Абсолютные однооборотные энкодеры стандартные Sendix

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Standard optical | **Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)** | **PROFIsafe**

The optical absolute Sendix S58 PROFIsafe encoders are based on the new Kübler Industrial Ethernet encoder platform and are therefore already designed today for future Industry 4.0 concepts.

One example of this is the integrated web server: Features or adjustments can be implemented quickly and easily at any time.

As certified SIL3 / PLe encoders with redundant design and PROFINET interface, they support the PROFIsafe profile and are predestined for safety applications.

Safety-Lock™ | High rotational speed | Temperature range | High protection level | High shaft load capacity | Shock / vibration resistant | Magnetic field proof | Reverse polarity protection | Optical sensor

Reliable and safe

- **Robust**
  Sturdy bearing construction in Safety-Lock™ Design for resistance against vibration and installation errors.
- **High resolution**
  - Singleturn 15 bit (safe) or 24 bit (non safe).
- **Safe**
  - SIL 3, performance level Ple, safety category Cat. 3.
  - Transmission via safety telegrams 36/37, according to BP and XP.
- **100 % future-proof**
  - Implement features and adaptations quickly and easily.
  - Cyber Security update in preparation / High system availability, protection against misuse (acc. IEC 62443).

Latest PROFINET functionality

- PROFINET IO, RT, IRT allows integration in applications with different performance requirementsorderungen.
- Supports the Isochronous Mode, can thus be implemented in networks for hard real-time requirements with clock cycles up to 500 µs.
- PROFINET v2.4.1, encoder profile V 4.2, PROFIsafe profile v2.6.1, PROFIdrive profile v4.2
- Ideal for highly synchronous applications, such as e. g. axis synchronization.
- Interoperability between many different control and drive manufacturers thanks to the PROFIdrive profile.
- Integrated web server for firmware update.

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Order code Shaft version

8.S5858FS3	.	X	X	C	N	.	C1	1	1
Type		a	b	c	d		e		

a *Flange*
1 = clamping flange, IP65 ø 58 mm [2.28“]
3 = clamping flange, IP67 ø 58 mm [2.28“]
2 = synchro flange, IP65 ø 58 mm [2.28“]
4 = synchro flange, IP67 ø 58 mm [2.28“]
5 = square flange, IP65 □63.5 mm [2.5“]
7 = square flange, IP67 □63.5 mm [2.5“]

b *Shaft (ø x L), with flat*
2 = 10 x 20 mm [0.39 x 0.79“]
5 = 12 x 20 mm [0.47 x 0.79“]
4 = 3/8“ x 7/8“
Shaft (ø x L), with feather key DIN 6885 A-3x3x10
A = 10 x 20 mm [0.39 x 0.79“]
B = 12 x 20 mm [0.47 x 0.79“]
C = 3/8“ x 7/8“

c *Interface / Supply voltage*
C = PROFINET IO / 10 ... 30 V DC

d *Type of connection*
N = 3 x axial M12 connector, 4-pin

e *Fieldbus profile*
C1 = PROFINET IO

Optional on request
- Ex 2/22 (only for variants with IP67)
- surface protection salt spray tested

Order code Hollow shaft

8.S5878FS3	.	X	X	C	N	.	C1	1	1
Type		a	b	c	d		e		

a *Flange*
1 = with torque stop FS, flexible, IP65
2 = with torque stop FS, flexible, IP67
5 = with stator coupling FS, ø 63 mm [2.48“] , IP65
6 = with stator coupling FS, ø 63 mm [2.48“] , IP67
7 = with torque stop FS, rigid, IP65 (incl. torque pin FS)
8 = with torque stop FS, rigid, IP67 (incl. torque pin FS)

b *Blind hollow shaft*
(insertion depth max. 30 mm [1.18“])
A = ø 10 mm [0.39“]
B = ø 12 mm [0.47“]
C = ø 14 mm [0.55“]
D = ø 15 mm [0.59“]
E = ø 3/8“
F = ø 1/2“

c *Interface / Supply voltage*
C = PROFINET IO / 10 ... 30 V DC

d *Type of connection*
N = 3 x axial M12 connector, 4-pin

e *Fieldbus profile*
C1 = PROFINET IO

Optional on request
- Ex 2/22 (only for variants with IP67)
- surface protection salt spray tested

Absolute encoders – singleturn

Standard optical	Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)	PROFIsafe

Mounting accessory for shaft encoders			Order no.
Bellows coupling FS	bellows coupling FS ø 25 mm [0.98"] for shaft 10 mm [0.39"]		**8.0000.15FS.1010**
	bellows coupling FS ø 25 mm [0.98"] for shaft 12 mm [0.47"]		**8.0000.15FS.1212**

Accessories			Order no.
Screw retention	Loctite 243, 5 ml		**8.0000.4G05.0000**

Cables and connectors			Order no.
Preassembled cables	M12 male connector with external thread, 4-pin, D coded, straight single-ended 2 m [6.56'] PUR cable	port 1 + port 2	**05.00.6031.4411.002M**
	M12 male connector with external thread, 4-pin, D coded, right-angle single-ended 2 m [6.56'] PUR cable	port 1 + port 2	**05.00.6031.4511.002M**
	M12 female connector with coupling nut, 4-pin, A coded, straight single-ended 2 m [6.56'] PUR cable	power supply	**05.00.6061.6211.002M**
	M12 female connector with coupling nut, 4-pin, A coded, right-angle single-ended 2 m [6.56'] PUR cable	power supply	**05.00.6061.6311.002M**
Connectors	M12 male connector with external thread, 4-pin, D coded, straight (metal)	port 1 + port 2	**05.WASCSY4S**
	M12 male connector with external thread, 4-pin, D coded, right-angle (metal)	port 1 + port 2	**8.0000.5128.0000**
	M12 female connector with coupling nut, 4-pin, A coded, straight (plastic)	power supply	**05.B8141-0**
	M12 female connector with coupling nut, 4-pin, A coded, right-angle (plastic)	power supply	**05.B8241-0**

Further Kübler accessories can be found at: /accessories
Further Kübler cables and connectors can be found at: /connection-technology

Standard optical | **Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)** | **PROFIsafe**

Technical data

Notes regarding "Functional Safety"

These encoders are suitable for use in safety-related systems up to SIL3 acc. to EN 61800-5-2 and PLe to EN ISO 13849-1 in conjunction with controllers or evaluation units, which possess the necessary functionality.

Additional functions can be found in the operating manual.

Safety characteristics

Classification	PLe / SIL3
System structure	2 channel (Kat. 3)
PFH_d value [1]	9,54 x 10^{-10} h^{-1}
Mission time / Proof test interval	20 years
Relevant standards	EN ISO 13849-1:2015; EN ISO 13849-2:2012; EN 61800-5-2:2007

Mechanical characteristics

Max. speed		9000 min^{-1} (short-term – 10 min) 6000 min^{-1} (continuous)
Starting torque at 20 °C [68 °F]		< 0.01 Nm
Moment of inertia		
	shaft version	3.0 x 10^{-6} kgm^2
	blind hollow shaft version	4.0 x 10^{-6} kgm^2
Load capacity of shaft	radial	80 N
	axial	40 N
Weight		approx. 0.45 kg [15.87 oz]
Protection acc. to EN 60529		IP65, IP67
Ambient temperature		-40 °C ... +80 °C [-40 °F ... +176 °F]
Material	shaft/hollow shaft	stainless steel
	flange	aluminum
	housing	aluminum
Shock resistance acc. EN 60068-2-27		1000 m/s^2, 6 ms
Vibration resistance acc. EN 60068-2-6		100 m/s^2, 55 ... 2000 Hz

Electrical characteristics

Supply voltage	10 ... 30 V DC
Power consumption (no load)	max. 250 mA
Reverse polarity protection of the supply voltage (+V)	yes
Smallest safe measuring step	158,4 arcsec (0,044° / 4 increments)
Lowest safe speed	4 rpm (σ_v < 0,5 %)

Approvals

UL compliant in accordance with	File no. E224618
CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU
ATEX Directive	2014/34/EU (for Ex 2/22 variants)
Machinery Directive	2006/42/EG

1) The specified value is based on a diagnostic coverage of 99 %, that must be achieved with an encoder evaluation unit.
The encoder evaluation unit must meet at least the requirements for SIL3.

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Interface characteristics PROFIsafe

General information

Protocol	PROFINET IO / PROFIsafe
Classifications	RT Class 3 (IRT) Conformance Class C Application Class 6 Encoder Class 4 / S2 Netload Class III

Adjustable parameters

- Preset
- Counting direction
- Resolution per revolution - MUR
- Unit speed
- IP address
- Total resolution - TMR
- Position format
- Speed reference value
- Scaling
- Device name
- F-Destination Address
- I&M 0...3 Parameter
- Alarm behavior
- Parameter write protection
- Parameter initialization

Resolution

Resolution Singleturn (MUR)

scalable safe	1 ... 32 768 (15 bit)
scalable non-safe	1 ... 16 777 216 (24 bit)
default	8 192 (13 bit)

PROFIsafe characteristics

- I&M 0 ... 4
- standard telegrams (81, 82, 83, 84, 86, 88)
- standard safety telegrams (36, 37) BP and XP
- IRT up to 500 µs
- RT Safe up to 4 ms
- Isochronous Mode
- MRP
- LLDP
- PDEV
- SNMP
- FSU

Process data

- Position (Safe / Non-Safe)
- Speed (Safe / Non-Safe)
- Failure
- Warnings

Terminal assignment bus

Interface	Type of connection	Function	M12 connector, 4-pin				
C	N (3 x M12 connector)	Bus Port 1	Signal:	Transmit data+	Receive data+	Transmit data -	Receive data -
			Abbreviation:	TxD+	RxD+	TxD-	RxD-
			Pin:	1	2	3	4
		Power supply	Signal:	Voltage +	–	Voltage –	–
			Abbreviation:	+ V	–	0 V	–
			Pin:	1	2	3	4
		Bus Port 2	Signal:	Transmit data+	Receive data+	Transmit data -	Receive data -
			Abbreviation:	TxD+	RxD+	TxD-	RxD-
			Pin:	1	2	3	4

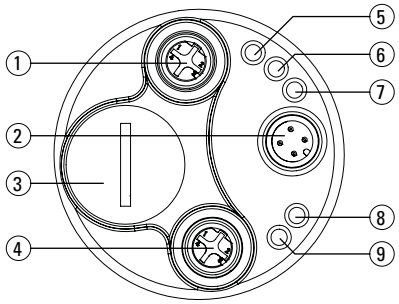
D coded

D coded

Rear side connections and display elements

①	Ethernet Port – Link 2	
②	Supply voltage	
③	Cover screw	
④	Ethernet Port – Link 1	
⑤	Link 2	flashes yellow when connected
⑥	BF – Bus Failture	displays network errors *)
⑦	SF – System Failture	displays system errors *)
⑧	ENC	shows status of encoder *)
⑨	Link 1	flashes yellow when connected

*) see manual



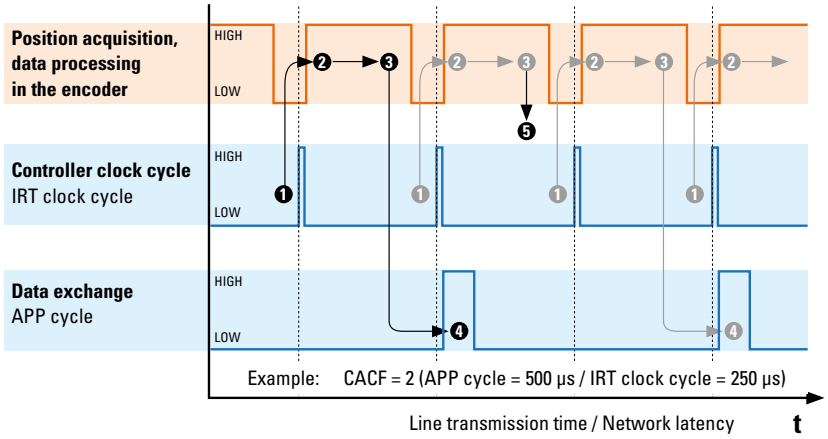
Standard optical | **Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)** | **PROFIsafe**

Technology in detail

Clock synchronicity – Isochronous Real Time (IRT) in position sensor technology

In general, for time-critical applications, focus is set on very short sensor cycle times. However, in order to achieve high control performance, simply accelerating data acquisition and processing by shortest cycle times is not sufficient. All sensors and actuators are to operate according to the same clock.

This is achieved thanks to a clock used for the whole network, defined by the controller. This transmit clock cycle (IRT clock) is however not necessarily the clock cycle used for process data exchange. Another cycle (application cycle) is used for this purpose, which can also be defined by the customer controller. The illustration below represents the connection between the different clock cycles.



❶ **Clock specification by controller**
IRT clock cycle = Transmit clock

❷ **Data acquisition position signals**
Internal sensor clock synchronizes with the IRT clock. Acquisition of the sensor raw values

❸ **Data processing in the encoder**
Position data is processed and written in the buffer memory of the encoder

❹ **Data transmission via the network**
At every application cycle (APP cycle), data is read from the buffer memory and transmitted to the controller.

❺ **All 2nd positions**
Since the APP cycle is twice as long as the IRT clock cycle, every 2nd position acquired will not be transmitted.
Or: data exchange takes place only every second IRT clock cycle.

When receiving the IRT clock signal, the sensor starts reading its current measured point. This raw value is processed internally (e.g. scaling, speed calculation, etc.) and stored in a buffer memory.

The buffer memory is read at every application cycle. If it contains a value, this value is transmitted to the controller via the network.

If the application cycle is a multiple of the IRT clock cycle, it may happen that the buffered process data is not sent directly, but is overwritten, because, even though this data is acquired with every IRT clock cycle, it is sent only with every application cycle.

The ratio between application cycle and IRT clock cycle represents the CACF (Controller Application Cycle Factor).
In this example, the CACF = 2. This indicates that only every 2nd acquired position will be transmitted to the controller.

The described methodology guarantees a determinism: since the controller defines a clock cycle for the whole network, this allows ensuring that all measured values transmitted by the sensors to the controller are never older than the selected IRT cycle! Therefore, all downstream actuators can always be regulated on the basis of the latest available measured values.

PROFIsafe encoders – Data flow of safe and non-safe position values

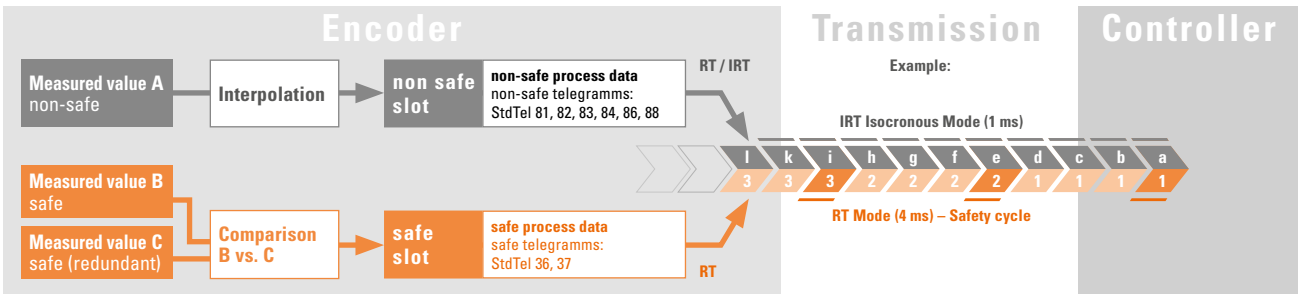
In safety-related applications, safe process data is required for sequence control, which must be detected at least redundantly and provided reliably.

With high performance controllers, it is possible to compare the two measured values against each other and thus generate safe process data. This data can be directly evaluated, calculated or scaled in the sensor before it is transferred.

Since there are restrictions on the resolution and transmission speed for safe process data due to the comparison of the redundant measured values, it can happen that non-safe process data is also required in addition to the safe data, for example to transmit a high-resolution position to the following periphery.

The safe process data is then sent via the same infrastructure as the non-safe process data according to the so-called „black channel“ principle. From the point of view of the protocol used, this takes place in a separate area (safe slot) that is distinct from the non-safe area (non-safe slot). Both transmissions can run parallel to each other.

Unlike with safe data, the non-safe process data can also be sent at a specified clock cycle of the controller (isochronous mode).



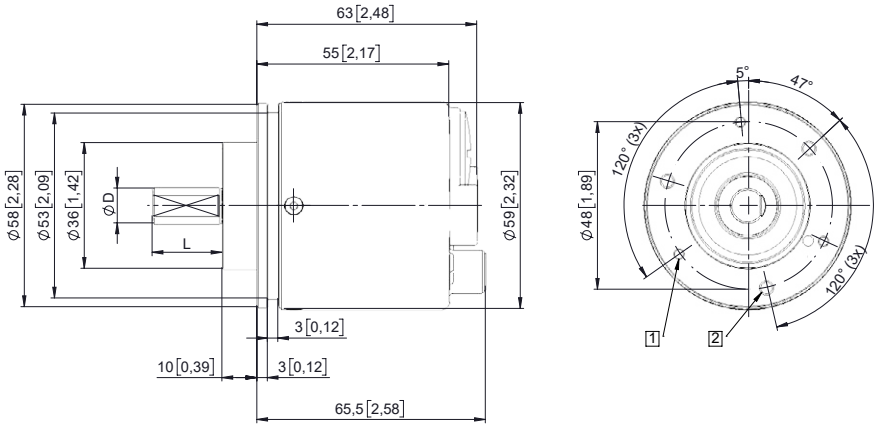
Standard optical | **Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)** | **PROFIsafe**

Dimensions shaft version

Dimensions in mm [inch]

Clamping flange, ø 58 [2.28]
Flange type 1 + 3

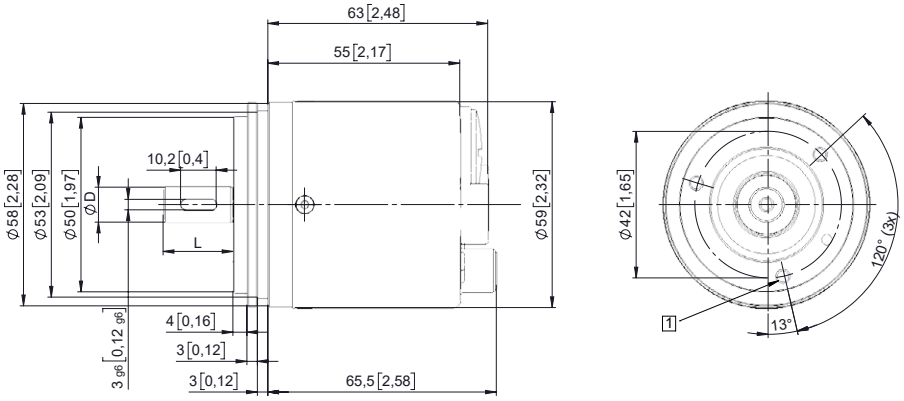
1 3 x M3, 6 [0.24] deep
2 3 x M4, 8 [0.31] deep



D	Fit	L
10 [0.39]	h7	20 [0.79]
12 [0.47]	h7	20 [0.79]
3/8"	h7	7/8"

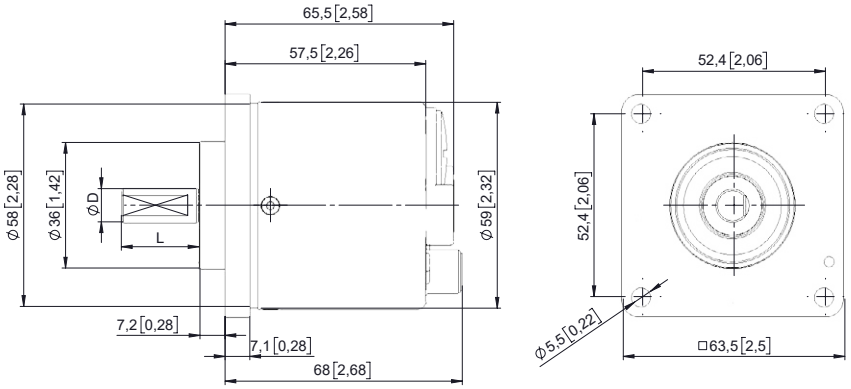
Synchro flange, ø 58 [2.28]
Flange type 2 + 4

1 3 x M4, 8 [0.31] deep



D	Fit	L
10 [0.39]	h7	20 [0.79]
12 [0.47]	h7	20 [0.79]
3/8"	h7	7/8"

Square flange, □ 63.5 [2.5]
Flange type 5 + 7



D	Fit	L
10 [0.39]	h7	20 [0.79]
12 [0.47]	h7	20 [0.79]
3/8"	h7	7/8"

