoder
Sendix 5000:

D8.4B1.XXXX.0053.2000

The standard device is supplied mounted. The mounted encoder is the Sendix incremental 5000 encoder, Connector axial 8 pin M12, Push-pull with inverted signals, supply voltage 10 ... 30 V DC (8.5000.8353.2000)

Recommended standard device
with **absolute** encoder
Sendix 5863 or 5868:

D8.4B1.XXXX.6324.G123

Sendix absolut 58**63** encoder with **SSI interface** (Gray code), 2048 pulses/rev., Set key, 10 ... 30 V DC, radial 12 pole M23 connector (8.5863.1224.G123)

D8.4B1.XXXX.6822.2113

Sendix absolut 58**68** encoder with **CANopen interface**, 4096 pulses/rev. programmable via the bus, Set key, 10 ... 30 V DC, M12 connector (8.5868.1222.2113)

D8.4B1.XXXX.6832.3113

Sendix absolut 58**68** encoder with **Profibus connection**, 4096 pulses/rev. programmable via the bus, Set key, 10 ... 30 V DC, M12 connector (8.5868.1232.3113)

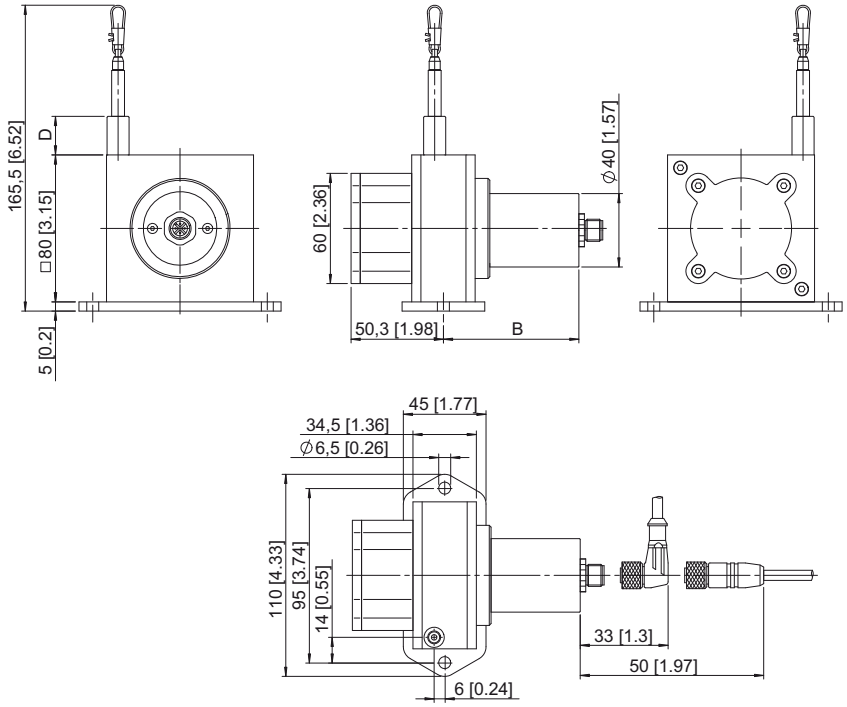
- Measuring range
  - 0100 = 1000 mm
  - 0200 = 2000 mm
  - 0300 = 3000 mm

*other measuring ranges on request

NEW

Draw wire encoder B80

Dimensions:
Draw wire mechanics with analogue sensor



Sensor type	Measuring length [mm]	B	D
Potentiometer	1000	74	21
	2000		
	3000	102.25	35
0 ... 10 V 4 ... 20 mA	1000	87.5	21
	2000		
	3000	102.25	35

Order code with analogue sensor:

D8.3B1.XXXX.XXXX.0000

Draw wire mechanics

Measuring range*
- 0100 = 1000 mm
- 0200 = 2000 mm
- 0300 = 3000 mm

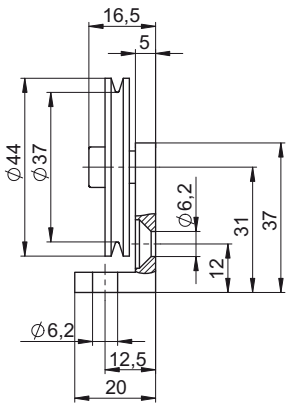
*other measuring ranges on request

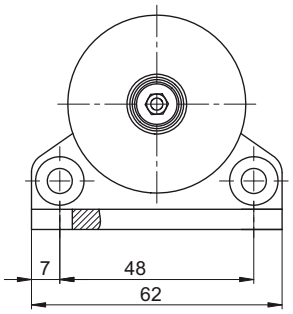
Type of connection:
- 1 = Axial cable, length 2m
- 3 = 4-pole M12 connector

Analogue sensor output
- A11 = 4 ... 20 mA
  Supply voltage 12 ... 30 V DC
- A22 = 0 ... 10 V
  Supply voltage 12 ... 30 V DC
- A33 = Potentiometer 1 kOhm
  Max. supply voltage 30 V DC

Accessories:
Guide pulley for draw-wire encoder

Order code for the set:
(Guide pulley, 2x countersunk screws for lateral fixing, 2x hexagonal screws for fixing on a flat surface)
8.0000.7000.0045





NEW

Linear Measuring Technology
Draw wire mechanics with encoder or analogue sensor

Kübler

Draw wire encoder C120


Wide temperature-range


Shock/vibration resistant

High IP protection rating


Reverse polarity protection

Robust

- **Insensitive to the environment**
  Titanium-anodised aluminium housing
- **High-resistance wire**
  Stainless steel wire
- **Wire exit free from wear**
  Diamond-polished ceramic guide
- **Can be used in a wide temperature range without extra charge**
  max. -20 .... +90 °C

Dynamic

- **High traverse speed**
- **High acceleration**
  Dynamic spring traction by means of a constant force spring, long service life,approx. 2 million complete cycles

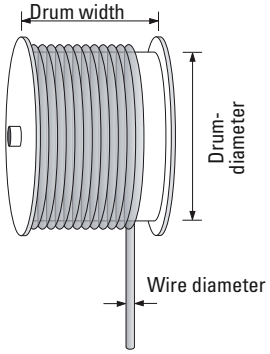
Versatile

- **Suitable for various sensors/encoders**
  – Absolute
  – Fieldbus
  – Incremental
  – Analogue
- **Quick mounting**
  Fastening by means of 2 screws
- **Flexible connection possibilities**
  Cable, connector, radial, axial
- **Linearity up to 0.05 %**

Mechanical characteristics (draw wire mechanics):

Measuring range:	**6000 mm**
Extension force Fmin:	5.4 N
Fmax:	7.8 N
Max. speed:	10 m/s
Max. acceleration:	140 m/s^2
Linearity:	analogue output: 0.1 % (of the measuring range)
	encoder: 0.05 % (of the measuring range)
Weight:	approx. 1600 g (depending on the sensor/encoder used)
Materials:	housing: titanium-anodised aluminium wire: stainless steel ø 0.5 mm
Protection (sensor):	IP65 (IP67 on request for encoders)
Lifetime	> 2 million full cycles

Operating principle:



Construction:
The core of a draw wire device is a drum mounted on bearings, onto which a wire is wound. Winding takes place via a spring-loaded device.

Note
Exceeding the maximum extension length of the draw wire will lead to damage to the wire and the mechanics.

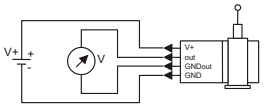
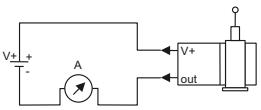
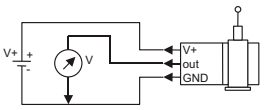
NEW

Draw wire encoder C120

Electrical characteristics (digital output):

The electrical characteristics of the draw wire mechanics with digital output can be found in the data sheets of the encoders.

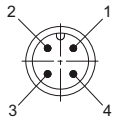
Electrical characteristics (analogue output):

Analogue output:	0 ... 10 V	4 ... 20 mA	Potentiometer
Output:	0 ... 10 V galvanically isolated, 4 conductors	4 ... 20 mA 2 conductors	1 kOhm
Supply voltage:	12 ... 30 V DC	12 ... 30 V DC	max. 30 V DC
Recommended slider current:	–	–	< 1 µA
Max. current consumption:	22.5 mA (no load)	50 mA	–
Reverse polarity protection:	yes	yes	–
Operating temperature:	-20 ... +60 °C	-20 ... +60 °C	-20 ... +85 °C
Connection diagrams:			
CE compliant according to:	EN 61000-6-2, EN 61000-6-4, EN 61000-6-3		

Terminal assignment (analogue output):

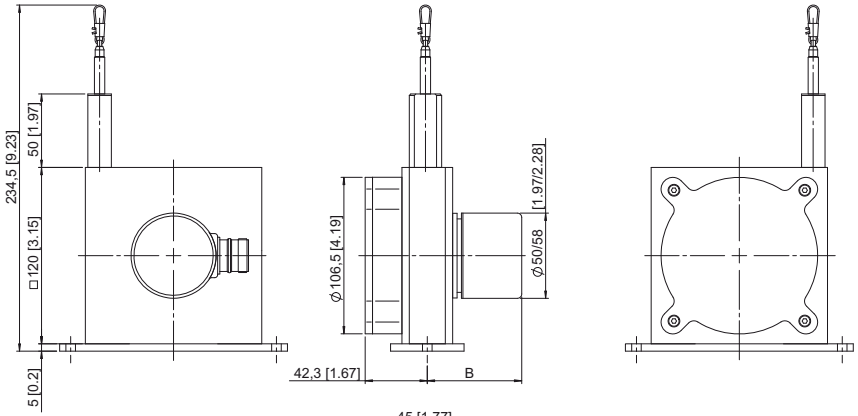
Pin	Cable colour	0 ... 10 V	4 ... 20 mA	1 kOhm
1	brown	V+	V+	V+
2	white	Signal	n. c.	Slider
3	blue	GND	Signal	GND
4	black	GND Sig.	n. c.	n. c.

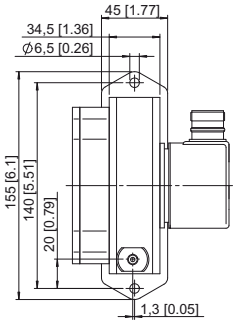
Connector (analogue output):



Dimensions:

Draw wire mechanics with encoder





Dimension **B** depends on the encoder used	
Encoder	B
Sendix incremental (5000) D8.4C1.XXXX.**00**XX.XXXX	54.25
Sendix absolut (5863) D8.4C1.XXXX.**63**XX.XXXX	66.75
Sendix absolut (5868) D8.4C1.XXXX.**68**XX.XXX	93.25

NEW

Linear Measuring Technology
Draw wire mechanics with encoder or analogue sensor

Draw wire encoder C120

Order code with encoder: **D8.4C1.XXXX.XXXX.XXXX**

- Draw wire mechanics
- Measuring range*
  0600 = 6000 mm
  *other measuring ranges on request
- Resolution/protocol/options
  depending on the encoder used
- Type of connection:*
  depending on the encoder used
- Output:*
  depending on the encoder used
- Encoder used*
  00 = Sendix incremental 5000
  63 = Sendix absolut 5863
  68 = Sendix absolut 5868

*You will find our recommended encoders below

Standard resolutions for draw wire with **incremental** encoder Sendix 5000, drum circumference 317.68 mm		
Pulses/revolution	500	2000
Pulses/mm	1.6	6.3
Resolution [mm]	~0.63	~0.16

Standard resolutions for draw wire with **absolute** encoder Sendix 5863 or 5868, drum circumference 317.68 mm		
Absolute encoder	5863	5868
Pulses/revolution	2048/ 11 bits	4096, programmable via the bus/ 12 bits
Pulses/mm	6.4	12.9
Resolution [mm]	~0.16	~0.08

Recommended standard device with **incremental** encoder Sendix 5000:

D8.4C1.XXXX.0053.2000 — The standard device is supplied mounted. The mounted encoder is the Sendix incremental 5000 encoder, Connector axial 8 pin M12, Push-pull with inverted signals, supply voltage 10 ... 30 V DC (8.5000.8353.2000)

Recommended standard device with **absolute** encoder Sendix 5863 or 5868:

D8.4C1.XXXX.6324.G123 — Sendix absolut 58**63** encoder with **SSI interface** (Gray code), 2048 pulses/rev., Set key, 10 ... 30 V DC, radial 12 pole M23 connector (8.5863.1224.G123)

D8.4C1.XXXX.6822.2113 — Sendix absolut 58**68** encoder with **CANopen interface**, 4096 pulses/rev. programmable via the bus, Set key, 10 ... 30 V DC, M12 connector (8.5868.1222.2113)

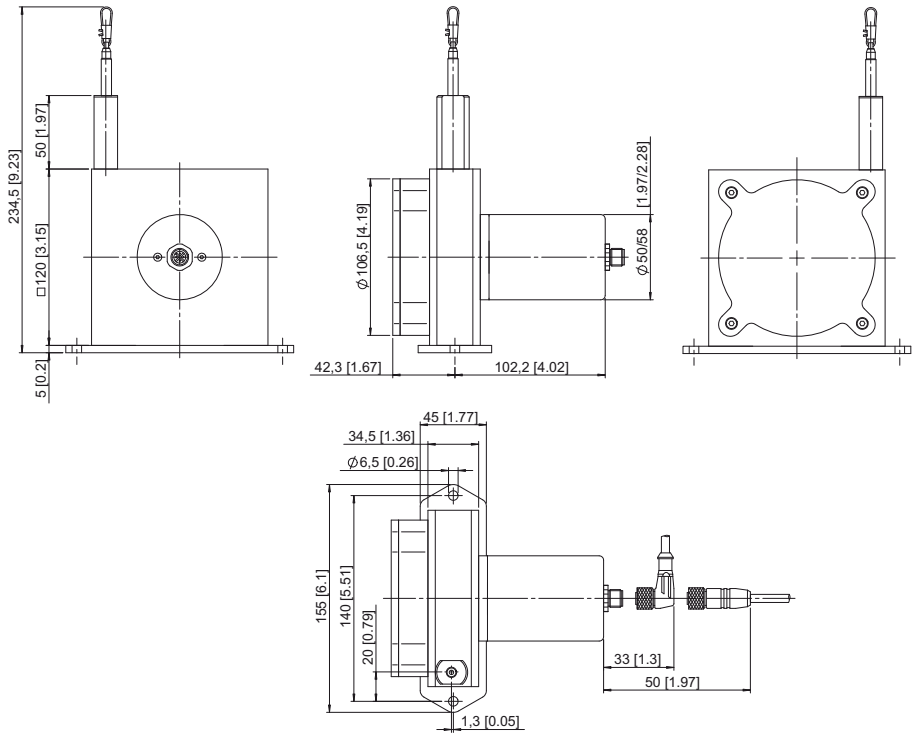
D8.4C1.XXXX.6832.3113 — Sendix absolut 58**68** encoder with **Profibus connection**, 4096 pulses/rev. programmable via the bus, Set key, 10 ... 30 V DC, M12 connector (8.5868.1232.3113)

- Measuring range
  0600 = 6000 mm
  *other measuring ranges on request

NEW

Draw wire encoder C120

Dimensions:
Draw wire mechanics with analogue sensor



Order code with analogue sensor:

D8.3C1.XXXX.XXXX.0000

Draw wire mechanics

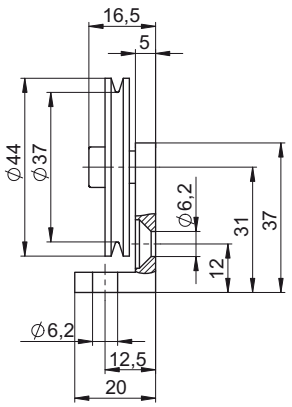
Measuring range*
0600 = 6000 mm
*other measuring ranges on request

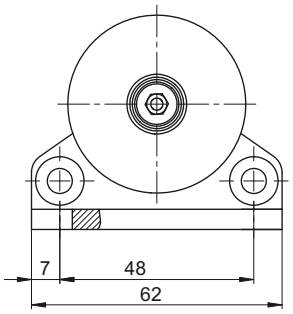
Type of connection:
1 = Axial cable, length 2m
3 = 4-pole M12 connector

Analogue sensor output
A11 = 4 ... 20 mA
Supply voltage 12 ... 30 V DC
A22 = 0 ... 10 V
Supply voltage 12 ... 30 V DC
A33 = Potentiometer 1 kOhm
Max. supply voltage 30 V DC

Accessories:
Guide pulley for draw-wire encoder

Order code for the set:
(Guide pulley, 2x countersunk screws for lateral fixing, 2x hexagonal screws for fixing on a flat surface)
8.0000.7000.0045





NEW

Linear Measuring Technology
Draw wire mechanics with encoder or analogue sensor

Kübler

Draw wire encoder D135


Wide temperature-range


Shock/vibration resistant

High IP protection rating


Reverse polarity protection

Robust

- **Insensitive to the environment**
  Titanium-anodised aluminium housing
- **High-resistance wire**
  Stainless steel wire
- **Wire exit free from wear**
  Diamond-polished ceramic guide
- **Can be used in a wide temperature range without extra charge**
  max. -20 .... +90 °C

Dynamic

- **High traverse speed**
- **High acceleration**
  Dynamic spring traction by means of a constant force spring, long service life,approx. 2 million complete cycles

Versatile

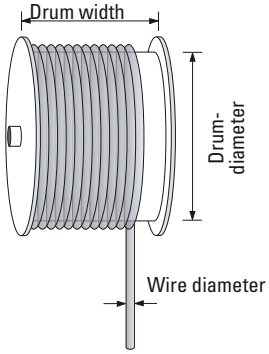
- **Suitable for various sensors/encoders**
  – Absolute
  – Fieldbus
  – Incremental
  – Analogue
- **Flexible Mounting**
  Various fastening possibilities are available
- **Flexible connection possibilities**
  Cable, connector, radial, axial
- **Linearity up to 0.05 %**

Mechanical characteristics (draw wire mechanics):

Measuring range:	8000 mm	10000/15000 mm	20000 mm	25000/30000 mm	35000/40000 mm
Extension force Fmin:	7.2 N	8.7 N	7.0N	7.3 N	7.0 N
Fmax:	16.0 N	16.9 N	12.4 N	15.7 N	14.1 N
Max. speed:	10 m/s	6m/s	5m/s	5 m/s	5 m/s
Max. acceleration:	140 m/s^2	80 m/s^2	60 m/s^2	60 m/s^2	60 m/s^2

Linearity:	analogue output: 0.1 % (of the measuring range) encoder: 0.05 % (of the measuring range)
Weight:	depending on the measuring range and on the sensor/encoder used
Materials:	housing: titanium-anodised aluminium wire: stainless steel ø 0.5 mm
Protection (sensor):	IP65 (IP67 on request for encoders)
Lifetime	> 2 million full cycles

Operating principle::



Construction:
The core of a draw wire device is a drum mounted on bearings, onto which a wire is wound. Winding takes place via a spring-loaded device.

Note
Exceeding the maximum extension length of the draw wire will lead to damage to the wire and the mechanics.

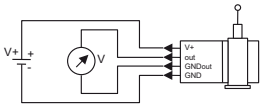
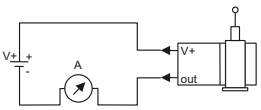
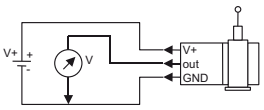
NEW

Draw wire encoder D135

Electrical characteristics (digital output):

The electrical characteristics of the draw wire mechanics with digital output can be found in the data sheets of the encoders.

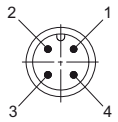
Electrical characteristics (analogue output):

Analogue output:	0 ... 10 V	4 ... 20 mA	Potentiometer
Output:	0 ... 10 V galvanically isolated, 4 conductors	4 ... 20 mA 2 conductors	1 kOhm
Supply voltage:	12 ... 30 V DC	12 ... 30 V DC	max. 30 V DC
Recommended slider current:	–	–	< 1 µA
Max. current consumption:	22.5 mA (no load)	50 mA	–
Reverse polarity protection:	yes	yes	–
Operating temperature:	-20 ... +60 °C	-20 ... +60 °C	-20 ... +85 °C
Connection diagrams:			
CE compliant according to:	EN 61000-6-2, EN 61000-6-4, EN 61000-6-3		

Terminal assignment (analogue output):

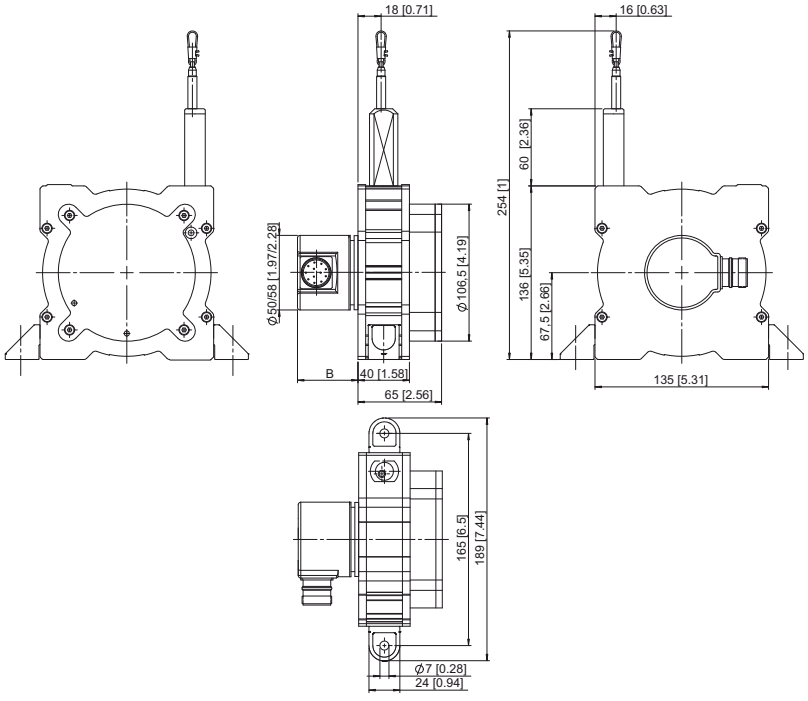
Pin	Cable colour	0 ... 10 V	4 ... 20 mA	1 kOhm
1	brown	V+	V+	V+
2	white	Signal	n. c.	Slider
3	blue	GND	Signal	GND
4	black	GND Sig.	n. c.	n. c.

Connector (analogue output)):



Dimensions:

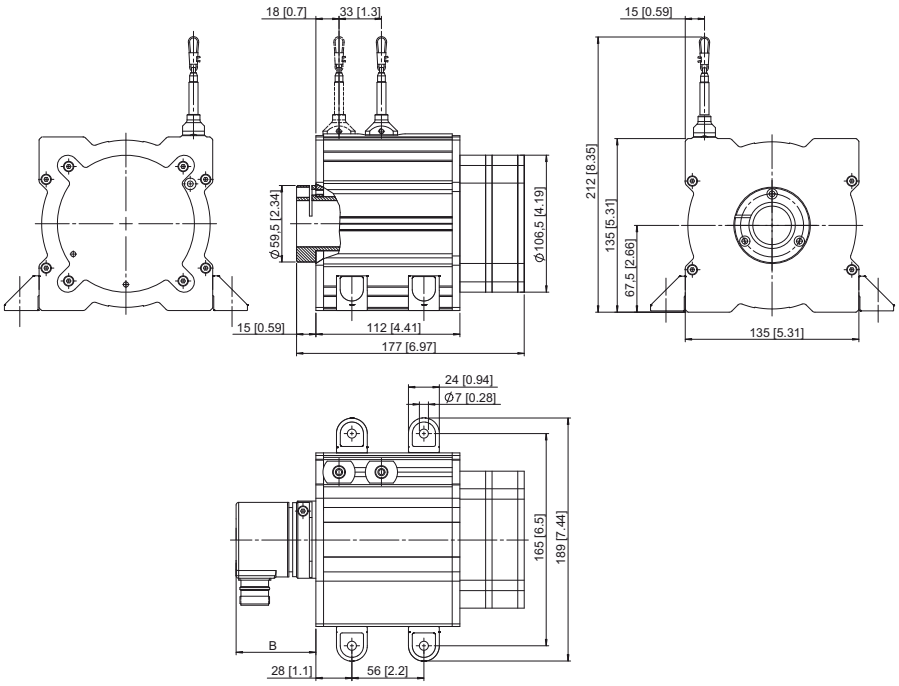
Draw wire mechanics with encoder, **measuring range 8000 mm**



Dimension **B** depends on the encoder used	
Encoder	B
Sendix incremental (5000) D8.4D1.XXXX.**00**XX.XXXX	37.00
Sendix absolut (5863) D8.4D1.XXXX.**63**XX.XXXX	49.50
Sendix absolut (5868) D8.4D1.XXXX.**68**XX.XXX	76.00

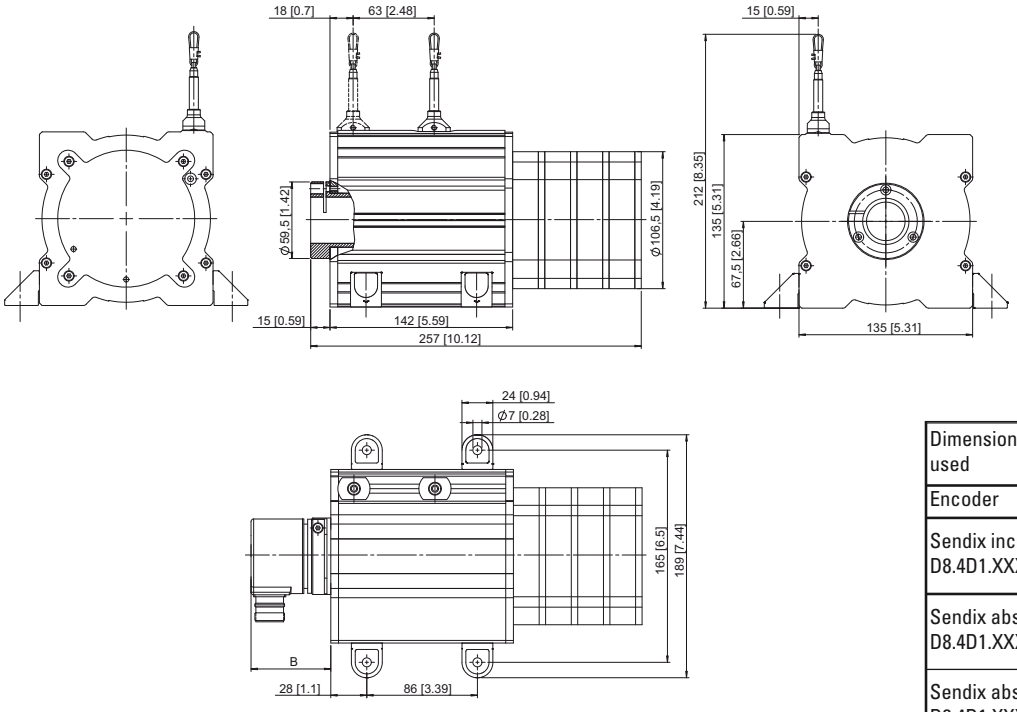
Draw wire encoder D135

Dimensions:
Draw wire mechanics with encoder, **measuring range 10000 mm ... 20000 mm**



Dimension **B** depends on the encoder used	
Encoder	B
Sendix incremental (5000) D8.4D1.XXXX.**00**XX.XXXX	37.00
Sendix absolut (5863) D8.4D1.XXXX.**63**XX.XXXX	49.50
Sendix absolut (5868) D8.4D1.XXXX.**68**XX.XXX	76.00

Dimensions:
Draw wire mechanics with encoder, **measuring range 25000 mm ... 40000 mm**