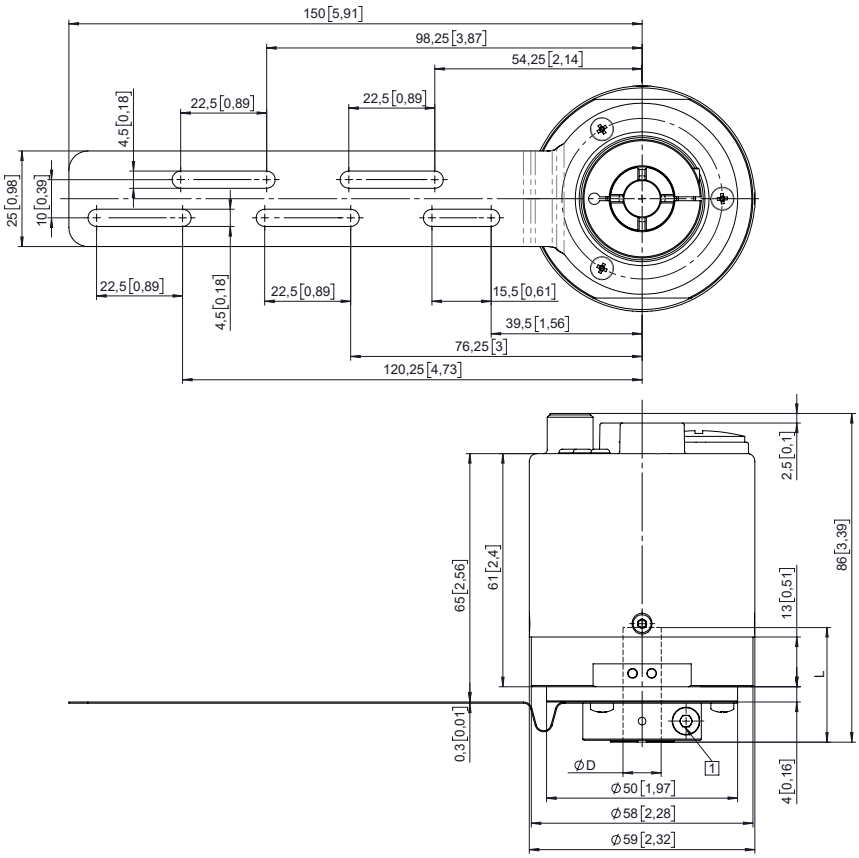
Standard optical | **Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)** | **PROFIsafe**

Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with torque stop FS, flexible
Flange type 1 + 2

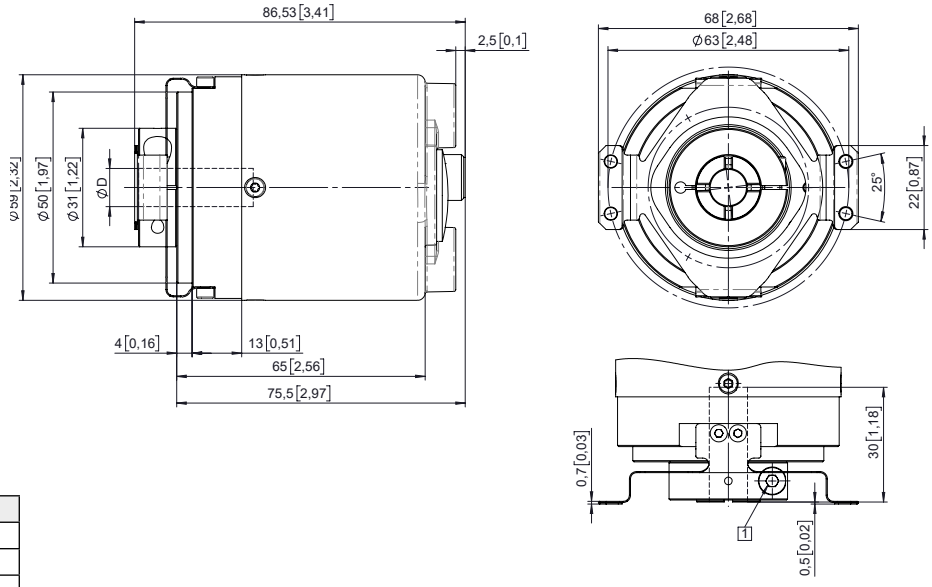
1 Recommended torque for the clamping ring 2.5 Nm



D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

Flange with stator coupling FS, ø 63 [2.48]
Flange type 5 + 6

1 Recommended torque for the clamping ring 2.5 Nm



D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

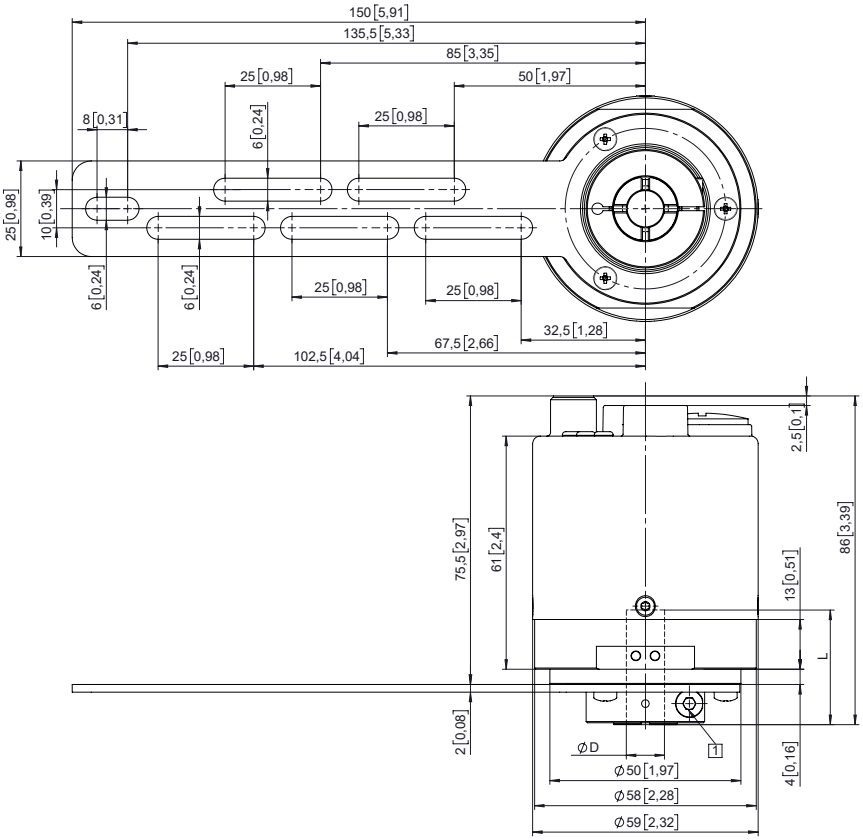
Standard optical | **Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)** | **PROFIsafe**

Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with torque stop FS, rigid
Flange type 7 + 8

1 Recommended torque for the clamping ring 2.5 Nm



D	Fit	L
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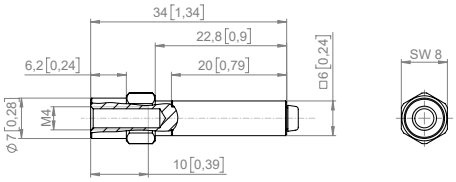
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

Torque pin with rectangular sleeve with M4 thread

(included in scope of delivery)



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  Sturdy bearing construction in Safety-Lock™ Design for resistance against vibration and installation errors.
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  - Singleturn 15 bit (safe) or 24 bit (non safe).
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  - SIL 3, performance level Ple, safety category Cat. 3.
  - Transmission via safety telegrams 36/37, according to BP and XP.
- **100 % future-proof**
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  - Cyber Security update in preparation / High system availability, protection against misuse (acc. IEC 62443).

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- PROFINET v2.4.1, encoder profile V 4.2, PROFIsafe profile v2.6.1, PROFIdrive profile v4.2
- Ideal for highly synchronous applications, such as e. g. axis synchronization.
- Interoperability between many different control and drive manufacturers thanks to the PROFIdrive profile.
- Integrated web server for firmware update.

Standard optical | **Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)** | **PROFIsafe**

Order code Shaft version

8.S5858FS3	.	X	X	C	N	.	C1	1	1
Type		a	b	c	d		e		

a *Flange*
1 = clamping flange, IP65 ø 58 mm [2.28“]
3 = clamping flange, IP67 ø 58 mm [2.28“]
2 = synchro flange, IP65 ø 58 mm [2.28“]
4 = synchro flange, IP67 ø 58 mm [2.28“]
5 = square flange, IP65 □63.5 mm [2.5“]
7 = square flange, IP67 □63.5 mm [2.5“]

b *Shaft (ø x L), with flat*
2 = 10 x 20 mm [0.39 x 0.79“]
5 = 12 x 20 mm [0.47 x 0.79“]
4 = 3/8“ x 7/8“
Shaft (ø x L), with feather key DIN 6885 A-3x3x10
A = 10 x 20 mm [0.39 x 0.79“]
B = 12 x 20 mm [0.47 x 0.79“]
C = 3/8“ x 7/8“

c *Interface / Supply voltage*
C = PROFINET IO / 10 ... 30 V DC

d *Type of connection*
N = 3 x axial M12 connector, 4-pin

e *Fieldbus profile*
C1 = PROFINET IO

Optional on request
- Ex 2/22 (only for variants with IP67)
- surface protection salt spray tested

Order code Hollow shaft

8.S5878FS3	.	X	X	C	N	.	C1	1	1
Type		a	b	c	d		e		

a *Flange*
1 = with torque stop FS, flexible, IP65
2 = with torque stop FS, flexible, IP67
5 = with stator coupling FS, ø 63 mm [2.48“] , IP65
6 = with stator coupling FS, ø 63 mm [2.48“] , IP67
7 = with torque stop FS, rigid, IP65 (incl. torque pin FS)
8 = with torque stop FS, rigid, IP67 (incl. torque pin FS)

b *Blind hollow shaft*
(insertion depth max. 30 mm [1.18“])
A = ø 10 mm [0.39“]
B = ø 12 mm [0.47“]
C = ø 14 mm [0.55“]
D = ø 15 mm [0.59“]
E = ø 3/8“
F = ø 1/2“

c *Interface / Supply voltage*
C = PROFINET IO / 10 ... 30 V DC

d *Type of connection*
N = 3 x axial M12 connector, 4-pin

e *Fieldbus profile*
C1 = PROFINET IO

Optional on request
- Ex 2/22 (only for variants with IP67)
- surface protection salt spray tested

Absolute encoders – singleturn

Standard optical	Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)	PROFIsafe

Mounting accessory for shaft encoders			Order no.
Bellows coupling FS	bellows coupling FS ø 25 mm [0.98"] for shaft 10 mm [0.39"]		**8.0000.15FS.1010**
	bellows coupling FS ø 25 mm [0.98"] for shaft 12 mm [0.47"]		**8.0000.15FS.1212**

Accessories			Order no.
Screw retention	Loctite 243, 5 ml		**8.0000.4G05.0000**

Cables and connectors			Order no.
Preassembled cables	M12 male connector with external thread, 4-pin, D coded, straight single-ended 2 m [6.56'] PUR cable	port 1 + port 2	**05.00.6031.4411.002M**
	M12 male connector with external thread, 4-pin, D coded, right-angle single-ended 2 m [6.56'] PUR cable	port 1 + port 2	**05.00.6031.4511.002M**
	M12 female connector with coupling nut, 4-pin, A coded, straight single-ended 2 m [6.56'] PUR cable	power supply	**05.00.6061.6211.002M**
	M12 female connector with coupling nut, 4-pin, A coded, right-angle single-ended 2 m [6.56'] PUR cable	power supply	**05.00.6061.6311.002M**
Connectors	M12 male connector with external thread, 4-pin, D coded, straight (metal)	port 1 + port 2	**05.WASCSY4S**
	M12 male connector with external thread, 4-pin, D coded, right-angle (metal)	port 1 + port 2	**8.0000.5128.0000**
	M12 female connector with coupling nut, 4-pin, A coded, straight (plastic)	power supply	**05.B8141-0**
	M12 female connector with coupling nut, 4-pin, A coded, right-angle (plastic)	power supply	**05.B8241-0**

Further Kübler accessories can be found at: /accessories
Further Kübler cables and connectors can be found at: /connection-technology

Standard optical | **Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)** | **PROFIsafe**

Technical data

Notes regarding "Functional Safety"

These encoders are suitable for use in safety-related systems up to SIL3 acc. to EN 61800-5-2 and PLe to EN ISO 13849-1 in conjunction with controllers or evaluation units, which possess the necessary functionality.

Additional functions can be found in the operating manual.

Safety characteristics

Classification	PLe / SIL3
System structure	2 channel (Kat. 3)
PFH_d value [1]	9,54 x 10^{-10} h^{-1}
Mission time / Proof test interval	20 years
Relevant standards	EN ISO 13849-1:2015; EN ISO 13849-2:2012; EN 61800-5-2:2007

Mechanical characteristics

Max. speed		9000 min^{-1} (short-term – 10 min) 6000 min^{-1} (continuous)
Starting torque at 20 °C [68 °F]		< 0.01 Nm
Moment of inertia		
	shaft version	3.0 x 10^{-6} kgm^2
	blind hollow shaft version	4.0 x 10^{-6} kgm^2
Load capacity of shaft	radial	80 N
	axial	40 N
Weight		approx. 0.45 kg [15.87 oz]
Protection acc. to EN 60529		IP65, IP67
Ambient temperature		-40 °C ... +80 °C [-40 °F ... +176 °F]
Material	shaft/hollow shaft	stainless steel
	flange	aluminum
	housing	aluminum
Shock resistance acc. EN 60068-2-27		1000 m/s^2, 6 ms
Vibration resistance acc. EN 60068-2-6		100 m/s^2, 55 ... 2000 Hz

Electrical characteristics

Supply voltage	10 ... 30 V DC
Power consumption (no load)	max. 250 mA
Reverse polarity protection of the supply voltage (+V)	yes
Smallest safe measuring step	158,4 arcsec (0,044° / 4 increments)
Lowest safe speed	4 rpm (σ_v < 0,5 %)

Approvals

UL compliant in accordance with	File no. E224618
CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU
ATEX Directive	2014/34/EU (for Ex 2/22 variants)
Machinery Directive	2006/42/EG

1) The specified value is based on a diagnostic coverage of 99 %, that must be achieved with an encoder evaluation unit.
The encoder evaluation unit must meet at least the requirements for SIL3.

Standard optical | **Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)** | **PROFIsafe**

Interface characteristics PROFIsafe

General information

Protocol	PROFINET IO / PROFIsafe
Classifications	RT Class 3 (IRT) Conformance Class C Application Class 6 Encoder Class 4 / S2 Netload Class III

Adjustable parameters

- Preset
- Counting direction
- Resolution per revolution - MUR
- Unit speed
- IP address
- Total resolution - TMR
- Position format
- Speed reference value
- Scaling
- Device name
- F-Destination Address
- I&M 0...3 Parameter
- Alarm behavior
- Parameter write protection
- Parameter initialization

Resolution

Resolution Singleturn (MUR)

scalable safe	1 ... 32 768 (15 bit)
scalable non-safe	1 ... 16 777 216 (24 bit)
default	8 192 (13 bit)

PROFIsafe characteristics

- I&M 0 ... 4
- standard telegrams (81, 82, 83, 84, 86, 88)
- standard safety telegrams (36, 37) BP and XP
- IRT up to 500 µs
- RT Safe up to 4 ms
- Isochronous Mode
- MRP
- LLDP
- PDEV
- SNMP
- FSU

Process data

- Position (Safe / Non-Safe)
- Speed (Safe / Non-Safe)
- Failure
- Warnings

Terminal assignment bus

Interface	Type of connection	Function	M12 connector, 4-pin				
C	N (3 x M12 connector)	Bus Port 1	Signal:	Transmit data+	Receive data+	Transmit data -	Receive data -
			Abbreviation:	TxD+	RxD+	TxD-	RxD-
			Pin:	1	2	3	4
		Power supply	Signal:	Voltage +	–	Voltage –	–
			Abbreviation:	+ V	–	0 V	–
			Pin:	1	2	3	4
		Bus Port 2	Signal:	Transmit data+	Receive data+	Transmit data -	Receive data -
			Abbreviation:	TxD+	RxD+	TxD-	RxD-
			Pin:	1	2	3	4

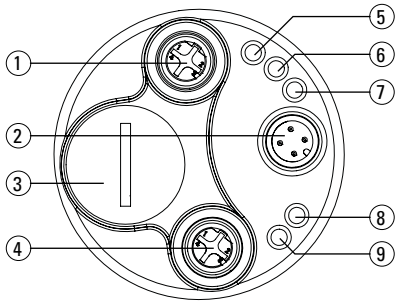
D coded

D coded

Rear side connections and display elements

①	Ethernet Port – Link 2	
②	Supply voltage	
③	Cover screw	
④	Ethernet Port – Link 1	
⑤	Link 2	flashes yellow when connected
⑥	BF – Bus Failture	displays network errors *)
⑦	SF – System Failture	displays system errors *)
⑧	ENC	shows status of encoder *)
⑨	Link 1	flashes yellow when connected

*) see manual



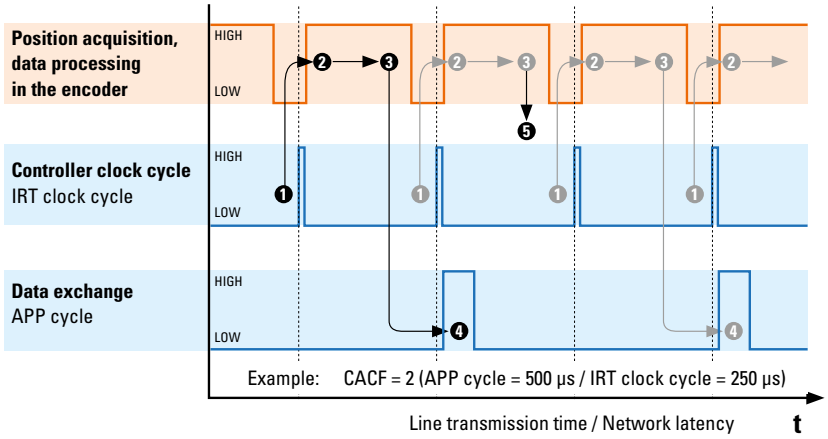
Standard optical | **Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)** | **PROFIsafe**

Technology in detail

Clock synchronicity – Isochronous Real Time (IRT) in position sensor technology

In general, for time-critical applications, focus is set on very short sensor cycle times. However, in order to achieve high control performance, simply accelerating data acquisition and processing by shortest cycle times is not sufficient. All sensors and actuators are to operate according to the same clock.

This is achieved thanks to a clock used for the whole network, defined by the controller. This transmit clock cycle (IRT clock) is however not necessarily the clock cycle used for process data exchange. Another cycle (application cycle) is used for this purpose, which can also be defined by the customer controller. The illustration below represents the connection between the different clock cycles.



❶ **Clock specification by controller**
IRT clock cycle = Transmit clock

❷ **Data acquisition position signals**
Internal sensor clock synchronizes with the IRT clock. Acquisition of the sensor raw values

❸ **Data processing in the encoder**
Position data is processed and written in the buffer memory of the encoder

❹ **Data transmission via the network**
At every application cycle (APP cycle), data is read from the buffer memory and transmitted to the controller.

❺ **All 2nd positions**
Since the APP cycle is twice as long as the IRT clock cycle, every 2nd position acquired will not be transmitted.
Or: data exchange takes place only every second IRT clock cycle.

When receiving the IRT clock signal, the sensor starts reading its current measured point. This raw value is processed internally (e.g. scaling, speed calculation, etc.) and stored in a buffer memory.

The buffer memory is read at every application cycle. If it contains a value, this value is transmitted to the controller via the network.

If the application cycle is a multiple of the IRT clock cycle, it may happen that the buffered process data is not sent directly, but is overwritten, because, even though this data is acquired with every IRT clock cycle, it is sent only with every application cycle.

The ratio between application cycle and IRT clock cycle represents the CACF (Controller Application Cycle Factor).
In this example, the CACF = 2. This indicates that only every 2nd acquired position will be transmitted to the controller.

The described methodology guarantees a determinism: since the controller defines a clock cycle for the whole network, this allows ensuring that all measured values transmitted by the sensors to the controller are never older than the selected IRT cycle! Therefore, all downstream actuators can always be regulated on the basis of the latest available measured values.

PROFIsafe encoders – Data flow of safe and non-safe position values

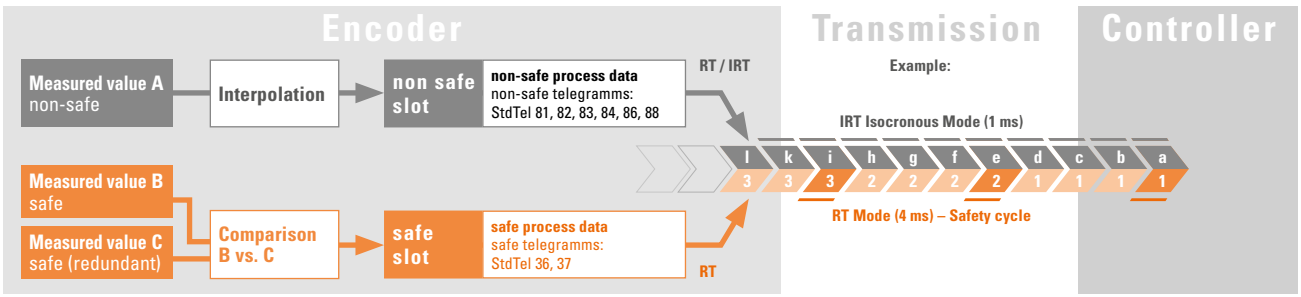
In safety-related applications, safe process data is required for sequence control, which must be detected at least redundantly and provided reliably.

With high performance controllers, it is possible to compare the two measured values against each other and thus generate safe process data. This data can be directly evaluated, calculated or scaled in the sensor before it is transferred.

Since there are restrictions on the resolution and transmission speed for safe process data due to the comparison of the redundant measured values, it can happen that non-safe process data is also required in addition to the safe data, for example to transmit a high-resolution position to the following periphery.

The safe process data is then sent via the same infrastructure as the non-safe process data according to the so-called „black channel“ principle. From the point of view of the protocol used, this takes place in a separate area (safe slot) that is distinct from the non-safe area (non-safe slot). Both transmissions can run parallel to each other.