Dimension **B** depends on the encoder used	
Encoder	B
Sendix incremental (5000) D8.4D1.XXXX.**00**XX.XXXX	37.00
Sendix absolut (5863) D8.4D1.XXXX.**63**XX.XXXX	49.50
Sendix absolut (5868) D8.4D1.XXXX.**68**XX.XXX	76.00

NEW

Draw wire encoder D135

Order code with encoder: D8.4D1.XXXX.XXXX.XXXX

Draw wire mechanics

Measuring range*
- 0800 = 8 000 mm
- 1000 = 10 000 mm
- 1500 = 15 000 mm
- 2000 = 20 000 mm
- 2500 = 25 000 mm
- 3000 = 30 000 mm
- 3500 = 35 000 mm
- 4000 = 40 000 mm

*other measuring ranges on request

Resolution/protocol/options
depending on the encoder used

Type of connection:*
depending on the encoder used

Output:*
depending on the encoder used

Encoder used*
- 00 = Sendix incremental 5000
- 63 = Sendix absolut 5863
- 68 = Sendix absolut 5868

*You will find our recommended encoders below

Standard resolutions for draw wire with **incremental** encoder Sendix 5000, drum circumference 333.33 mm (357.14 mm for the 8 000 mm measuring range)		
Pulses/revolution	500	2000
Pulses/mm	1.5 (1.4)	6 (5.6)
Resolution [mm]	0.66 (0.71)	0.17 (0.18)

Standard resolutions for draw wire with **absolute** encoder Sendix 5863 or 5868, drum circumference 333.33 mm (357.14 mm for the 8 000 mm measuring range)		
Absolute encoder	5863	5868
Pulses/revolution	2048/ 11 bits	4096, programmable via the bus/ 12 bits
Pulses/mm	6.14 (5.73)	12.28 (11.47)
Resolution [mm]	~0.16 (0.17)	~0.08 (0.09)

Recommended standard device with **incremental** encoder Sendix 5000:

D8.4D1.XXXX.0053.2000 The standard device is supplied mounted. The mounted encoder is the Sendix incremental 5000 encoder, Connector axial 8 pin M12, Push-pull with inverted signals, supply voltage 10 ... 30 V DC (8.5000.8353.2000)

Recommended standard device with **absolute** encoder Sendix 5863 or 5868:

D8.4D1.XXXX.6324.G123 Sendix absolut 5863 encoder with **SSI interface** (Gray code), 2048 pulses/rev., Set key, 10 ... 30 V DC, radial 12 pole M23 connector (8.5863.1224.G123)

D8.4D1.XXXX.6822.2113 Sendix absolut 5868 encoder with **CANopen interface**, 4096 pulses/rev. programmable via the bus, Set key, 10 ... 30 V DC, M12 connector (8.5868.1222.2113)

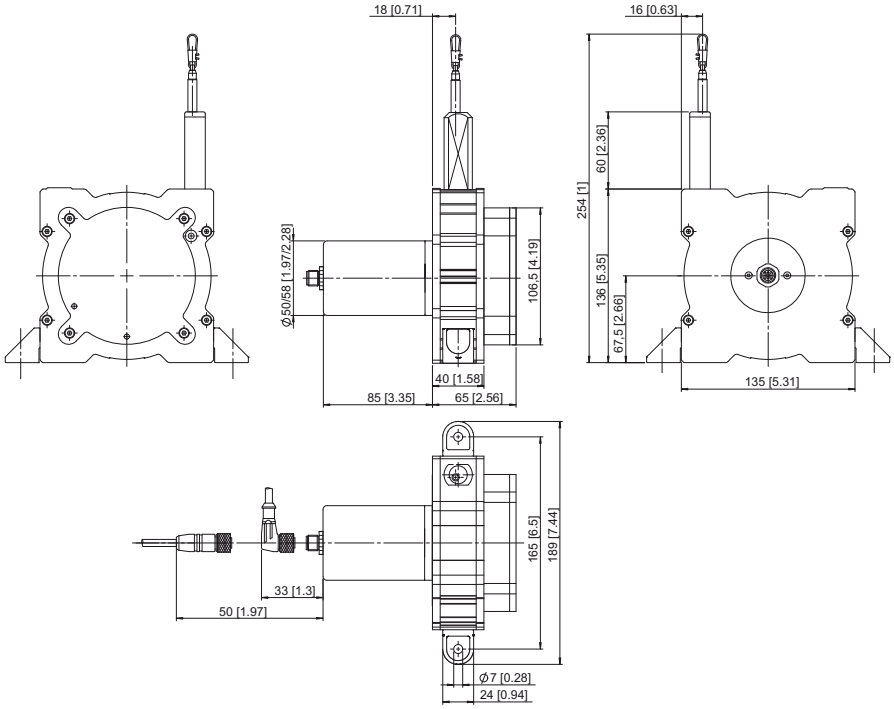
D8.4D1.XXXX.6832.3113 Sendix absolut 5868 encoder with **Profibus connection**, 4096 pulses/rev. programmable via the bus, Set key, 10 ... 30 V DC, M12 connector (8.5868.1232.3113)

Measuring range*
- 0800 = 8 000 mm
- 1000 = 10 000 mm
- 1500 = 15 000 mm
- 2000 = 20 000 mm
- 2500 = 25 000 mm
- 3000 = 30 000 mm
- 3500 = 35 000 mm
- 4000 = 40 000 mm

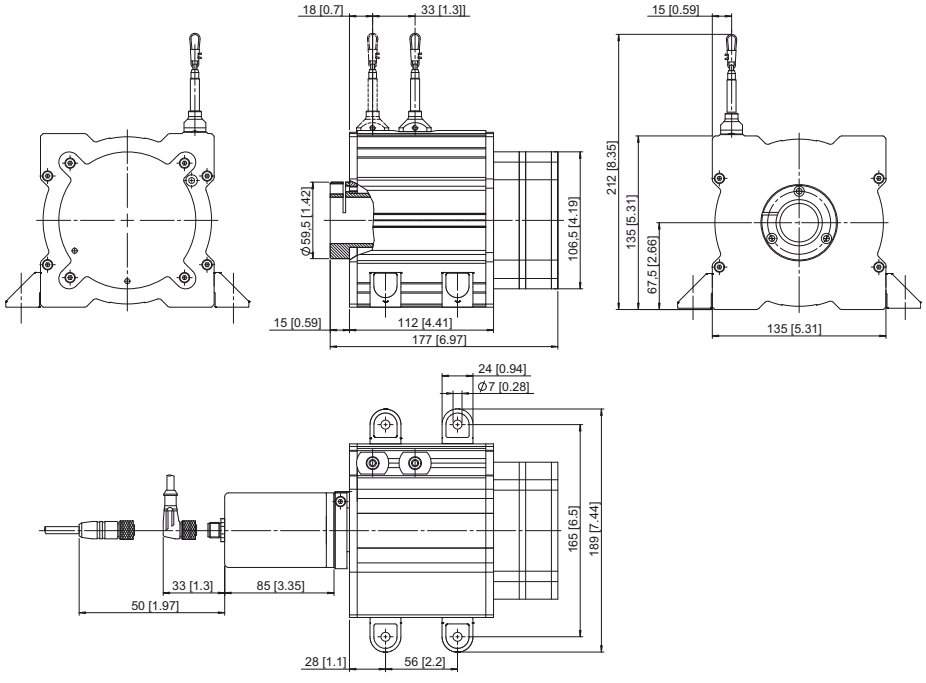
*other measuring ranges on request

Draw wire encoder D135

Dimensions:
Draw wire mechanics with analogue sensor, **measuring range 8000 mm**



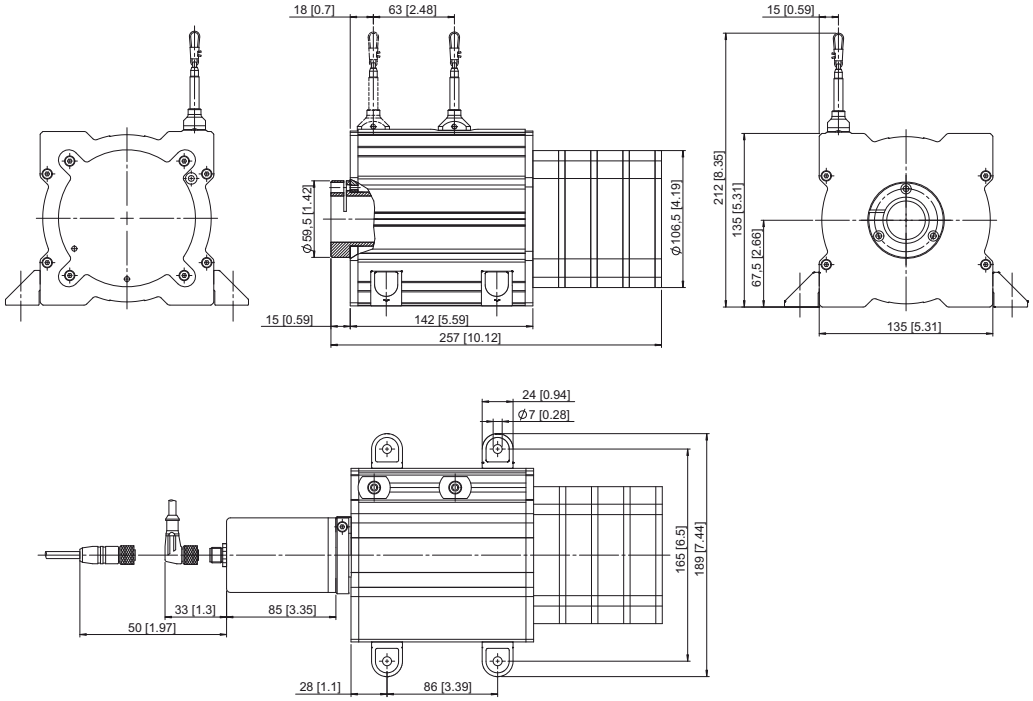
Dimensions:
Draw wire mechanics with analogue sensor, **measuring range 10000 ... 20000 mm**



NEW

Draw wire encoder D135

Dimensions:
Draw wire mechanics with analogue sensor, **measuring range 25000 ... 40000 mm**



Order code with analogue sensor: **D8.3D1.XXXX.XXXX.0000**

Draw wire mechanics

Measirung range*
- 0800 = 8 000 mm
- 1000 = 10 000 mm
- 1500 = 15 000 mm
- 2000 = 20 000 mm
- 3000 = 30 000 mm
- 3500 = 35 000 mm
- 4000 = 40 000 mm

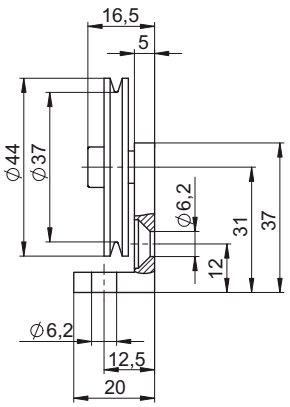
*other measuring ranges on request

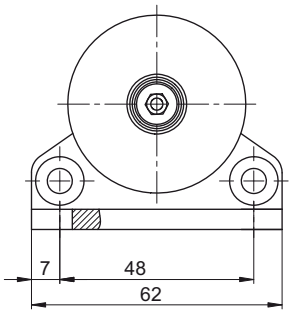
Type of connection:
- 1 = Axial cable, length 2 m
- 3 = 4-pole M12 connector

Analogue sensor output
- A11 = 4 ... 20 mA
  Supply voltage 12 ... 30 V DC
- A22 = 0 ... 10 V
  Supply voltage 12 ... 30 V DC
- A33 = Potentiometer 1 kOhm
  Max. supply voltage 30 V DC

Accessories:
Guide pulley for draw-wire encoder

Order code for the set:
(Guide pulley, 2x countersunk screws for lateral fixing, 2x hexagonal screws for fixing on a flat surface)
8.0000.7000.0045





Mini draw wire encoder, analogue output

- Compact
- Measuring length up to 2000 mm
- Robust construction
- Simple processing of analogue signal by means of a digital panel meter
- Voltage or current output

Mechanical characteristics of the draw-wire encoder:

Measuring range:	up to 2000 mm	
Absolute accuracy:	±0.35 % for the whole measuring range	
Repetition accuracy:	±0.15 mm per direction of travel	
Resolution:	analogue output signal	
	1 m ⇒ 0 ... 10 V DC	2 m ⇒ 0 ... 10 V DC
	1 m ⇒ 4 ... 20 mA	2 m ⇒ 4 ... 20 mA
	1 m ⇒ 0 ... 10 kΩ	2 m ⇒ 0 ... 10 kΩ
Traversing speed:	max. 800 mm/s	
Required force:	approx. 10 N (on wire)	
Material:	Housing: reinforced plastic	
	Wire: stainless steel ø 0.45 mm,	
	plastic coated	
Weight:	approx. 0.210 kg	

Electrical characteristics:

Analogue output:	0 ... 10 V	4 ... 20 mA	Potentiometer 10 kΩ
Supply voltage:	15 ... 28 V DC	15 ... 28 V DC	–
Temperature range:	0 ... 50 °C	0 ... 50 °C	0 ... 50 °C
Load:	max 500 Ω	max 500 Ω	–
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3			

Cable colour output 0 .. 10 V

Signal :	+ 24 V	GND	Uout
Colour:	BN	WH	GN

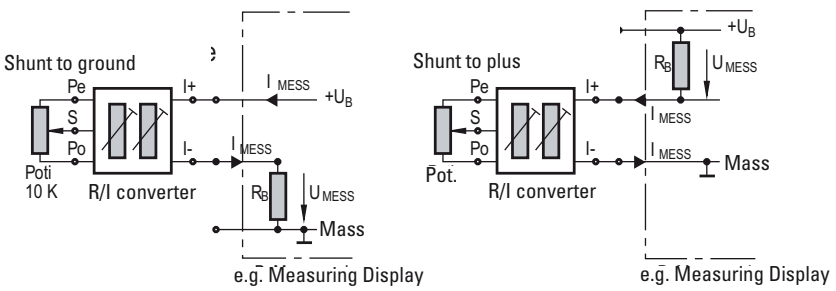
Cable colour output: 4 ... 20 mA

Signal :	+I	-I
Colour:	BN	WH

Cable colour output: Potentiometer

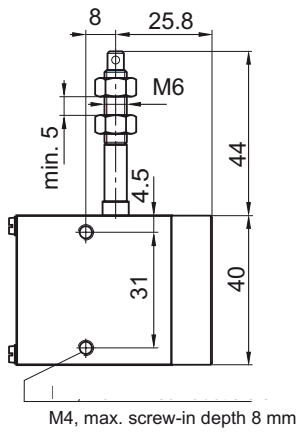
Sign	Po	Pe	S
Colour:	BN	WH	GN
	start	end	Wiper contact

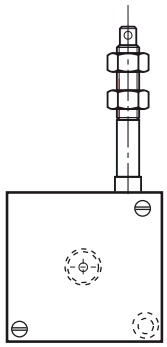
Electrical connections (4 ... 20 mA):



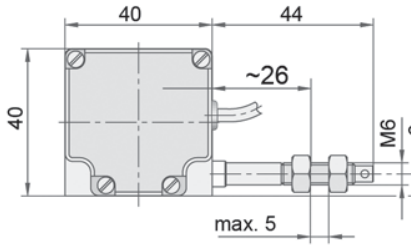
Mini draw wire encoder, analogue output

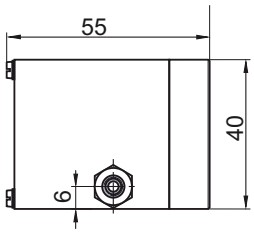
Dimensions:
length = 1 m

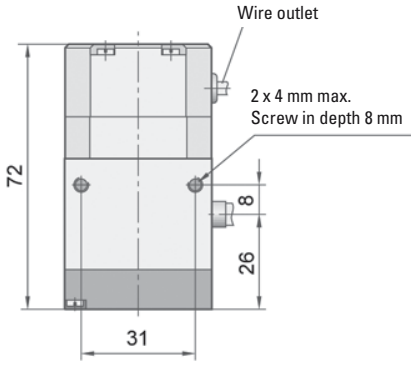




Dimensions:
length = 2 m







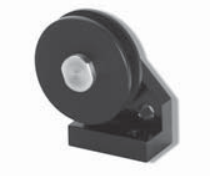
Order code:

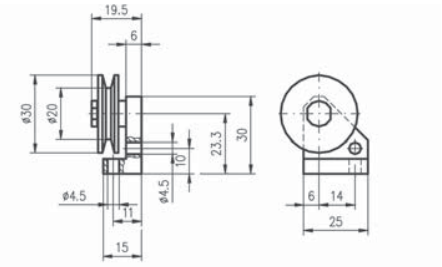
D5.350X.AXX1

Mini draw wire	
Wire type/length	
3501 = 1 m steel wire	
3502 = 2 m steel wire	
Supply voltage, Output	
11 =	Analogue output 4 ... 20 mA Supply voltage 15 ... 28 V DC
22 =	Analogue output 0 ... 10 V DC Supply voltage 15 ... 28 V DC
33 =	Potentiometer output 10 kΩ

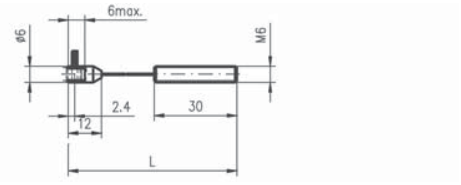
Stock types
D5.3501.A111.0000
D5.3501.A221.0000
D5.3501.A331.0000

Accessories





- Guide pulley for draw-wire encoder
  Order code 8.0000.7000.0031



Extension cable, steel wire 2 m:	Order code	8.0000.7000.0033
Extension cable, steel wire 5 m:	Order code	8.0000.7000.0034
Extension cable, steel wire 10 m:	Order code	8.0000.7000.0035
Extension cable, para wire 2 m:	Order code	8.0000.7000.0032

Mini draw wire encoder, incremental

Introduction

Measuring length and position is one of the routine tasks in the manufacture of machinery and plant. Draw wire encoders offer proven cost-effective solutions in such applications. Linear motion is converted to rotary motion using a wire that is drawn out or in from the draw wire mechanism. This rotation is converted into corresponding electrical signals by an encoder or potentiometer connected to the mechanism.

The electrical signals can then be processed by remote displays, counters or controllers. Kübler also provides an extensive range of displays, counters and controllers.

- Compact
- Measuring length up to 2000 mm
- Robust construction

Mechanical characteristics of the draw-wire encoders:

Measuring range:	up to 2000 mm
Absolute accuracy:	±0.1 % for the whole measuring range
Repetition accuracy	±0.15 mm per direction of travel
Resolution (incremental):	0.1 mm (standard encoder) with 1000 ppr.
Traversing speed:	max. 800 mm/s
Required force:	approx. 10 N (on wire)
Material:	Housing: reinforced plastic Wire: stainless steel ø 0.45 mm, plastic coated
Weight:	approx. 0.210 kg

Description of the incremental encoder (connected on load side)

- Compensation for temperature and ageing
- Short-circuit protected outputs
- Reverse polarity protected power-supply input
- Push-pull output

Mechanical characteristics:

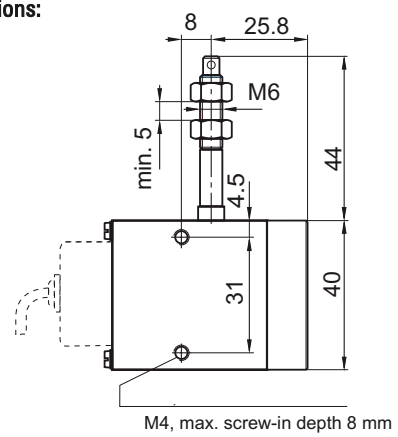
Protection acc. to EN 60529:	IP 64 from housing side
Working temperature:	–20° C ... +85 °C
Operating temperature:	–20° C ... +90 °C
Shock resistance acc. to DIN-IEC 68-2-27:	1000 m/s^2, 6 ms
Vibration resistance acc. to DIN-IEC 68-2-27:	100 m/s^2, 55 ... 2000 Hz

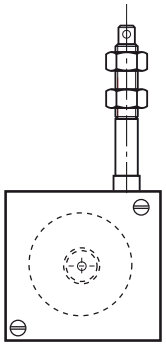
Electrical characteristics:

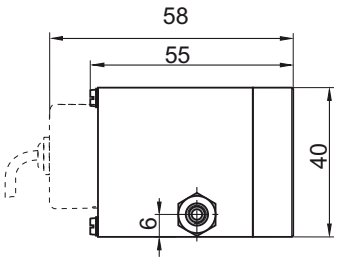
Output circuits:	Push-pull	Push-pull
Supply voltage:	5 ... 24 V DC	8 ... 30 V DC
Current consumption (without load):	max. 50 mA	max. 50 mA
Permitted load per channel:	max. 50 mA	max. 50 mA
Pulse rate:	max. 160 kHz	max. 160 kHz
Switching level high:	min. U_B – 2.5 V	min. U_B – 3 V
Switching level low:	max. 0.5 V	max. 2.5 V
Rise time t_r:	max. 1 µs	max. 1 µs
Fall time t_f:	max. 1 µs	max. 1 µs
Short-circuit protected outputs:	yes	yes
Conforms to CE requirements acc. to EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3		

Mini draw wire encoder incremental

Dimensions:







Terminal assignment of the encoder:

Signal:	0V	$+U_B$	A	$\overline{A}$
Cable colour:	WH	BN	GN	YE

Signal:	B	$\overline{B}$	0	$\overline{0}$
Cable colour:	GY	PK	BU	RD

Isolate unused outputs before start-up.

Order code:

D5.2XXX.24XX.1000

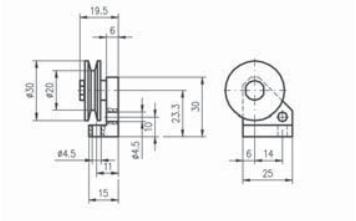
Mini draw wire

Wire type/length
- 501 = 1 m steel wire
- 102 = 2 m steel wire

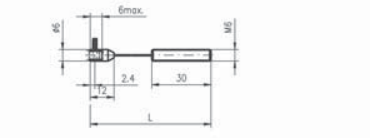
Supply voltage, Output
- 21 = 5 ... 24 V DC, Push-Pull with inverted signal
- 41 = 8 ... 30 V DC Push-Pull with inverted signal

Stock types
- D5.2102.2421.1000
- D5.2102.2441.1000
- D5.2501.2421.1000
- D5.2501.2441.1000

Accessories



- Guide pulley for draw-wire encoder
  Order code 8.0000.7000.0031



Extension cable, steel wire 2 m:	Order code	8.0000.7000.0033
Extension cable, steel wire 5 m:	Order code	8.0000.7000.0034
Extension cable, steel wire 10 m:	Order code	8.0000.7000.0035
Extension cable, para wire 2 m:	Order code	8.0000.7000.0032

Draw wire encoder

with shaft encoder type 58xx

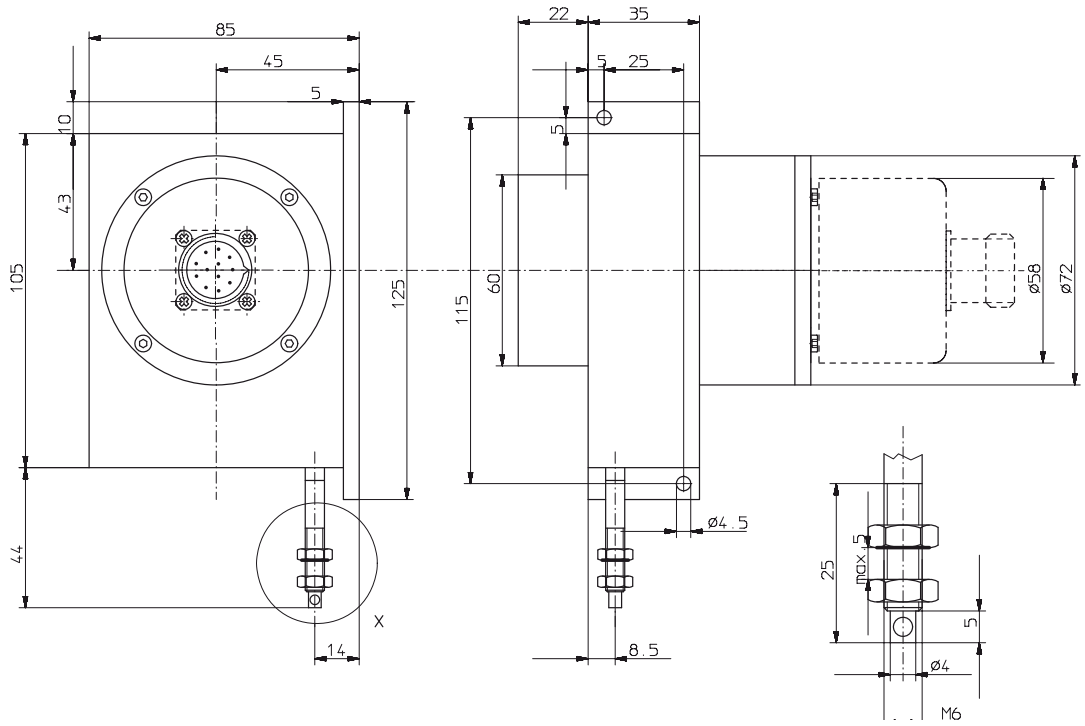
Your benefit:
- direct length measurement
- long measuring lengths up to 40 m
- high repeatability
- easy assembly
- no additional guidance system
- wire guidance possible using guide pulleys
- Distance and angle measurement are standard tasks in machine-building and engineering industries. Kübler wire-actuated transducers are an economical and easy to handle solution. Wire-actuated transducers transform linear movements into rotary motion by winding/unwinding a wire. The rotary motion is transmitted to an incremental or absolute encoder. Remote display units or controls can be used to display/process the measured values. Please ask about the Kübler range of displays and counters!

Mechanical characteristics of the wire-draw encoder:

Measuring range:	up to 6000 mm
Repeatability:	~ 0.05 mm
(if position is always approached from same direction)	
Resolution:	0.1 mm (standard encoder) with 2000 ppr.
Extension length 200 mm:	~ 1 encoder revolution
Travel speed:	max. 3000 mm/s
Required pull on spring:	min. 5 N (on wire)
Wire diameter:	para wire 2,6 m: 1.05 mm
	steel wire 6 m: 0.54mm
Weight:	approx. 1.050 kg

Note!
If the maximum extension length is exceeded, the wire and transducer will be damaged.

Dimensions:



Draw wire encoder

Order code: D8.1XXX.XXXX.XXXX

- Draw wire actuator
- Wire
  - 106 = steel wire, 6 m
  - 2A1 = para wire, 2,8 m
- Encoder information*
- Resolution/pulses/protocol, these data depend on the chosen encoder*
- Type of connection these data depend on the chosen encoder*
- Output circuit these data depend on the chosen encoder*
- Encoder*
  - 00 = 5800
  - 04 = 5804
  - 05 = 5805
  - 10 = 5810
  - 2Z = 5000
  - 60 = 5860
  - 62 = 5862

*The type of encoder and the version are specified here.
The first two numbers describe the type of encoder e.g. 5800.
Further characteristics of the encoder can be extracted from the description of the encoder and are identical to the encoder order code.

Order example:
Draw wire actuator with 2.8 m para wire.
The encoder should be a 5800 with RS 422 (with inverting) and 5 V voltage supply.

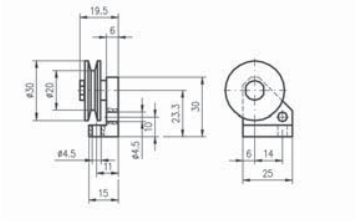
The connection should be 1 m axial cable (PVC). The pulse rate will be 2048.