Unlike with safe data, the non-safe process data can also be sent at a specified clock cycle of the controller (isochronous mode).



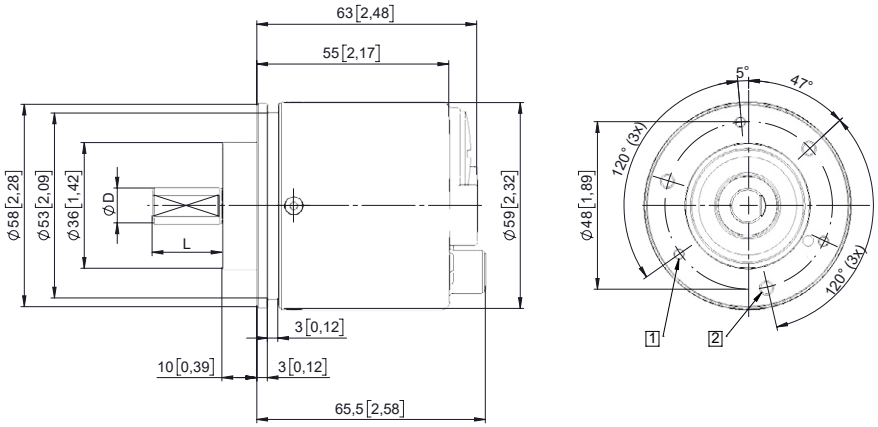
Standard optical | **Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)** | **PROFIsafe**

Dimensions shaft version

Dimensions in mm [inch]

Clamping flange, ø 58 [2.28]
Flange type 1 + 3

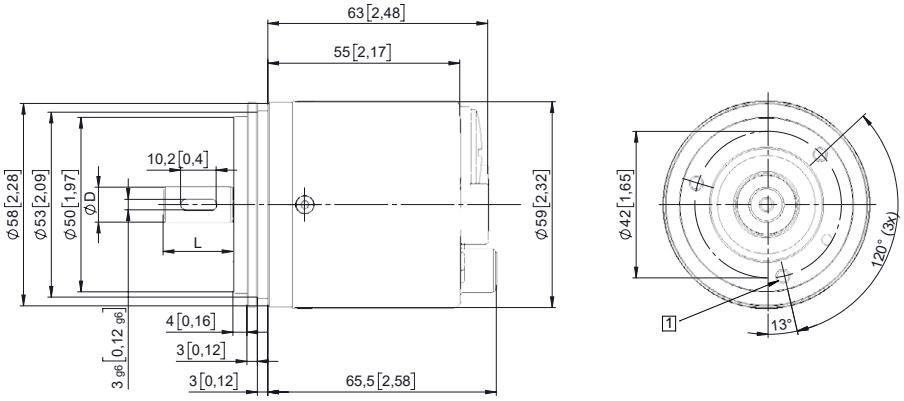
1 3 x M3, 6 [0.24] deep
2 3 x M4, 8 [0.31] deep



D	Fit	L
10 [0.39]	h7	20 [0.79]
12 [0.47]	h7	20 [0.79]
3/8"	h7	7/8"

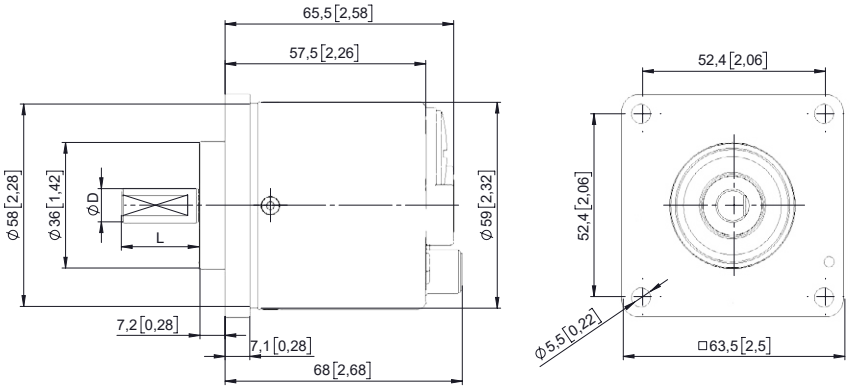
Synchro flange, ø 58 [2.28]
Flange type 2 + 4

1 3 x M4, 8 [0.31] deep



D	Fit	L
10 [0.39]	h7	20 [0.79]
12 [0.47]	h7	20 [0.79]
3/8"	h7	7/8"

Square flange, □ 63.5 [2.5]
Flange type 5 + 7



D	Fit	L
10 [0.39]	h7	20 [0.79]
12 [0.47]	h7	20 [0.79]
3/8"	h7	7/8"

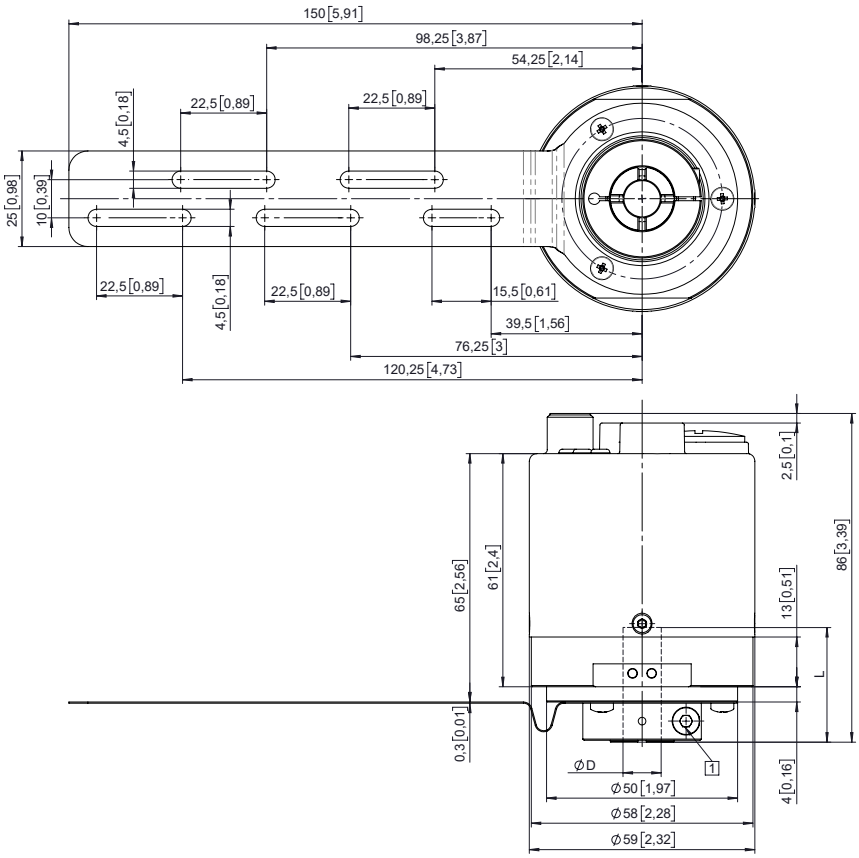
Standard optical | **Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)** | **PROFIsafe**

Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with torque stop FS, flexible
Flange type 1 + 2

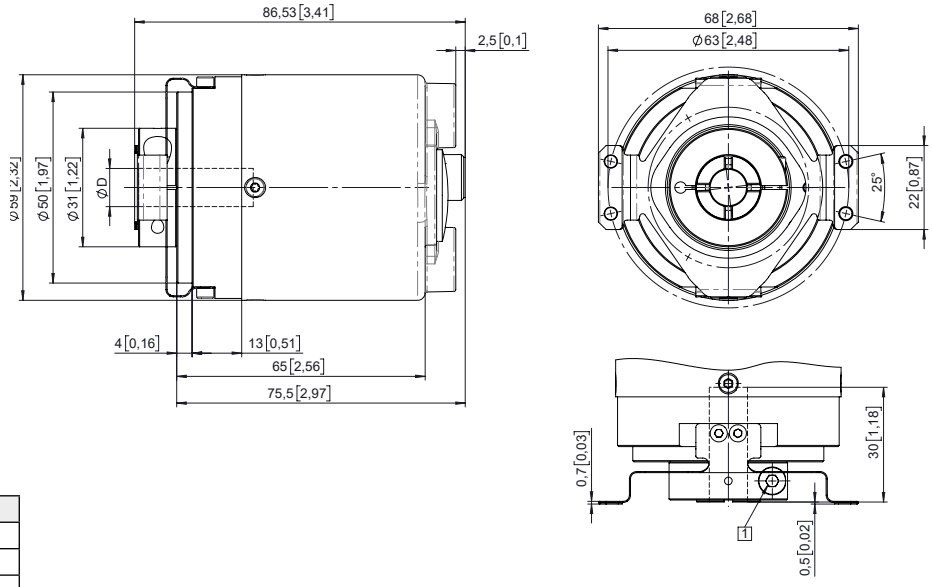
1 Recommended torque for the clamping ring 2.5 Nm



D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

Flange with stator coupling FS, ø 63 [2.48]
Flange type 5 + 6

1 Recommended torque for the clamping ring 2.5 Nm



D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

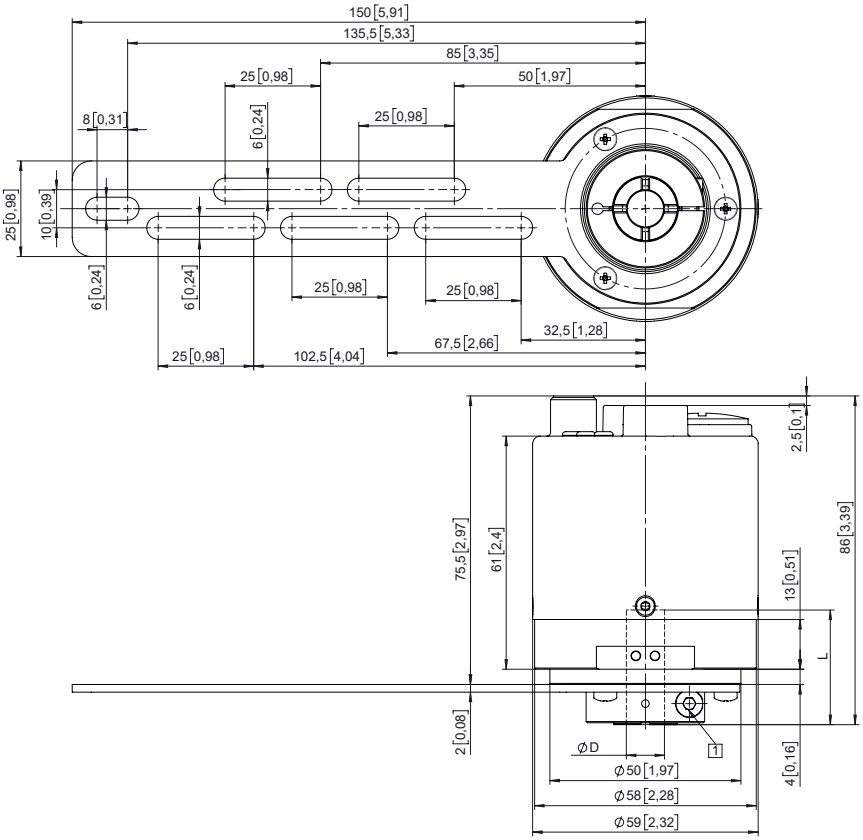
Standard optical | **Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)** | **PROFIsafe**

Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with torque stop FS, rigid
Flange type 7 + 8

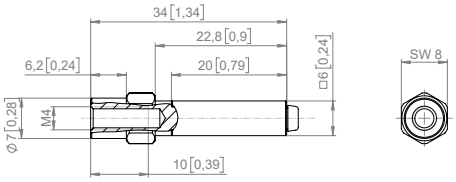
1 Recommended torque for the clamping ring 2.5 Nm



D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

Torque pin with rectangular sleeve with M4 thread

(included in scope of delivery)



Standard optical | **Sendix F5858 / F5878 (shaft / hollow shaft)** | **EtherNet/IP**

New generation - ready for the future.

The optical absolute singleturn and multiturn Sendix F58 EtherNet/IP encoders are based on the latest CIP version v3.32 and EtherNet/IP version v1.30.

Key features are neighborhood detection, gear factor, the calculation of acceleration and simultaneous connection to up to 5 controllers. Thanks to the new framework, the functionality can be extended at any time via the integrated web server by update.

Temperature range

High protection level

Safety-Lock™

High rotational speed

High shaft load capacity

Shock / vibration resistant

Magnetic field proof

Reverse polarity protection

Optical sensor

Features

- Scaling of the total resolution via the gear factor.
- High resolution: singleturn up to 19 bit.
- High-precision setting of velocity and acceleration values through filter and hysteresis.
- Device Level Ring (DLR) ring redundancy of the network with two network ports.
- Low RPI time of minimum 1 ms - this makes the encoder usable for time-critical applications up to 1000 Hz update frequency.

Benefits

- Direct mapping of pitch ratios, e.g. for gear ratios or gear reductions.
- Precise position detection.
- Cost and time savings when setting up the control system.
- Communication is maintained when the ring structure is interrupted.

Standard optical | **Sendix F5858 / F5878 (shaft / hollow shaft)** | **EtherNet/IP**

Order code Shaft version

8.F5858	.	X	X	A	N	.	A3	2	2
Type		ⓐ	ⓑ	ⓒ	ⓓ		ⓔ		

ⓐ *Flange*
1 = clamping flange, IP65 ø 58 mm [2.28“]
3 = clamping flange, IP67 ø 58 mm [2.28“]
2 = synchro flange, IP65 ø 58 mm [2.28“]
4 = synchro flange, IP67 ø 58 mm [2.28“]
5 = square flange, IP65 □63.5 mm [2.5“]
7 = square flange, IP67 □63.5 mm [2.5“]

ⓑ *Shaft (ø x L), with flat*
1 = 6 x 10 mm [0.24 x 0.39“]
2 = 10 x 20 mm [0.39 x 0.79“]
3 = 1/4“ x 7/8“
4 = 3/8“ x 7/8“

ⓒ *Interface / Supply voltage*
A = EtherNet/IP / 10 ... 30 V DC

ⓓ *Type of connection*
N = 3 x axial M12 connector, 4-pin

ⓔ *Fieldbus profile*
A3 = EtherNet/IP

Options – Standard types (available from 1 piece)

Surface protection salt spray tested
with clamping flange IP67 and shaft ø 10 mm:
8.F5858.32AN.A322-**C**

V2A DIN 1.4305 AISI 303
Stainless steel V2A [1]
Order expansion:
8.F5858.XXAN.A322-**V2A**

V4A DIN 1.4404 AISI 316L
Stainless steel V4A [1]
Order expansion:
8.F5858.XXAN.A322-**V4A**

Options – on request (for other flange/shaft combinations)
- Surface protection salt spray tested
- Stainless steel V2A
- Stainless steel V4A

Order code Hollow shaft

8.F5878	.	X	X	A	N	.	A3	2	2
Type		ⓐ	ⓑ	ⓒ	ⓓ		ⓔ		

ⓐ *Flange*
1 = with spring element long, IP65
2 = with spring element long, IP67
3 = with stator coupling, IP65 ø 65 mm [2.56“]
4 = with stator coupling, IP67 ø 65 mm [2.56“]
5 = with stator coupling, IP65 ø 63 mm [2.48“]
6 = with stator coupling, IP67 ø 63 mm [2.48“]
9 = with torque stop, flexible, IP65
J = with torque stop, flexible, IP67

ⓑ *Blind hollow shaft (insertion depth max. 30 mm [1.18“])*
A = ø 10 mm [0.39“]
B = ø 12 mm [0.47“]
C = ø 14 mm [0.55“]
D = ø 15 mm [0.59“]
E = ø 3/8“
F = ø 1/2“

ⓒ *Interface / Supply voltage*
A = EtherNet/IP / 10 ... 30 V DC

ⓓ *Type of connection*
N = 3 x axial M12 connector, 4-pin

ⓔ *Fieldbus profile*
A3 = EtherNet/IP

Options – Standard types (available from 1 piece)

V2A DIN 1.4305 AISI 303
Stainless steel V2A [2]
Order expansion:
8.F5878.2XAN.A322-**V2A**

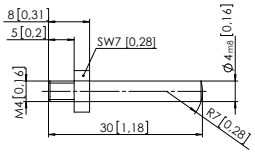
V4A DIN 1.4404 AISI 316L
Stainless steel V4A [2]
Order expansion:
8.F5878.2XAN.A322-**V4A**

Options – on request (for other flange/hollow shaft combinations)
- Surface protection salt spray tested
- Stainless steel V2A
- Stainless steel V4A

1) Only in conjunction with flange ⓐ = 3 or 4 and shaft ⓑ = 1 or 2.
2) Only in conjunction with flange ⓐ = 2 and hollow shaft ⓑ = B or D.

Standard optical	Sendix F5858 / F5878 (shaft / hollow shaft)	EtherNet/IP

Mounting accessory for shaft encoders		Order no.
Coupling	bellows coupling ø 19 mm [0.75“] for shaft 6 mm [0.24“]	**8.0000.1102.0606**
	bellows coupling ø 19 mm [0.75“] for shaft 10 mm [0.39“]	**8.0000.1102.1010**

Mounting accessory for hollow shaft encoders Dimensions in mm [inch]		Order no.
Torque pin, ø 4 mm for flange with spring element (flange type 1)	with fixing thread 	**8.0010.4700.0000**

Cables and connectors			Order no.
Preassembled cables	M12 male connector with external thread, 4-pin, D coded, straight single-ended 2 m [6.56‘] PUR cable	port 1 + port 2	**05.00.6031.4411.002M**
	M12 male connector with external thread, 4-pin, D coded, right-angle single-ended 2 m [6.56‘] PUR cable	port 1 + port 2	**05.00.6031.4511.002M**
	M12 female connector with coupling nut, 4-pin, A coded, straight single-ended 2 m [6.56‘] PUR cable	power supply	**05.00.6061.6211.002M**
	M12 female connector with coupling nut, 4-pin, A coded, right-angle single-ended 2 m [6.56‘] PUR cable	power supply	**05.00.6061.6311.002M**
Connectors	M12 male connector with external thread, 4-pin, D coded, straight (metal)	port 1 + port 2	**05.WASCSY4S**
	M12 male connector with external thread, 4-pin, D coded, right-angle (metal)	port 1 + port 2	**8.0000.5128.0000**
	M12 female connector with coupling nut, 4-pin, A coded, straight (plastic)	power supply	**05.B8141-0**
	M12 female connector with coupling nut, 4-pin, A coded, right-angle (plastic)	power supply	**05.B8241-0**

Further Kübler accessories can be found at: /accessories
Further Kübler cables and connectors can be found at: /connection-technology

Standard optical | **Sendix F5858 / F5878 (shaft / hollow shaft)** | **EtherNet/IP**

Technical data

Mechanical characteristics

Max. speed		9000 min^{-1} (short-term – 10 min) 6000 min^{-1} (continuous)		
Starting torque at 20 °C [68 °F]		< 0.01 Nm		
Moment of inertia				
	shaft version	3.0 x 10^{-6} kgm^2		
	blind hollow shaft version	4.0 x 10^{-6} kgm^2		
Load capacity of shaft	radial	80 N		
	axial	40 N		
Weight		approx. 0.45 kg [15.87 oz]		
Protection acc. to EN 60529		IP65, IP67		
Working temperature range		-40 °C ... +80 °C [-40 °F ... +176 °F]		
Material		Standard	V2A DIN 1.4305 AISI 303	V4A DIN 1.4404 AISI 316L
	shaft/hollow shaft	V2A	V2A	V4A
	flange	aluminum	V2A	V4A
	housing	aluminum	V2A	V4A
Shock resistance acc. EN 60068-2-27		2500 m/s^2, 6 ms		
Vibration resistance acc. EN 60068-2-6		100 m/s^2, 55 ... 2000 Hz		

Electrical characteristics

Power supply	10 ... 30 V DC
Current consumption (at 24 V DC)	max. 45 mA
Power consumption	max. 1.5 W
Reverse polarity protection of the power supply (V+)	yes

Approvals

UL compliant in accordance with	File no. E224618
CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU

Interface characteristics EtherNet/IP

General information

EtherNet/IP conformance tested acc. to	version CT-12 of 11. Dez. 2014
EtherNet/IP specification	Vol 2, Ed 1.17
CIP specification	Vol 1, Ed 3.16
Protocol	
F58x8 Standards & Features	CIP Version v3.32 Ethernet/IP Version v1.30 LLDP BOOTP DHCP
Device Profile	Encoder Device

Resolution

Resolution singleturn (MUR)	
scalable	1 ... 524 288 (19 bit)
default	262 144 (18 bit)

Adjustable parameters

- Preset
- Count direction
- Resolution
- Unity of speed
- IP address
- Number of revolutions
- Position
- Position format
- Position limit
- Acceleration unit
- Speed limit
- Acceleration limit
- Scaling
- Gear factor
- Filter for speed and acceleration
- Hysteresis for speed and acceleration

Objects (CIP Objects)

- Identity Object
- Message Router
- Assembly Object
- Connection Manager
- Position Sensor Object
- Qos Object
- Port Object
- TCP / IP Interface Object
- EtherNet Link Object

EtherNet/IP features

- DLR (Device Level Ring) possible
- Qos (Quality of Service) possible
- ACD (Address Conflict Detection)
- Multicast and unicast capability
- Up to 5 PLC connections

Process data

- Position
- Speed data
- Acceleration
- Errors
- Alarms
- Warnings
- Offset (for preset)
- Battery voltage
- Operating voltage
- Temperature

Standard optical | **Sendix F5858 / F5878 (shaft / hollow shaft)** | **EtherNet/IP**

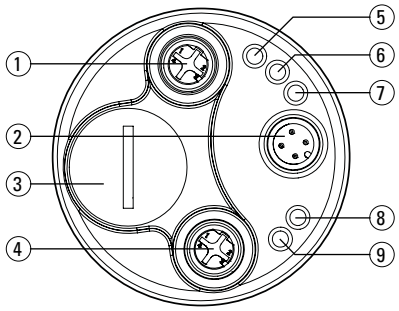
Terminal assignment bus

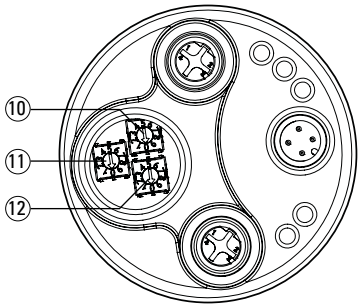
Interface	Type of connection	Function	M12 connector, 4-pin					
A	N (3 x M12 connector)	Bus Port 1	Signal:	Transmit data+	Receive data+	Transmit data -	Receive data -	 D coded
			Abbreviation:	TxD+	RxD+	TxD-	RxD-	
			Pin:	1	2	3	4	
		Power supply	Signal:	Voltage +	–	Voltage –	–	
			Abbreviation:	+ V	–	0 V	–	
			Pin:	1	2	3	4	
		Bus Port 2	Signal:	Transmit data+	Receive data+	Transmit data -	Receive data -	 D coded
			Abbreviation:	TxD+	RxD+	TxD-	RxD-	
			Pin:	1	2	3	4	

Rear side connections and display elements

①	Ethernet Port – Link 2	
②	Supply voltage	
③	Cover screw	
④	Ethernet Port – Link 1	
⑤	Link 2	flashes yellow when connected
⑥	BF – Bus Failture	displays network errors *)
⑦	SF – System Failture	displays system errors *)
⑧	ENC	Shows status of encoder *)
⑨	Link 1	flashes yellow when connected
⑩	Switch: x 100	
⑪	Switch: x 10	
⑫	Switch: x 1	

*) see manual





Settings rotary switch

Switch position	Meaning
000	Address assignment via DHCP
1 ... 254	Use stored subnet (standard: 192.168.1.x, mask: 255.255.255.0) The last digit „x" of the IP address is determined by the rotary switch.
300	Explicit Protection Mode OFF
555	Resetting the encoder to factory setting. To reset, this switch position must be set. If necessary, switch off the operating voltage and switch it on again within 10 seconds. After that, the encoder can be switched off and the switch setting desired during operation can be made. All parameters are now set to factory settings - both the encoder objects and the TCP/IP settings.
800	Explicit Protection Mode ON
Other positions	Reserved, do not use!