Order code: D8.12A1.0041.2048

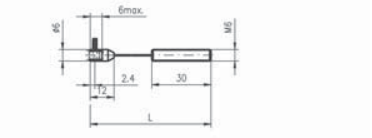
- Pulse rate 2048
- Encoder 5800
- Specifications for the draw wire actuator

For the encoder order code , please refer to the Encoder section.

Accessories

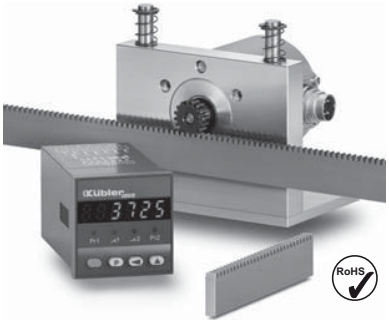


- Guide pulley for draw-wire encoder
  Order code 8.0000.7000.0031



Extension cable, steel wire 2 m:	Order code	8.0000.7000.0033
Extension cable, steel wire 5 m:	Order code	8.0000.7000.0034
Extension cable, steel wire 10 m:	Order code	8.0000.7000.0035
Extension cable, para wire 2 m:	Order code	8.0000.7000.0032

Displacement measuring device



- Complete measuring system as kit or as individual components
- Flexible, spring-loaded holding device for encoder, ensures optimal pressure and protects encoder shaft
- With rack and pinion
- Perfectly calibrated components: 1 revolution of the pinion corresponds to a displacement of 50 mm

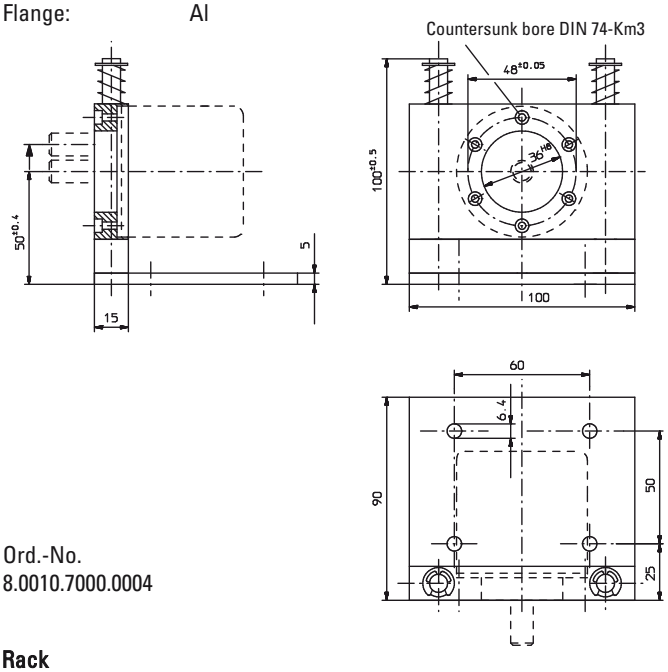
Description and application:

The holding device for the encoder (8.0010.7000.0004) is a movable support for encoders, to the shaft of which, for instance, a measuring wheel or pinion can be attached. Due to the fact that it is movable, optimum contact pressure is ensured and overload on the bearings of the encoder prevented.
When used in conjunction with a pulse generating unit, the rack and pinion combination (8.0010.7000.0001 and ...0002) serves as a simple length and displacement measuring system. One rotation of the pinion on the rack corresponds to a displacement of 50 mm. Moreover the racks are designed in such a way that they can be butt-mounted without pitch error.
The absolute accuracy is 0.5 mm per meter. The resolution / repetition accuracy is 0.1 mm. Holding device, rack and pinion are available as a set for the purpose of displacement measurement (8.0010.7000.0005).
The installation aid (8.0010.7000.0003) is required to maintain exact pitch when butt-mounting racks.

Typical areas of application are:
- Wood working industry
- Textile industry
- Handling and automation technology
- Mechanical engineering / Special machines

Holding device for encoders:

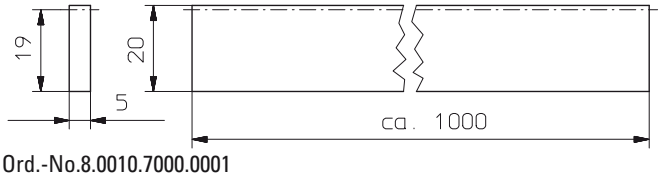
Material:
Guide rods: stainless steel
Flange: Al



Ord.-No.
8.0010.7000.0004

Rack

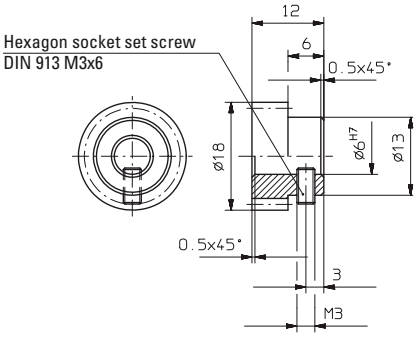
Material: St 37
Surface: uncoated
Module pitch: approx. 1



Ord.-No.8.0010.7000.0001

Pinion

Material: free-cutting steel
Surface: burnished
Module pitch: approx. 1, No of teeth: 16

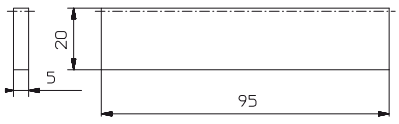


Ord.-No. With bore diameter ø 6 mm
8.0010.7000.0002

With bore diameter ø 10 mm
8.0010.7000.0006

Installation aid

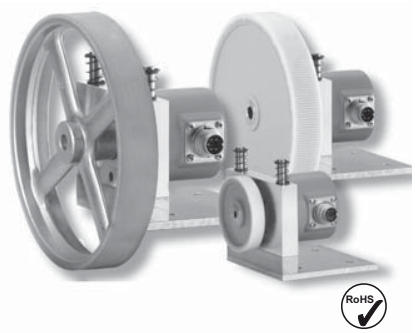
Material: St 37
Surface: uncoated, Module pitch: approx. 1



Ord.-No. 8.0010.7000.0003

8.5810.1235.0500
5810 encoder for rack and pinion , 0.1 mm res
.
6.716.010.000
716 LED preset counter 90-260VAC, 1 preset

Length measuring kits



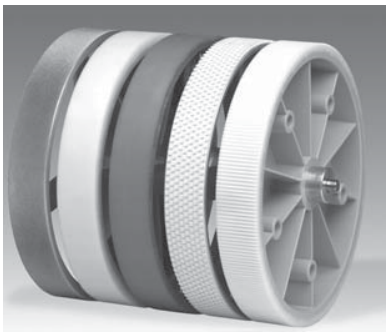
- Length measuring kit (metric) for length measurement of a measuring object that is moving; a complete solution, which can quickly and easily be implemented!
- Measuring wheels (Hytrel plastic for the textile industry, Vulkollan for the wood, paper, metal and plastics industries).
- Resolution of 1 mm for measuring wheels.
- Because of the encoder holding device, an optimal loading of the encoder shaft on the rack is achieved.
- An additional power supply for the encoder is not required, as the encoder can be powered directly from the preset counter.

Technical data:		
Measuring wheels:	Circumfer. 0.2 m:	Standard bore 6 mm, measuring width 12 mm, wheel body made of plastic, weight 35 g.
	Circumfer. 0.5 m:	Standard bore 10 mm, measuring width 25 mm, wheel body made of plastic (Hytrel) or aluminum (Vulkollan). Weight 260 g (Hytrel), 320 g (Vulkollan).
Encoder holding device:		Flange 100x100 mm Al, Guide rod: stainless steel, Countersunk bore DIN74-Km3,
Encoders, cable assembly:		See detailed technical specifications in this catalogue.
Counter:		See catalogue Counting Technology

Ordering information:

6.716.010.000	716 LED preset counter 90-260VAC, 1 preset
8.0000.3291.0010	0.2 m measuring wheel, plastic (Hytrel) corrugated
8.0000.3552.0010	0.5 m measuring wheel, plastic (Vulkollan) smooth
8.0000.3592.0010	0.5 m measuring wheel, plastic (Hytrel) corrugated
8.0000.6201.0003	Cable assembly for measuring wheel-length measuring kit
8.0000.6311.0003	Cable assembly for rack and pinion-length measuring kit
8.0010.7000.0004	Flexible holding device for encoders
8.0010.7000.0010	Spring encoder arm
8.5800.1275.0200	5802 encoder for 0.2m measuring wheel, 1 mm resolution
8.5800.1275.0500	5802 encoder for 0.5m measuring wheel, 1 mm resolution

Measuring wheels



- Measuring wheels are utilized in combination with encoders to measure material in the wood, paper, metal, textile and plastic industry.
- When selecting a measuring wheel, the first consideration is the type of material to be measured as this serves as the basis for determining the surface finish or coating of the measuring wheel.
- Various diameters, designed for use with Kübler encoders, available for metric and imperial systems.

Surface of the measured material:

Surface of the measured material:	Recommended profile no.
Plastic e.g. PVC, PE, ...)	4, 5
Paper	4, 5
Cardboard	1, 4, 5
Wood	1, 4, 5
Textile	6, 9, 1
Bare metals	6
Varnished surfaces	6
Wire	5

Measuring wheels in stock:

8.0000.3211.0004	8.0000.3542.0010
8.0000.3211.0006	8.0000.3542.0012
8.0000.3211.0010	8.0000.3552.0010
8.0000.3241.0006	8.0000.3552.0012
8.0000.3211.0010	8.0000.3562.0007
8.0000.3291.0004	8.0000.3562.0010
8.0000.3291.0006	8.0000.3592.0006
8.0000.3291.0010	8.0000.3592.0010
8.0000.3512.0010	8.0000.3592.0012
8.0000.3542.0007	8.0000.3751.0010

Measuring wheels for metric system:

Measuring wheel	Profile	Coating	Coating hardness	Standard bore [mm][1)]	Measuring width [mm]	Material of wheel body	Weight (approx.) [g]	Wheel No.
0.2 m	1	diamond knurl		6	12	aluminium	40	211
ø 6,37 cm	4	Hytrel, smooth	85 ... 90	4/6/10	12	plastic	35	241
	9	Hytrel, corrugated	85 ... 90	4/6/10	12	plastic	35	291
0.5 m	1	diamond knurl		10	25	aluminium	350	512
ø 15,92 cm	4	Hytrel, smooth	85 ... 90	7/10	25	plastic	260	542
	5	Vulkollan, smooth	85 ... 90	10	25	aaluminium	320	552
	6	tufted rubber		10	25	aluminium	320	562
	9	Hytrel, corrugated	85 ... 90	7/10	25	plastic	260	592

Measuring wheels for imperial system:

Measuring wheel	Profile	Coating	Coating hardness	Standard bore [mm][1)]	Measuring width [mm]	Material of wheel body	Weight (approx.) [g]	Wheel No.
1 foot	5	Vulkollan, smooth	70 .. 75	6	9,7	aluminum	110	751

[1)] other bore diameters on request

Please note:
If a measuring wheel is mounted directly on the shaft of a rotary encoder, the pressure force between the measuring wheel and measured material should not exceed the radial shaft load listed in the data sheet of the encoder. In addition, the measuring wheels can only be used for in-house purposes which are not subject to the stipulations of the German calibration code.

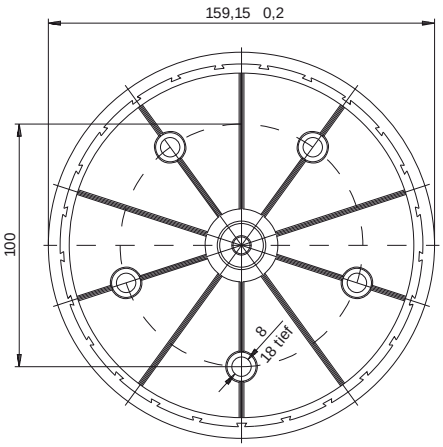
Order code:

8.0000.3XXX.00XX

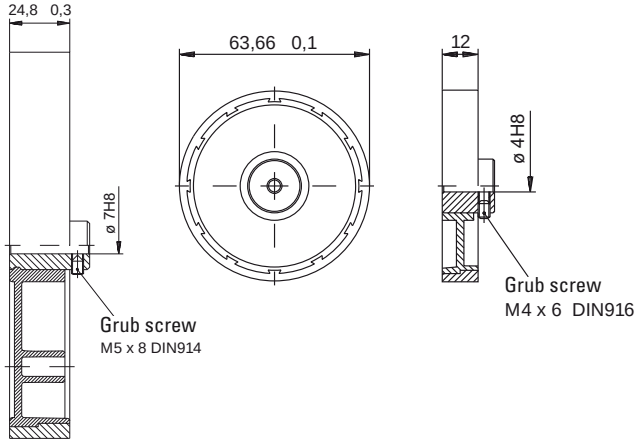
Measuring wheel no.	bore diameter

Measuring wheels

Dimensions:
Type 3542 and 3592



Dimensions:
Type 3241 and 3291



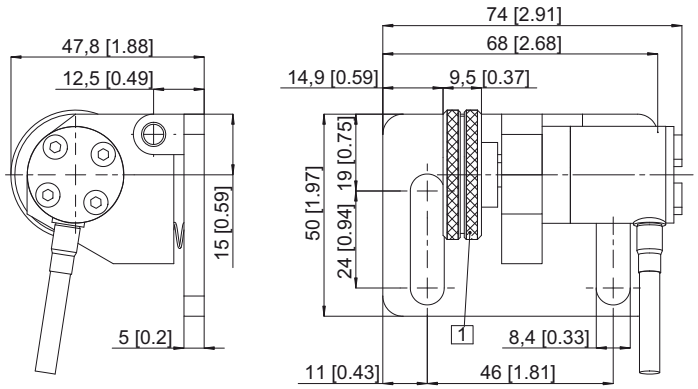
Mini Measurement System

- With incremental interface
- Very compact (74 mm x 50 mm x 52 mm)
- Easy to install, one unit
- Fix, connect, ready-to-go
- Measuring wheel circumference 100 mm
- Resolution 0.1 mm
- Cable outlet radial, 2 m PVC cable

Speed max.	2000/min.
Protection:	IP 64
Output circuit:	Push-pull with inversion
Power supply:	8 ... 30 V DC
Current:	≤ 20 mA
Load Channel max..:	20 mA
Output frequency max.:	≥ 100 kHz

Order code: 05.2400.0040.1000.5045

Dimensions:



1 Knurl AA1, 2

Spring encoder arm


Temperature range


Shock/vibration resistant

Robust

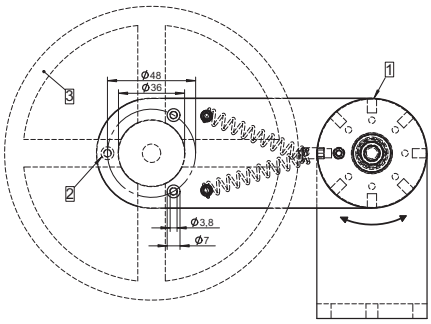
- **Pressure**
  Max. 40 N, adjustable spring pressure available in any position

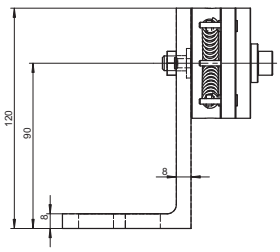
Reliable

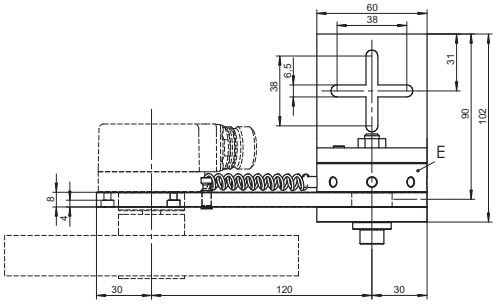
- **Temperature range**
  -40 °C ... 120 °C

Versatile

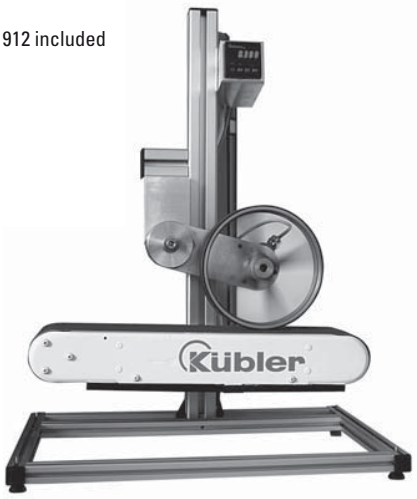
- **Can be installed in any mounting position**
  9 setting positions in 40° steps
- **Base plate**
  Variable in 4 directions







1 Setting with a size 0 or 1 screwdriver
2 3 pcs. screws M3 x 8 DIN 912 included
3 Measuring wheel



Technical data:

Pressure for each notch:	appr. 20 N (first notch between 0 and appr. 20 N)
Temperature:	-40 °C ... + 120 °C

Order code: 8.0010.7000.0010

NEW

Inclinometer Type IS40

Output | IP 67 | Reverse polarity protection | Shock/vibration resistant

The inclinometer IS40 permits 2-dimensional inclinations to be measured.
Versions are available for the measuring ranges ±10°, ±45° or ±60°.
The rugged compact construction makes this sensor the ideal device for angle measurement in harsh environments.

Innovative:

- **Rugged construction**
- **High resolution and accuracy**
- **Current or voltage interface**
- **High shock resistance**
- **Zero point adjustment**

Compact:

- **Small design**
- **Minimal space requirement**

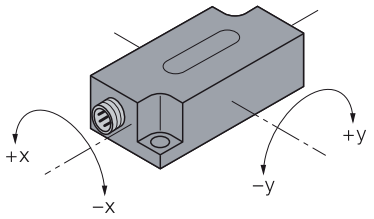
Many applications:

- **Vehicle technology**
- **Solar installations**
- **Cranes and hoists**
- **Commercial vehicles**

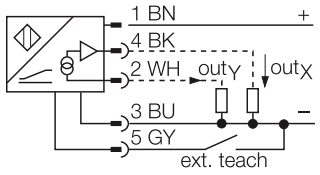
Technical Data Inclinometer:

Supply voltage:	5 VDC +/- 0,25 V or 10 ... 30 V DC (depending on version)
No-load current:	≤ 20 mA
Reverse polarity protection	Yes
Measuring range:	±10°, ±45° ±60 ° (depending on version)
Resolution:	≤ 0.05° ≤ 0,1° ≤ 0,15°
Repeat accuracy:	≤ 0.2 % of the measuring range ≤ 0.1 % after a warm-up period of 30 min.
Absolute accuracy:	0.3° for version ±10° 0.5° for version ±45° and ±60°
Temperature drift:	≤ 0,025%/K ±0.01 °/K (10°-version), ±0.03 °/K (45° and 60°-version)
Cross sensitivity:	3 %
Ambient temperature:	-30 ... +70 °C
Output:	Analogue output
Voltage output:	0.1 ... 4.9 V short-circuit protected to U_b
Current output:	4 ... 20 mA
Output impedance:	99 ... 105 Ohm
Reaction time:	0.1 ... 0.5 s (Time that the output signal requires to reach 90 % full scale, if the angle is changed from -60° to +60°)
Zero point adjustment	For version: ±10 ° => ±5 ° ±45 ° => ±15 ° ±60 ° => ±15 °
Housing:	Plastic PBT-GF20-VO
Connection:	M12-plug connector
Vibration resistance:	55 Hz (1 mm)
Shock resistance:	30 g, 11 ms
Protection rating:	IP67
Weight:	50 g
Standards:	EN 61362-2-3 (EMC requirements for transducers)

Direction of Inclination:

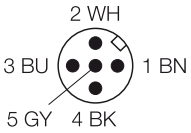


Connections:



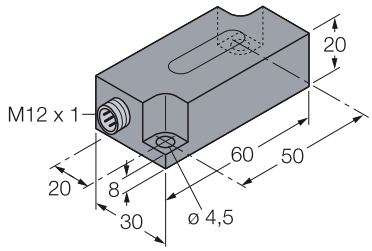
ext. teach: if this input is connected to 0 V, then the output of the inclinometer is reset to 0°.

PIN allocation:



Inclinometer Type IS40

Dimensions:



Order Code Inclinometer: **8.IS40.2XXX1**

Series	
Measuring direction	2 = 2-dimensional
Measuring range	1 = ±10° 2 = ±45° 3 = ±60°
Connection	1 = M12 connector
Supply voltage	1 = 5 V DC * 2 = 10 ... 30 V DC
Interface	1 = 4 ... 20 mA 3 = 0,1 ...4,9 V DC 4 = ratiometric 2% ...98 %**

*only in combination with interface 4

** in relation to the supply voltage 5 V DC

Accessories:
Corresponding mating connector: 05.B-8151-0/9

Slip rings
For the rotary transmission of current and signals

NEW

Slip rings IST-SR060

Description:
The SR060 is a compact, economical slip ring for up to 3 load and 2 signal transmissions from a stationary to a rotating platform. The transmission between the stator and rotor units occurs extremely reliably via sliding contacts.

Advantages and benefits:
- Various component configurations for the transmission paths, max. 3 x load and 2 x signal transmission
- Fully encapsulated in high-grade glass reinforced plastic housing shells
- Ideally suited for the heating of sealing drums (rollers) in packaging machines
- Can be used as a pair starting from just 60 mm shaft distance of the sealing rollers
- Economical – thanks to minimization of individual components, advantages in mounting and component part design to suit

Application areas for Slip Rings:
- Packaging machines
- Textile machines
- Robots and handling equipment
- Cranes
- Pipeline inspection systems
- Video surveillance (CCTV) equipment
- Fairground rides
- Bottling plants
- Rotary tables

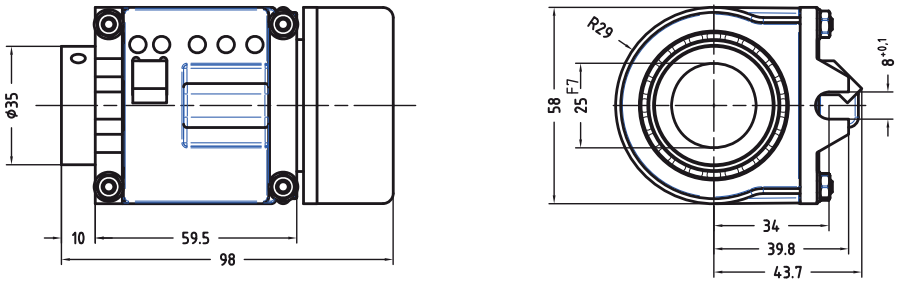
Technical Data (standard version):

Dimensions:	see drawing
Overall length:	dependent on the number of transmission paths
Hollow shaft diameter:	up to max. ø 25 mm
Current loading:	max. 16 A (at 240 V AC)
Voltage/current loading:	240 V AC (dependent on the current loading)
Contact resistance load channel:	≤ 1 Ohm
Contact resistance signal channel:	≤ 0.1 Ohm
Insulation resistance at 500 V DC:	10^3 MOhm
Dielectric strength:	1000 V eff. (60 sec.)
Speed:	max. 500
Operating temperature:	0 ° ... 75 °C
Protection rating:	IP 50
Service life:	> 500 Mio. revolutions
Maintenance cycles:	approx. 50 Mio. revolutions

Fully encapsulated housing:

Easily accessible connections:

Dimensions:
Example Type IST-SR060



Order code: **IST-SR060-XX-X-X-V01**

Product group: slip ring	Version number V01 (Standard)
Size: ø 60 mm	Number of load transmission paths (max. 3)
Hollow shaft diameter*	Number of signal transmission paths (max. 2)
18 = ø 18 mm	
20 = ø 20 mm	
24 = ø 24 mm	
25 = ø 25 mm	
* other diameters on request	

NEW

Slip rings
For the rotary transmission of load current, signals, pneumatics and hydraulics

Slip rings IST-SR085

Description:
In general slip rings are used to transmit power, signal or data from a stationary to a rotating platform. The transmission between the stator and rotor takes place via sliding contacts and is extremely reliable. The construction is modular and offers the greatest flexibility in a variety of applications.

Advantages and benefits:
- Rugged design for industrial use
- Modular system construction, load and signal channels can be combined selectively
- GFPC housing (glass-reinforced polycarbonate) 30% glass fibre content
- Long service life and long maintenance cycles
- Individually replaceable brush rings
- Customised versions easily available
- Separate signal channels
- Fieldbus signals such as Profibus, CANopen etc. up to 12 MB

Application areas for Slip Rings:
- Packaging machines
- Textile machines
- Robots and handling equipment
- Cranes
- Pipeline inspection systems
- Video surveillance (CCTV) equipment
- Fairground rides
- Bottling plants
- Rotary tables

Safety-Trans™-Design:
- Two-cavity system for load and signal transmission
- Labyrinth seal
- High vibration resistance

Modular construction system:

1 Copper graphite for high abrasion resistance
2 Platinum/Gold alloy (50% Gold content)
3 Separate signal channels with contact guide

Stator ring with pick-off spring for load currents.

Insulator with slip ring for load currents.

Stator ring with pick-off spring for signal currents.

Insulator with slip ring for signal currents.

Practical maintenance window:

Secure connections:

Easily accessible connections:

Technical Data (standard version):

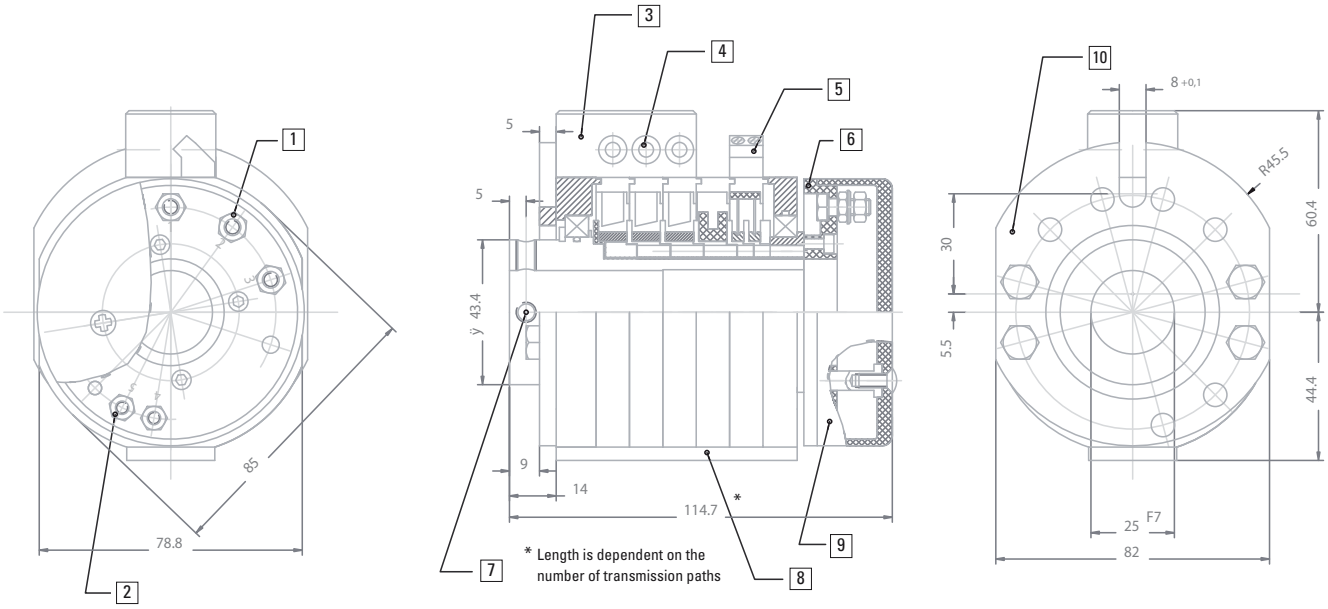
Dimensions:	see drawing
Overall length:	dependent on the number of transmission paths
Bore diameter:	up to ø 30 mm
Current loading:	max. 16 A (at 240 V AC)
Voltage/current loading:	240 V AC (dependent on the current loading)
Contact resistance load channel:	≤ 1 Ohm
Contact resistance signal channel:	≤ 0.1 Ohm
Insulation resistance at 500 V DC:	10^3 MOhm
Dielectric strength:	1000 V eff. (60 sec.)
Speed:	max. 800 1/min
Operating temperature:	0 ... 80 °C
Protection rating:	IP 50 up to IP 64 on request
Service life:	> 500 Mio. revolutions
Maintenance cycles:	approx. 50 Mio. revolutions
Number of rings:	approx. 20

Slip rings
For the rotary transmission of load current, signals, pneumatics and hydraulics

NEW

Slip rings IST-SR085

Dimensions:
Example type IST-SR085-2-3-V14



1 Screw terminal M5 for load transmission
2 Screw terminal M4 for signal transmission
3 Terminal clamp for load without wire protection, with shock-hazard touch protection
4 Wire lead-in for load possible on both sides
5 Terminal clamp for signal transmission
6 Rotating connection ring
7 4 x socket set screw DIN 914 M6x10
8 Window for maintenance
9 Protective cover for connections
10 Torque stop

Standard version:
Protection rating IP 50, Signal rings (if present) on the connection side for horizontal mounting and mounting from underneath, terminal connections, for tolerances see dimensional drawing

Order code:
for standard versions

IST-SR085-XX-XX-VXX

Type series

Number of data channels
(only in pairs, e.g. 2, 4, 6*)

Version number
V19: Standard version with hollow shaft 20 mm
V14: Standard version with hollow shaft 25 mm
V38: Standard version with hollow shaft 30 mm
V39: Standard version with hollow shaft 1 Inch

Number of power channels*

Accessories: Maintenance set (comprises brush and contact oil for signal contacts) IST-MS-01
* 20 combination max. , for example 4 data channels and 16 power channels

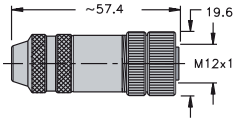
Options on request:
- Pneumatics, hydraulics transmission
- Current 40 A
- Voltage 400 V AC
- Other mounting positions
- Higher protection rating
- Mounting from above
- Load rings 400 V/16 A
- Load rings 240 V AC/25 A

Table of contents

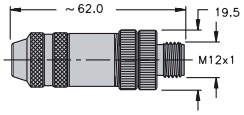
Connectors for incremental and absolute encoders

Fig.	PIN assignment	Type	Use	Order code	Suitable for encoders
		M12-straight coupling, 8 pins, selfassembly, IP67	Incremental encoders Absolute encoders	05.CMB-8181-0	5000, 5020, 5853, 5873, 5863, 5883
		M12-straight connector, 8 pins, self-assembly, IP67	Incremental encoders Absolute encoders	05.CMBS-8181-0	5000, 5020, 5853, 5873, 5863, 5883

Coupling:



Connector:



for cable-ø 8 mm

Pre-assembled cables for incremental and absolute encoders

Fig.	PIN-assignment	Type	Use	Order code	Suitable for encoders
		M12-straight coupling, 8 pins, single-ended, **PVC**-Cable 2...15 m	Incremental encoders Absolute encoders	2m: 05.WAKS8-2/P00 5m: 05.WAKS8-5/P00 10m: 05.WAKS8-10/P00 15m: 05.WAKS8-15/P00	5000, 5020
		M12-straight coupling, 8 pins, single-ended, **PUR**-Cable 2...15 m	Incremental encoders Absolute encoders	2m: 05.WAKS8-2/S366 5m: 05.WAKS8-5/S366 10m: 05.WAKS8-10/S366 15m: 05.WAKS8-15/S366	5000, 5020
		M12-right-angle coupling 8 pins, single-ended, **PVC**-Cable 2...30 m	Incremental encoders Absolute encoders	2m: 05.WWAKS8-2/P00 5m: 05.WWAKS8-5/P00 10m: 05.WWAKS8-10/P00 15m: 05.WWAKS8-15/P00 30 m: 05.WWAKS8-30/P00	5000, 5020

Characteristics Connector:

Connector/coupling body:	blueTPU plastic
Contact:	moulded polyurethane
Connecting nut:	gold-plated brass
Temperature:	–30 ... +90 °C
Protection:	IP 67, screwed
Rated current:	8 pins 2 A
Rating:	30 V

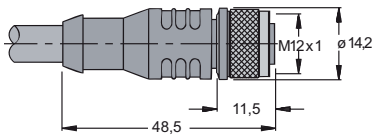
Characteristics PVC-Cable P00 (LiFYY):

Cable-ø	6.2 ±0.2 mm
Colour:	grey, similar to Ral 7040
Conductor specifications:	shielded, 8 x 0.25 mm^2

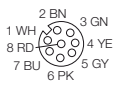
Characteristics PUR-PVC-Cable, halogen-free (LiF9YHC11YH):

Rating:	240 V, 80 °C
Material:	Outer jacket: polyether-polyurethane Wire isolation: Polypropylene, Oil resistant acc. to VDE 0472, Section 803, Flame resistant acc. to VDE 0472, Section 804 / B, Sea water resistant, halogen-free
Cable-ø	6.5 ±0.2 mm, 8 x 0.25 mm^2 screened
Colour:	grey, similar to Ral 7040
Temperature range:	–40 ... +90 °C
Bending radius:	min. 10 x cable ø for mobile use

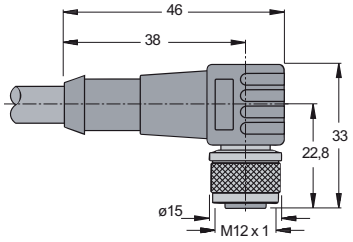
Coupling straight:



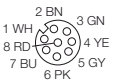
PIN-assignment:



Coupling right angle:



PIN-assignment:



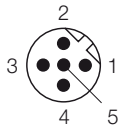
Profibus-DP

Fig.	PIN assignment	Type	Use	Order code	Suitable for encoders
		M12-straight coupling, 5 pins for PROFIBUS-DP cables	Profibus	05.BMWS 8151-8.5	5858, 5860, 5868, 5878, 5888, 9080
		M12-straight connector, 5 pins for PROFIBUS-DP cables	Profibus	05.BMSWS 8151-8.5	5858, 5860, 5868, 5878, 5888, 9080
		M12-right angle coupling, 5 pins for PROFIBUS-DP cables	Profibus	05.BMWS 8251-8.5	5858, 5860, 5868, 5878, 5888, 9080
		M12-right angle connector, 5 pins for PROFIBUS-DP cables	Profibus	05.BMSWS 8251-8.5	5858, 5860, 5868, 5878, 5888, 9080

Charactereristics:

Materials:	
Body and contact carrier:	brass (CuZn), nickel-plated surface
Contact surface:	alloy (CuSnZs)
Coupling nuts:	nickel-plated brass
Cross section for connector:	0.75 mm², screwed
Temperature:	–40 ... +85 °C
Protection acc. to EN 60529:	IP 67
Rated voltage/contact:	30 V AC/36 V DC
Rated current/contact:	4 A

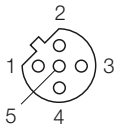
PIN-assignment: M12 x 1 connector



Connection diagram:

nc	→	1
GN	→	2 (Bus A)
nc	→	3
RD	→	4 (Bus B)
Shield	→	5

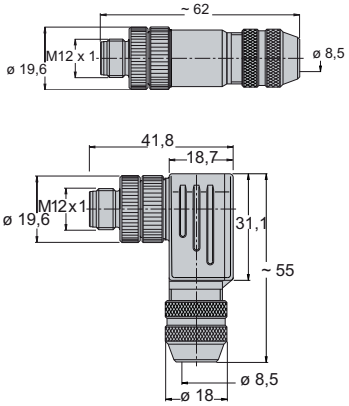
PIN-assignment: M12 x 1 coupling



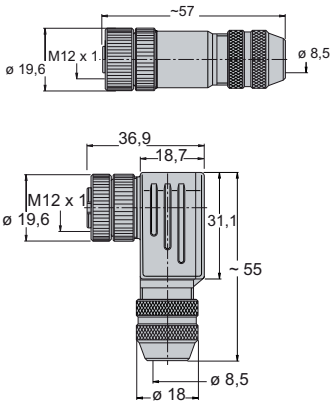
Connection diagram:

nc	←	1
GN	←	2 (Bus A)
nc	←	3
RD	←	4 (Bus B)
Shield	←	5

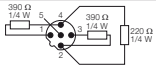
Connector:



Coupling:



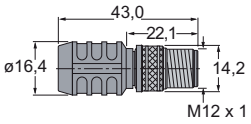
Profibus-DP

Fig.	PIN assignment	Type	Use	Order code	Suitable for encoders
		Terminating resistor	Profibus	05.RSS4.5-PDP-TR	5858, 5860, 5868, 5878, 5888, 9080
		M12 lead-through	Profibus	05.FKW-FSW45/M12	5858, 5860, 5868, 5878, 5888, 9080

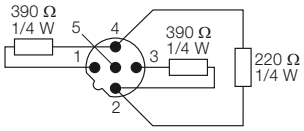
Characteristics for Terminating resistor:

Materials:	
Body and contact carrier:	oil resistant polyurethane
Contact material:	gold plated copper alloy
Coupling nut:	nickel-plated brass
Temperature:	–40 ... +80 °C
Protection acc. to EN 60529:	IP 67
Rated voltage:	50 V DC
Internal resistance:	390 Ω 1/4 W, 220 Ω 1/4 W

Dimensions:



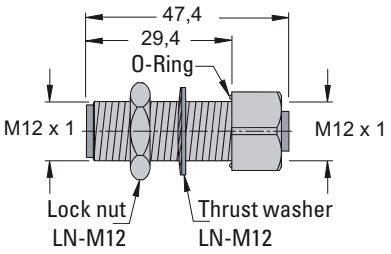
Pin-assignment:



Characteristics for Lead-through:

Materials:	
Body:	nickel-plated brass
Contact carrier:	PA 6
Contact material:	gold-plated brass
Temperature:	–40 ... +105 °C
Protection acc.EN 60529:	IP 67 and NEMA 1, 3, 4, 6

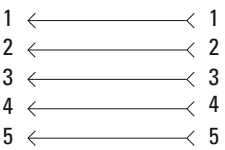
Dimensions:



Pin-assignment:

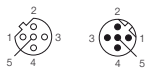
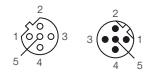
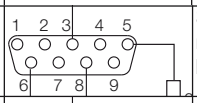
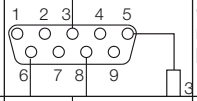
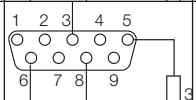
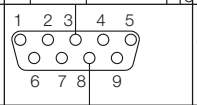
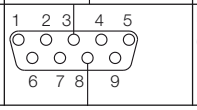
Connector M12 x 1 Coupling M12 x 1

Connection diagram:



Hole pattern:

Profibus-DP - Bus cable

Fig.	PIN assignment	Type	Use	Order code	Suitable for encoders
		M12 straight coupling, single-ended, PUR cable, length 6 ... 15 m	Profibus, Bus in	6m: 05.RKSW451-6M 10m: 05.RKSW451-10M 15m: 05.RKSW451-15M	5858, 5860, 5868, 5878, 5888, 9080
		M12 straight connector, single-ended, PUR cable, length 6 ... 15 m	Profibus, Bus out	6m: 05.RSSW451-6M 10m: 05.RSSW451-10M 15m: 05.RSSW451-15M	5858, 5860, 5868, 5878, 5888, 9080
		M12 right-angle coupling, single-ended, PUR cable, length 6 ... 15 m	Profibus, Bus in	6m: 05.WKSW451-6M 10m: 05.WKSW451-10M 15m: 05.WKSW451-15M	5858, 5860, 5868, 5878, 5888, 9080
		M12 right-angle connector, single-ended, PUR cable, length 6 ... 15 m	Profibus, Bus out	6m: 05.WSSW451-6M 10m: 05.WSSW451-10M 15m: 05.WSSW451-15M	5858, 5860, 5868, 5878, 5888, 9080
		M12 straight connector, M12 straight coupling, PUR cable, length 2 ... 15 m	Profibus, Bus out-Bus in	2m: 05.RSSW-RKSW451-2M 6m: 05.RSSW-RKSW451-6M 10m: 05.RSSW-RKSW451-10M 15m: 05.RSSW-RKSW451-15M	5858, 5860, 5868, 5878, 5888, 9080
		M12 right-angle connector, M12 right-angle coupling, PUR cable, length 2 ... 15 m	Profibus, Bus out-Bus in	2m: 05.WSSW-WKSW451-2M 6m: 05.WSSW-WKSW451-6M 12m: 05.WSSW-WKSW451-10M 15m: 05.WSSW-WKSW451-15M	5858, 5860, 5868, 5878, 5888, 9080
		Sub-D connector with terminating resistor, single-ended, PUR cable, length 0.5... 2m	Profibus, Master	0.5 m: 05.D9T-451-0.5M 2 m: 05.D9T-451-2M	5858, 5860, 5868, 5878, 5888, 9080
		Sub-D connector with terminating resistor, M12 coupling, PUR cable, length 0.5... 2m	Profibus, Master, Bus in	0.5 m: 05.RKSW-D9T451-0.5M 2 m: 05.RKSW-D9T451-2M	5858, 5860, 5868, 5878, 5888, 9080
		Sub-D connector with terminating resistor, M12 coupling, PUR cable, length 0.5... 2m	Profibus, Master, Bus out	0.5 m: 05.RSSW-D9T451-0.5M 2 m: 05.RSSW-D9T451-2M	5858, 5860, 5868, 5878, 5888, 9080
		M12 straight connector-Sub-D-connector-M12 straight coupling, PUR cable, length 2x0.5m...2x2m	Profibus, Master, Bus in, Bus out	2x0.5 m: 05.RSSW-D9-RKSW451-0.5M-0.5M 2x2 m: 05.RSSW-D9-RKSW451-2M-2M	5858, 5860, 5868, 5878, 5888, 9080
		M12 straight coupling-Sub-D-connector-M12 straight coupling, PUR cable, length 2x0.5m...2x2m	Profibus, Bus in, Bus out	2x0.5 m: 05.RKSW-D9-RKSW451-0,5M-0,5M 2x2 m: 05.RKSW-D9-RKSW451-2M-2M	5858, 5860, 5868, 5878, 5888, 9080

Characteristics M12-Connector:

Connector/coupling:	M12 x 1, reverse-coded, according to PNO guidelines
Connector-/coupling body:	moulded polyurethane
Contacts:	gold plated brass
Coupling nut:	nickel-plated brass screened
Temperature:	–40 ... +80 °C
Protection:	IP 67 and NEMA 1, 3, 4, 6, 13
Rated current:	4 A

Characteristics SUB-D-Connector:

Connector:	SUB-D, 9-Pin
Protection:•	IP20

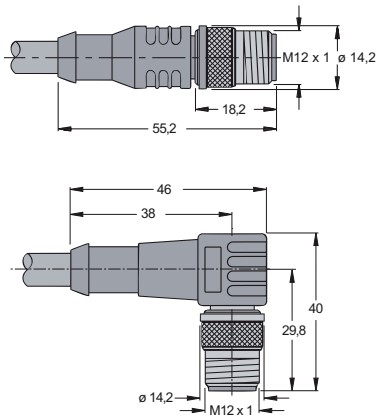
Characteristics for cable: see next page

Profibus-DP - Bus cable

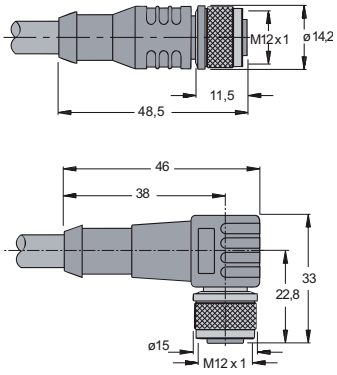
Characteristics for cable:

Rating:	36 V, 80 °C
Materials:	PUR-outer jacket, PE-wire insulation
Colour:	violet
Conductor specifications:	red, green 2 x 0.34 mm², stranded tinned copper, 7 x 0.25 mm, twisted pair, 300 V, PE, 80 °C, DC resistance - 50 Ω/km rated current - 4 A, rated impedance 150 Ω ±15 Ω at 3 ... 20 MHz, rated capacitance conductor to conductor 30 pF/m
Screen /drain:	tinned copper braid, aluminum foil coverage 100% 0.5 mm² stranded tinned copper

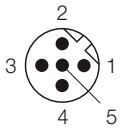
Connector:



Coupling:



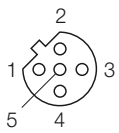
PIN-assignment:



Connection diagram::

nc	→	1
GN	→	2 (Bus A)
nc	→	3
RD	→	4 (Bus B)
Shield	→	5

PIN-assignment:



Connection diagram::

nc	←	1
GN	←	2 (Bus A)
nc	←	3
RD	←	4 (Bus B)
Shield	←	5

1 cable outlet:

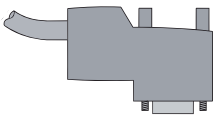
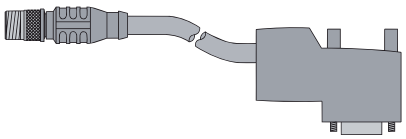


Illustration with connector:



Example of connection with M12-connector:

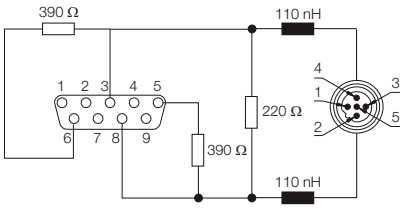
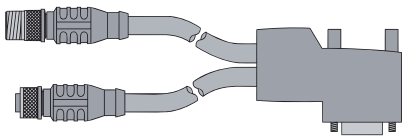
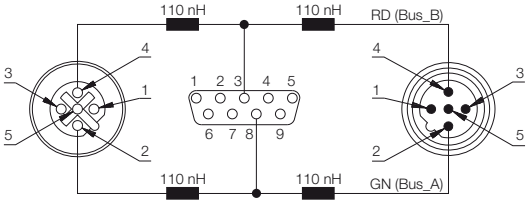


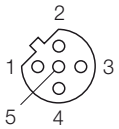
Illustration of 2 cable outlets with connector and/or coupling:



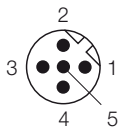
Connection example:



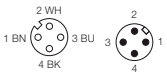
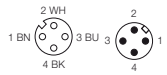
M12 x 1 coupling:



M12 x 1 connector:



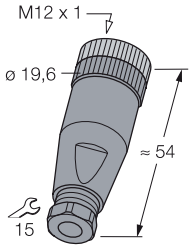
Profibus-DP - Power supplies

Fig.	PIN-assignment	Type	Use	Order code	Suitable for encoders
		4-pin plug-and-socket connector, M12 straight coupling, self-assembly	Profibus voltage supply	05.B8141-0	5858, 5860, 5868, 5878, 5888, 9080
		4-pin plug-and-socket connector, M12 right-angle coupling, self-assembly	Profibus voltage supply	05.B8241-0	5858, 5860, 5868, 5878, 5888, 9080
		4-pin plug-and-socket connector, M12 straight connector, self-assembly	Profibus voltage supply	05.BS8141-0	5858, 5860, 5868, 5878, 5888, 9080
		4-pin plug-and-socket connector, M12 right-angle connector, self-assembly	Profibus voltage supply	05.BS8241-0	5858, 5860, 5868, 5878, 5888, 9080
		M12 straight coupling, single-ended, PUR/PVC cable, length 2...10 m	Profibus voltage supply	2 m: 05.WAK4-2/S90 10 m: 05.WAK4-10/S90	5858, 5860, 5868, 5878, 5888, 9080
		M12 right-angle coupling, single-ended, PUR/PVC cable, length 2...10m	Profibus voltage supply	2m: 05.WWAK4-2/S90 10m: 05.WWAK4-10/S90	5858, 5860, 5868, 5878, 5888, 9080
		M12 straight connector-M12 straight coupling, PUR/PVC cable, length 2...10m	Profibus voltage supply	2m: 05.WAK-2-WAS4/S90 5m: 05.WAK-5-WAS4/S90 10m: 05.WAK-10-WAS4/S90	5858, 5860, 5868, 5878, 5888, 9080

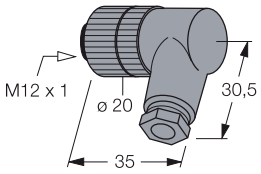
Characteristics for connectors:

Rating:	125 V AC/150 V DC
Rated current:	4 A
Ambient temperature:	–40 ... +80 °C
Materials:	handle part: PBT, coupling nuts: CuZn-Ni
Protection:	IP 67

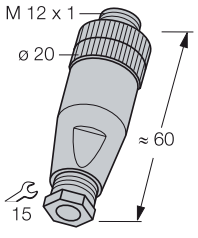
Coupling:
straight



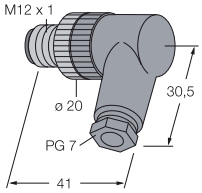
right angle



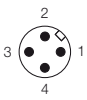
Connector:
straight

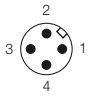


right angle



PIN-assignment





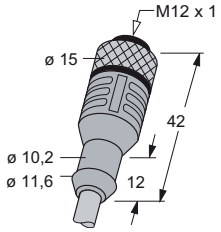
Profibus-DP - Power supplies

Characteristics for connection cable:

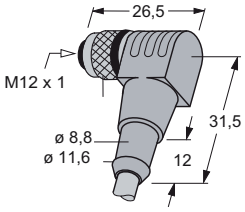
Rated voltage:	250 V AC/300 V DC
Ambient temperature:	Cable: –25 ... +80 °C
Materials:	handle part: PVC
	coupling nut: CuZn-Ni
	cable: sheath: PUR
	insulation of leads: PVC
Protection:	IP 67

Coupling:

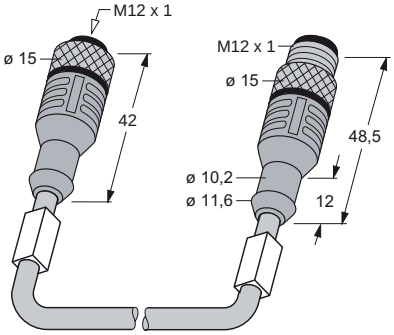
straight



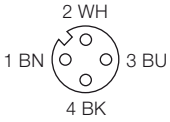
right angle

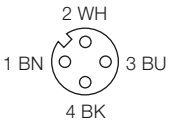


Dimensions:

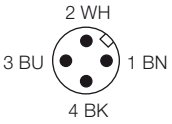


PIN-assignment:

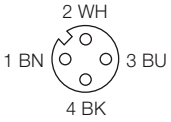




PIN-assignment connector

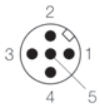
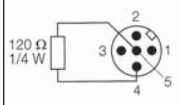


PIN-assignment coupling



CANopen/DeviceNet

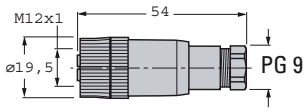
DeviceNet CANopen

Fig.	PIN-assignment	Type	Use	Order code	Suitable for encoders
		M12 self-assembly coupling	CANopen/ DeviceNet in	straight 05.B-8151-0/9 right angle 05.B-8251-0/9	3658, 3678, 5858, 5860, 5868, 5878, 5888, 9080
		M12 self-assembly connector	CANopen/ DeviceNet out	straight 05.BS-8151-0/9 right angle 05.BS-8251-0/9	5858, 5860, 5868, 5878, 5888, 9080
		Terminating resistor	CANopen/DeviceNet	05.RSE 57 TR2	5858, 5860, 5868, 5878, 5888, 9080

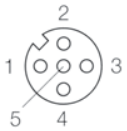
Characteristics for connectors:

Connector/coupling:	M12 x 1
Connector/coupling body:	polyester, black PBT
Contact materials:	nickel-plated copper alloy
Connector-inserts	PTB, spacings to VDE 0110. group C
Coupling nut:	nickel-plated brass screened
Temperature:	–40 ... +85 °C
Protection:	IP 67 and NEMA 1, 3, 4, 6p
Rated current:	3 A, 36 V DC
Max. cable diameter:	6 ... 8 mm

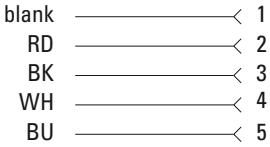
Dimensions:

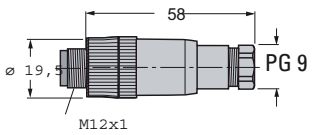


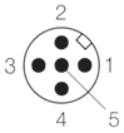
PIN-assignment:



Connection diagramm:



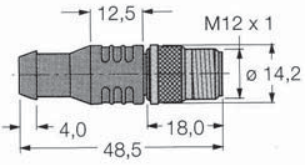




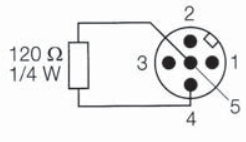
Characteristics for bus terminating resistor:

Materials:	
Body and contact carrier:	oil resistant polyurethane
Contact materials:	gold plated copper alloy
Coupling nut:	nickel-plated brass
Temperature:	–40 ... +80 °C
Protection EN 60529:	IP 67
Rated voltage:	24 V D
Internal resistance:	120 Ω 1/4 W

Dimensions:

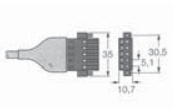
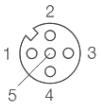
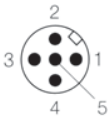
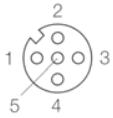
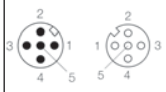
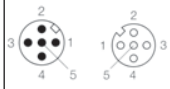


Pin-assignment:



DeviceNet

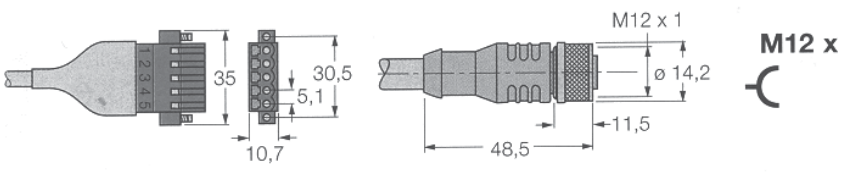
DeviceNet

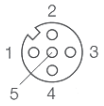
Fig.	PIN-assignment	Type	Use	Order code	Suitable for encoders
		CBC5 open connector/M12*1 coupling combination, cable length 2m	DeviceNet for control connection	05.CBC5 572-2M	5860, 9080
		M12 straight connector, single-ended, PVC cable, length 6...15m	DeviceNet out	6m: 05.RSC-572-6M 15m: 05.RSC-572-15M	5860, 9080
		M12 straight coupling, single-ended, PVC cable, length 6...15m	DeviceNet in	6m: 05.RKC-572-6M 15m: 05.RKC-572-15M	5860, 9080
		M12 straight connector - M12 straight coupling, PVC cable, length 0.5...15m	DeviceNet in/out	0.5m: 05.RSC-RKC-572-0.5M 1m: 05.RSC-RKC-572-1M 2m: 05.RSC-RKC-572-2M 4m: 05.RSC-RKC-572-4M 10m: 05.RSC-RKC-572-10M 15m: 05.RSC-RKC-572-15M	5860, 9080
		M12 right-angle connector M12 right-angle coupling, PVC cable, length 0.5...6m	DeviceNet in/out	0.5m: 05.WSC-WKC-572-0,5M 2m: 05.WSC-WKC-572-2M 6m: 05.WSC-WKC-572-6M	5860, 9080

Characteristics for CBS5:

Connector/coupling:	M12 x 1
Connector/coupling body:	moulded polyurethane
Contacts:	gold plated brass
Coupling nut:	nickel-plated brass screened
Temperature:	–40 ... +80 °C
Protection (CBS5):	IP 20
Rated current:	4 A