Standard optical | **Sendix F5858 / F5878 (shaft / hollow shaft)** | **EtherNet/IP**

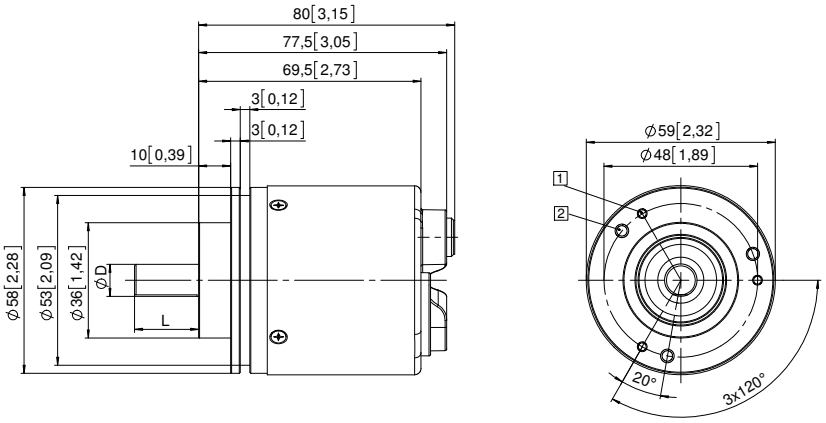
Dimensions shaft version

Dimensions in mm [inch]

Clamping flange, ø 58 [2.28]
Flange type 1 + 3

1 3 x M3, 6 [0.24] deep

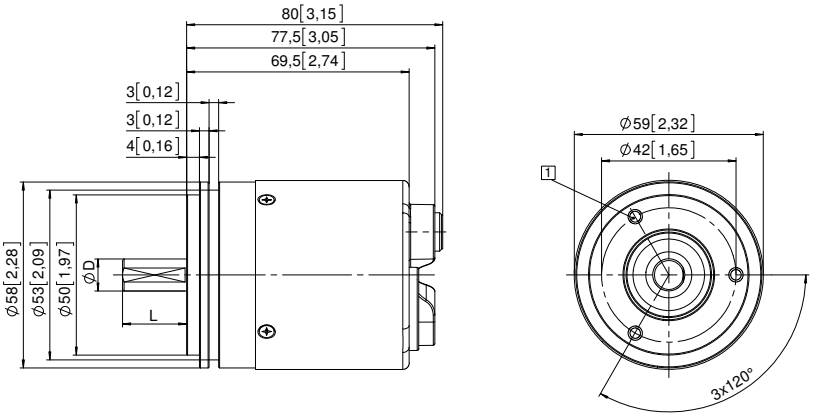
2 3 x M4, 8 [0.31] deep



D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h7	7/8"
3/8"	h7	7/8"

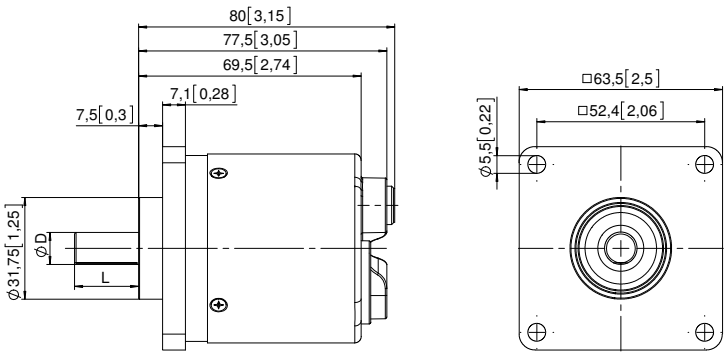
Synchro flange, ø 58 [2.28]
Flange type 2 + 4

1 3 x M3, 6 [0.24] deep



D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h7	7/8"
3/8"	h7	7/8"

Square flange, □ 63.5 [2.5]
Flange type 5 + 7



D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h7	7/8"
3/8"	h7	7/8"

Standard optical | **Sendix F5858 / F5878 (shaft / hollow shaft)** | **EtherNet/IP**

Dimensions hollow shaft version

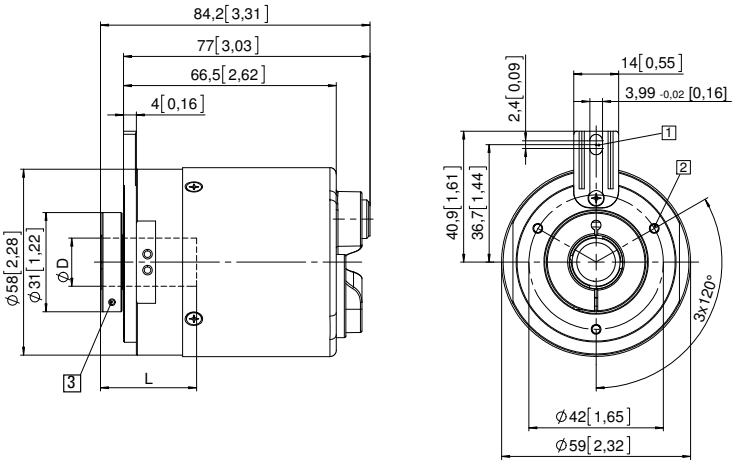
Dimensions in mm [inch]

Flange with spring element, long
Flange type 1 + 2

1 Slot spring element, recommendation: torque pin DIN 7, ø 4 [0.16]

2 3 x M3, 5.5 [0.22] deep

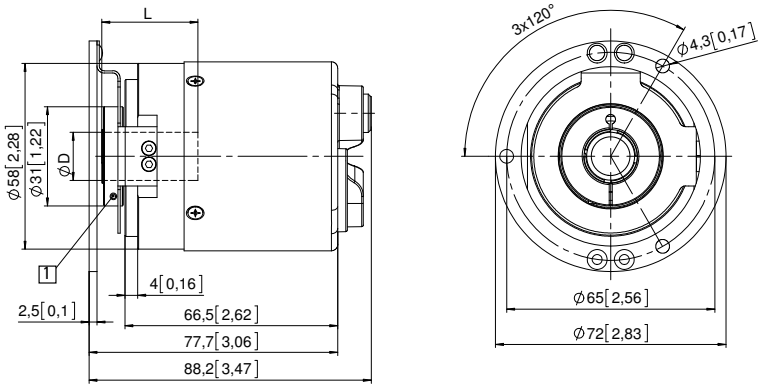
3 Recommended torque for the clamping ring 0.6 Nm



D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

Flange with stator coupling, ø 65 [2.56]
Flange type 3 + 4

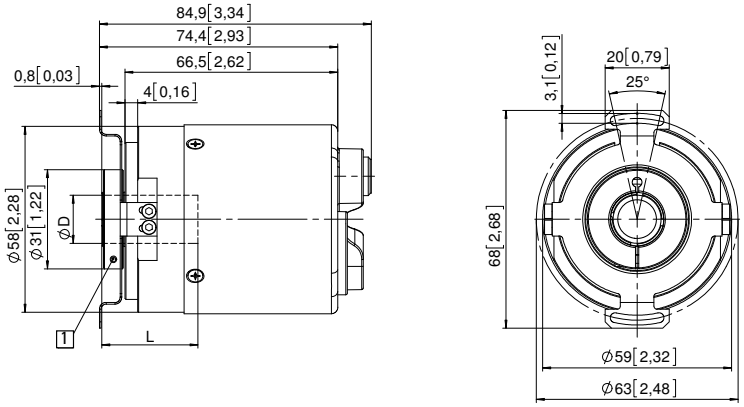
1 Recommended torque for the clamping ring 0.6 Nm



D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

Flange with stator coupling, ø 63 [2.48]
Flange type 5 + 6

1 Recommended torque for the clamping ring 0.6 Nm



D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

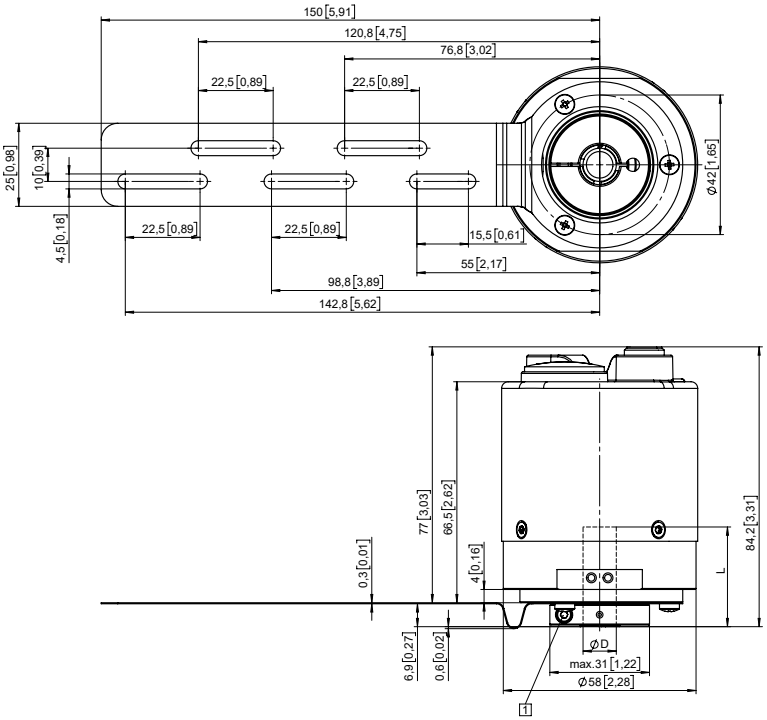
Standard optical | **Sendix F5858 / F5878 (shaft / hollow shaft)** | **EtherNet/IP**

Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with torque stop, flexible
Flange type 9 + J

1 Recommended torque for the clamping ring 0.6 Nm



D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8“	H7	30 [1.18]
1/2“	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

Standard optical | **Sendix F5858 / F5878 (shaft / hollow shaft)** | **PROFINET IO**

The Sendix F58 singleturn is a particularly high resolution optical encoder without gears and with 100 percent magnetic insensitivity.

19 bits total resolution, shaft up to 10 mm, blind hollow shaft up to 15 mm and certified PROFINET functionality. A minimum cycle time of 250 µs, the PROFIdrive application profile and a web server for FW updates are supported.

Safety-Lock™ | High rotational speed | Temperature range -40°... +80°C | High protection level IP67 | High shaft load capacity | Shock / vibration resistant | Magnetic field proof | Reverse polarity protection | Optical sensor

Latest PROFINET functionality

- PROFINET IO, RT, IRT allows integration in applications with different performance requirements.
- Supports the Isochronous Mode, can thus be implemented in networks for hard real-time requirements with clock cycles up to 250 µs.
- Encoder profile V 4.2 with full support of various Profinet features.
- Ideal for highly synchronous applications, such as e. g. axis synchronization.
- Interoperability between many different control and drive manufacturers thanks to the PROFIdrive profile.

Reliable and insensitive

- Sturdy bearing construction in Safety-Lock™ Design for resistance against vibration and installation errors.
- Wide temperature range, -40 °C ... +80 °C.

Standard optical | **Sendix F5858 / F5878 (shaft / hollow shaft)** | **PROFINET IO**

Order code Shaft version

8.F5858	.	X	X	C	N	.	C1	2	2
Type		ⓐ	ⓑ	ⓒ	ⓓ		ⓔ		

ⓐ *Flange*
1 = clamping flange, IP65 ø 58 mm [2.28“]
3 = clamping flange, IP67 ø 58 mm [2.28“]
2 = synchro flange, IP65 ø 58 mm [2.28“]
4 = synchro flange, IP67 ø 58 mm [2.28“]
5 = square flange, IP65 □63.5 mm [2.5“]
7 = square flange, IP67 □63.5 mm [2.5“]

ⓑ *Shaft (ø x L), with flat*
1 = 6 x 10 mm [0.24 x 0.39“]
2 = 10 x 20 mm [0.39 x 0.79“]
3 = 1/4“ x 7/8“
4 = 3/8“ x 7/8“

ⓒ *Interface / Supply voltage*
C = PROFINET IO / 10 ... 30 V DC

ⓓ *Type of connection*
N = 3 x axial M12 connector, 4-pin

ⓔ *Fieldbus profile*
C1 = PROFINET IO

Options – Standard types (available from 1 piece)

Surface protection salt spray tested
with clamping flange IP67 and shaft ø 10 mm:
8.F5858.32CN.C122-**C**

V2A DIN 1.4305 AISI 303
Stainless steel V2A [1]
Order expansion:
8.F5858.XXCN.C122-**V2A**

V4A DIN 1.4404 AISI 316L
Stainless steel V4A [1]
Order expansion:
8.F5858.XXCN.C122-**V4A**

Options – on request (for other flange/shaft combinations)
- Surface protection salt spray tested
- Stainless steel V2A
- Stainless steel V4A

Order code Hollow shaft

8.F5878	.	X	X	C	N	.	C1	2	2
Type		ⓐ	ⓑ	ⓒ	ⓓ		ⓔ		

ⓐ *Flange*
1 = with spring element long, IP65
2 = with spring element long, IP67
3 = with stator coupling, IP65 ø 65 mm [2.56“]
4 = with stator coupling, IP67 ø 65 mm [2.56“]
5 = with stator coupling, IP65 ø 63 mm [2.48“]
6 = with stator coupling, IP67 ø 63 mm [2.48“]
9 = with torque stop, flexible, IP65
J = with torque stop, flexible, IP67

ⓑ *Blind hollow shaft (insertion depth max. 30 mm [1.18“])*
A = ø 10 mm [0.39“]
B = ø 12 mm [0.47“]
C = ø 14 mm [0.55“]
D = ø 15 mm [0.59“]
E = ø 3/8“
F = ø 1/2“

ⓒ *Interface / Supply voltage*
C = PROFINET IO / 10 ... 30 V DC

ⓓ *Type of connection*
N = 3 x axial M12 connector, 4-pin

ⓔ *Fieldbus profile*
C1 = PROFINET IO

Options – Standard types (available from 1 piece)

V2A DIN 1.4305 AISI 303
Stainless steel V2A [2]
Order expansion:
8.F5878.2XCN.C122-**V2A**

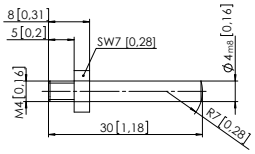
V4A DIN 1.4404 AISI 316L
Stainless steel V4A [2]
Order expansion:
8.F5878.2XCN.C122-**V4A**

Options – on request (for other flange/hollow shaft combinations)
- Surface protection salt spray tested
- Stainless steel V2A
- Stainless steel V4A

1) Only in conjunction with flange ⓐ = 3 or 4 and shaft ⓑ = 1 or 2.
2) Only in conjunction with flange ⓐ = 2 and hollow shaft ⓑ = B or D.

Standard optical	Sendix F5858 / F5878 (shaft / hollow shaft)	PROFINET IO

Mounting accessory for shaft encoders		Order no.
Coupling	bellows coupling ø 19 mm [0.75“] for shaft 6 mm [0.24“]	**8.0000.1102.0606**
	bellows coupling ø 19 mm [0.75“] for shaft 10 mm [0.39“]	**8.0000.1102.1010**

Mounting accessory for hollow shaft encoders Dimensions in mm [inch]		Order no.
Torque pin, ø 4 mm for flange with spring element (flange type 1)	with fixing thread 	**8.0010.4700.0000**

Cables and connectors			Order no.
Preassembled cables	M12 male connector with external thread, 4-pin, D coded, straight single-ended 2 m [6.56‘] PUR cable	port 1 + port 2	**05.00.6031.4411.002M**
	M12 male connector with external thread, 4-pin, D coded, right-angle single-ended 2 m [6.56‘] PUR cable	port 1 + port 2	**05.00.6031.4511.002M**
	M12 female connector with coupling nut, 4-pin, A coded, straight single-ended 2 m [6.56‘] PUR cable	power supply	**05.00.6061.6211.002M**
	M12 female connector with coupling nut, 4-pin, A coded, right-angle single-ended 2 m [6.56‘] PUR cable	power supply	**05.00.6061.6311.002M**
Connectors	M12 male connector with external thread, 4-pin, D coded, straight (metal)	port 1 + port 2	**05.WASCSY4S**
	M12 male connector with external thread, 4-pin, D coded, right-angle (metal)	port 1 + port 2	**8.0000.5128.0000**
	M12 female connector with coupling nut, 4-pin, A coded, straight (plastic)	power supply	**05.B8141-0**
	M12 female connector with coupling nut, 4-pin, A coded, right-angle (plastic)	power supply	**05.B8241-0**

Further Kübler accessories can be found at: /accessories
Further Kübler cables and connectors can be found at: /connection-technology

Standard optical | **Sendix F5858 / F5878 (shaft / hollow shaft)** | **PROFINET IO**

Technical data

Mechanical characteristics

Max. speed		9000 min^{-1} (short-term – 10 min) 6000 min^{-1} (continuous)		
Starting torque at 20 °C [68 °F]		< 0.01 Nm		
Moment of inertia				
	shaft version	3.0 x 10^{-6} kgm^2		
	blind hollow shaft version	4.0 x 10^{-6} kgm^2		
Load capacity of shaft	radial	80 N		
	axial	40 N		
Weight		approx. 0.45 kg [15.87 oz]		
Protection acc. to EN 60529		IP65, IP67		
Working temperature range		-40 °C ... +80 °C [-40 °F ... +176 °F]		
Material		Standard	V2A DIN 1.4305 AISI 303	V4A DIN 1.4404 AISI 316L
	shaft/hollow shaft	V2A	V2A	V4A
	flange	aluminum	V2A	V4A
	housing	aluminum	V2A	V4A
Shock resistance acc. EN 60068-2-27		2500 m/s^2, 6 ms		
Vibration resistance acc. EN 60068-2-6		100 m/s^2, 55 ... 2000 Hz		

Electrical characteristics

Power supply	10 ... 30 V DC
Current consumption (at 24 V DC)	max. 45 mA
Power consumption	max. 1.5 W
Reverse polarity protection of the power supply (V+)	yes

Approvals

UL compliant in accordance with	File no. E224618
CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU

Interface characteristics PROFINET IO

General information

Protocol	PROFINET IO
Classifications	RT Class 3 (IRT) Conformance Class C Application Class 6 Encoder Class 4 Netload Class III

Adjustable parameters

- Preset
- Counting direction
- Resolution per revolution - MUR
- Unit speed
- IP address
- Total resolution - TMR
- Position format
- Speed reference value
- Scaling
- Device name
- F-Destination Address
- I&M 0...3 Parameter
- Alarm behavior
- Parameter write protection
- Parameter initialization

Resolution

Resolution Singleturn (MUR)		
	scalable	1 ... 524 288 (19 bit)
	default	8 192 (13 bit)

PROFINET characteristics

- I&M 0 ... 3
- standard telegrams (81, 82, 83, 84, 86, 88)
- IRT up to 250 µs
- Isochrounus Mode
- MRP
- LLDP
- PDEV
- SNMP
- FSU

Process data

- Position
- Speed
- Failure
- Warnings

Standard optical	Sendix F5858 / F5878 (shaft / hollow shaft)	PROFINET IO

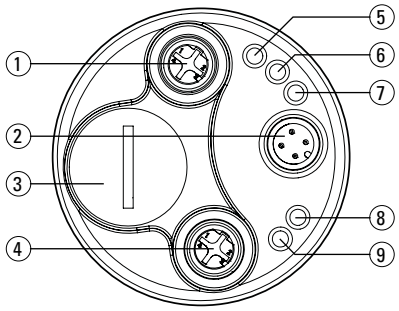
Terminal assignment bus

Interface	Type of connection	Function	M12 connector, 4-pin				
C	N (3 x M12 connector)	Bus Port 1	Signal:	Transmit data+	Receive data+	Transmit data -	Receive data -	 D coded
			Abbreviation:	TxD+	RxD+	TxD-	RxD-	
			Pin:	1	2	3	4	
		Power supply	Signal:	Voltage +	–	Voltage –	–	
			Abbreviation:	+ V	–	0 V	–	
			Pin:	1	2	3	4	
		Bus Port 2	Signal:	Transmit data+	Receive data+	Transmit data -	Receive data -	 D coded
			Abbreviation:	TxD+	RxD+	TxD-	RxD-	
			Pin:	1	2	3	4	

Rear side connections and display elements

①	Ethernet Port – Link 2	
②	Supply voltage	
③	Cover screw	
④	Ethernet Port – Link 1	
⑤	Link 2	flashes yellow when connected
⑥	BF – Bus Failture	displays network errors *)
⑦	SF – System Failture	displays system errors *)
⑧	ENC	shows status of encoder *)
⑨	Link 1	flashes yellow when connected

*) see manual



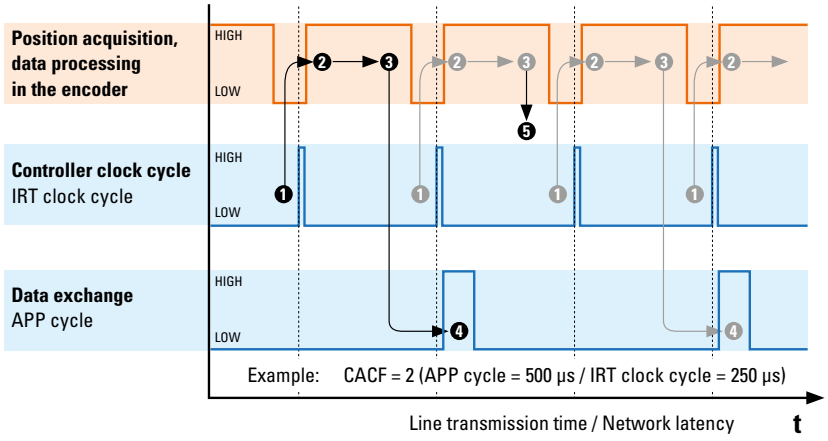
Standard optical | **Sendix F5858 / F5878 (shaft / hollow shaft)** | **PROFINET IO**

Technology in detail

Clock synchronicity – Isochronous Real Time (IRT) in position sensor technology

In general, for time-critical applications, focus is set on very short sensor cycle times. However, in order to achieve high control performance, simply accelerating data acquisition and processing by shortest cycle times is not sufficient. All sensors and actuators are to operate according to the same clock.