Cable:	
Certified:	AWM 300 V
Conductor specifications:	Power supply: black, red; 2/17 AWG, 2 x 1.04 mm², DCR 16.9Ω/km, Insulation PVC
	Data transmission line: blue/white; 2/20 AWG, DCR 34.1Ω/km, Insulation PE
Cable	grey diameter 8.4 mm
Shield	foil, drain 20 AWG 0.52 mm²





1 = Shield
2 = RD (V+)
3 = BK (V-)
4 =WH (CAN-H)
5 = BU (CAN L)

DeviceNet

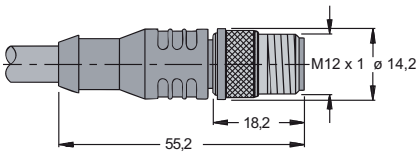
DeviceNet

Connector:	
Connector/coupling:	M12 x 1
Connector/coupling body:	moulded polyurethane
Contacts:	gold-plated brass
coupling nut:	nickel-plated brass screened
Temperature:	–40 ... +80 °C
Protection:	IP 67 and NEMA 1, 3, 4, 6, 13
Rated current:	4 A

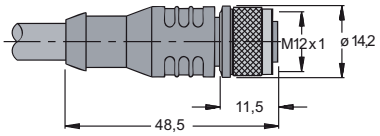
Cable:	
Rating:	36 V, 80 °C
Material:	PVC outer jacket, PE Insulation
Colour:	grey
Conductor specifications:	Power supply: red, black; 2 x 0.32 mm^2, 2/22 AWG , DCR 54.1 Ω/km, Insulation PVC Data transmission line: white, blue; 2 x 0.32 mm^2, 2/22 AWG , Outer jacket PVC grey, Outer diameter 7.3 mm Aluminium shield, draw wire 2/22 AWG 0.32 mm^2

Bus cable pre-assembled:

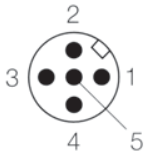
Connector:



Coupling:



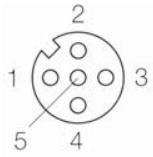
PIN-assignment:



Connection diagramm:

Shield	1
RD	2
BK	3
WH	4
BU	5

PIN-assignment:

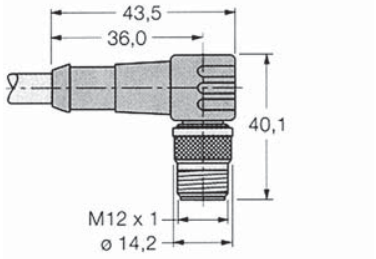


Connection diagramm:

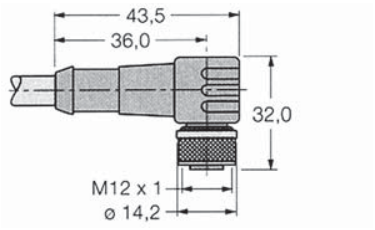
Schirm	1
RD	2
BK	3
WH	4
BU	5

Connection/Coupling-combination:

Connection:



Coupling:



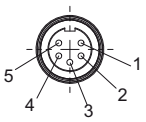
Connectors

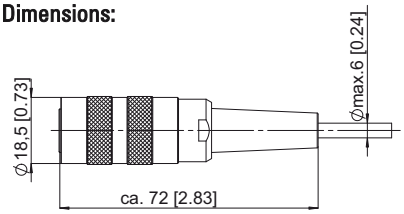
- Wide choice of connectors
- Female or male
- 5 pins, 7 pins and 10 pins
- Connectors with MS
- Right-angle plug

Round connectors: **Order description:** **Pin-assignment:** **Dimensions:**

5-pin cable connector
female

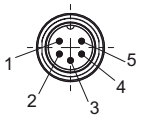
Order code 8.0000.5022.0000

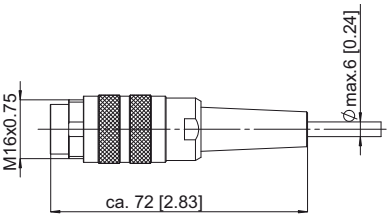




5-pin coupling
male

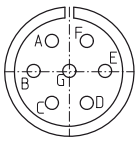
Order code 8.0000.5025.0000

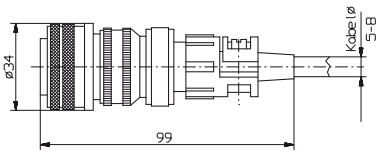




7-pin cable connector
female

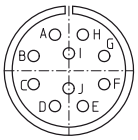
Order code 8.0000.5052.0000

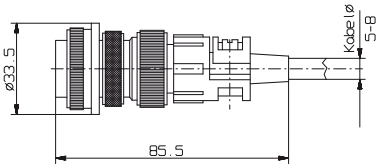




10-pin cable connector
female

Order code 8.0000.5062.0000



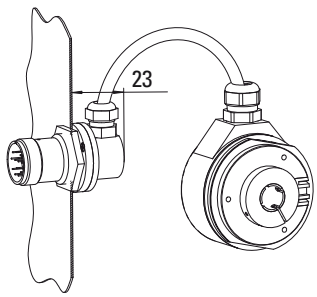


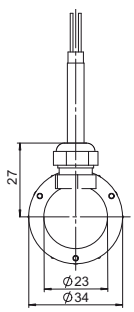
M23 connectors for connection to fan cowls

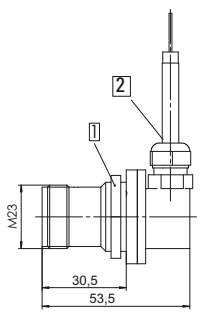
Your benefit
- Right angle connector with fixing nut, offering optimal installation height
- For lead-through to ventilator plates on geared motors or control cabinets
- 9, 12 or 17 pins, project-oriented

Product features
- Needs only 23 mm high installation space
- IP 66 when screwed-in
- Mechanically solid construction
- Pin inserts

Installation/mounting example:





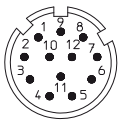
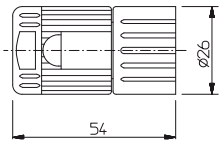
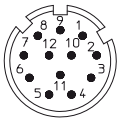
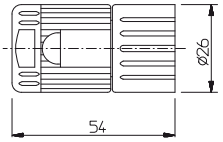
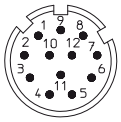
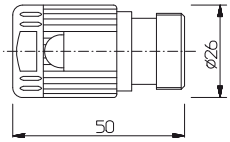
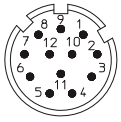
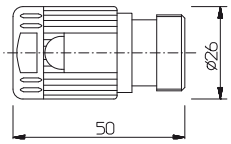
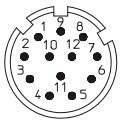
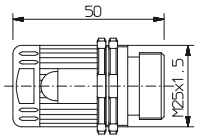
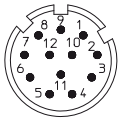
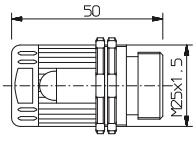
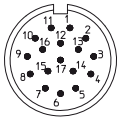
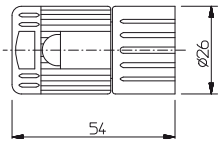


Order code:
Can only be ordered in conjunction with encoders and cable outlet.

1 M25 x 1,5
2 cable-ø 4 ... 6,5 mm

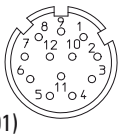
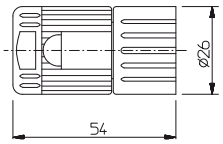
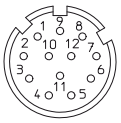
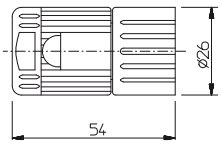
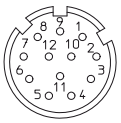
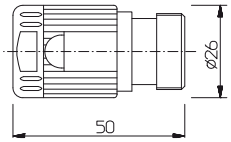
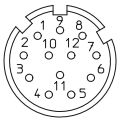
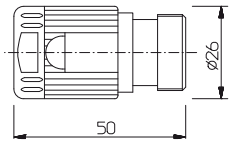
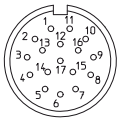
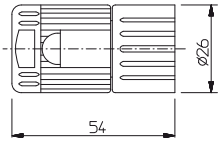
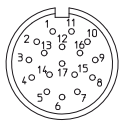
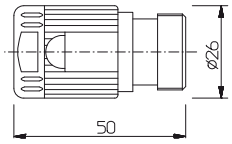
Round connectors series M23x1 male:

- Wide choice of connectors
- 9 pins, 12 pins and 17 pins
- Robust construction, metal body
- Pin inserts can be supplied wired clockwise or counter clockwise
- •• Coupling thread for cables ø 5.5 – 10.5 mm

Round connectors:	Order description:	PIN-assignment:	Dimensions:
	Plug connector, 12 pins pin assignment ccw Order code 8.0000.5011.0000		
	Plug connector, 12 pins pin assignment cw Order code 8.0000.5011.0001		
	Plug connector with coupling thread, 12 pins, pin assignment ccw Standard connector M23 for encoders with cable Order code 8.0000.5015.0001		
	Plug connector with coupling thread, 12 pins, pin assignment cw Order code 8.0000.5015.0002		
	Plug connector with coupling thread, 12 pins, with central fastening pin assignment ccw Order code 8.0000.5015.0000		
	Plug connector with coupling thread, 12 pins, with central fastening pin assignment cw Order code 8.0000.5015.0003		
	Plug connector, 17 pins pin assignment cw Order code 8.0000.5041.0000		

Round connectors series M23x1 female

- Wide choice of connectors
- 9 pins, 12 pins and 17 pins
- Robust construction, metal body
- Pin sockets can be supplied wired clockwise or counter clockwise
- •• Coupling thread for cables ø 5.5 – 10.5 mm

Round connectors	Order description:	PIN-assignment:	Dimensions:
	12-pin plug connector **Pin socket assignment cw** **Standard-M23-connector** **Order code 8.0000.5012.0000** (Mating connector, suitable for 8.0000.5015.0001)		
	12-pin plug connector Pin socket assignment ccw Order code 8.0000.5012.0001 (Mating connector, suitable for 8.0000.5015.0002)		
	12 pin-coupling Pin socket assignment cw Order code 8.0000.5016.0000 (Mating connector, suitable for 8.0000.5011.0000)		
	12 pin-coupling Pin socket assignment ccw Order code 8.0000.5016.0001 (Mating connector, suitable for 8.0000.5011.0001)		
	17-pin plug connector Pin socket assignment ccw Order code 8.0000.5042.0000		
	17-pin coupling Pin socket assignment ccw Order code 8.0000.5046.0000 (Mating connector, suitable for 8.0000.5041.0000)		

Cable

Unprepared, cut to length

Description:	PUR electronic trailing cable	PVC electronic cable LiYCY	PVC electronic cable LiYCY	PVC electronic cable LiYCY
Order code:	8.0000.6100	8.0000.6200	8.0000.6300	8.0000.6400
Suitable for:	robust incremental encoders	incremental encoders Standard-Cable	incremental encoders without inversions	Limes, 365X, 368X SSI and analog
Number of conductors:	12 core + shield	12 core + shield	5 core + shield	8 core + shield
Cross section:	10 x 0.14 mm^2 + 2 x 0.5 mm^2	12 x 0.14 mm^2	5 x 0.14 mm^2	8 x 0.14 mm^2
Permanent working temp. range:				
Flexible installation:	–30 °C ... +70 °C	–5 °C ... +70 °C	–5 °C ... +70 °C	-20 .... +80 °C
Secure installation:	–50 °C ... +90 °C	–30 °C ... +80 °C	–30 °C ... +80 °C	-40 .... + 80 °C
Bending radius:				
Flexible installation:	min. 70 mm	min. 100 mm	min. 75 mm	min. 65 mm
Secured installation:	min. 50 mm	min. 100 mm	min. 75 mm	min. 45 mm
Cable-ø	ca. 6.9 ±0,2 mm	ca. 6.9 ±0,2 mm	ca. 4.7 ±0,2 mm	ca. 5.5 ±0,2 mm
Colour of conductors:	see pre-assembled cables with plug			

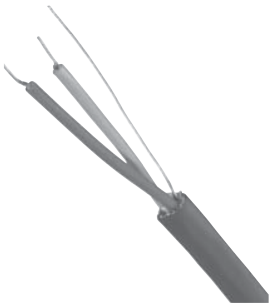
Description:	TPE electronic cable LIYCY (TP)	PVC electronic cable LiYCY (TP)	PVC electronic cable LiYCY
Order code	8.0000.6E00	8.0000.6900	8.0000.6700
Suitable for:	High temperatures or voltages Sine wave encoders	SSI and 4 ... 20 mA output twisted paired cond.	Absolute encoders with parallel interface twisted paired conductors
Number of conductors:	12 core + shield	12 core + shield	18 core + shield
Cross section	5 x 2 x 0.14 mm^2+ 2 x 0.5 mm^2	6 x 2 x 0.14 mm^2	18 x 0.14 mm^2
Permanent working temp. range:			
Flexible installation:	–40 ... +110 °C	–5 ... +70 °C	–5 ... 70 °C
Secure installation:	–60 ... +135 °C	–30 ... +80 °C	–30 ... +80 °C
Bending radius:			
Flexible installation:	min. 90 mm	min. 110 mm	min. 100 mm
Secured installation:	min. 70 mm	min. 75 mm	min. 100 mm
Cable-ø:	ca. 8.5 ±0,4 mm	ca. 7.3 ±0,2 mm	ca. 7.8 ±0,2 mm
	halogen-free		
Colour of conductors:	see pre-assembled cables with plug		

Order code:

8.0000.6X00.XXXX

Type of cable	Length in meters e.g. (0025 => 25 m)
Designations of colours to DIN standard 757	available lengths: 2, 3, 5, 8, 10. 15, 20, 25 and 30 m other lengths upon request

Profibus-DP- Cable



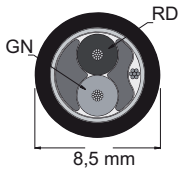
Your benefit
- Colour-coded for Profibus-DP systems
- Highly flexible stranded-wire construction
- Oil and abrasion resistant outer jacket
- Halogen-free

Product features
- PUR exhibits excellent oil resistance
- Can be used in drag chain installations

Characteristics:

Rating:	36 V, 80 °C
Materials:	TPUS-outer jacket, PE-wire isolation
Colour:	violet
Conductor specifications:	red, green 2 x 0.34 mm², stranded bare copper, 7 x 0.25 mm, twisted pair, 300 V, PE, 80 °C, DC resistance - 50 Ω/km current rating - 4 A, rated impedance 150 Ω ±15 Ω at 3 ... 20 MHz, rated capacitance conductor to conductor 30 pF/m
Screen/ drain:	tinned copper braid, aluminium foil coverage 100% 0.5 mm² stranded tinned copper

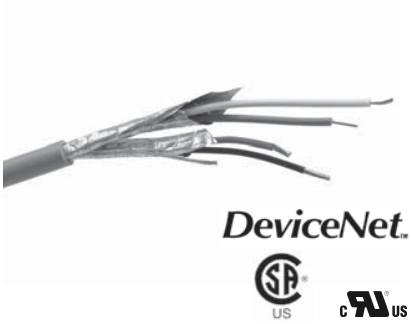
Cable profile:



Order code:

05.KABEL451.XXX
Cable length [m]
Example: 010 is 10 m

DeviceNet - Cable



Your benefit
- Highly flexible stranded-wire construction
- Oil and abrasion resistant outer jacket
- Halogen-free

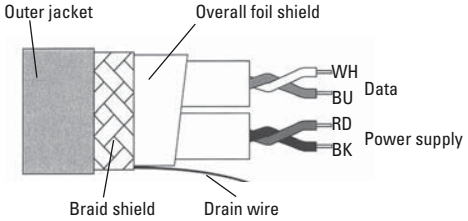
Product features
- PUR exhibits excellent oil resistance
- Can be used in drag chain installations

Characteristics:

Certified	AWM 300 V
Conductor specifications:	Power supply: black, red; 2/17 AWG, 2 x 1.04 mm², DCR 16,9Ω/km, insulation PVC Data transmission: blue, white; 2/20 AWG, DCR 34.1Ω/km, insulation PE
Outer jacket	PUR, colour: grey outer diameter 8.4 mm
Shield	Aluminum foil, drain wire 20 AWG 0.52 mm²

Order code:

05.KABEL5723.XXX
Cable length [m]
Example: 010 is 10 m



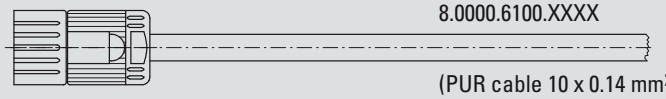
Pre-assembled cables for incremental encoders

- Compatible with Kübler encoders
- Saves on installation time, thanks to pre-wiring
- Reduces the possibility of wiring errors
- Eliminates risks of short-circuits
- Available lengths: 2, 3, 5, 8, 10, 15, 20, 25 and 30m; other lengths upon request.

Stock types
all connectors and cables can be delivered from stock

Suitable for encoders with push-pull output, inverted push-pull and RS 422 type series 5000, 5020, 5800, 5802, 5820, 5822, 9000. Assembled with 12-pin plug connector (female)

Order code 8.0000.6101.XXXX
(XXXX = length in m)



Includes plug connector type 8.0000.5012.0000 and cable type 8.0000.6100.XXXX

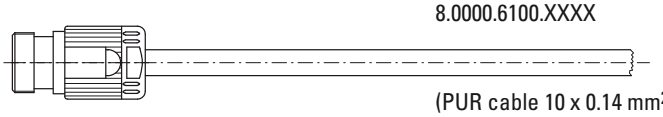
(PUR cable 10 x 0.14 mm² + 2 x 0.5 mm²)

PIN – cable colour assignment												
PIN:	1	2	3	4	5	6	7	8	9	10	11	12
Cable colour:	PK	BN	BU	RD	GN	YE	–	GY	–	WH 0.5 mm²	WH	BN 0.5 mm²

Shield applied on the connector housing

Suitable for encoders with push-pull output, type series 5000, 5020, 5800, 5802, 5820, 5822, 9000 and A020. Assembled with 12-pin plug connector (female) with coupling thread

Order code 8.0000.6103.XXXX
(XXXX = length in m)



Includes plug connector type 8.0000.5016.0000 and cable type 8.0000.6100.XXXX

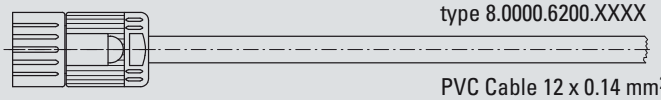
(PUR cable 10 x 0.14 mm² + 2 x 0.5 mm²)

PIN – cable colour assignment												
PIN:	1	2	3	4	5	6	7	8	9	10	11	12
Cable colour:	PK	BN	BU	RD	GN	YE	–	GY	–	WH 0.5 mm²	WH	BN 0.5 mm²

Shield applied on the connector housing

Suitable for encoders with push-pull output, inverted push-pull and RS 422 type series 5800, 5802, 5820,5822, 9000 and A020. Assembled with 12-pin plug connector (female)

Order code 8.0000.6201.XXXX
(XXXX = length in m)



Includes plug connector type 8.0000.5012.0000 and cable type 8.0000.6200.XXXX type 8.0000.6200.XXXX

PVC Cable 12 x 0.14 mm²

PIN – cable colour assignment												
PIN:	1	2	3	4	5	6	7	8	9	10	11	12
Cable colour:	PK	RD BU	BU	RD	GN	YE	–	GY	–	WH	GY PK	BN

Shield applied on the connector housing

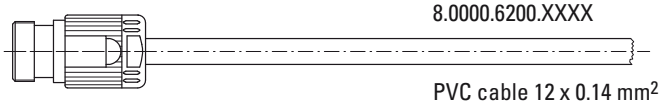
Pre-assembled cables for incremental encoders

- Compatible with Kübler encoders
- Saves on installation time, thanks to pre-wiring
- Reduces the possibility of wiring errors
- Eliminates risks of short-circuits
- Available lengths: 2, 3, 5, 8, 10, 15, 20, 25 and 30m; other lengths upon request.

Stock types
all connectors and cables can be delivered from stock

Suitable for encoders with push-pull output, type series 5000, 5020, 5800, 5802, 5820,5822, 9000 and A020.
Assembled with 12-pin plug connector (female) with coupling thread

Order code 8.0000.6203.XXXX
(XXXX = length in m)



Includes plug connector type 8.0000.5016.0000 and cable type 8.0000.6200.XXXX

PVC cable 12 x 0.14 mm²

PIN – cable colour assignment												
PIN:	1	2	3	4	5	6	7	8	9	10	11	12
Cable colour:	PK	RD BU	BU	RD	GN	YE	–	GY	–	WH	GY PK	BN

Shield applied on the connector housing

Suitable for encoders with push-pull output, type series 5810.
Assembled with 5-pin plug connector (female)

Order code 8.0000.6311.XXXX
(XXXX = length in m)

Includes plug connector type 8.0000.5022.0000 and cable type 8.0000.6300.XXXX

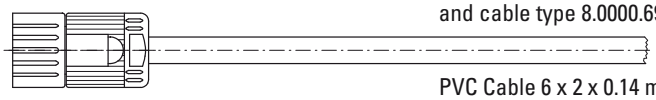
PVC cable 5 x 0.14 mm²

PIN – cable colour assignment					
PIN:	1	2	3	4	5
Cable colour:	WH	BN	GN	YE	GY

Shield applied on the connector housing

Suitable for encoders with RS 422 type or Voltage Sine Wave output, type series 5000, 50020, 5800, 5802, 5803, 5804, 5820, 5822, 5823, 5824, 9000, A020.
Assembled with 12-pin plug connector (female)

Order code 8.0000.6901.XXXX
(XXXX = length in m)



Includes plug connector type 8.0000.5012.0000
and cable type 8.0000.6900.XXXX

PVC Cable 6 x 2 x 0.14 mm²

PIN – cable colour assignment												
PIN:	1	2	3	4	5	6	7	8	9	10	11	12
Cable colour:	PK	RD BU	BU	RD	GN	YE	–	GY	–	WH	GY PK	BN

Shield applied on the connector housing

Pre-assembled cables for incremental encoders

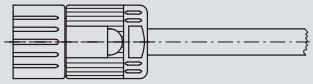
- Compatible with Kübler encoders
- Saves on installation time, thanks to pre-wiring
- Reduces the possibility of wiring errors
- Eliminates risks of short-circuits
- Available lengths: 2, 3, 5, 8, 10, 15, 20, 25 and 30 m; other lengths upon request.

Stock types
all connectors and cables can be delivered from stock

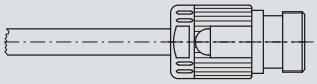
Suitable for all incremental encoders with push-pull output or RS 422 interface, type series 50xx, 58xx and 90xx

12-pin female plug to 12-pin male plug with coupling thread.

Order code 8.0000.6905.XXXX
(XXXX = length in m)



Includes plug connector type
8.0000.5012.0000 and cable type

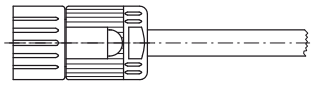


8.0000.6900.XXXX and connector type
8.0000.5015.0001 (pins)

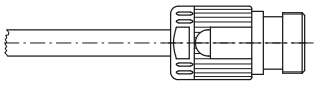
Suitable for encoders with push-pull outputs type series 5803, 5823, 5804 and 5824

12-pin female plug to 12-pin male plug with coupling thread: 1:1 connection

Order Code 8.0000.6E04.XXXX
(XXXX = length in m)



Includes plug connector type
8.0000.5012.0000 and cable type



8.0000.6E00.XXXX and connector type
8.0000.5015.0001 (pins)

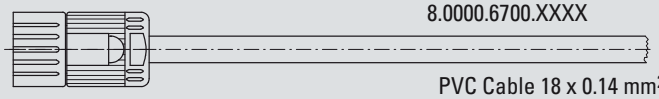
Pre-assembled cables for absolute encoders

- Compatible with Kübler encoders
- Saves on installation time, thanks to pre-wiring
- Reduces the possibility of wiring errors
- Eliminates risks of short-circuits
- Available lengths: 2, 3, 5, 8, 10, 15, 20, 25 and 30m; other lengths upon request

Stock types
all connectors and cables can be delivered from stock

Suitable for encoders with up to 14-bit parallel output, type series 5850, 5852, 5870, 5872. Assembled with 17-pin plug connector (female)

Order code 8.0000.6741.XXXX
(XXXX = length in m)



Includes plug connector type 8.0000.5042.0000 and cable type 8.0000.6700.XXXX

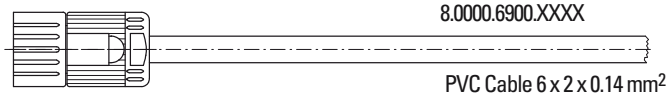
PVC Cable 18 x 0.14 mm²

PIN – cable colour assignment																	
PIN:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY PK	RD BU	WH GN	BN GN	WH YE	YE BN	WH GY

Shield applied on the connector housing

Suitable for encoders with SSI and analogue output, type series 5850, 5853, 5862, 5863, 5873, 5870, 5882, 5883, 9081
Assembled with 12-pin plug connector (female)

Order code 8.0000.6901.XXXX.0031
(XXXX = length in m)



Includes plug connector type 8.0000.5012.0000 and cable type 8.0000.6900.XXXX

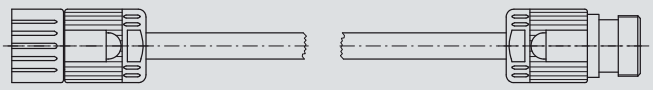
PVC Cable 6 x 2 x 0.14 mm²

PIN – cable colour assignment												
PIN:	1	2	3	4	5	6	7	8	9	10	11	12
Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY PK	RD BU

Shield applied on the connector housing

Suitable for encoders with SSI and analogue output, type series 5850, 5853, 5862, 5863, 5873, 5870, 5882, 5883, 9081,
12-pin female plug to 12-pin male plug with coupling thread female plug

Order code 8.0000.6905.XXXX.0032
(XXXX = length in m)



Includes plug connector type 8.0000.5012.0000 and cable type 8.0000.6900.XXXX

PIN – cable colour assignment												
PIN:	1	2	3	4	5	6	7	8	9	10	11	12
Cable colour:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY PK	RD BU

Shield applied on the connector housing

NEW

Optical fibre module

The solution for tough signal transmission.
The system is made up of an optical fibre transmitter and an optical fibre receiver. The optical fibre transmitter converts the electrical signals of an usual incremental encoder into a light signal for transmission by means of an optical fibre.

The receiving module converts the optical signal back into electrical signals. Up to 4 channels may be transmitted safely.

Innovative:

- **Signal transmission thanks to a simple glass fibre**
- **Safe signal transmission up to 1000 m**
- **Input frequency up to 400 kHz**
- **Input level 10 – 30 V or RS 422**
- **Inverted input signals**
- **Resists extremely strong electro-magnetical fields**

Compact:

- **Only 22 mm wide**
- **DIN rail mounting, small size**

Versatile:

- **Process control technology and automation technology**
- **Interference-sensitive applications**
- **High voltage plants**
- **Plants with long transmission distances**
- **Potential separation**
- **Explosive areas**

Technical data:

Supply voltage:	10 ... 30 V or 5 V ± 5%
Power consumption per module:	< 2 W
Operating voltage reverse connection protection:	available
Encoder inputs - optical fibre transmitter:	Channels A, A\, B, B\, 0, 0\
Max. input frequency - optical fibre transmitter: and output frequency - optical fibre receiver:	400 kHz
Input level - optical fibre transmitter:	10 ... 30 V or RS 422
Optical wavelength:	820 nm
Optical transmission rate:	120 Mbit/s
Optical fibre connection:	ST connector, 13 mm, ø 9 mm, on the bottom side of the housing
Glass fibre:	Multimode fibre, 50/125 µm, 62,5/125 µm
Optical fibre synchronisation display:	LED on the receiver
Input signals sampling rate:	10 MSamples/s
Max. optical fibre transmission distance:	1000 m
Dimensions:	22,5 x 110,8 x 88,4 mm (B x L x H)
Protection:	IP 40, terminals IP 20
Terminals:	Protected against contact, max. conductor diameter: 2,5 mm^2
Temperature range	-10 °C ... +60 °C
Standards:	EN 55 011 Class B1 EN 61 000 - 6 - 2: 2006

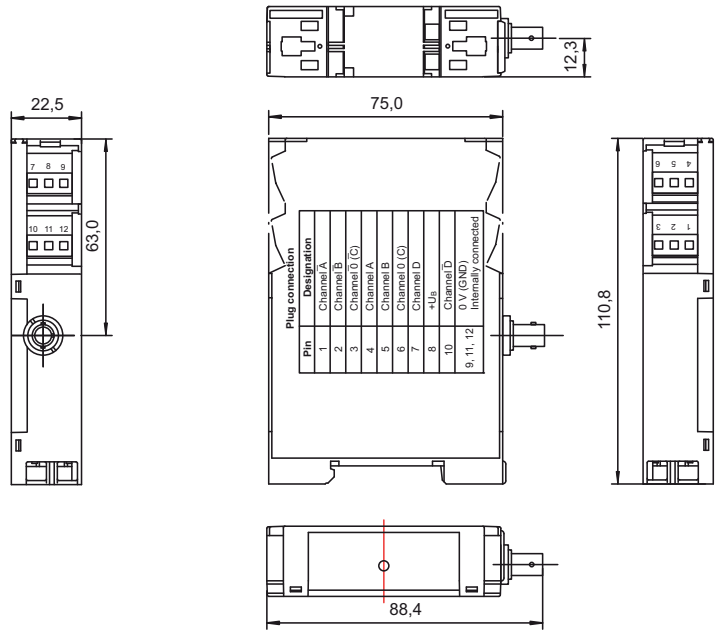
LED function:

Green LED ON when the supply voltage and the optical fibre cable are connected correctly.

The LED in the receiver module (LWLE) blinks when the optical fibre cable is not connected correctly or is broken.

Optical fibre module

Dimensions:



Connecting diagram of the optical fibre transmitter and receiver:

Pin	Description
1	Channel $\overline{A}$
2	Channel $\overline{B}$
3	Channel $\overline{0}$ ($\overline{C}$)
4	Channel A
5	Channel B
6	Channel 0 (C)
7	Channel $\overline{D}$
8	+ UB
10	Channel D
9, 11 , 12	0 V, GND, linked internally

Order code:

Optical fibre transmitter

UB = 10 ... 30 V DC, input RS 422:	6. LWLS.1
UB = 10 ... 30 V DC, input HTL, without inversions:	6. LWLS.2
UB = 5 V DC, input RS 422:	6. LWLS.4
UB = 10 ...30 V DC, input HTL:	6. LWLS.5

Optical fibre receiver

UB = 10 ... 30 V DC, output RS 422:	6. LWLE.1
UB = 5 V DC, output RS 422:	6. LWLE.4
UB = 10 ... 30 VDC, output HTL:	6. LWLE.5

Scope of delivery:

- Optical fibre module
- Multilingual operating manual

Accessories:

Simplex Patch cable ST-ST - Multimode

Connector: 2xST/PC, fibre: 1x50/125
Standard lengths: 2 m, 5m, 8m, 10m, 15m, 20m, ... (in 5m steps)

Order code:

05.B09-B09-821-LXXX
Length in m

ST Multimode coupling

Barrel: ceramic, slotted
Order code: 05.LWLK.001

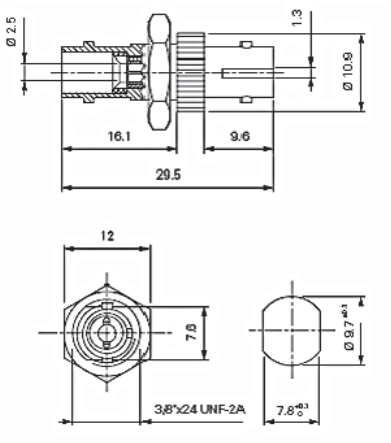


Table of contents

Fig.	Example of use	Use	Order code:	Pitch circle diameter	Suitable for encoders	Page
		For applications with high axial play	8.0010.4K00.0000 Long spring element	cylindrical pin 110 mm	A020, A02H 9080, 9081	262
		For applications with reduced mounting space	8.0010.4J00.0000 Short spring element	cylindrical pin 76 mm	A020, 9080, 9081	262
		For applications with axial and radial play with low dynamics for constant rotary movements	8.0010.4G00.0000 Tether square	A02X: 65 mm 9080: 60 mm 9081: 60 mm 1 screw	A020, A02H, 9080, 9081	262
		For applications with fastening points located on variable pitch circle diameters	8.0010.4E00.0000 Tether arm large	104 mm – 206 mm 1 screw	A020, A02H, 9080, 9081	263
		For applications with axial play	8.0010.4T00.0000 Tether arm short	149 mm 1 screw	A020, A02H, 9080, 9081	263
		For applications with axial and radial play, and high dynamics	8.0010.40V0.0000 Stator coupling	119 mm 2 screws	A020, A02H	264
		For applications with low axial and radial play, flexible in use	Tether arm Length = 70 mm 8.0010.40S0.0000 Length = 100 mm 8.0010.40T0.0000 Length = 150 mm 8.0010.40U0.0000	Flexible 262 ... 422 mm 1 screw	A020, A02H, 9080, 9081	263

Fig.	Example of use	Use	Order code:	Pitch circle diameter	Suitable for encoders	Page
		For applications with axial play and low dynamics	8.0010.4I00.0000 Spring element	3620: 60 mm 3720: 63 mm 5020: 44 mm 58XX: 65 mm Cylindric pin	3620,3720, 5020,582X, 587X,588X	264
		For standard applications with axial and radial play, and high dynamics	8.0010.1602.0000	65 mm	5020, 582X, 587X, 588X	265
		For standard applications with axial and radial play, and high dynamics	8.0010.1602.0000	65 mm	582X, 587X, 588X	265
		For applications with axial and radial play, and high dynamics	8.0010.4R00.0000 Flexible fastening arm	80 mm – 170 mm 1 screw	5020,582X, 587X,588X	266
		For applications with axial and radial play, and high dynamics	8.0010.40L0.0000 Stator coupling	65 mm 3 screws	5020,582X, 587X,588X	266
		For applications with axial and radial play, for constant rotary movements	8.0010.40E0.0000 Flexible fastening arm	65 mm – 91,5 mm 1 screw	5020,582X, 587X,588X	266
		For applications with axial and radial play, for constant rotary movements	8.0010.40M0.0000 Flexible fastening arm	65 mm – 91,5 mm 1 screw	5020,582X, 587X,588X	267
		For applications with axial and radial play, and high dynamics	8.0010.4C00.0000 Double-winged stator coupling	46 mm 2 screws	3720, 3620	267
		For applications with limited axial play and low dynamics, and reduced mounting space	8.0010.4H00.0000 Spring element	3620: 42 mm 3720: 40 mm 5020: 58XX: 42 mm Cylindric pin	3620, 3720, 5020,582X, 587X,588X	267

Mounting attachments

Mounting kit for large hollow shaft encoders

These attachments allow a wide range of mounting variants.

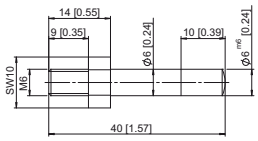
Suitable for the A02X and 908X encoders

Supplied as a comprehensive set:
Order code 8.0010.4A00.0000
The kit includes the following individual elements, which may also be ordered separately.

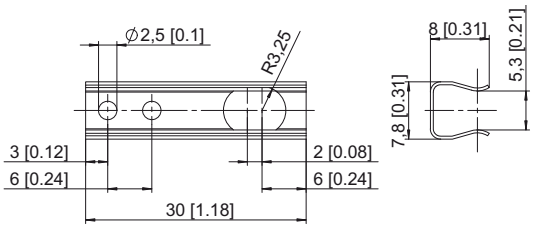
1 x long cylindrical pin with fastening thread
Order code 8.0010.4700.0003

1 x long spring element
Order code 8.0010.4K00.0000
(The set includes the screws)

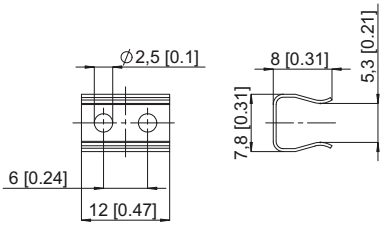
1 x short spring element
Order code. 8.0010.4J00.0000



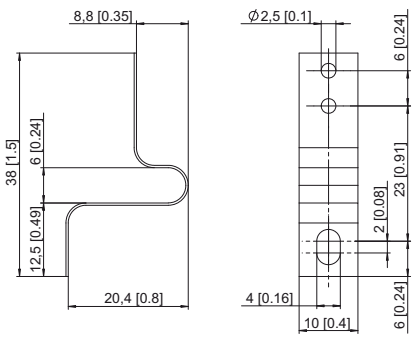
1 x long spring element
Order code 8.0010.4K00.0000



1 x short spring element
Order code 8.0010.4J00.0000



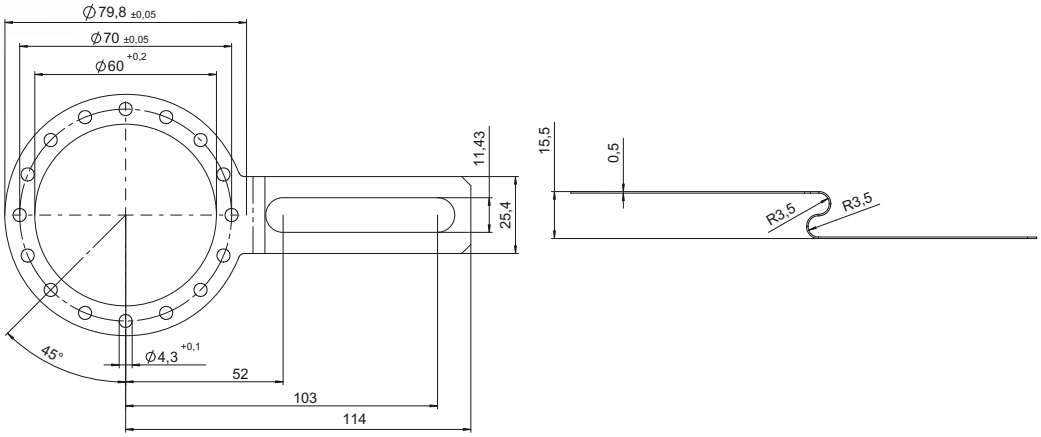
Tether square
Order code 8.0010.4G00.0000



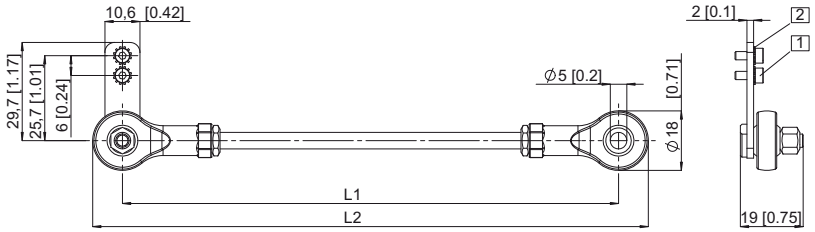
Tether arm large

- For encoder types A020 and 908X
- Prevents radial play of the encoder
- The necessary axial play remains unchanged
- Material:
  – Mounting flange: stainless steel
  – Screws: steel, galvanized

Delivery includes:
– Flexed spring device
– 3 screws
Order code: 8.0010.4E00.0000



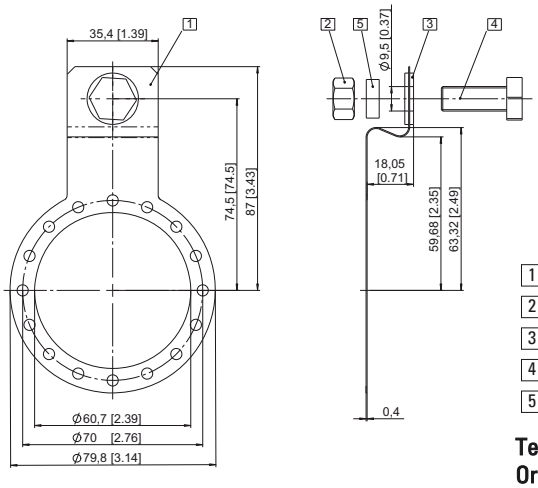
Tether arm large, flexible



Tether arm			
Length L	L1	L2	**Order code**
70 mm	70 [2.76]	88 [3.46]	**8.0010.40S0.0000**
100 mm	100 [3.94]	118 [4.65]	**8.0010.40T0.0000**
150 mm	150 [5.91]	168 [6.61]	**8.0010.40U0.0000**

1 Socket cap screw M2.6x6
2 Lock washer

Tether arm short

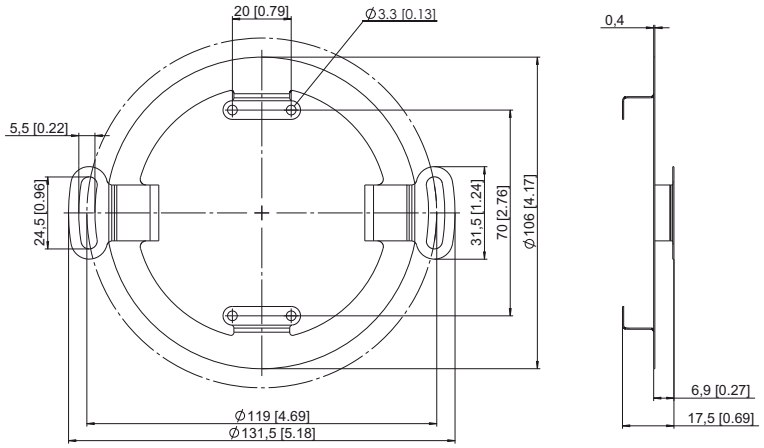


1 Curved spring element
2 Hexagonal nut 3/8 - 16 UNC
3 Washer (isolating)
4 Hexagonal screw 3/8 16 UNC x 1"
5 Washer D10,4 x 15 x 15

Tether arm short
Order code: 8.0010.4T00.0000

Stator coupling

Stator coupling
Order code: 8.0010.40V0.0000

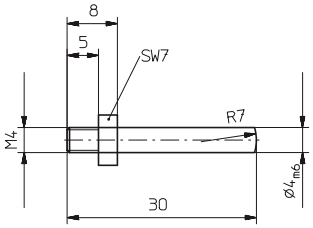


Mounting set for hollow shaft encoders 58 mm

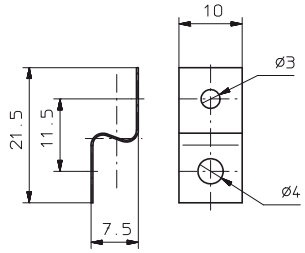
Various mounting variants can be supplied

Delivery includes:

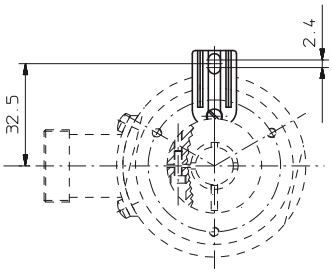
1 x cylindrical pin with thread
Order code 8.0010.4700.0000



1 x mounting flange
Order code T.035.009
incl. screw M3x5
Order code N.630.305

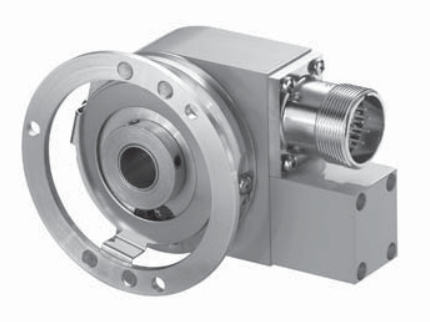


1 x long torque support slot
Order code 8.0010.4I00.0000



Complete set:
Order code 8.0010.4600.0000

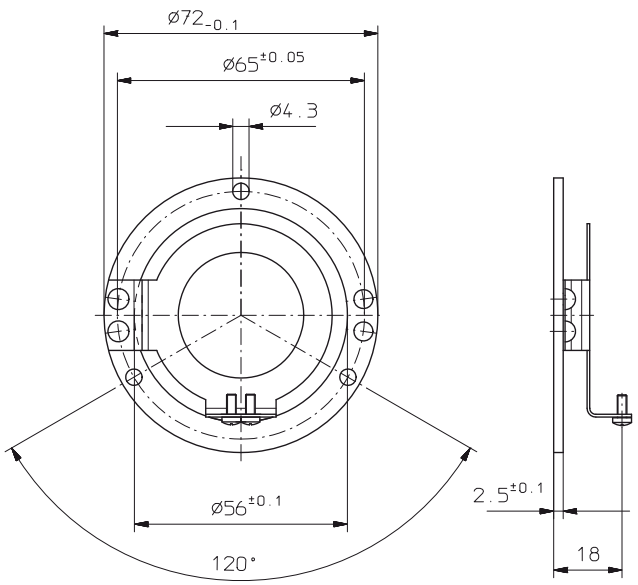
Mounting attachments

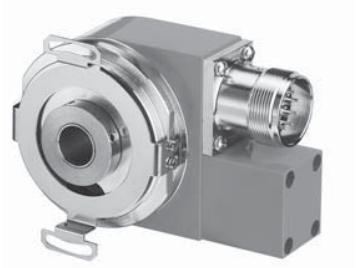


- Stator coupling for hollow shaft encoders
- Mounting kit for hollow shaft encoder

Stator coupling for hollow shaft encoders:
For hollow shaft encoders type series
582X, 587X, 588X, 7030 or 7031

Delivered as a kit with 2 fixing screws
Order code 8.0010.1602.0000

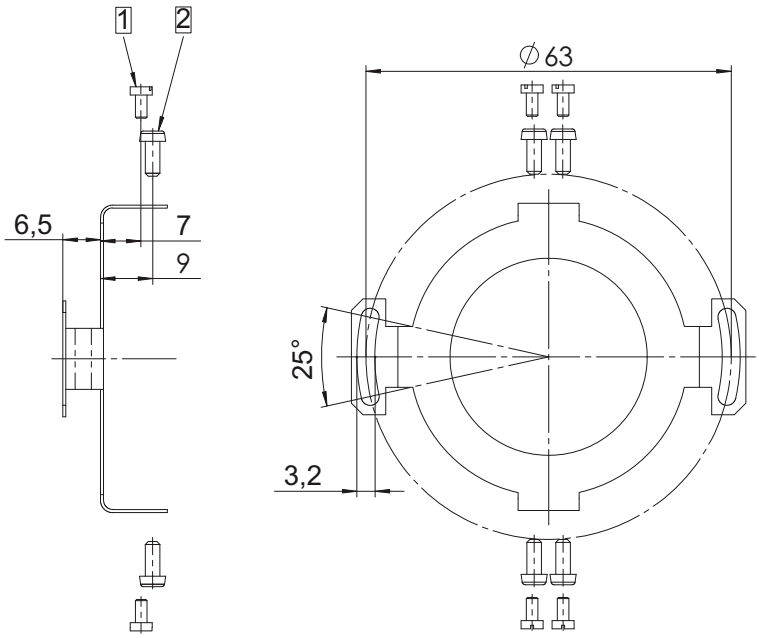




Double-winged stator coupling
- For increased torsional strength
- For increased dynamic loads

Kit for hollow shaft encoders type 58XX
comprising:
- 1 x stator coupling, double-winged
- 2 x 2 screws

Complete kit:
Order code 8.0010.4D00.0000

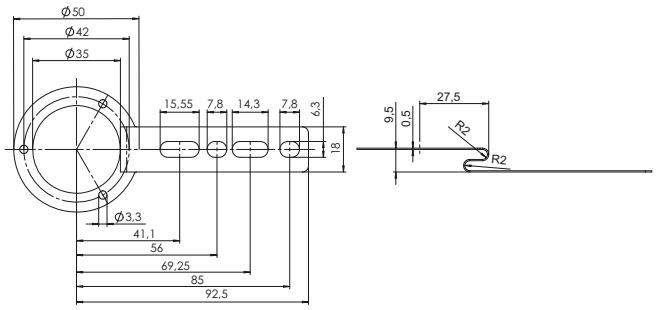


1 Fixing screw for 5882
2 Fixing screw for 582X, 587X

Mounting attachments

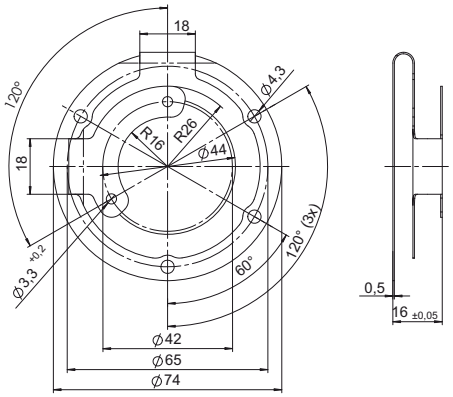
8.0010.4R00.0000
Flexible fastening arm

Suitable for:
5020,582X,
587X,588X



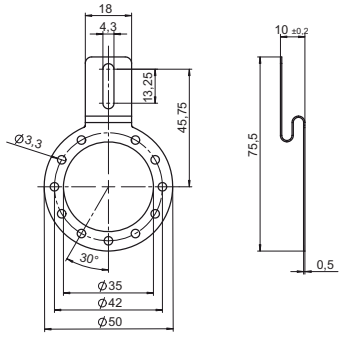
8.0010.40L0.0000
Stator coupling (The kit includes the screws)

Suitable for:
5020,582X,
587X,588X



8.0010.40E0.0000
Flexible fastening arm

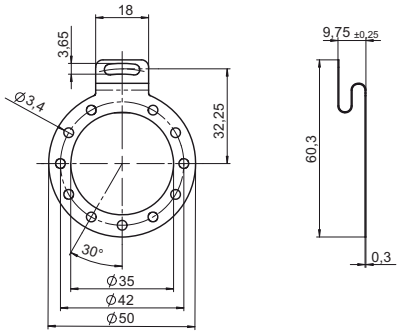
Suitable for:
5020,582X,
587X,588X



Mounting attachments

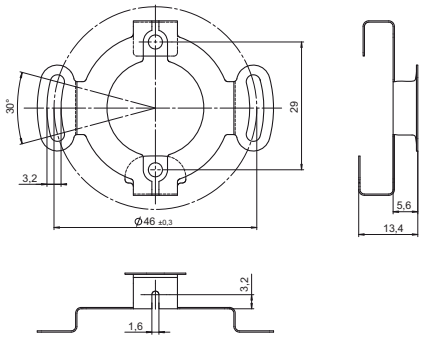
8.0010.40M0.0000
Flexible fastening arm

Suitable for:
5020,582X,
587X,588X



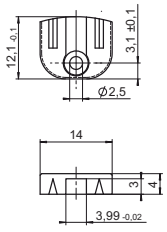
8.0010.4C00.0000
Double-winged stator coupling

Suitable for:
3720, 3620



8.0010.4H00.0000
Spring element

Suitable for:
3620, 3720,
5020,582X,
587X,588X



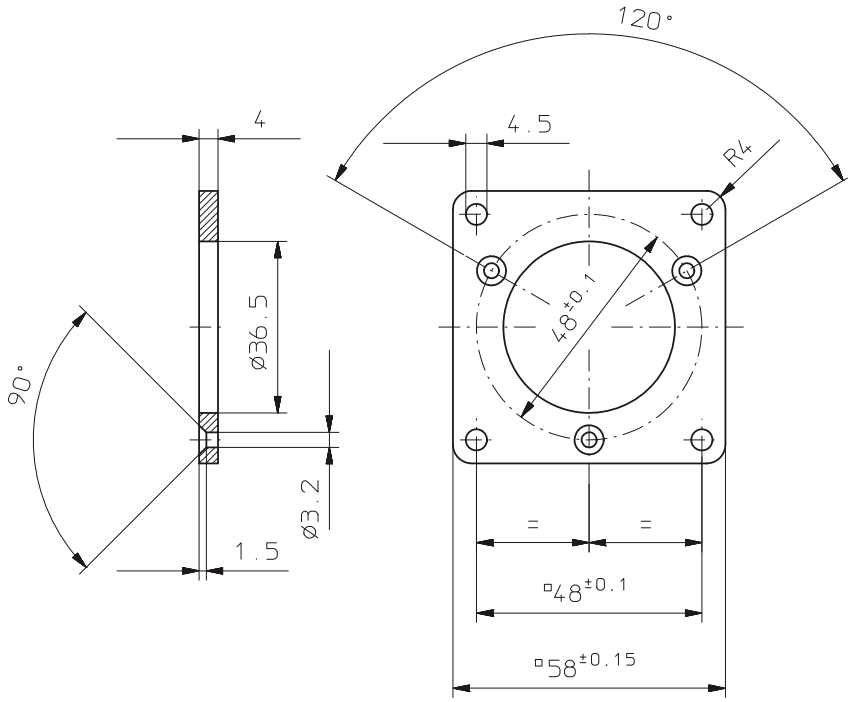
Flanges

- Suitable for shaft encoders with clamping flange
- Mounting screws included
- Material aluminium

Square flange:
Suitable for shaft encoders type series 580X and 5000 with clamping flange

Order code
8.0010.2100.0000 (Kit)

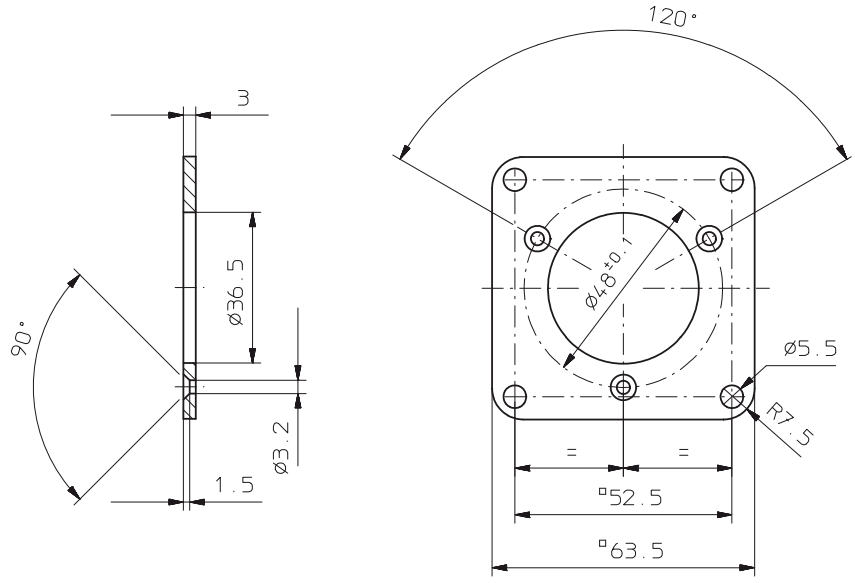
Includes flange and screws for encoder mounting.



Square flange:
Suitable for shaft encoders type series 580X and 5000 with clamping flange

Order code
8.0010.2120.0000 (Kit)

Includes flange and screws for encoder mounting.