This is achieved thanks to a clock used for the whole network, defined by the controller. This transmit clock cycle (IRT clock) is however not necessarily the clock cycle used for process data exchange. Another cycle (application cycle) is used for this purpose, which can also be defined by the customer controller. The illustration below represents the connection between the different clock cycles.



❶ **Clock specification by controller**
IRT clock cycle = Transmit clock

❷ **Data acquisition position signals**
Internal sensor clock synchronizes with the IRT clock. Acquisition of the sensor raw values

❸ **Data processing in the encoder**
Position data is processed and written in the buffer memory of the encoder

❹ **Data transmission via the network**
At every application cycle (APP cycle), data is read from the buffer memory and transmitted to the controller.

❺ **All 2nd positions**
Since the APP cycle is twice as long as the IRT clock cycle, every 2nd position acquired will not be transmitted.
Or: data exchange takes place only every second IRT clock cycle.

When receiving the IRT clock signal, the sensor starts reading its current measured point. This raw value is processed internally (e.g. scaling, speed calculation, etc.) and stored in a buffer memory.

The buffer memory is read at every application cycle. If it contains a value, this value is transmitted to the controller via the network.

If the application cycle is a multiple of the IRT clock cycle, it may happen that the buffered process data is not sent directly, but is overwritten, because, even though this data is acquired with every IRT clock cycle, it is sent only with every application cycle.

The ratio between application cycle and IRT clock cycle represents the CACF (Controller Application Cycle Factor).
In this example, the CACF = 2. This indicates that only every 2nd acquired position will be transmitted to the controller.

The described methodology guarantees a determinism: since the controller defines a clock cycle for the whole network, this allows ensuring that all measured values transmitted by the sensors to the controller are never older than the selected IRT cycle! Therefore, all downstream actuators can always be regulated on the basis of the latest available measured values.

Standard optical | **Sendix F5858 / F5878 (shaft / hollow shaft)** | **PROFINET IO**

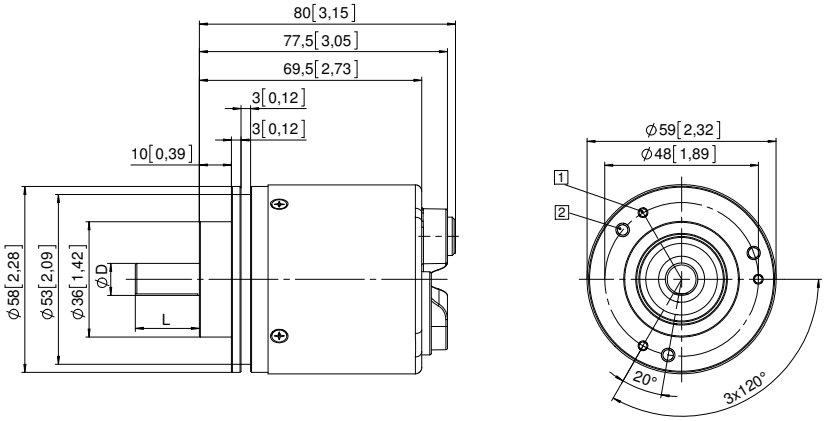
Dimensions shaft version

Dimensions in mm [inch]

Clamping flange, ø 58 [2.28]
Flange type 1 + 3

1 3 x M3, 6 [0.24] deep

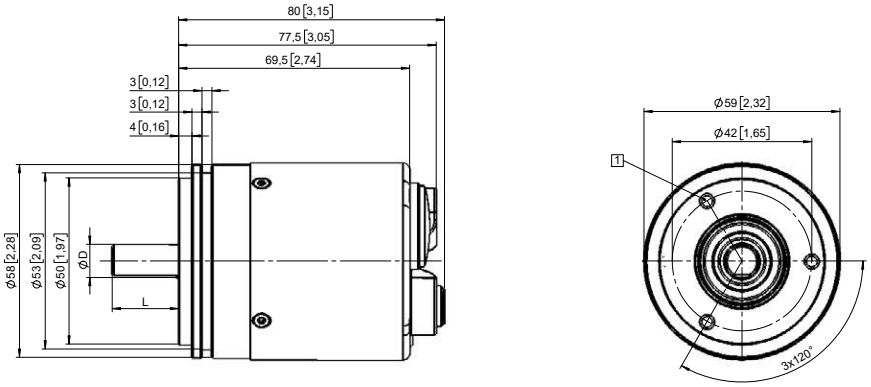
2 3 x M4, 8 [0.31] deep



D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h7	7/8"
3/8"	h7	7/8"

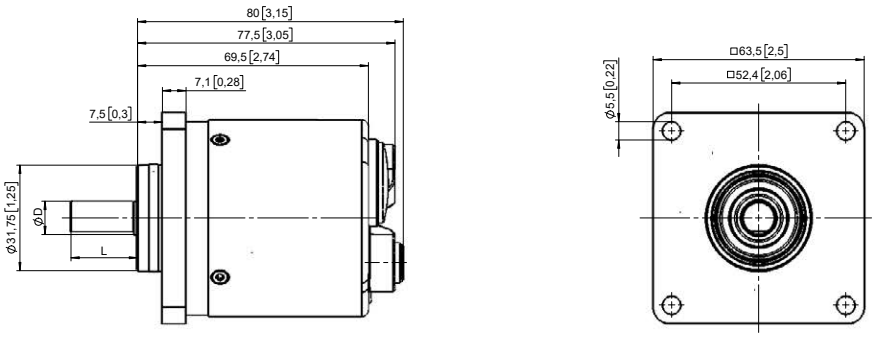
Synchro flange, ø 58 [2.28]
Flange type 2 + 4

1 3 x M3, 6 [0.24] deep



D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h7	7/8"
3/8"	h7	7/8"

Square flange, □ 63.5 [2.5]
Flange type 5 + 7



D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h7	7/8"
3/8"	h7	7/8"

Standard optical | **Sendix F5858 / F5878 (shaft / hollow shaft)** | **PROFINET IO**

Dimensions hollow shaft version

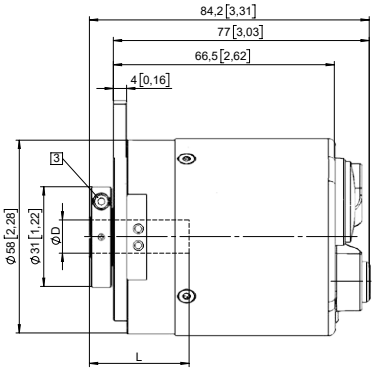
Dimensions in mm [inch]

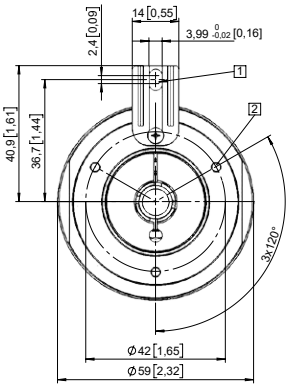
Flange with spring element, long
Flange type 1 + 2

1 Slot spring element, recommendation: torque pin DIN 7, ø 4 [0.16]

2 3 x M3, 5.5 [0.22] deep

3 Recommended torque for the clamping ring 0.6 Nm

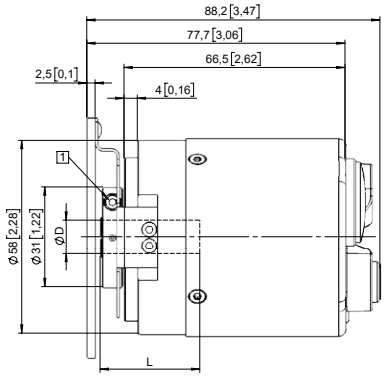


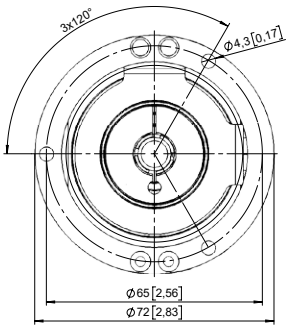


D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

Flange with stator coupling, ø 65 [2.56]
Flange type 3 + 4

1 Recommended torque for the clamping ring 0.6 Nm

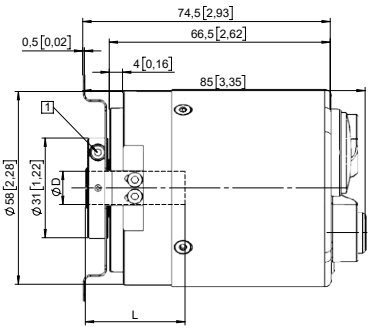


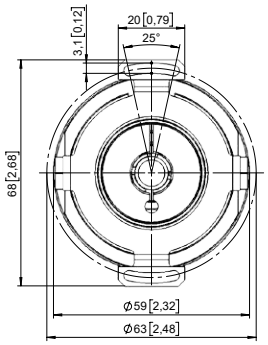


D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

Flange with stator coupling, ø 63 [2.48]
Flange type 5 + 6

1 Recommended torque for the clamping ring 0.6 Nm





D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

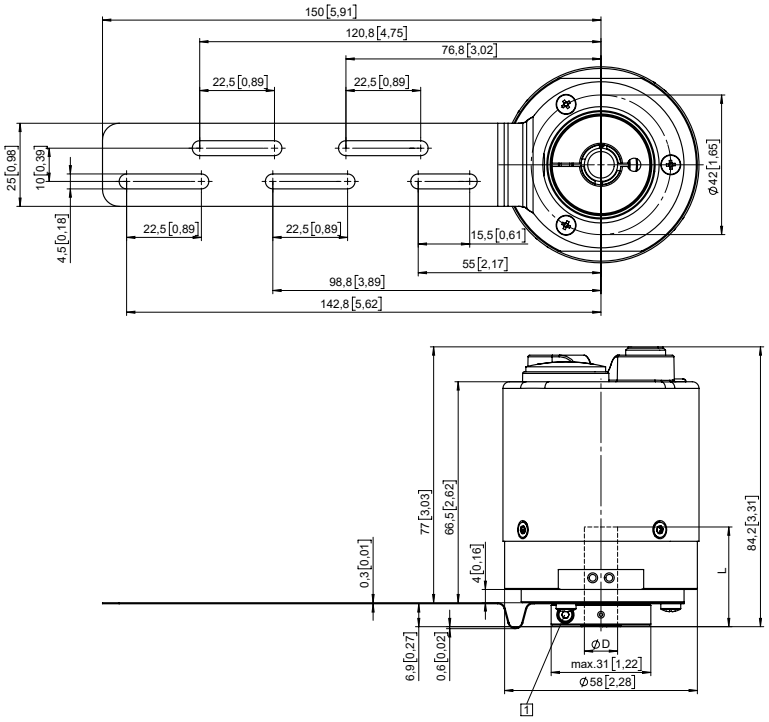
Standard optical | **Sendix F5858 / F5878 (shaft / hollow shaft)** | **PROFINET IO**

Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with torque stop, flexible
Flange type 9 + J

1 Recommended torque for the clamping ring 0.6 Nm



D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

Standard magnetic | **Sendix M5851A (shaft)** | **Analog**

The Sendix M5851A is a magnetic singleturn encoder in compact design. High robustness and high resolution make this encoder the ideal device for use in demanding applications.

Safety-Lockplus™ | High rotational speed | Temperature range -40°... +85°C | High protection level IP | High shaft load capacity | Shock / vibration resistant | Reverse polarity protection

Highest robustness

- Sturdy bearing construction in Safety-Lockplus™ design for particularly high resistance.
- Extra large bearings.
- Mechanically protected shaft seal.
- Wide temperature range -40 °C ... +85 °C.

Application oriented

- Current output 4 ... 20 mA.
- Voltage output 0 ... 10 V or 0 ... 5 V.
- Different measuring ranges.
- SET input for easy start-up.

Order code Shaft version

8.M5851A	.	X	X	X	X	.	X	X	X	2
Type		a	b	c	d		e	f	g	

a *Version*
3 = clamping flange, IP65, ø 58 mm [2.28"]
4 = synchro flange, IP65, ø 58 mm [2.28"]

b *Shaft (ø x L), with flat*
1 = ø 6 x 12.5 mm [0.24 x 0.49"]
5 = ø 10 x 20 mm [0.39 x 0.79"]

c *Output circuit* [1)]
3 = current output
4 = voltage output

d Type of connection
2 = radial cable, 1 m [3.28'] PVC
B = radial cable, special length PVC *)
4 = radial M12 connector, 5-pin

Type of connection with changed terminal assignment (see page 5)
D = radial M12 connector, 5-pin

*) Available special lengths (connection types B):
2, 3, 5, 8, 10, 15 m [5.56, 9.84, 16.40, 26.25, 32.80, 49.21']
order code expansion .XXXX = length in dm
ex.: 8.M5851A.313B.3112.0030 (for cable length 3 m)

e Interface / resolution / supply voltage
3 = 4 ... 20 mA / 12 bit / 10 ... 30 V DC
4 = 0 ... 10 V / 12 bit / 15 ... 30 V DC
5 = 0 ... 5 V / 11 bit / 10 ... 30 V DC

f *Measuring range*
1 = 1 x 360°
2 = 1 x 180°
3 = 1 x 90°
4 = 1 x 45°

g *Counting direction*
1 = cw
2 = ccw

Optional on request
- Ex 2/22

1) Output circuit "3" only in conjunction with interface "3", output circuit "4" only in conjunction with interface "4" or "5".

Standard magnetic	Sendix M5851A (shaft)	Analog

Mounting accessory for shaft encoders		Order no.
Coupling	Bellows coupling ø 19 mm [0.75“] for shaft 10 mm [0.39“]	**8.0000.1102.1010**

Cables and connectors		Order no.
Preassembled cables	M12 female connector with coupling nut, 5-pin, A coded, straight single ended 2 m [6.56‘] PVC cable	**05.00.6081.2211.002M**
Connector	M12 female connector with coupling nut, 5-pin, A coded, straight (metal)	**8.0000.5116.0000**

Further Kübler accessories can be found at: /accessories
Further Kübler cables and connectors can be found at: /connection-technology

Technical data

Electrical characteristics current interface 4 ... 20 mA

Supply voltage		10 ... 30 V DC
Current consumption (no load)		max. 30 mA
Reverse polarity protection of the supply voltage		yes
Short-circuit proof outputs		yes [1]
Measuring range		45°, 90°, 180° or 360°
DA converter resolution		12 bit
Angular measurement deviation [2]		±0,5°
Temperature coefficient		< 100 ppm/K
Repeat accuracy, at 25°C [77°F]		±0.2°
Output load	at 10 V DC at 24 V DC at 30 V DC	max. 200 Ohm max. 900 Ohm max. 1200 Ohm
Setting time		< 1 ms, R_{Burden} = 900 Ohm, 25°C [77°F]
LEDs (green/red)		- system status - current loop interruption – input load too high - reference point display (only with factory settings) at cw: betw. 0° and 1° at ccw: betw. 0° and -1°
SET input		level = +V for 1 s minimum
PowerON Time		< 1 s
Update rate		1 ms

Electrical characteristics voltage interface 0 ... 10 V / 0 ... 5 V

Supply voltage	output 0 ... 5 V output 0 ... 10 V	10 ... 30 V DC 15 ... 30 V DC
Current consumption (no load)		max. 30 mA
Reverse polarity protection of the supply voltage		yes
Short-circuit proof outputs		yes [1]
Measuring range		45°, 90°, 180° or 360°
DA converter resolution	0 ... 10 V 0 ... 5 V	12 bit 11 bit
Angular measurement deviation [2]		±0,5°
Temperature coefficient		< 100 ppm/K
Repeat accuracy, at 25°C [77°F]		±0.2°
Current output		max. 10 mA
Setting time		< 1 ms, R_{Load} = 1000 Ohm, 25°C [77°F]
LEDs (green/red)		- system status - reference point display (only with factory settings) at cw: betw. 0° and 1° at ccw: betw. 0° and -1°
SET input		level = +V for 1 s minimum
PowerON Time		< 1 s
Update rate		1 ms

1) When the supply voltage is correctly applied.
But not output to +V. Supply voltage and sensor output signal are not galvanically isolated.
2) Over the whole temperature range.

Standard magnetic | **Sendix M5851A (shaft)** | **Analog**

Mechanical characteristics

Maximum speed		4000 min^{-1} 2000 min^{-1} (continuous)
Starting torque at 20 °C [68 °F]		< 0.01 Nm
Shaft load capacity	radial axial	80 N 40 N
Weight		approx. 280 g [9.88 oz]
Protection acc. to EN 60529/DIN 40050-9		IP65
Working temperature range		-40 °C ... +85 °C [-40 °F ... +185 °F]
Materials	shaft flange housing cable	V2A aluminum zinc die-cast PVC
Shock resistance acc. to EN 60068-2-27		5000 m/s^2, 4 ms
Vibration resistance acc. to EN 60068-2-6		300 m/s^2, 10 ... 2000 Hz

Approvals

E1 compliant in accordance with	ECE guideline
UL compliant in accordance with	File no. E224618
CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU
ATEX Directive	2014/34/EU (for Ex 2/22 variants)

SET input

Input		active HIGH
Input type		comparator
Signal level (+V = supply voltage)	HIGH LOW	min. 60 % of +V, max: +V max. 30 % of +V
Input current		< 0.5 mA
Min. pulse duration (SET)		10 ms
Input delay		1 ms
New position data readable after		1 ms
Internal processing time		200 ms

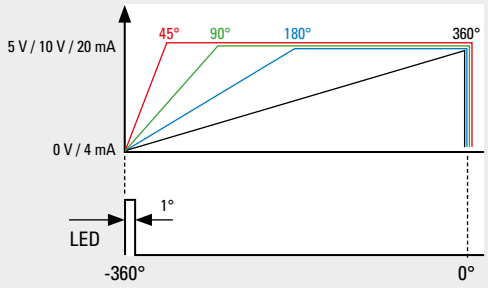
The encoder can be set to zero at any position by means of a HIGH signal on the SET input. Other preset values can be factory-programmed. The SET input has a signal processing time of approx. 1 ms, after which the new position data can be read. Once the SET function has been triggered, the encoder requires an internal processing time of typ. 200 ms; during this time the supply voltage must not be switched off.
The SET function should be carried out whilst the encoder is at rest.

The number of preset value writing cycles is limited to 10,000.

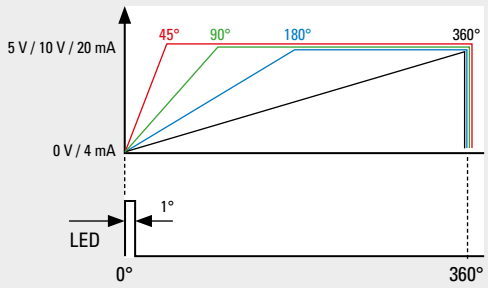
If this input is not used, it should be connected to 0 V (Encoder ground GND) in order to avoid interferences.

Example (output signal evolution) Variante counting direction cw

Direction of rotation left

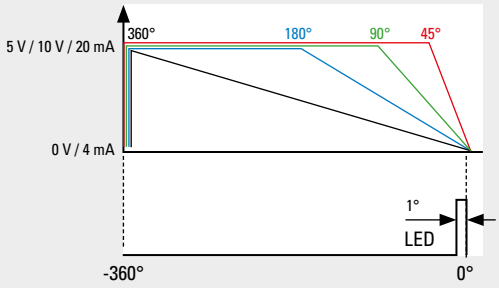


Direction of rotation right

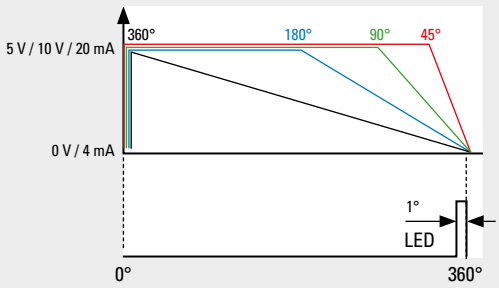


Example (output signal evolution) Variante counting direction ccw

Direction of rotation left



Direction of rotation right



Standard magnetic | **Sendix M5851A (shaft)** | **Analog**

Terminal assignment

Interface	Type of connection	Cable (isolate unused cores individually before initial start-up)					
3 (current)	2, B	Signal:	0 V	+V	+I	SET	–
		Core color:	WH	BN	GN	GY	PK

Interface	Type of connection	M12 connector, 5 pin					
3 (current)	4	Signal:	0 V	+V	+I	SET	–
		Pin:	3	2	1	5	4

Interface	Type of connection	M12 connector, 5 pin					
3 (current)	D	Signal:	0 V	+V	+I	SET	–
		Pin:	3	1	2	4	5

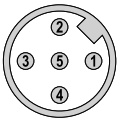
Interface	Type of connection	Cable (isolate unused cores individually before initial start-up)					
4, 5 (voltage)	2, B	Signal:	0 V	+V	+U	SET	–
		Core color:	WH	BN	GN	GY	PK

Interface	Type of connection	M12 connector, 5 pin					
4, 5 (voltage)	4	Signal:	0 V	+V	+U	SET	–
		Pin:	3	2	1	5	4

Interface	Type of connection	M12 connector, 5 pin					
4, 5 (voltage)	D	Signal:	0 V	+V	+U	SET	–
		Pin:	3	1	2	4	5

+V : Supply voltage encoder +V DC
0 V : Supply voltage encoder ground GND (0 V)
+U : Voltage
+I : Current
SET : SET input

Top view of mating side, male contact base



M12 connector, 5-pin

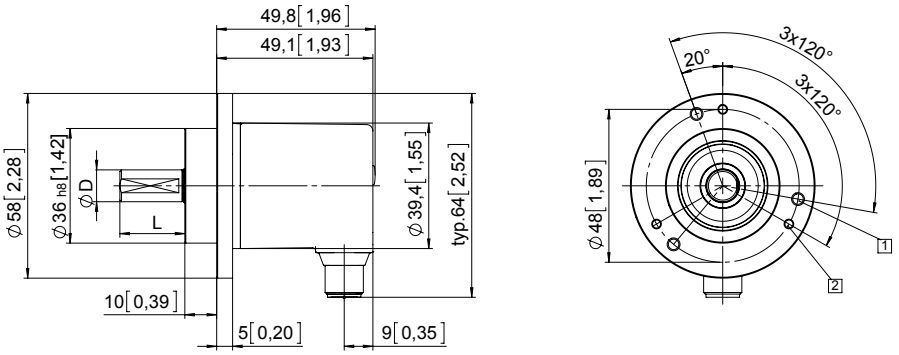
Standard magnetic	Sendix M5851A (shaft)	Analog

Dimensions

Dimensions in mm [inch]

Clamping flange, ø 58 [2.28]
Flange type 3

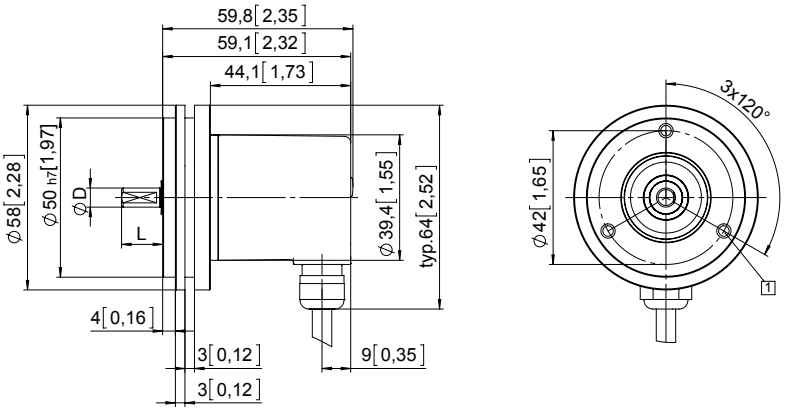
1 3 x M4
2 3 x M3



D	Fit	L
6 [0.24]	h7	12.5 [0.49]
10 [0.39]	h7	20 [0.79]

Synchro flange, ø 58 [2.28]
Flange type 4

1 3 x M4, 10 [0.39] deep



D	Fit	L
6 [0.24]	h7	12.5 [0.49]
10 [0.39]	h7	20 [0.79]

Absolute encoders – singleturn

Standard magnetic	Sendix M5853A (shaft)	SSI

The Sendix M5853A is a magnetic singleturn encoder in compact design. High robustness and high resolution make this encoder the ideal device for use in demanding applications.

Safety-Lockplus™ | High rotational speed | Temperature range | High protection level | High shaft load capacity | Shock / vibration resistant | Reverse polarity protection

Highest robustness

- Sturdy bearing construction in Safety-Lockplus™ design for particularly high resistance.
- Extra large bearings.
- Mechanically protected shaft seal.
- Wide temperature range -40 °C ... +85 °C.

Application oriented

- Angular measurement deviation ±0,5°.
- Repeat accuracy ±0.2°.
- Short control cycles, clock frequency with SSI up to 2 MHz.
- Max. resolution 14 bit.

Order code Shaft version

8.M5853A.	X	X	2	X	.	X	X	1	2
Type	a	b	c	d		e	f		

a *Version*
3 = clamping flange, IP65, ø 58 mm [2.28"]
4 = synchro flange, IP65, ø 58 mm [2.28"]

b *Shaft (ø x L), with flat*
1 = ø 6 x 12.5 mm [0.24 x 0.49"]
5 = ø 10 x 20 mm [0.39 x 0.79"]

c *Interface / supply voltage*
2 = SSI / 10 ... 30 V DC

d Type of connection
2 = radial cable, 1 m [3.28'] PUR
B = radial cable, special length PUR *)
4 = radial M12 connector, 8-pin
*) Available special lengths (connection types B):
2, 3, 5, 8, 10, 15 m [5.56, 9.84, 16.40, 26.25, 32.80, 49.21']
order code expansion .XXXX = length in dm
ex.: 8.M5853A.352B.G312.0030 (for cable length 3 m)

e *Code*
B = SSI, binary
G = SSI, gray

f *Resolution*
A = 10 bit
2 = 12 bit
3 = 13 bit
4 = 14 bit

Optional on request
- Ex 2/22 (only for connection type 4)

Mounting accessory for shaft encoders		Order no.
Coupling	Bellows coupling ø 19 mm [0.75"] for shaft 10 mm [0.39"]	**8.0000.1102.1010**

Cables and connectors		Order no.
Preassembled cables	M12 female connector with coupling nut, 8-pin, A coded, straight single ended 2 m [6.56'] PUR cable	**05.00.6051.8211.002M**
Connector	M12 female connector with coupling nut, 8-pin, A coded, straight (metal)	**05.CMB 8181-0**

Further Kübler accessories can be found at: /accessories
Further Kübler cables and connectors can be found at: /connection-technology

Standard magnetic | **Sendix M5853A (shaft)** | **SSI**

Technical data

Mechanical characteristics

Maximum speed		4000 min^{-1} 2000 min^{-1} (continuous)
Starting torque at 20 °C [68 °F]		< 0.01 Nm
Shaft load capacity	radial axial	80 N 40 N
Weight		approx. 280 g [9.88 oz]
Protection acc. to EN 60529/DIN 40050-9		IP65
Working temperature range		-40 °C ... +85 °C [-40 °F ... +185 °F]
Materials	shaft flange housing cable	V2A aluminum zinc die-cast PUR
Shock resistance acc. to EN 60068-2-27		5000 m/s^2, 4 ms
Vibration resistance acc. to EN 60068-2-6		300 m/s^2, 10 ... 2000 Hz

Electrical characteristics

Supply voltage	10 ... 30 V DC
Current consumption (no load)	max. 30 mA
Reverse polarity protection of the supply voltage	yes
Short-circuit proof outputs	yes [1]

SSI interface

Output driver		RS485 transceiver type
Permissible load / channel		max. +/- 30 mA
Signal level	HIGH LOW with I_{Load} = 20 mA	typ 3.8 V typ 1.3 V
Resolution		10 ... 14 bit
Angular measurement deviation [2]		±0,5°
Repeat accuracy		±0.2°
Code		binary or gray
SSI clock rate		50 kHz ... 2 MHz
Data refresh rate		2 ms
Monoflop time		≤ 15 µs

Note: If the clock cycle starts within the monoflop time a second data transfer begins with the same data. If the clock cycle starts after the monoflop time the cycle begins with the new values. The update rate is dependent on the clock speed, data length and monoflop time.

SET input

Input		active HIGH
Input type		comparator
Signal level (+V = supply voltage)	HIGH LOW	min. 60 % of +V, max: +V max. 30 % of +V
Input current		< 0.5 mA
Min. pulse duration (SET)		10 ms
Input delay		1 ms
New position data readable after		1 ms
Internal processing time		200 ms

The encoder can be set to zero at any position by means of a HIGH signal on the SET input. Other preset values can be factory-programmed. The SET input has a signal processing time of approx. 1 ms, after which the new position data can be read via SSI. Once the SET function has been triggered, the encoder requires an internal processing time of typ. 200 ms; during this time the supply voltage must not be switched off.
The SET function should be carried out whilst the encoder is at rest.

The number of preset value writing cycles is limited to 10,000.

If this input is not used, it should be connected to 0 V (Encoder ground GND) in order to avoid interferences.

DIR input

Direction input: A HIGH signal switches the direction of rotation from the default cw to ccw. This inverted function can also be factory-programmed.

If this input is not used, it should be connected to 0 V (Encoder ground GND) in order to avoid interferences.

Response time (DIR input)	1 ms

Power-ON

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

Hot plugging of the encoder should be avoided.

Approvals

UL compliant in accordance with	File no. E224618
CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU
ATEX Directive	2014/34/EU (for Ex 2/22 variants)

1) Short circuit proof to 0 V or to output when supply voltage correctly applied.
2) Over the whole temperature range.

Standard magnetic	Sendix M5853A (shaft)	SSI

Terminal assignment

Interface	Type of connection	Features	Cable (isolate unused cores individually before initial start-up)									
2	2, B	SET, DIR	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	⏚
			Core color:	WH	BN	GN	YE	GY	PK	BU	RD	shield

Interface	Type of connection	Features	M12 connector, 8-pin									
2	4	SET, DIR	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	⏚
			Pin:	1	2	3	4	5	6	7	8	PH

+V: Supply voltage encoder +V DC
0 V: Supply voltage encoder ground GND (0 V)
C+, C-: Clock signal
D+, D-: Data signal
SET: Set input
DIR: Direction input
PH ⏚: Plug connector housing (shield)

Top view of mating side, male contact base

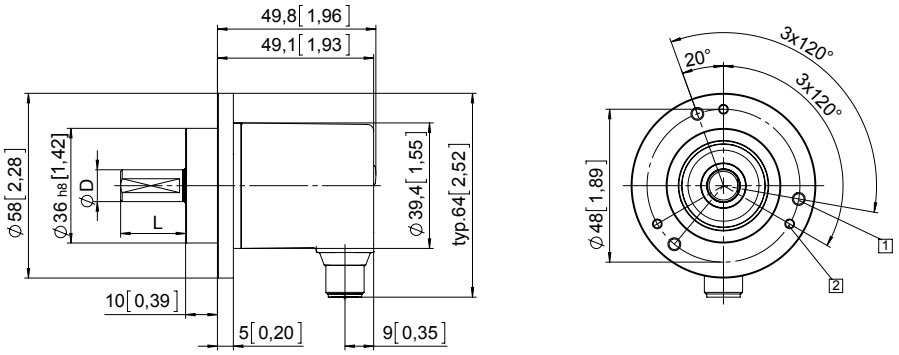
M12 connector, 8-pin

Dimensions

Dimensions in mm [inch]

Clamping flange, ø 58 [2.28]
Flange type 3

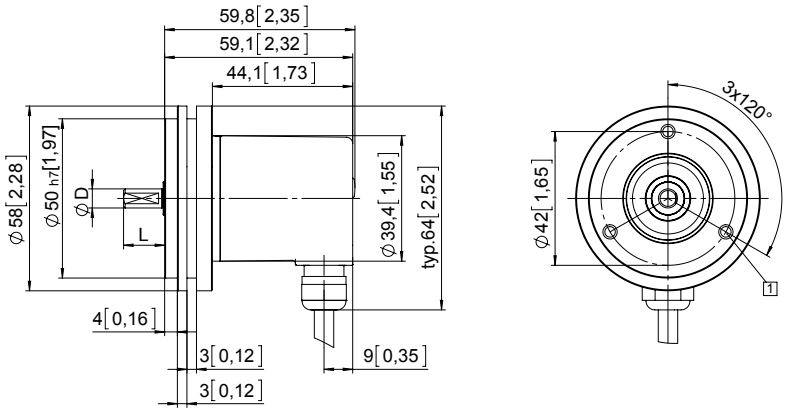
1 3 x M4
2 3 x M3



D	Fit	L
6 [0.24]	h7	12.5 [0.49]
10 [0.39]	h7	20 [0.79]

Synchro flange, ø 58 [2.28]
Flange type 4

1 3 x M4, 10 [0.39] deep



D	Fit	L
6 [0.24]	h7	12.5 [0.49]
10 [0.39]	h7	20 [0.79]

Standard magnetic | **Sendix M5858A (shaft)** | **CANopen**

The Sendix M5858A is a magnetic singleturn encoder in compact design. High robustness and high resolution make this encoder the ideal device for use in demanding applications.

Safety-Lockplus™ | High rotational speed | Temperature range -40°... +85°C | High protection level IP | High shaft load capacity | Shock / vibration resistant | Reverse polarity protection

Highest robustness

- Sturdy bearing construction in Safety-Lockplus™ design for particularly high resistance.
- Extra large bearings.
- Mechanically protected shaft seal.
- Wide temperature range -40 °C ... +85 °C.

Up-to-the-minute fieldbus performance

- LSS services for configuration of the node address and baud rate.
- Variable PDO mapping in the memory.
- Configuration management (bootloader).

Order code Shaft version

8.M5858A.	X	X	2	X	.	21	2	2
Type	a	b	c	d		e		

a *Version*
3 = clamping flange, IP65, ø 58 mm [2.28"]
4 = synchro flange, IP65, ø 58 mm [2.28"]

b *Shaft (ø x L), with flat*
1 = ø 6 x 12.5 mm [0.24 x 0.49"]
5 = ø 10 x 20 mm [0.39 x 0.79"]

c *Interface / supply voltage*
2 = CANopen DS301 V4.2 / 10 ... 30 V DC

d Type of connection
2 = radial cable, 1 m [3.28'] PVC
B = radial cable, special length PVC *)
4 = radial M12 connector, 5-pin

*) Available special lengths (connection types B):
2, 3, 5, 8, 10, 15 m [5.56, 9.84, 16.40, 26.25, 32.80, 49.21']
order code expansion .XXXX = length in dm
ex.: 8.M5858A.312B.2122.0030 (for cable length 3 m)

e *Fieldbus profile*
21 = CANopen

Optional on request
- Ex 2/22 (only for connection type 4)

Standard magnetic	Sendix M5858A (shaft)	CANopen

Mounting accessory for shaft encoders		Order no.
Coupling	Bellows coupling ø 19 mm [0.75“] for shaft 10 mm [0.39“]	**8.0000.1102.1010**

Cables and connectors			Order no.
Preassembled cables	M12 female connector with coupling nut, 5-pin, A coded, straight open ended 5 m [16.40‘] PVC cable	Bus in	**05.00.6091.A211.005M**
	M12 female connector with coupling nut, 5-pin, A coded, straight Deutsch connector DT04, male contacts, 6-pin, straight 1 m [3.28‘] PVC cable	Bus in	**05.00.6091.22C7.001M**
Connectors	M12 female connector with coupling nut, 5-pin, A coded, straight (metal)	Bus in	**8.0000.5116.0000**

Further Kübler accessories can be found at: /accessories
Further Kübler cables and connectors can be found at: /connection-technology

Technical data

Mechanical characteristics

Maximum speed		4000 min^{-1} 2000 min^{-1} (continuous)
Starting torque at 20 °C [68 °F]		< 0.01 Nm
Shaft load capacity	radial axial	80 N 40 N
Weight		approx. 280 g [9.88 oz]
Protection acc. to EN 60529/DIN 40050-9		IP65
Working temperature range		-40 °C ... +85 °C [-40 °F ... +185 °F]
Materials	shaft flange housing cable	V2A aluminum zinc die-cast PVC
Shock resistance acc. to EN 60068-2-27		5000 m/s^2, 4 ms
Vibration resistance acc. to EN 60068-2-6		300 m/s^2, 10 ... 2000 Hz

Electrical characteristics

Supply voltage	10 ... 30 V DC
Current consumption (no load)	max. 30 mA
Reverse polarity protection of the supply voltage	yes
Short-circuit proof outputs	yes [1]

Interface characteristics CANopen

Resolution	1 ... 16.384 (14 bit), scalable default: 16.384 (14 bit)
Angular measurement deviation [2]	±0,5°
Repeat accuracy	±0.2°
Interface	CAN high-speed acc. to ISO 11898, Basic- and Full-CAN, CAN specification 2.0 B
Protocol	CANopen profile DS406 V4.0 with manufacturer-specific add-ons, LSS-Service, bootloader
Power-ON time	< 1200 ms
SDO timeout	< 1000 ms
Baud rate	10 ... 1000 kbit/s software configurable
Node address	1 ... 127 software configurable
Termination	software configurable
LSS protocol	CIA LSS protocol DS305, global command support for node address and baud rate, selective commands via attributes of the identity object
Bootloader	configuration management CIA DS 302-3

Approvals

E1 compliant in accordance with	ECE guideline
UL compliant in accordance with	File no. E224618
CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU
ATEX Directive	2014/34/EU (for Ex 2/22 variants)

1) Short circuit proof to 0 V or to output when supply voltage correctly applied.
2) Over the whole temperature range.

Standard magnetic | **Sendix M5858A (shaft)** | **CANopen**

General information about CANopen

The CANopen encoders support the latest CANopen communication profile according to DS301 V4.02 . In addition, device-specific profiles like the encoder profile DS406 V3.2, DS305 (LSS) and DS302 (Bootloader) 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 CANbus. 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**, **speed, acceleration** 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-color LED located on the back indicates the operating or fault status of the CAN-bus, as well as the status of the internal diagnostics.

CANbus connection

The CANopen encoders are equipped with a bus trunk line in various lengths or a M12 connector and can be terminated in the device.

The devices do not have an integrated T-coupler nor they are looped internally and must therefore only be used as end devices.

LSS layer setting services DS305 V2.0

- Global command support for node ID and baud rate configuration.
- Selective protocol via identity object (1018h).

CANopen communication profile DS301 V4.2

Among others, the following functionality is integrated. (Class C2 functionality):

- NMT Slave.
- Heartbeat Protocol.
- Identity Object.
- Error Behavior 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 V4.0

The following parameters can be programmed:

- Event mode, start optional.
- 1 work area with upper and lower limit and the corresponding output states.
- Variable PDO mapping for position, speed, work area status, error and acceleration.
- Extended failure management for position sensing.
- User interface with visual display of bus and failure status 1 LED two colors.
- Customer-specific protocol.
- "Watchdog controlled" device.

Bootloader functionality DS302-3

Configuration Management:

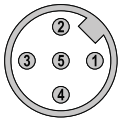
- Program download.
- Program start.
- Program erase.