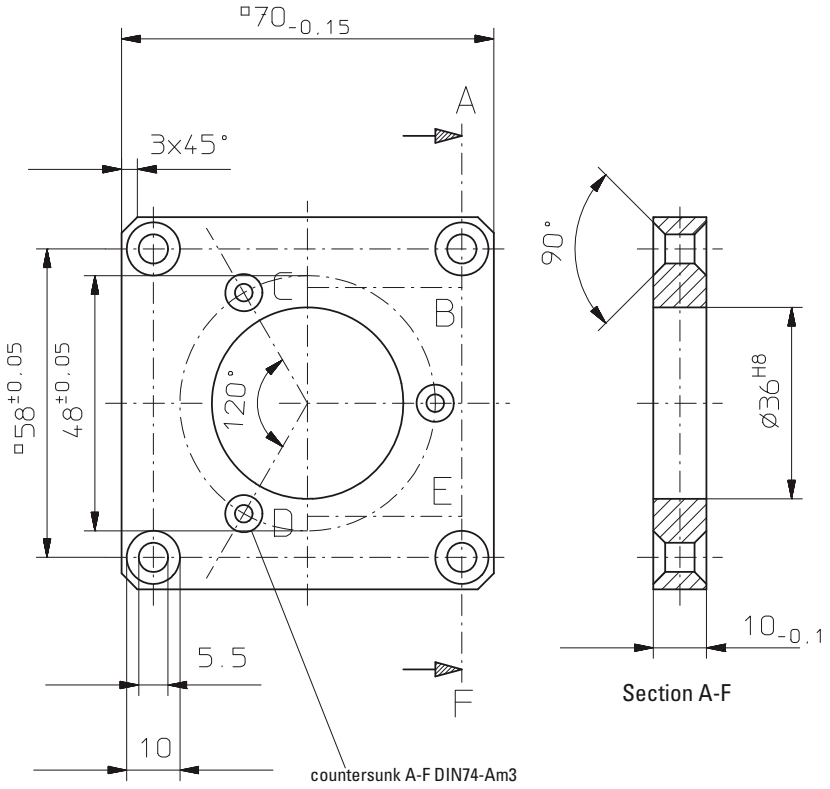


Flanges

Square flange:
Suitable for shaft encoders type series 580X and 5000 with clamping flange
Material: aluminium

Order code
8.0010.2600.0000 (Kit)

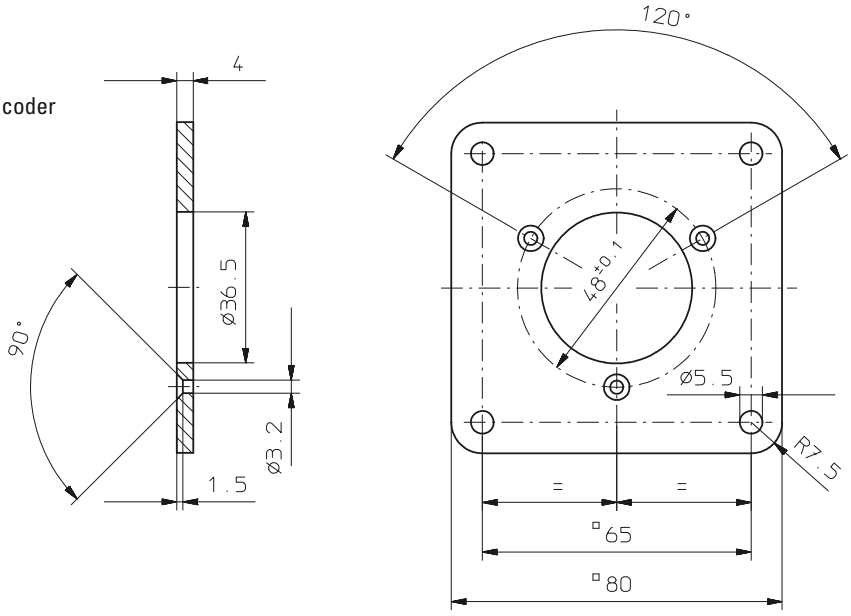
Includes flange and screws for encoder mounting.



Square flange:
Suitable for encoders type series 580X and 5000 with clamping flange

Order code
8.0010.2800.0000 (Kit)

Includes flange and screws for encoder mounting.



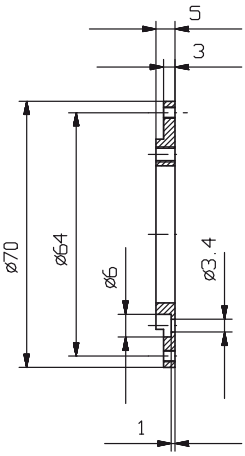
Round flange

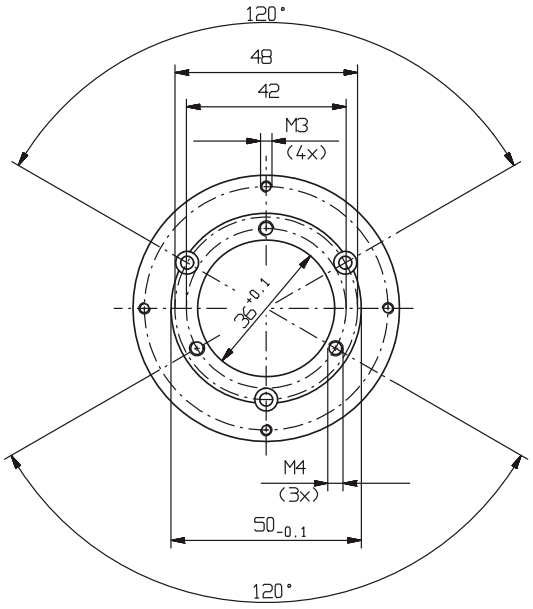
- Suitable for Kübler encoders with clamping flange
- Includes flange and screws for encoder mounting.
- Material aluminium

Round flange:
Suitable for shaft encoders type series 580X and 5000 with clamping flange

Order code
8.0010.2200.0000 (Kit)

Includes flange and screws for encoder mounting.

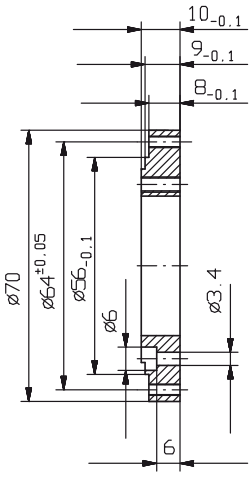


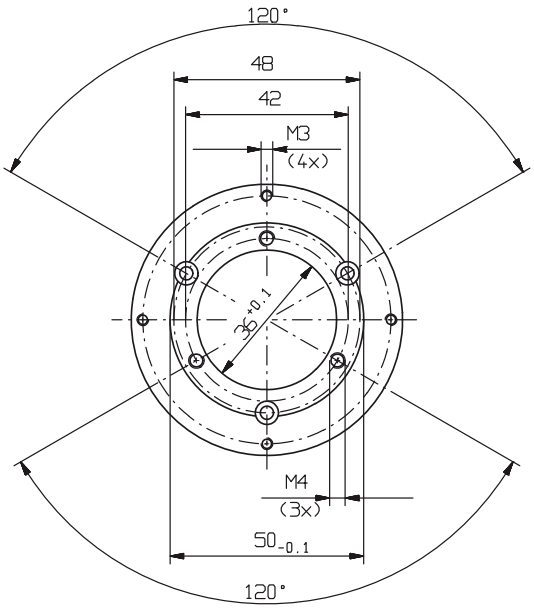


Round flange:
Suitable for shaft encoders type series 580X and 5000 with clamping flange

Order code
8.0010.2500.0000 (Kit)

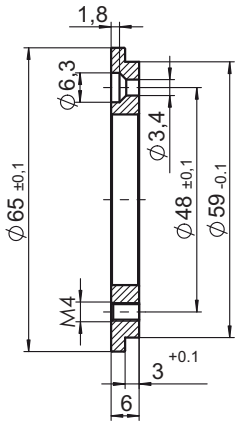
Includes flange and screws for encoder mounting.

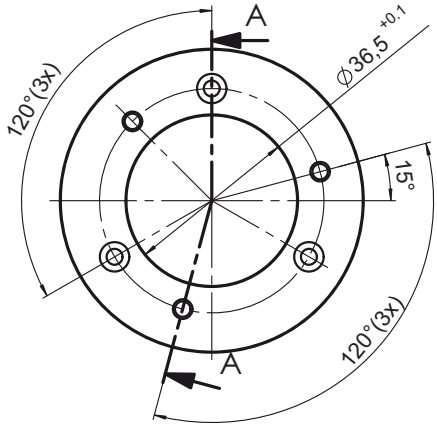




Adapter flange 65

- Suitable for encoders of the 580X and 5000 series with clamping flange
- With this adapter flange, Küber encoders with size 58 mm can replace encoders with diameter 65 and pitch circle diameter 48 mm
- Screws are included in delivery
- Material: aluminium





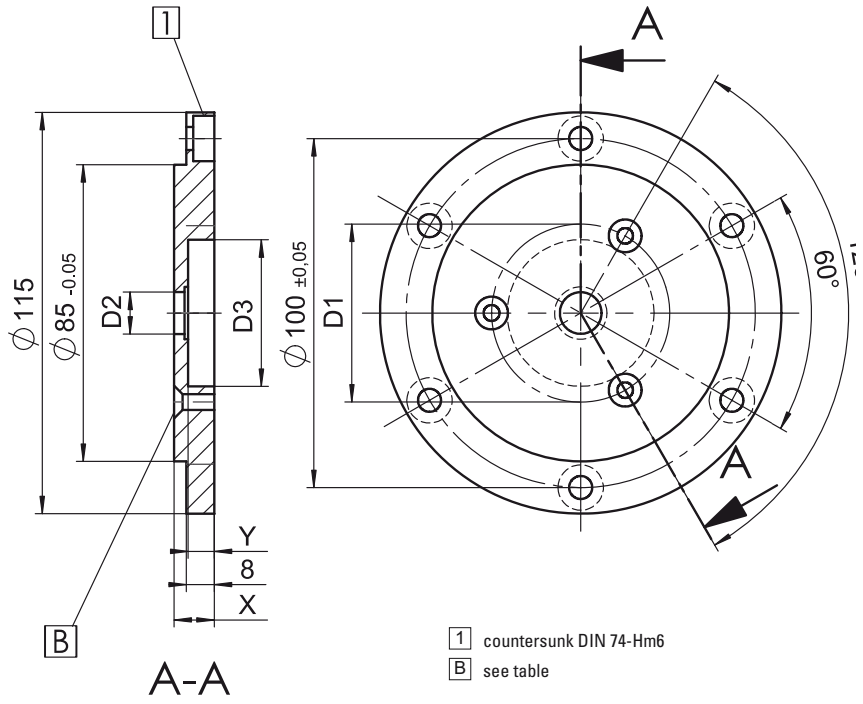
Order code
8.0010.2230.0000 (Set)
Includes flange and screws
for encoder mounting.

Flanges

Round flange (Euro REO 444):
Suitable for shaft encoders
type series 580X and 5000
703X
9000

Order code
see table (Kit)

Includes flange and screws for encoder mounting.



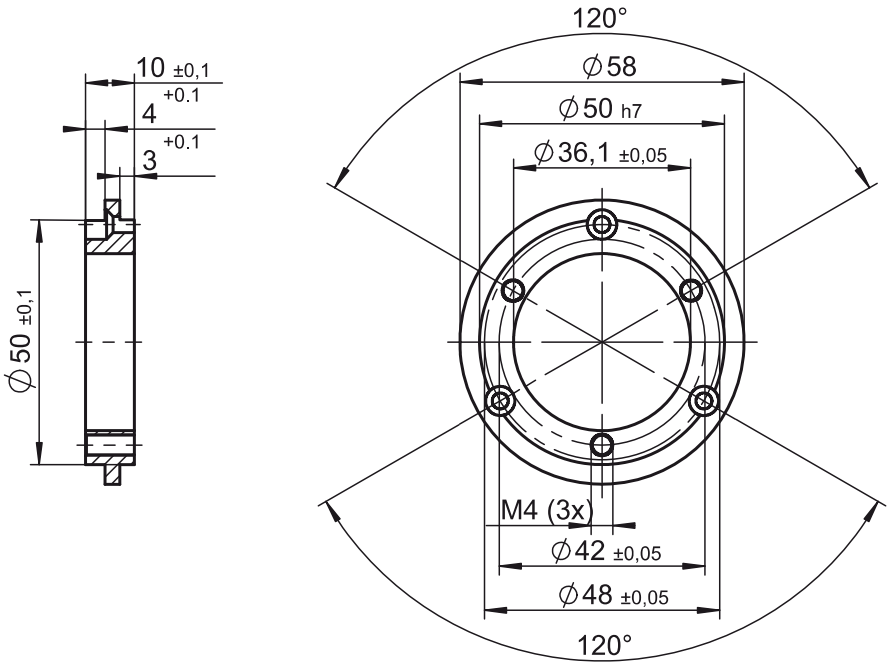
Encoder type	Order code	D1	D2	D3	X	Y	B
580X/5000:	8.0010.2160.0000	48	36	58	11	1	DIN 74-BM3
703X	8.0010.2170.0000	51	12	42	11,5	7,5	DIN 74-BM4
9000	8.0010.2130.0000	60	40	90	11,5	6,5	DIN 74-BM6

Adapter flange

For type series 580X and 5000 encoder
To mount encoders with clamping flange using the fastening eccentrics.

Includes flange and screws for encoder mounting.

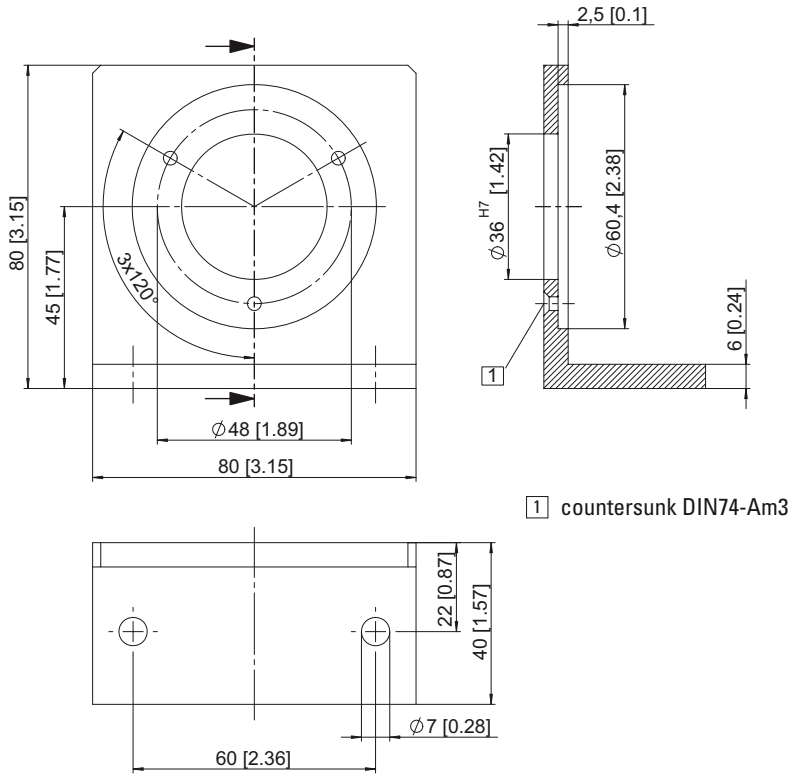
Order code 8.0010.2180.0000 (Kit)



Mounting attachment

Angular flange:
Suitable for shaft encoders type series 580X and 5000 with clamping flange

Order code
8.0010.2300.0000 (KIT)
Includes flange and screws for encoder mounting.

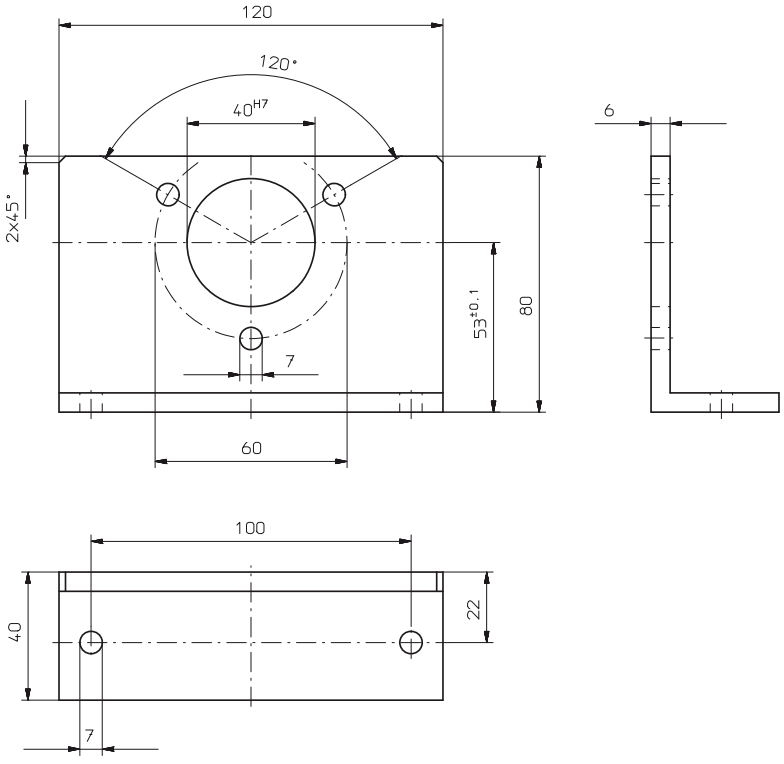


1 countersunk DIN74-Am3

Angular flange:
Suitable for shaft encoder 8.90XX
Material: aluminium

Order code
8.0010.2400.0000 (Kit)

Includes flange and screws for encoder mounting.

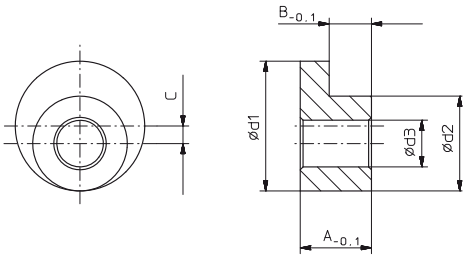


Mounting attachment

- Fastening eccentrics for rotary encoders with synchronous flange
- Including screws
- Material: ACu Zn 39 Pb 3
- Surface finish: galvanized Ni

Fastening eccentrics for shaft encoders with synchronous flange

Note:
Use at least three fastening eccentrics to mount the encoder.



Application example

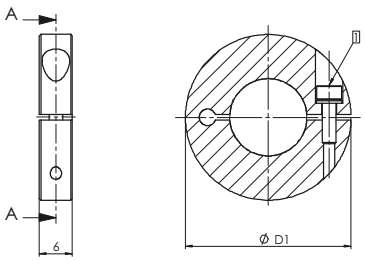
Dimensions table

d_1	d_2	d_3	A	B	C	For encoder type	Order code (set)
6,8	5	2,8	3,5	2,25	0,9	8.3600.1XXX.XXXX	8.0010.4200.0000
8,9	6,5	3,2	5,6	2,9	1,2	8.58XX.2XXX.XXXX	8.0010.4100.0000
14	9	5,3	10	4,9	2,5	8.90X0.1XXX.XXXX	8.0010.4300.0000
(set includes 3 eccentrics and 3 screws)							

Mounting attachments for hollow shaft encoders

Clamping ring, stainless steel

Stainless steel, balanced
clamping ring for high rotational speeds.



1 Screw DIN 912 A2 M2.5, maximum tightening torque 0.45 Nm.

Ordering designations

Order code:	For encoders with hollow shaft diameter
8.0000.4T00.0000	6,0 mm
8.0000.4U00.0000	8,0 mm
8.0000.4V00.0000	10,0 mm
8.0000.4W00.0000	12,0 mm

Couplings

- Bellow type couplings are recommended as an inexpensive type of coupling
- They are also suitable to compensate larger angular displacements
- Spring washer type couplings for high speed applications
- Easy to mount, two parts

Description and applications

Manufacturing and installation tolerances as well as the effects of temperature cause alignment errors between shafts in drive engineering which can sometimes lead to extreme overload on the bearings.
This may result in increased wear of the bearings and may lead to premature failure of the encoder. By using couplings, these alignment errors can be compensated, thereby reducing the load on the bearings to a minimum.
A distinction should be made between three different kinds of alignment error: radial, angular and axial displacement.
Whilst with torsion-free but bendable shaft couplings, axial shaft displacements produce only static forces in the coupling, radial and angular displacements produce alternating stresses, restoring forces and moments which may have an impact on adjoining components (shaft bearings).
Depending on the type of coupling, particular attention should be paid to radial shaft displacement which should be kept to a minimum.

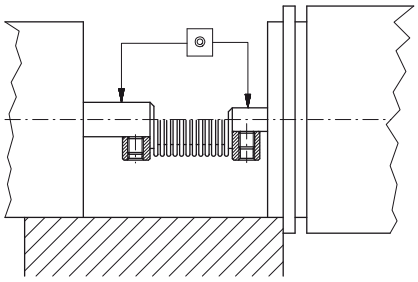
Areas of application:

Metal bellows-type couplings (.1101 and 1201) are recommended as an inexpensive type of coupling. They are also suitable for compensating larger angle displacements.

Spring washer-type couplings (.1300 and .1401) are used mainly in those cases where high speeds and smaller angular displacements are involved. For applications where electrical insulation between rotary encoder and drive is required, the electrically insulating spring whasher-type coupling should be used.

Installation instructions:

1. Check shaft for displacement; See technical data for details
2. Align and adjust coupling on shafts.



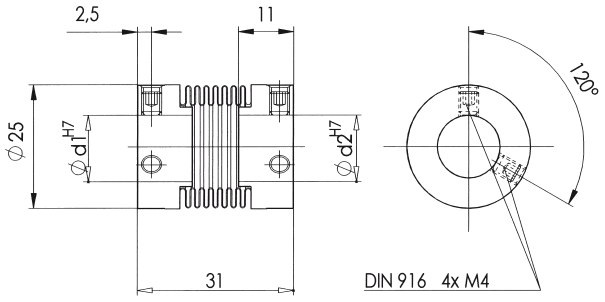
3. Tighten locking screws carefully. Avoid overtightening.
4. During installation protect the coupling from damage and from overbending.

Technical data

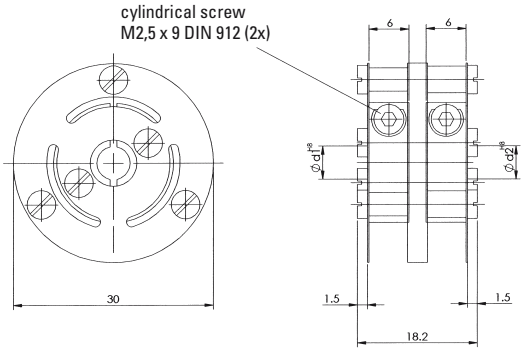
Type		8.0000.1101.XXXX	8.0000.1201.XXXX	8.0000.1301.XXXX	8.0000.1401.XXXX	1501.XXXX
Max. speed	min^{-1}	12000	12000	12000	12000	12000
Max. torque	Ncm	150	50	80	60	200
Max. radial displacement	mm	± 0,2	± 0,2	± 0,4	± 0,3	± 0,2
Max. angular displacement	Grad	± 1,5	± 1,5	± 3	± 2,5	± 1,5
Max. axial displacement	mm	± 0,7	± 0,5	± 0,4	± 0,4	± 0,6
Torsion spring parameter	Ncm/Grad	700	210	265	55	1300
Moment of inertia	gcm^2	5,5	1,2	19	35	18
Weight approx.	g	14	6	16	30	24
Material: Flange		Al	Al	Al cu Mg Pb	diecast Zinc	Al
Bellow or spring washer/casing		stainless steel	stainless steel	Cu Sn 6 Vern.	PA 6,6 20% gf	stainless steel
Diameter d/d1 from ... to	mm	3...12	3...9	3...8	4...16	3...16
Max. tightening torque of locking screws	Ncm	150	70	80	80	180
Standard bore diameter	mm $[d_1/d_2]$	12/12 12/10 10/10 6/6	8/6 6/6 6/4 4/4 10/8	6/6 6/4	12/12 12/10 10/10 10/6 6/6 3/8"/10 3/8"/6 1/4"/10 1/4"/6	15/12 14/12 14/10 06/14

Couplings

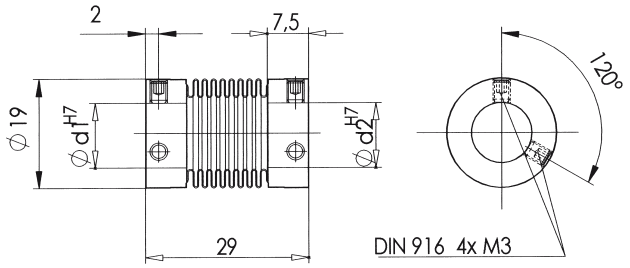
Bellows-type coupling
Order code 8.0000.1501.XXXX



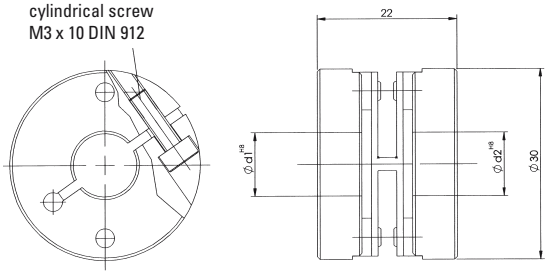
Spring washer coupling
Order code 8.0000.1300.XXXX



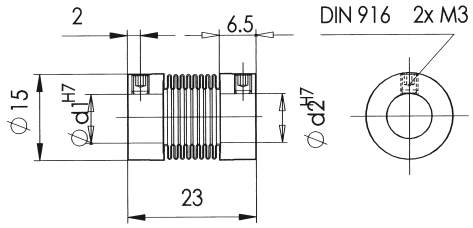
Bellows-type coupling
Order code 8.0000.1101.XXXX



Spring washer coupling
Order code 8.0000.1401.XXXX



Bellows-type coupling
Order code 8.0000.1201.XXXX



Order code:

8.0000.1X01.XXXX

Description of the Order Code

Type of coupling	
1	Bellows-type ø 19 mm
2	Bellows-type ø 15 mm
3	Spring washer type
4	Spring washer type*
5	Bellows-type ø 25 mm

Bore diameter d_2 (see table)

Bore diameter d_1 (see table)	
Example:	a) d_1 = 10 mm and d_2 = 12 mm => XXXX.XXXX.1012)
Note:	for the bore diameter d1 = 3/8" please enter Code A1 d1 = 1/4" please enter Code A2
Example:	b) Coupling type 1401 with d_2 = 10 mm and d_1 = 3/8": Order code = 1401.A110

Bearing block: Separation of bearing load and sensor component

Flexible
- Versions for retrofitting to solid shaft encoders; Versions for hollow shaft encoders for very small installation depth
- Simple upgrade, no mechanical adaptation

Upgradeeable
- Simple and easy to upgrade and retrofit

Reliable
- Long service life, durable mounting
- By separating the bearing load and the sensor technology the encoder is well protected even in harsh application conditions. This is, for example, a particular advantage with belts that can be tensioned differently such as occurs in lift construction (shaft copying)

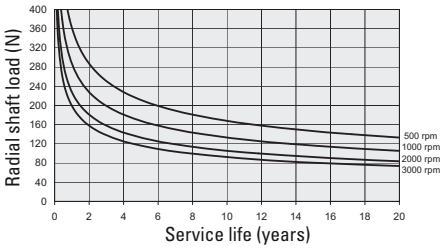
Mechanical characteristics:

	Shaft	Hollow shaft
Speed:	max.3000 min^{-1}	max.6000 min^{-1}
Load capacity of the shaft:	radial: 400 N (optional 600 N), axial: 200 N	radial: 300 N, axial: 150 N
Weight:	approx. 400 g	
Material:	shaft: stainless steel, flange: anodised aluminum, grub screw, protection for bore nut: steel	