Terminal assignment

Interface	Type of connection	Cable (isolate unused wires individually before initial start-up)					
2	2, B	Signal:	+V	0 V	CAN_GND	CAN_H	CAN_L
		Cable color:	BN	WH	GY	GN	YE

Interface	Type of connection	M12 connector, 5-pin					
2	4	Signal:	+V	0 V	CAN_GND	CAN_H	CAN_L
		Pin:	2	3	1	4	5

Top view of mating side, male contact base



M12 connector, 5-pin

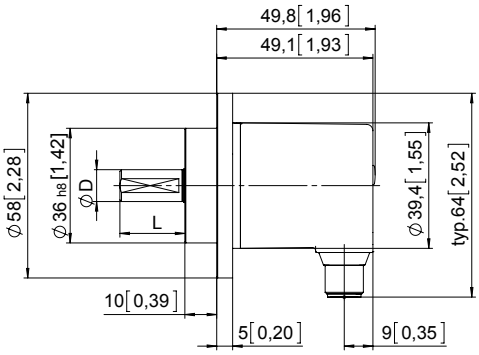
Standard magnetic | **Sendix M5858A (shaft)** | **CANopen**

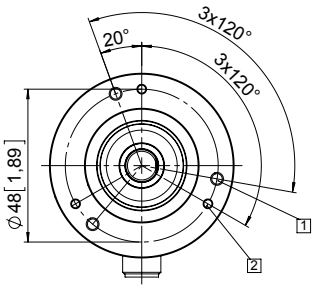
Dimensions

Dimensions in mm [inch]

Clamping flange, ø 58 [2.28]
Flange type 3

[1] 3 x M4
[2] 3 x M3

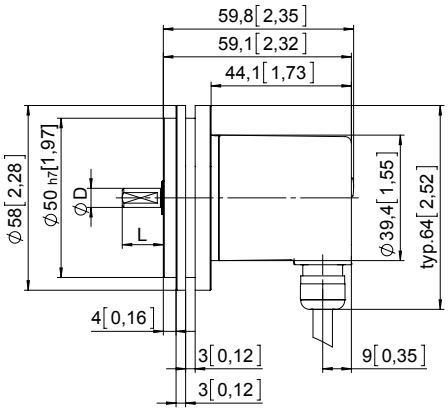


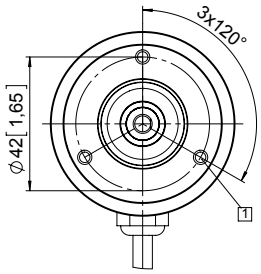


D	Fit	L
6 [0.24]	h7	12.5 [0.49]
10 [0.39]	h7	20 [0.79]

Synchro flange, ø 58 [2.28]
Flange type 4

[1] 3 x M4, 10 [0.39] deep





D	Fit	L
6 [0.24]	h7	12.5 [0.49]
10 [0.39]	h7	20 [0.79]

Standard magnetic | **Sendix M5858A (shaft)** | **SAE J1939**

The Sendix M5858A is a magnetic singleturn encoder in compact design. High robustness and high resolution make this encoder the ideal device for use in demanding applications.

SAE J1939

Safety-Lockplus™ | High rotational speed | Temperature range -40°... +85°C | High protection level IP | High shaft load capacity | Shock / vibration resistant | Reverse polarity protection

Highest robustness

- Sturdy bearing construction in Safety-Lockplus™ design for particularly high resistance.
- Extra large bearings.
- Mechanically protected shaft seal.
- Wide temperature range -40 °C ... +85 °C.

Up-to-the-minute fieldbus performance

- Up-to-the-minute fieldbus performance in the application: SAE J1939 with CAN-highspeed to ISO 11898.
- Fast determination of the operating status via two-color LED.

Order code Shaft version

8.M5858A	.	X	X	3	X	.	32	2	2
Type		a	b	c	d		e		

a *Version*
3 = clamping flange, IP65, ø 58 mm [2.28"]
4 = synchro flange, IP65, ø 58 mm [2.28"]

b *Shaft (ø x L), with flat*
1 = ø 6 x 12.5 mm [0.24 x 0.49"]
5 = ø 10 x 20 mm [0.39 x 0.79"]

c *Interface / supply voltage*
3 = SAE J1939 / 10 ... 30 V DC

d Type of connection
2 = radial cable, 1 m [3.28'] PVC
B = radial cable, special length PVC *)
4 = radial M12 connector, 5-pin

*) Available special lengths (connection types B):
2, 3, 5, 8, 10, 15 m [5.56, 9.84, 16.40, 26.25, 32.80, 49.21']
order code expansion .XXXX = length in dm
ex.: 8.M5858A.313B.3222.0030 (for cable length 3 m)

e *Fieldbus profile*
32 = SAE J1939

Optional on request
- Ex 2/22 (only for connection type 4)

Standard magnetic	Sendix M5858A (shaft)	SAE J1939

Mounting accessory for shaft encoders		Order no.
Coupling	Bellows coupling ø 19 mm [0.75“] for shaft 10 mm [0.39“]	**8.0000.1102.1010**

Cables and connectors			Order no.
Preassembled cables	M12 female connector with coupling nut, 5-pin, A coded, straight single ended 5 m [16.40‘] PVC cable	Bus in	**05.00.6091.A211.005M**
	M12 female connector with coupling nut, 5-pin, A coded, straight Deutsch connector DT04, male contacts, 6-pin, straight 1 m [3.28‘] PVC cable	Bus in	**05.00.6091.22C7.001M**
Connectors	M12 female connector with coupling nut, 5-pin, A coded, straight (metal)	Bus in	**8.0000.5116.0000**

Further Kübler accessories can be found at: /accessories
Further Kübler cables and connectors can be found at: /connection-technology

Technical data

Mechanical characteristics

Maximum speed		4000 min^{-1} 2000 min^{-1} (continuous)
Starting torque at 20 °C [68 °F]		< 0.01 Nm
Shaft load capacity	radial axial	80 N 40 N
Weight		approx. 280 g [9.88 oz]
Protection acc. to EN 60529/DIN 40050-9		IP65
Working temperature range		-40 °C ... +85 °C [-40 °F ... +185 °F]
Materials	shaft flange housing cable	V2A aluminum zinc die-cast PVC
Shock resistance acc. to EN 60068-2-27		5000 m/s^2, 4 ms
Vibration resistance acc. to EN 60068-2-6		300 m/s^2, 10 ... 2000 Hz

Electrical characteristics

Supply voltage	10 ... 30 V DC
Current consumption (no load)	max. 30 mA
Reverse polarity protection of the supply voltage	yes
Short-circuit proof outputs	yes [1]

Interface characteristics SAE J1939

Resolution	1 ... 16.384 (14 bit), scalable default: 16.384 (14 bit)
Angular measurement deviation [2]	±0,5°
Repeat accuracy	±0.2°
Interface	CAN high-speed acc. to ISO 11898, CAN specification 2.0 B
Protocol	SAE J1939
Power-ON time	< 1200 ms
Baud rate	250 kbit/s switchable by software to 500 kbit/s
Node address	software configurable
Termination	software configurable

Approvals

E1 compliant in accordance with	ECE guideline
UL compliant in accordance with	File no. E224618
CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU
ATEX Directive	2014/34/EU (for Ex 2/22 variants)

1) Short circuit proof to 0 V or to output when supply voltage correctly applied.
2) Over the whole temperature range.

Standard magnetic | **Sendix M5858A (shaft)** | **SAE J1939**

General information concerning SAE J1939

The protocol J1939 originates from the international Society of Automotive Engineers (SAE) and operates on the physical layer with high speed CAN as per ISO11898. The application emphasis lies in the area of the power train and chassis of commercial vehicles. It serves to transfer diagnostic data (for example, motor speed, position, temperature) and control information. Type series M3658 and M3678 encoders support the total functionality of J1939.

This protocol is a multimaster system with decentralized network management that does not involve channel-based communication.

It supports up to 254 logic nodes and 30 physical control devices per segment. The information is described as parameters (signals) and combined on 4 memory pages (data pages) into parameter groups (PGs). Each parameter group can be identified via a unique number, the parameter group number (PGN). Independently of this, each signal is assigned a unique SPN (suspect parameter number).

The major part of the communication occurs cyclically and can be received by all control devices without the explicit request for data (Broadcast). Furthermore the parameter groups are optimized to a length of 8 data bytes. This enables very efficient utilization of the CAN protocol. If greater amounts of data need to be transferred, then transport protocols (TP) can be used: BAM (broadcast announce message) and CMDT (connection mode data transfer). With BAM TP the transfer of data occurs as a broadcast.

Encoder implementation SAE J1939

- PGNs that are adaptable to the customer's application.
- Resolution of address conflicts -> Address Claiming (ACL).
- Continuous checking whether control addresses have been assigned twice within a network.
- Change of control device addresses during run-time.
- Unique identification of a control device with the help of a name that is unique worldwide. This name serves to identify the functionality of a control device in the network.
- Predefined PGs for position, speed and alarm.
- 250 kbit/s, 29 bit identifier.
- Watchdog controlled device.

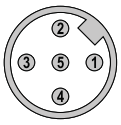
A two-color LED, located on the rear of the encoder, signals the operating and fault status of the J1939 protocol, as well as the status of the internal sensor diagnostics.

Terminal assignment

Interface	Type of connection	Cable (isolate unused wires individually before initial start-up)					
2	2, B	Signal:	+V	0 V	CAN_GND	CAN_H	CAN_L
		Cable color:	BN	WH	GY	GN	YE

Interface	Type of connection	M12 connector, 5-pin					
2	4	Signal:	+V	0 V	CAN_GND	CAN_H	CAN_L
		Pin:	2	3	1	4	5

Top view of mating side, male contact base



M12 connector, 5-pin

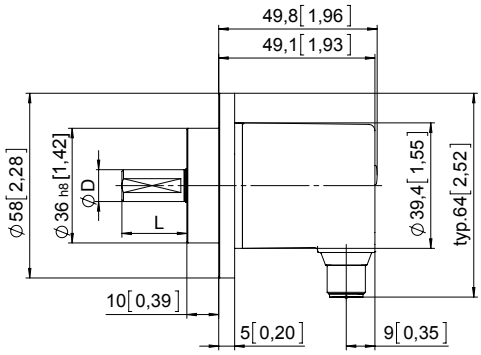
Standard magnetic	Sendix M5858A (shaft)	SAE J1939

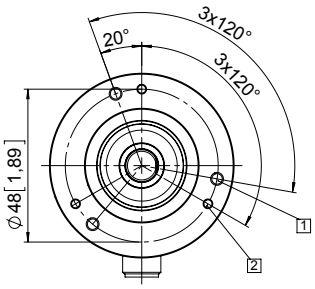
Dimensions

Dimensions in mm [inch]

Clamping flange, ø 58 [2.28]
Flange type 3

[1] 3 x M4
[2] 3 x M3

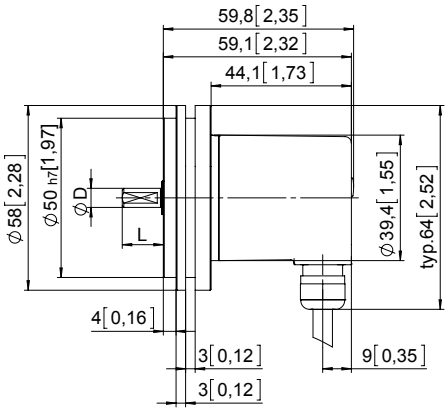


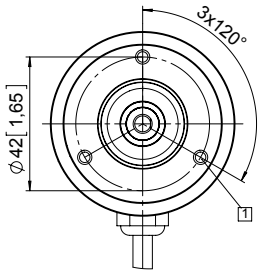


D	Fit	L
6 [0.24]	h7	12.5 [0.49]
10 [0.39]	h7	20 [0.79]

Synchro flange, ø 58 [2.28]
Flange type 4

[1] 3 x M4, 10 [0.39] deep





D	Fit	L
6 [0.24]	h7	12.5 [0.49]
10 [0.39]	h7	20 [0.79]

Standard magnetic | **Sendix M5858A (shaft)** | **IO-Link**

The Sendix M58 is a magnetic singleturn encoder in compact design. High robustness and high resolution make this encoder the ideal device for use in demanding applications.

With Smart Sensor Profile for easy and fast integration into the application.

Safety-Lockplus™ | High rotational speed | Temperature range -40°... +85°C | High protection level IP | High shaft load capacity | Shock / vibration resistant | Reverse polarity protection

Reliable and insensitive

- Sturdy bearing construction in Safety-Lock™ design for resistance against vibration and installation errors.
- Reduced number of components ensures magnetic insensitivity.
- IP67 protection and wide temperature range -40°C ... +85°C.

Up-to-the-minute performance

- Operation possible with any IO-Link master.
- Point-to-point communication in automation networks.
- Use of cost-effective unshielded cables possible.
- Automatic saving of device parameters.
- Firmware update via IO-Link.

Order code Shaft version

8.M5858A.	X	X	4	X	.	41	X	2
Type	a	b	c	d		e	f	

a *Flange*
3 = clamping flange, ø 58 mm [2.28"]
4 = synchro flange, ø 58 mm [2.28"]

b *Shaft (ø x L), with flat*
1 = ø 6 x 12.5 mm [0.24 x 0.49"]
5 = ø 10 x 20 mm [0.39 x 0.79"]

c *Interface / power supply*
4 = IO-Link / 18 ... 30 V DC

d Type of connection
3 = axial M12 connector, 4-pin
4 = radial M12 connector, 4-pin

e *Fieldbus profile*
41 = IO-Link

f *Profile*
2 = Standard Profile [1]
3 = Smart Sensor Profile [2]

Optional on request
- Ex 2/22

Mounting accessory for shaft encoders		Order no.
Coupling	Bellows coupling ø 19 mm [0.75"] for shaft 10 mm [0.39"]	**8.0000.1102.1010**

Cables and connectors		Order no.
Preassembled cables	M12 female connector with coupling nut, 4-pin, A coded, straight single-ended 2 m [6.56'] PUR cable	**05.00.6061.6211.002M**
Connectors	M12 female connector with coupling nut, 4-pin, A coded, straight	**05.B8141-0**

Further Kübler accessories can be found at: /accessories
Further Kübler cables and connectors can be found at: /connection-technology

1) Delivered with default setting for Standard Profile (switchable to Smart Sensor Profile).
2) Delivered with default setting for Smart Sensor Profile (switchable to Standard Profile).

Standard magnetic | **Sendix M5858A (shaft)** | **IO-Link**

Technical data

Mechanical characteristics

Maximum speed		4000 min^{-1} 2000 min^{-1} (continuous)
Starting torque at 20°C [68°F]		< 0.01 Nm
Shaft load capacity	radial axial	80 N 40 N
Weight		approx. 280 g [9.88 oz]
Protection acc. to EN 60529/DIN 40050-9		IP65
Working temperature range		-40 °C ... +85 °C [-40 °F ... +185° F]
Materials	shaft flange housing	V2A aluminum zinc die-cast
Shock resistance acc. to EN 60068-2-27		5000 m/s^2, 4 ms
Vibration resistance acc. to EN 60068-2-6		300 m/s^2, 10 ... 2000 Hz

Electrical characteristics

Power supply	18 ... 30 V DC
Current consumption (no load)	max. 40 mA
Reverse polarity protection of the power supply	yes

Interface characteristics IO-Link

Resolution	1 ... 16.384 (14 bit), scalable default: 16.384 (14 bit)
Angular measurement deviation [1]	±0,5°
Repeat accuracy	±0,2°
Interface	IO-Link version 1.1 acc. to IEC 61131-9
Profile (details see manual)	Kübler Standard Profile or Smart Sensor Profile
Port classe	Type A

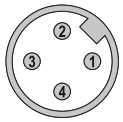
Approvals

UL compliant in accordance with	File no. E224618
CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU
ATEX Directive	2014/34/EU (for Ex 2/22 variants)

Terminal assignment

Interface	Type of connection	M12 connector, 4-pin				
4	3, 4	Signal:	Power supply +V DC	Reserved (no function)	Power supply 0 V (GND)	IO-Link communication (Data line)
		Abbreviation:	L+	res.	L-	C/Q
		Pin:	1	2	3	4

Top view of mating side, male contact base



M12 connector, 4-pin

1) Over the whole temperature range.

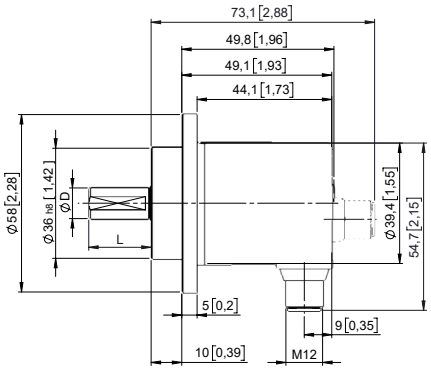
Standard magnetic | **Sendix M5858A (shaft)** | **IO-Link**

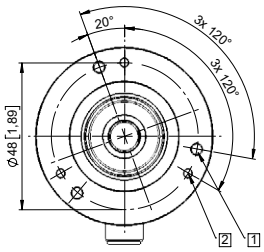
Dimensions

Dimensions in mm [inch]

Clamping flange, ø 58 [2.28]
Flange type 3

1 3 x M4
2 3 x M3

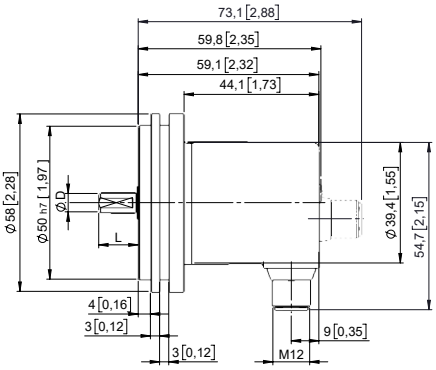


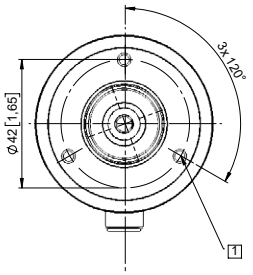


D	Fit	L
6 [0.24]	h7	12.5 [0.49]
10 [0.39]	f7	20 [0.79]

Synchro flange, ø 58 [2.28]
Flange type 4

1 3 x M4, 10 [0.39] deep





D	Fit	L
6 [0.24]	h7	12.5 [0.49]
10 [0.39]	f7	20 [0.79]

Standard optical | **Sendix 5853 / 5873 (shaft / hollow shaft)** | **SSI / BiSS + incremental**

The Sendix 5853 and Sendix 5873 singleturn encoders with optical sensor technology can achieve a resolution of max. 21 bits.

Easy integration in the application thanks to the BiSS interface, with electronic data sheet.

This series offers special versions for use on direct drives for the lift technology.

Electronic data sheet | Safety-Lock™ | Temperature range -40°... +90°C | High protection level IP | High shaft load capacity | Shock / vibration resistant | Magnetic field proof | Short-circuit proof | Reverse polarity protection | SinCos | Optical sensor

Reliable and insensitive

- Sturdy bearing construction in Safety-Lock™ design for resistance against vibration and installation errors.
- Ideal for use outdoors thanks to IP67 protection and wide temperature range from -40 °C up to +90 °C.

Versatile

- High-precision with a data refresh rate of the position value ≤ 1µs.
- High-resolution feedback in real-time via 21 bit fully digital or incremental outputs SinCos and RS422.
- BiSS-C BP3 encoder profile.
- Short control cycles, clock rate with SSI up to 2 MHz / with BiSS up to 10 MHz.

Order code Shaft version

8.5853	.	X	X	X	X	.	X	X	2	X
Type		a	b	c	d		e	f		g

a *Flange*
- **1 = clamping flange, IP65 ø 58 mm [2.28"]**
- 3 = clamping flange, IP67 ø 58 mm [2.28"]
- **2 = synchro flange, IP65 ø 58 mm [2.28"]**
- 4 = synchro flange, IP67 ø 58 mm [2.28"]
- 5 = square flange, IP65 □63.5 mm [2.5"]
- 7 = square flange, IP67 □63.5 mm [2.5"]

b *Shaft (ø x L), with flat*
- **1 = 6 x 10 mm [0.24 x 0.39"]** 1)
- **2 = 10 x 20 mm [0.39 x 0.79"]** 2)
- 3 = 1/4" x 7/8"
- 4 = 3/8" x 7/8"

c *Interface / supply voltage*
- 1 = SSI, BiSS / 5 V DC
- **2 = SSI, BiSS / 10 ... 30 V DC**
- 3 = SSI, BiSS + 2048 ppr. SinCos / 5 V DC
- 4 = SSI, BiSS + 2048 ppr. SinCos / 10 ... 30 V DC
- 5 = SSI, BiSS / 5 V DC, with sensor output
- 6 = SSI, BiSS + 2048 ppr. SinCos / 5 V DC, with sensor output
- 7 = SSI, BiSS + 2048 ppr. RS422 (TTL-comp.) / 5 V DC
- 8 = SSI, BiSS + 2048 ppr. RS422 (TTL-comp.) / 10 ... 30 V DC
- 9 = SSI, BiSS + 2048 ppr. RS422 (TTL-comp.) / 5 V DC, with sensor output

d *Type of connection*
- 1 = axial cable, 1 m [3.28'] PVC
- A = axial cable, special length PVC *)
- **2 = radial cable, 1 m [3.28'] PVC**
- B = radial cable, special length PVC *)
- 3 = axial M23 connector, 12-pin
- **4 = radial M23 connector, 12-pin**
- 5 = axial M12 connector, 8-pin 3)
- 6 = radial M12 connector, 8-pin 3)

*) Available special lengths (connection types A, B): 2, 3, 5, 8, 10, 15 m [5.56, 9.84, 16.40, 26.25, 32.80, 49.21'] order code expansion .XXXX = length in dm ex.: 8.5853.112A.G323.0030 (for cable length 3 m)

e *Code*
- B = SSI, binary
- C = BiSS, binary
- **G = SSI, gray**

f *Resolution* 4)
- A = 10 bit
- 1 = 11 bit
- 2 = 12 bit
- **3 = 13 bit**
- 4 = 14 bit
- 7 = 17 bit
- 9 = 19 bit
- C = 21 bit 5)

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

Optional on request
- Ex 2/22 6)
- surface protection salt spray tested
- other resolutions

1) Preferred type only in conjunction with flange type 2.
2) Preferred type only in conjunction with flange type 1.
3) Can be combined only with interface 1 and 2.
4) Resolution, preset value and counting direction factory-programmable.
5) Only in conjunction with interface 1 or 2.
6) For the cable connection type, cable material PUR.