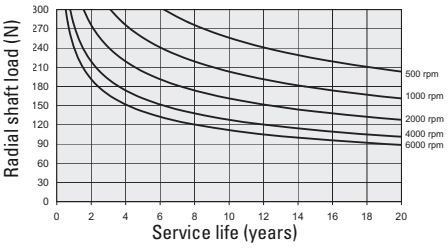
Shaft version

Hollow shaft version

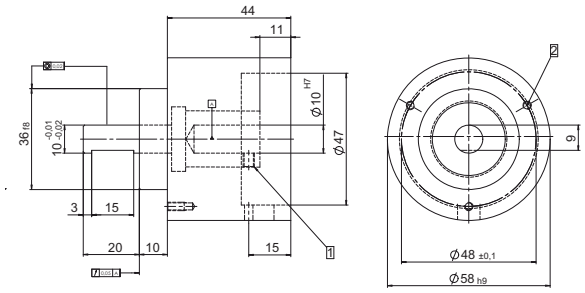
Service life dependent on the radial shaft load



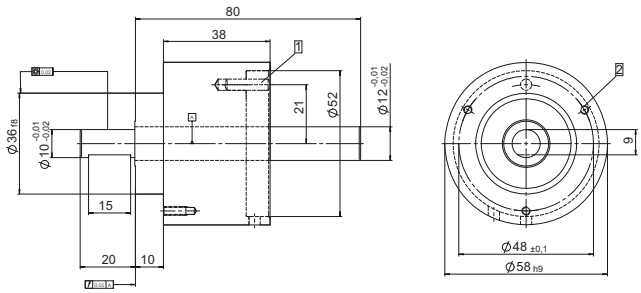
Service life dependent on the radial shaft load



Dimensions:



1 M4, SW2 2 M3, 5 depth (3 x 120°)



1 Cyl. pin DIN 7 ø 4 x 16 2 M3 x 8

Order code:

Type	Bearing block for solid shaft encoder ø 58 mm with clamping flange and shaft ø 10 mm	Bearing block for hollow shaft encoder ø 58 mm with hollow shaft ø 12 mm
Art. No.	8.0010.8200.0006	8.0010.8400.0007

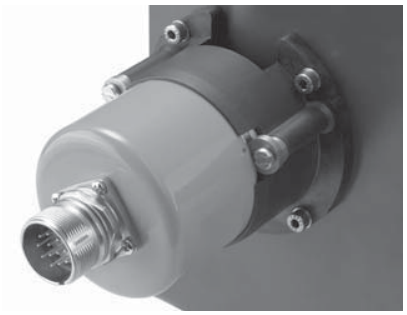
Assembly bell

- easy and quick encoder mounting
- electrical and thermal insulation: use of fibre glass plastic
- complete delivery (kit)

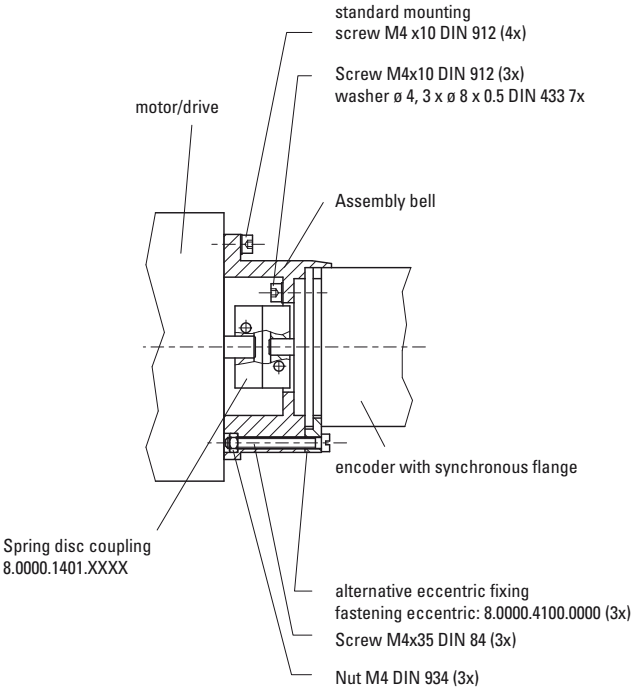
Kit includes:

– Assembly bell
– Spring washer type coupling Order code 8.0000.1401.XXXX
– 4 x hexagon socket head cap screws DIN 912 M 4 x 12
– 3 x hexagon socket head cap screws DIN 912 M 4 x 10
– 7 x washers DIN 433 Ø4
– 3 x fastening eccentrics 8.0000.4B00.0000
– 3 x hexagon head screws DIN 84 M 4 x 35
– 3 x hexagon nuts DIN 934 - M4

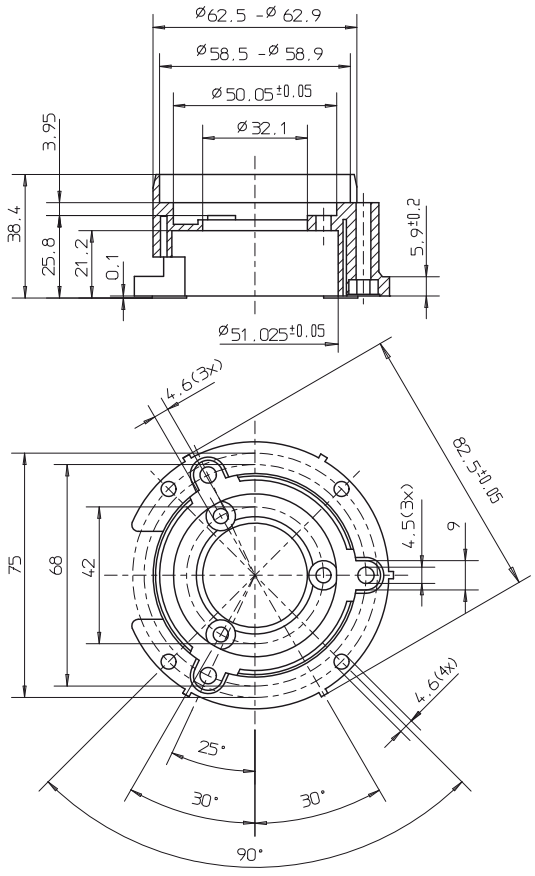
Example:



Mounting example:



Dimensions:



Order code:

8.0000.4500.XXXX

Bore diameter of coupling d_1 in mm

Bore diameter of coupling d_2 in mm

Bearing box

Description

In applications where the encoder is driven by use of gears, chains, belts etc. and the permitted axial and radial shaft loads are exceeded, we recommend the use of the special designed bearing box which has stronger bearings.

It can be combined with all encoders of the type series 58XX with clamping flange and shaft ø10 x 20 mm..

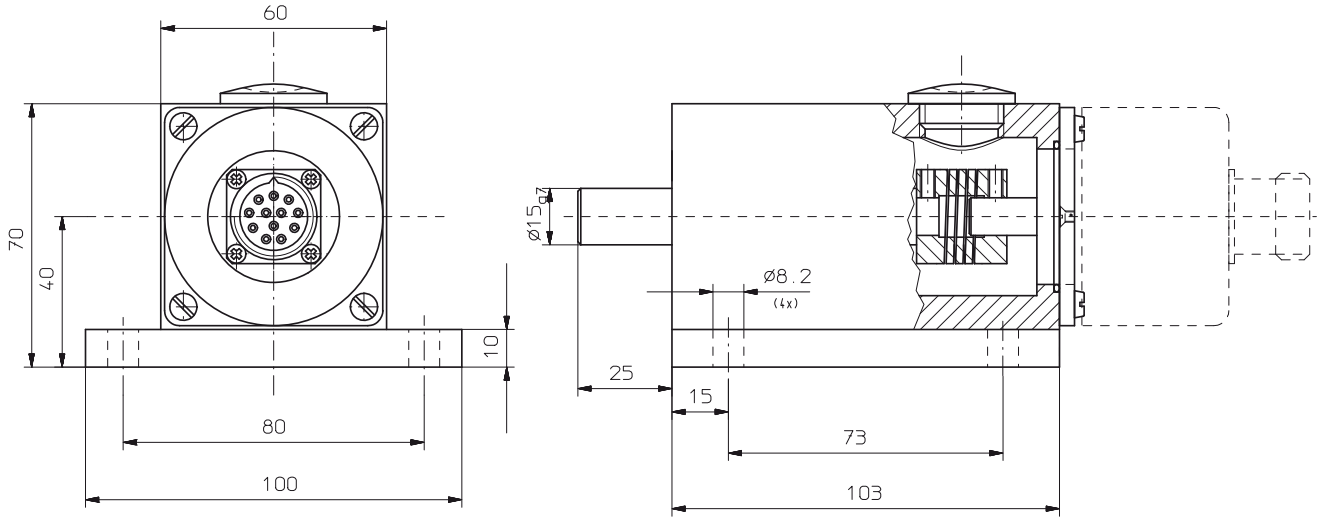
Technical data:

Suitable for encoders type series 58XX, with clamping flange and shaft Ø10 x 20 mm.	
Shaft load	axial: 150 N radial: 250 N
Lifetime of bearings:	50.000 h
Protection::	IP 65
Max. speed:	4000 min^{-1}

Kit includes:

- Bearing box with lock cover and sealing
- Coupling for shaft Ø 10
- Flange adapter 8.0010.2100.0000
- 3 x countersunk head screws DIN 63 M 3 x 8
- 4 x slotted cheese head screws DIN 84 M 4 x 8

Dimensions:



Order code
8.0010.8200.0004

SSI Display Type 570

Your benefit

- AC and DC supply voltage in one unit
- Master or slave mode
- Plug-in screw terminals
- SSI clock frequency from 100 Hz up to 1 MHz
- Display and outputs may be adjusted using scal- and offset-features
- Large 15 mm high LED-display, 6 digits, with adjustable brightness

Product features

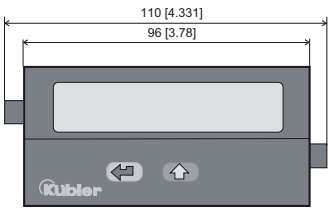
- Suitable for SSI protocols up to 25 bits
- Version with 2 optocoupler outputs to work as limit or preset values; also programmable with trail signal.
- Version with scaleable analogue output, resolution 14 bits, 0 ...10 V, –10 ... +10 V, 0 ... 20 mA or 4 ... 20mA
- Gray or binary code
- 48 x 96mm DIN housing, IP 65
- Versions with serial interface for read the data (RS232/RS485)

Technical data:

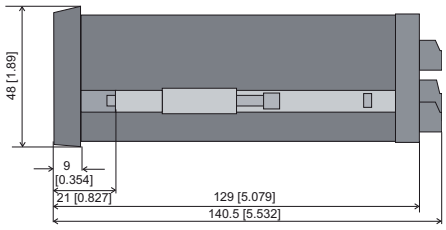
Supply	17 ... 30 V DC
voltage:	115/230 V AC ± 12,5 %
Display:	15 mm high LED-display, 6 digits
Current consumption [DC]:	17 V: 190 mA; 24 V: 150 mA;
	30 V: 120 mA
Power consumption [AC]:	7,5 VA
Sensor power supply:	24 V DC ± 15%, 120 mA
Inputs:	
SSI input frequency range:	100 Hz ... 1 MHz
Input reset:	PNP or NPN, programmable
	5.1 mA 24 V DC/ R_i = 4.7 kOhm
Input level:	Low: 0 ... 2 V
	High: 9 ... 35 V
Reset time:	min. 5 ms

Outputs:	
Scaleable analogue	0 ... 10 V, –10 ... + 10 V
output:	or 0 ... 20 mA, 4 ... 20mA 0.570.011.E90
Resolution:	14 bits + sign
Accuracy:	0.1 %
Optocoupler output:	5 ... 35 V DC/150 mA 0.570.012.E00
Interface:	RS232 and RS485 (ISO 1745)
	Drivecom Protokoll (0.570.012.E05)
Operating temperature:	0 ... +45 °C
Storage temperature:	–25 ... +70 °C
Protection class:	IP 65 (front)
EMC:	according to EC EMC directive 89/36/EC
Interference emissions:	EN 50081-2/EN 55011 class B
Interference resistance:	EN 6100-6-2
Weight:	approx. 200 g

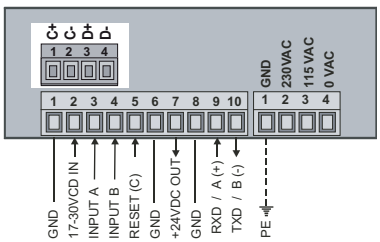
Dimensions:



Panel cut-out: 92 x 45mm

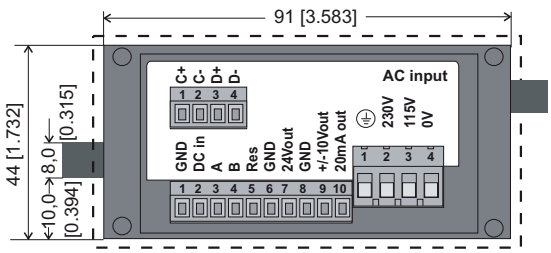


Display with serial interface 0.570.012.E05

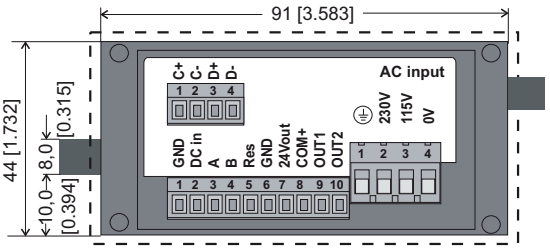


Wiring diagram:

Display with analogue output 0.570.012.E90



Display with 2 optocoupler outputs 0.570.011.E00



Do not connect A, B; C+, C– = clock signal SSI; D+, D– = data signal SSI

Scope of delivery:

- SSI-Display
- Gasket
- Mounting kit
- Plug-in screw terminals
- Manual German/English

Order code:

Display with 2 outputs:	0.570.011.E00*
Display with analogue outputs:	0.570.012.E90*
Display with serial interface:	0.570.012.E05

*stock types

Display Type 571

Your benefit

- AC and DC supply voltage in one unit
- Measuring function can be programmed for RPM, speed (from elapsed time), machine cycle time, throughput and baking time (time interval), as well as numerous count and stop-watch functions
- Scaleable display, programmed via 2 keys
- Large 15 mm high LED-display, 6 digit, with adjustable brightness

Product features

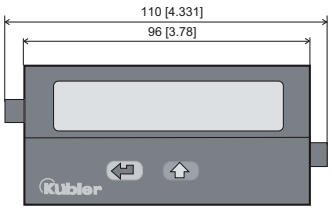
- Fast counting input, works with our ***LIMES*** measuring system (100KHz)
- Version with 2 optocoupler outputs for alarms
- Version with serial interface RS232/485 for importing and exporting data
- 48 x 96 mm DIN housing, IP65

Technical data:

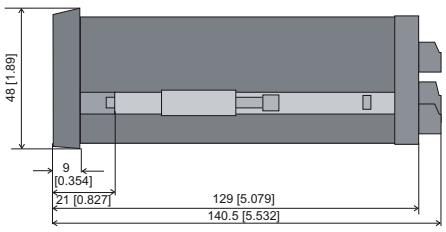
Supply voltage :	16 ... 35 V DC (Normal voltage: 24 V DC) 115/230 V AC ± 12.5 %
Display:	15 mm high LED display, 6 digits
Current consumption [DC]:	18 V: 120 mA; 24 V: 95 mA; 30 V: 80 mA
Power consumption [AC]:	7.5 VA
Sensor power supply :	24 V DC ± 15%, 120 mA (AC and DC supply)
Inputs:	3 Inputs (PNP, NPN and Namur) A, B = pulses, C = reset
Max. input frequency:	A, B = 25 kHz (100 kHz at count); C = 1 kHz
Accuracy:	±1 ppm ± 1 digit
Input level HTL:	Low: 0 ... 3.5 V High: 9 ... 35 V

Outputs:	
Analogue output: (0.571.012.E90)	0 ... +10 V, +10 ... –10 V and 0 ... 20 mA, 4 ... 20mA
Resolution:	14 bits + sign
Accuracy:	0.1 %
Optocoupler output: (0.571.011.E00)	5 ... 35 V DC/150 mA
Interface (0.571.012.E05)	RS232 and RS485 acc. to ISO 1745 Drivecom Protocol
Operating temperature:	0 ... +45 °C
Storage temperature:	–25 ... +70 °C
Protection	IP 65 (front)
EMC:	according to EC EMC directive 89/36/EC
Interference emissions:	EN 50081-2/EN 55011 Class B
Interference resistance:	EN 6100-6-2
Weight:	approx. 200 g

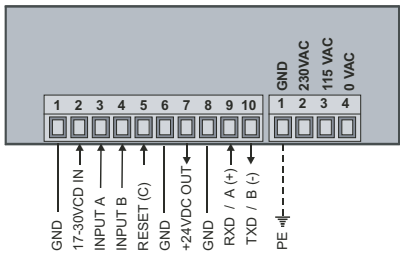
Dimensions:



Panel cut-out: 91 x 44mm

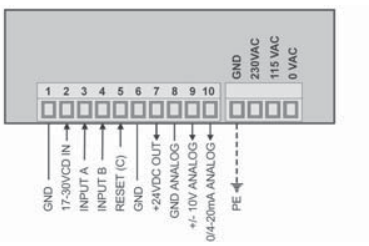


Display with serial Interface (0.571.012.E05)

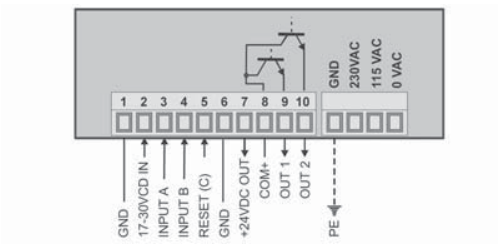


Terminal assignment:

Display with analog output (0.571.012.E90)



Display with 2 optocoupler outputs (0.571.011.E00)



Scope of delivery:

- Display 571
- Gasket
- Mounting kit
- Plug-in screw terminals
- Manual German/English

Order code:

Display with 2 outputs	Order code: 0.571.011.E00*
Display with analogue outputs	Order code: 0.571.012.E90*
Display with ser. Interface	Order code: 0.571.012.E05

*stock types

Preset counter electronic
Position display with analogue output

Position- and Difference display Type 572

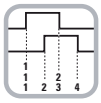
Supply voltage AC/DC

DIN front panel

High IP value

2 Inputs

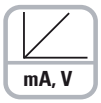

Operation with gloves



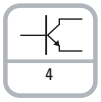
TTL, HTL and RS422-Input

6/8 LEDs

2 x Sensor supply



Output



Transistor-Output

Interface

Innovative:

- 2 separate freely scalable count inputs - HTL or TTL; Both also with inverted inputs, max. input frequency 1 MHz/ channel
- Very bright LED display 15 mm high (6 digit) and 10 mm high (8 digit)
- 4 freely programmable fast solid-state outputs, each with 350 mA output current
- Step or tracking preset
- Simple programming – with function codes, dependent on the operating mode selected
- With 8 different permanent count functions, such as simple count, difference count and total count of both inputs, batch counters etc.

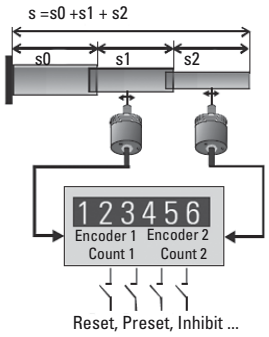
Compact:

- Up to 3 display values in a single device, Display Counter 1, Display Counter 2 as well as the display calculated from Counter 1 and 2
- AC and DC supply voltages in one device
- Simple programming with 4 keys, all keys can be assigned dual programming functions.
- Simple programming using 4 keys; all keys can be assigned programmable dual functions.

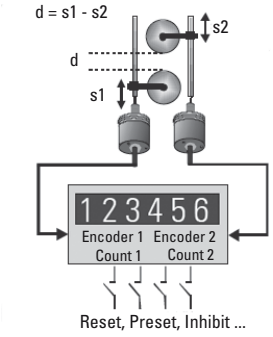
Versatile:

- Can be used as a counter or position display with limit values
- Monitoring function, where 2 values are monitored or calculated with respect to each other
- 4 fast programmable inputs with various functions such as reset, gate, display memory , reference input or switching between the display values.
- Scalable analogue output 0/4 ... 20 mA, +/-10 V or 0 ... 10 V
- 2 auxiliary power supplies for sensors: 5.2 V DC and 24 V DC
- Standard interface RS 232
  - for parameter setting
  - for reading out the values to a PC or PLC
  - for modifications during operation

Application examples:



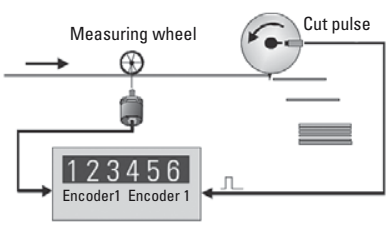
Total-Position display



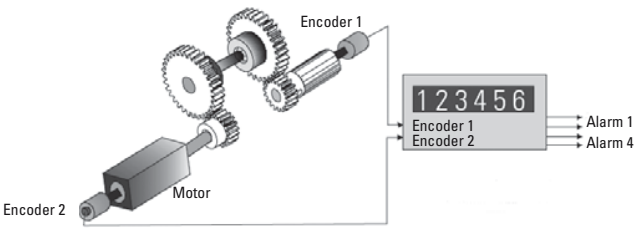
Difference-Position display

Counter series for demanding applications, with two individually scalable encoder inputs, in each case A, $\overline{A}$, B, $\overline{B}$ for count frequencies up to 1 MHz per channel. Operating modes can be selected for position or event counter, total counter, difference counter, cut-to-length display, diameter calculator and more.

Counter mounting fixture for DIN cut-out 92x45xmm Order code G 300005



Measurement of the effective cut amount



Monitoring of torsion, shafts or gear breakage

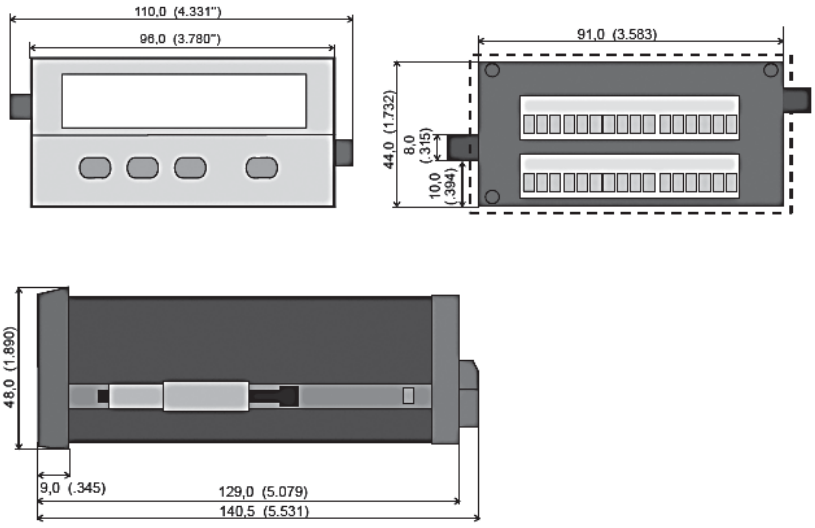
Position- and Difference display Type 572

Supply voltage:-	24 V AC, ± 10%	
	24 (17 ... 30) V DC	
Current consumption [DC]:	100 mA + Current consumption encoder	
Connected load [AC]:	15 VA	
Auxiliary power supply	2 x 5,2 V DC, each 150 mA	
output for sensors:	2 x 24 V DC, each 120 mA	
Display:	15 mm high LED-Display, 6 digit	
	10 mm high LED-Display, 8 digit	
Inputs:	2 universal incremental encoder inputs	
Count frequency:	RS422 and TTL with inv.	1 MHz
	HTL asymmetric	200 kHz
	TTL asymmetric	200 kHz
	(per encoder)	
Control inputs:	4 control inputs HTL, Ri = 3,3kOhm	
	Low < 2,5 V, High > 10V,	
	min. pulse duration 50 µs	

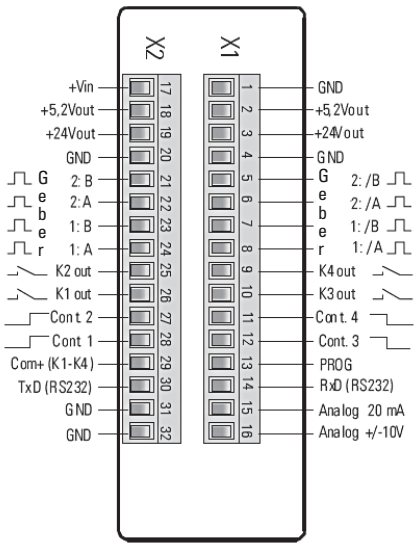
Switch outputs:	4 fast power transistors 5 ... 30 V DC	
	350 mA, reaction time < 1ms*, inductive	
	loads require a freewheeling diode	
Serial interface:	RS232, 2400 ... 38400 Baud	
Analogue outputs:	0/4 ... 20 mA, load max. 270 Ohm	
	0 ... ±10 V (max. 2 mA)	
	Resolution 14 Bit, precision 0,1 %	
	reaction time < 1 ms	
Ambient temperature:	0 ... 45 °C [32 ... 113 °F]	
Storage temperature:	-25 ... +70 °C [-13 .... 158 °F]	
Housing:	Noryl UL94-V-0	
Protection class:	IP65 (front side)	
Screw terminals:	Cable cross-section max. 1,5 mm^2	
Conformity and norms:	EMV 89/336/EWG:	EN 61 000-6-2
		EN 61 000-6-3
	NS73/23/EWG	EN 61010-1
Weight:	approx. 250 g	

*Intensive serial communication can temporarily prolong the reaction time

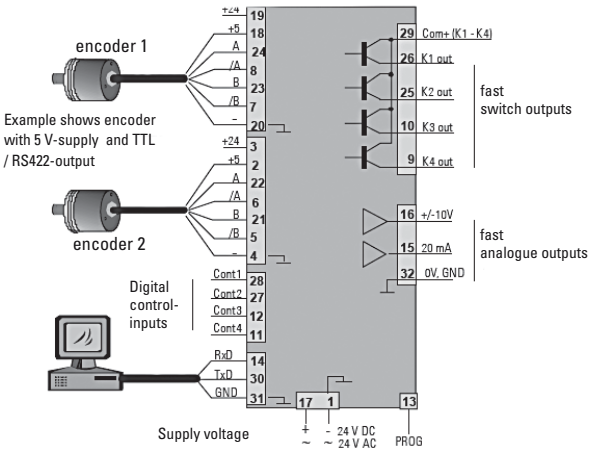
Dimensions:



Electrical connections:



Connection examples:



Order code specifications

Position display, 6 digits, with 4 fast switch outputs and serial interface:	6.572.0116.D05
Position display, 6 digits, with 4 fast switch outputs and serial interface and scalable analogue outputs:	6.572.0116.D95
Position display, 8 digits, with 4 fast switch outputs and serial interface:	6.572.0118.D05
Position display, 8 digits, with 4 fast switch outputs and serial interface and scalable analogue output:	6.572.0118.D95

Delivery contents:

- Controller 572
- Gasket, fastening set
- Instruction manual German/English

Note

What has to be considered when using Kübler products?

The correct functioning of the Kübler products can be guaranteed only when the contents of all notes are observed and electrical and mechanical limits are not exceeded. The user must ensure that he adheres to this without fail. The ambient conditions at the location where the encoder is used must also be taken into consideration.

When using Kübler products in a security area, the specific instructions of professional associations or approvals bodies (TÜV) are to be observed. In addition, when using Kübler products, all relevant VDE regulations and national regulations concerning the handling of electrical devices are to be complied with.

All specifications and data given are correct at the time of printing. The specifications in this catalogue refer only to the products and not to any suitability to a specific application or use.

Subject to change without notice.

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