Standard optical | **Sendix 5853 / 5873 (shaft / hollow shaft)** | **SSI / BiSS + incremental**

Order code Hollow shaft

8.5873	.	X	X	X	X	.	X	X	2	X
Type		a	b	c	d		e	f		g

a *Flange*
1 = with spring element, long, IP65
2 = with spring element, long, IP67
3 = with stator coupling, IP65 ø 65 mm [2.56"]
4 = with stator coupling, IP67 ø 65 mm [2.56"]
5 = with stator coupling, IP65 ø 63 mm [2.48"]
6 = with stator coupling, IP67 ø 63 mm [2.48"]
G = with stator coupling, IP65 ø 72 mm [2.83"] 1)
H = with expanding coupling, IP65 ø 65 mm [2.56"] 1)

b *Through hollow shaft*
3 = ø 10 mm [0.39"]
4 = ø 12 mm [0.47"]
5 = ø 14 mm [0.55"]
6 = ø 15 mm [0.59"]
8 = ø 3/8"
9 = ø 1/2"
Tapered shaft
K = ø 10 mm [0.39"]

c *Interface / supply voltage*
1 = SSI, BiSS / 5 V DC
2 = SSI, BiSS / 10 ... 30 V DC
3 = SSI, BiSS + 2048 ppr. SinCos / 5 V DC
4 = SSI, BiSS + 2048 ppr. SinCos / 10 ... 30 V DC
5 = SSI, BiSS / 5 V DC, with sensor output
6 = SSI, BiSS + 2048 ppr. SinCos / 5 V DC, with sensor output
7 = SSI, BiSS + 2048 ppr. RS422 (TTL-comp.) / 5 V DC
8 = SSI, BiSS + 2048 ppr. RS422 (TTL-comp.) / 10 ... 30 V DC
9 = SSI, BiSS + 2048 ppr. RS422 (TTL-comp.) / 5 V DC, with sensor output

d *Type of connection*
2 = radial cable, 1 m [3.28'] PVC
B = radial cable, special length PVC *)
E = tangential cable, 1 m [3.28'] PVC
F = tangential cable, special length PVC *)
4 = radial M23 connector, 12-pin
6 = radial M12 connector, 8-pin 2)

*) Available special lengths (connection types B, F): 2, 3, 5, 8, 10, 15 m [5.56, 9.84, 16.40, 26.25, 32.80, 49.21'] order code expansion .XXXX = length in dm ex.: 8.5873.542B.G323.0030 (for cable length 3 m)

e *Code*
B = SSI, binary
C = BiSS, binary
G = SSI, gray

f *Resolution* 3)
A = 10 bit
1 = 11 bit
2 = 12 bit
3 = 13 bit
4 = 14 bit
7 = 17 bit
9 = 19 bit
C = 21 bit 4)

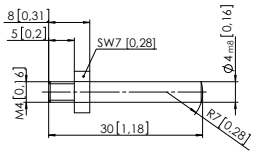
g *Options (service)*
1 = no option
2 = status LED
3 = SET button and status LED

Optional on request
- Ex 2/22 (not with type of connection E or F) 5)
- surface protection salt spray tested
- other resolutions

Mounting accessory for shaft encoders

		Order no.
Coupling	bellows coupling ø 19 mm [0.75"] for shaft 6 mm [0.24"]	**8.0000.1102.0606**
	bellows coupling ø 19 mm [0.75"] for shaft 10 mm [0.39"]	**8.0000.1102.1010**

Mounting accessory for hollow shaft encoders Dimensions in mm [inch]

		Order no.
Torque pin, ø 4 mm for flange with spring element (flange type 1)	with fixing thread 	**8.0010.4700.0000**

Cables and connectors

		Order no.
Preassembled cables	M12 female connector with coupling nut, 8-pin, A coded, straight single-ended 2 m [6.56'] PVC cable	**05.00.6041.8211.002M**
	M23 female connector with coupling nut, 12-pin, cw single-ended 2 m [6.56'] PVC cable	**8.0000.6901.0002.0031**
Connectors	M12 female connector with coupling nut, 8-pin, A coded, straight (metal)	**05.CMB 8181-0**
	M23 female connector with coupling nut, 12-pin, cw	**8.0000.5012.0000**

Further Kübler accessories can be found at: /accessories
Further Kübler cables and connectors can be found at: /connection-technology

1) Can be combined only with shaft K and type of connection E or F.
2) Can be combined only with interface 1 and 2.
3) Resolution, preset value and counting direction factory-programmable.
4) Only in conjunction with interface 1 or 2.
5) For the cable connection type, cable material PUR.

Standard optical | **Sendix 5853 / 5873 (shaft / hollow shaft)** | **SSI / BiSS + incremental**

Technical data

Mechanical characteristics

Maximum speed shaft version		
	IP65 up to 70 °C [158 °F]	12000 min^{-1}, 10000 min^{-1} (continuous)
	IP65 up to T_{max}	8000 min^{-1}, 5000 min^{-1} (continuous)
	IP67 up to 70 °C [158 °F]	11000 min^{-1}, 9000 min^{-1} (continuous)
	IP67 up to T_{max}	8000 min^{-1}, 5000 min^{-1} (continuous)
Maximum speed hollow shaft version		
	IP65 up to 70 °C [158 °F]	9000 min^{-1}, 6000 min^{-1} (continuous)
	IP65 up to T_{max}	6000 min^{-1}, 3000 min^{-1} (continuous)
	IP67 up to 70 °C [158 °F]	8000 min^{-1}, 4000 min^{-1} (continuous)
	IP67 up to T_{max}	4000 min^{-1}, 2000 min^{-1} (continuous)
Starting torque at 20 °C [68 °F]	IP65	< 0.01 Nm
	IP67	< 0.05 Nm
Mass moment of inertia		
	shaft version	3.0 x 10^{-6} kgm^2
	hollow shaft version	6.0 x 10^{-6} kgm^2
Load capacity of shaft	radial	80 N
	axial	40 N
Weight		approx. 0.35 kg [12.35 oz]
Protection acc. to EN 60529	housing side	IP67
	shaft side	IP65, opt. IP67
Working temperature range		-40 °C ... +90 °C [-40 °F ... +194 °F] [1]
Materials	shaft/hollow shaft	stainless steel
	flange	aluminum
	housing	zinc die-cast
	cable	PVC (PUR for Ex 2/22)
Shock resistance acc. EN 60068-2-27		2500 m/s^2, 6 ms
Vibration resistance acc. EN 60068-2-6		100 m/s^2, 55 ... 2000 Hz

Electrical characteristics

Supply voltage		5 V DC (+5 %) or 10 ... 30 V DC
Current consumption (no load)	5 V DC	max. 70 mA
	10 ... 30 V DC	max. 45 mA
Reverse polarity protection of the supply voltage		yes
Short circuit proof outputs		yes [2]

SSI interface

Output driver		RS485 transceiver type
Permissible load / channel		max. +/- 20 mA
Signal level	HIGH	typ. 3.8 V
	LOW at I_{Load} = 20 mA	typ. 1.3 V
Resolution		10 ... 14 bit; 17, 19 and 21 bit
Code		binary or gray
SSI clock rate		50 kHz ... 2 MHz
Data refresh rate		
	ST resolution ≤ 14 bit	≤ 1 µs
	ST resolution > 14 bit	≤ 4 µs
Monoflop time		≤ 15 µs

Note: If the clock starts cycling within the monoflop time, a second data transfer starts with the same data. If the clock starts cycling after the monoflop time, the data transfer starts with the new values. The update rate is dependent on the clock speed, data length and monoflop-time.

BiSS interface

Output driver		RS485 transceiver type
Permissible load / channel		max. +/- 20 mA
Signal level	HIGH	typ. 3.8 V
	LOW at I_{Load} = 20 mA	typ. 1.3 V
Resolution		10 ... 14 bit; 17, 19 and 21 bit
Code		binary
Clock rate		50 kHz ... 10 MHz
Max. update rate		< 15 µs, depends on the clock rate and the data length
Data refresh rate		
	ST resolution ≤ 14 bit	≤ 1 µs
	ST resolution > 14 bit	≤ 4 µs
Protocol		BiSS-C BP3 encoder profile

Note:
- Bidirectional, factory programmable parameters are: resolution, code, direction, alarms and warnings
- CRC data verification
- EDS (electronic data sheet)

Status output and LED

Output driver		open collector, internal pull up resistor 22 kOhm
Permissible load		max. 20 mA
Signal level	HIGH	+V
	LOW	< 1 V
Active		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 22 kOhm).

An active status output (LOW) displays:
- Sensor error, singleturn or multiturn (soiling, glass breakage etc.)
- LED fault (failure or ageing)
- over- or under-temperature

In the SSI mode, the fault indication can only be reset by switching off the supply voltage to the device.

Incremental outputs (A/B)

	SinCos	**RS422 TTL compatible**
Max. frequency -3dB	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]
Pulse rate	2048 ppr	2048 ppr

1) Cable version: -30 °C ... +75 °C [-22 °F ... +167 °F].
2) Short circuit to 0 V or to output, one channel at a time, supply voltage correctly applied.

Standard optical	Sendix 5853 / 5873 (shaft / hollow shaft)	SSI / BiSS + incremental

SET input or SET button

Input		active HIGH
Input type		comparator
Signal level	HIGH	min: 60 % of +V (supply voltage) max: +V
	LOW	max: 25 % of +V (supply voltage)
Input current		< 0.5 mA
Min. pulse duration (SET)		10 ms
Timeout after SET signal		14 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 button (with a pencil, ball-point pen or similar).
Other preset values can be factory-programmed. The SET input has a signal processing 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 status output is at LOW.

If this input is not used, it should be connected to 0 V (Encoder ground GND) in order to avoid interferences.

DIR input

Direction 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 status output will switch to LOW.

If this input is not used, it should be connected to 0 V (Encoder ground GND) in order to avoid interferences.

Response time (DIR input)	1 ms

Power-ON

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

Hot plugging of the encoder should be avoided.

Approvals

UL compliant in accordance with	File no. E224618
CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU
ATEX Directive	2014/34/EU (for Ex 2/22 variants)

Standard optical | **Sendix 5853 / 5873 (shaft / hollow shaft)** | **SSI / BiSS + incremental**

Terminal assignment

Interface	Type of connection	Features	Cable (isolate unused cores individually before initial start-up)													
1, 2	1, 2, A, B, E, F	SET, DIR, Status	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	Stat	N/C	N/C	N/C	⏚
			Core color:	WH	BN	GN	YE	GY	PK	BU	RD	BK	-	-	-	shield

Interface	Type of connection	Features	M23 connector, 12-pin													
1, 2	3, 4	SET, DIR, Status	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	Stat	N/C	N/C	N/C	⏚
			Pin:	1	2	3	4	5	6	7	8	9	10	11	12	PH

Interface	Type of connection	Features	Cable (isolate unused cores individually before initial start-up)													
5	1, 2, A, B, E, F	SET, DIR, Status	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	Stat	N/C	0Vsens	+Vsens	⏚
		sensor output	Core color:	WH	BN	GN	YE	GY	PK	BU	RD	BK	-	GY-PK	RD-BU	shield

Interface	Type of connection	Features	M23 connector, 12-pin													
5	3, 4	SET, DIR, Status	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	Stat	N/C	0Vsens	+Vsens	⏚
		sensor output	Pin:	1	2	3	4	5	6	7	8	9	10	11	12	PH

Interface	Type of connection	Features	Cable (isolate unused cores individually before initial start-up)													
3, 4, 7, 8	1, 2, A, B, E, F	SET, DIR, SinCos	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	A	$\overline{A}$	B	$\overline{B}$	⏚
		or incr. RS422	Core color:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU	shield

Interface	Type of connection	Features	M23 connector, 12-pin													
3, 4, 7, 8	3, 4	SET, DIR, SinCos	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	A	$\overline{A}$	B	$\overline{B}$	⏚
		or incr. RS422	Pin:	1	2	3	4	5	6	7	8	9	10	11	12	PH

Interface	Type of connection	Features	Cable (isolate unused cores individually before initial start-up)													
6, 9	1, 2, A, B, E, F	SinCos o. incr. RS422	Signal:	0 V	+V	C+	C-	D+	D-	A	$\overline{A}$	B	$\overline{B}$	0Vsens	+Vsens	⏚
		sensor output	Core color:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU	shield

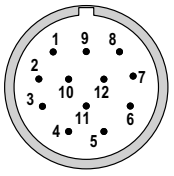
Interface	Type of connection	Features	M23 connector, 12-pin													
6, 9	3, 4	SinCos o. incr. RS422	Signal:	0 V	+V	C+	C-	D+	D-	A	$\overline{A}$	B	$\overline{B}$	0Vsens	+Vsens	⏚
		sensor output	Pin:	1	2	3	4	5	6	7	8	9	10	11	12	PH

Interface	Type of connection	Features	M12 connector, 8-pin								
1, 2	5, 6	SET, DIR	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	⏚
			Pin:	1	2	3	4	5	6	7	8	PH

+V: Supply voltage encoder +V DC
0 V: Supply voltage encoder ground GND (0 V)
0 V_{sens} / +V_{sens}: Using the sensor outputs of the encoder, the voltage present can be measured and if necessary increased accordingly.
C+, C-: Clock signal
D+, D-: Data signal
A, $\overline{A}$: Incremental output channel A (cosine)
B, $\overline{B}$: Incremental output channel B (sine)
SET: Set input
DIR: Direction input
Stat: Status output
PH ⏚: Plug connector housing (shield)

Top view of mating side, male contact base

M12 connector, 8-pin



M23 connector, 12-pin

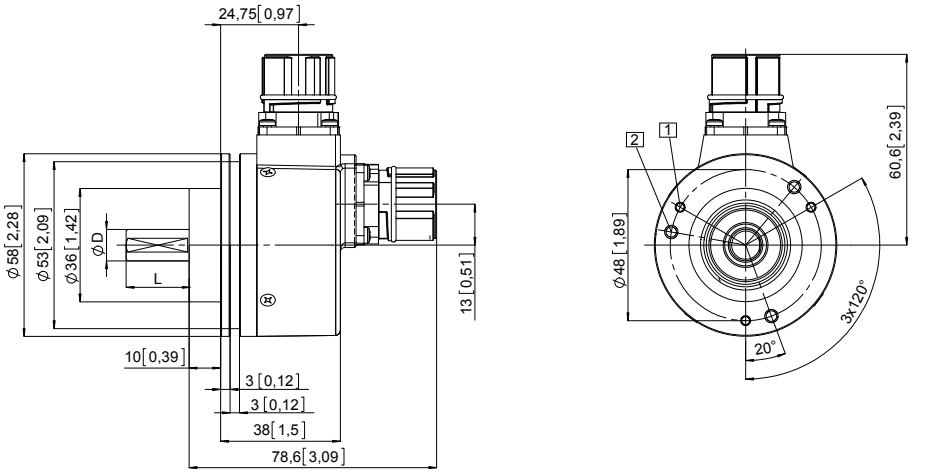
Standard optical | **Sendix 5853 / 5873 (shaft / hollow shaft)** | **SSI / BiSS + incremental**

Dimensions shaft version

Dimensions in mm [inch]

Clamping flange, ø 58 [2.28]
Flange type 1 and 3
(drawing with M23 connector)

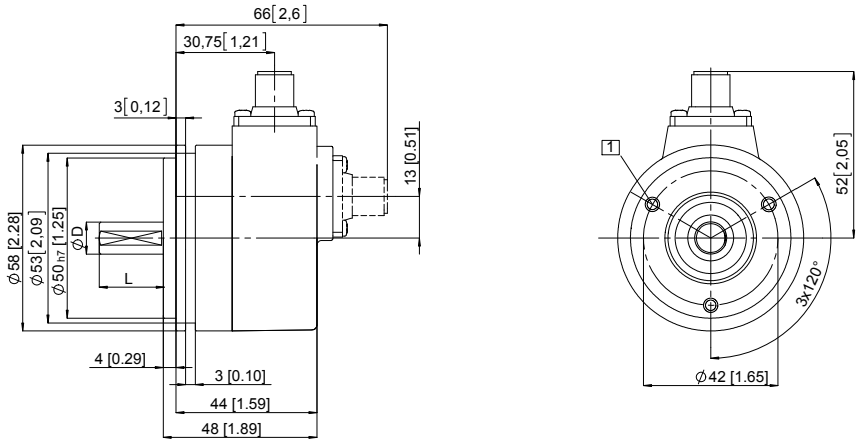
1 3 x M3, 6 [0.24] deep
2 3 x M4, 8 [0.32] deep



D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h8	7/8"
3/8"	h8	7/8"

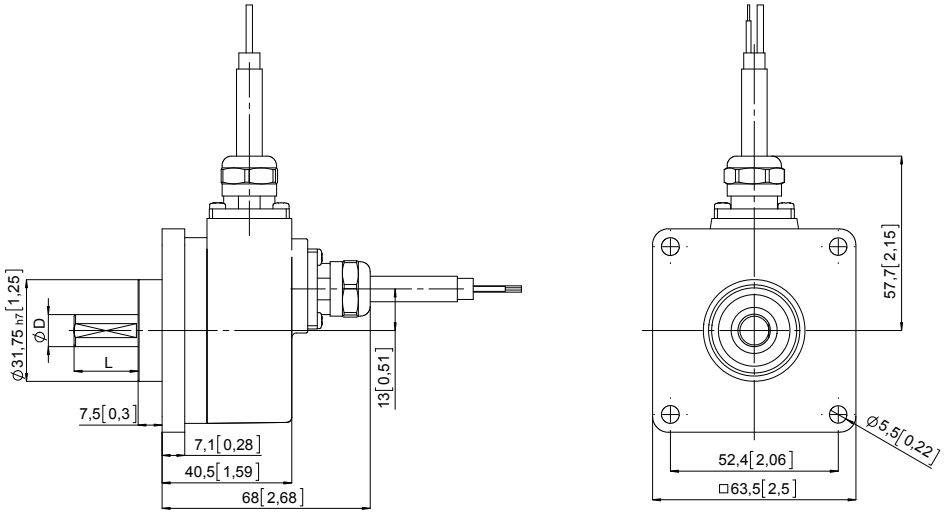
Synchro flange, ø 58 [2.28]
Flange type 2 and 4
(drawing with M12 connector)

1 3 x M4, 6 [0.24] deep



D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h8	7/8"
3/8"	h8	7/8"

Square flange, □63.5 [2.5]
Flange type 5 and 7
(drawing with cable)



D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h8	7/8"
3/8"	h8	7/8"

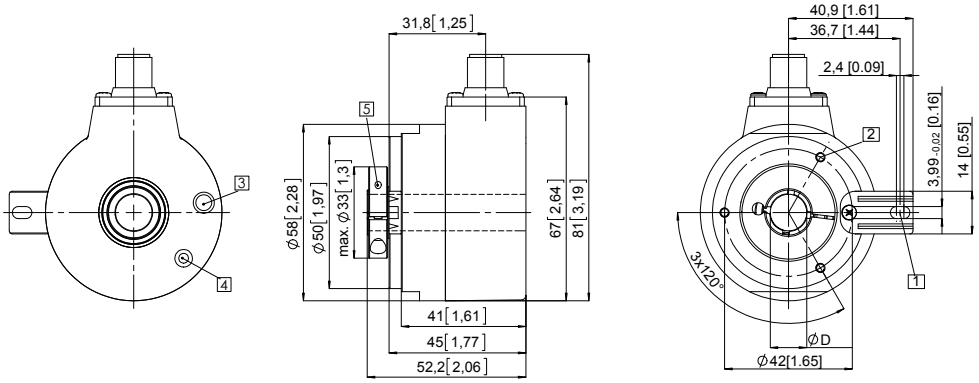
Standard optical | **Sendix 5853 / 5873 (shaft / hollow shaft)** | **SSI / BiSS + incremental**

Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with spring element, long
Flange type 1 and 2
(drawing with M12 connector)

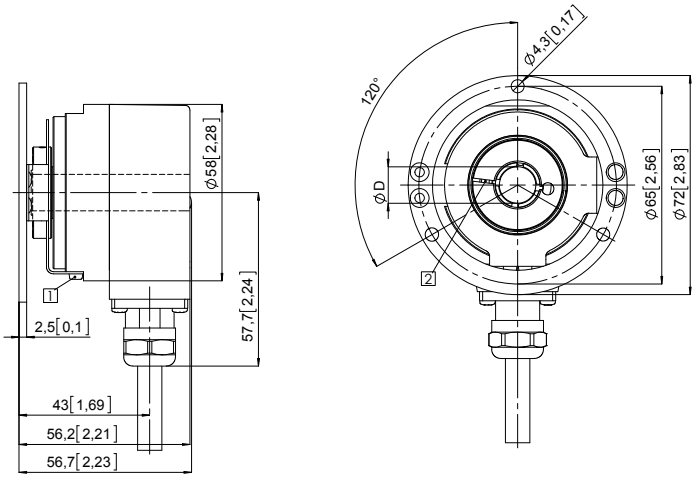
1 Slot spring element, recommendation: torque pin DIN 7, ø 4 [0.16]
2 3 x M3, 5.5 [0.22] deep
3 Status-LED
4 SET button
5 Recommended torque for the clamping ring 0.6 Nm



D	Fit
10 [0.39]	H7
12 [0.47]	H7
14 [0.55]	H7
15 [0.59]	H7
3/8"	H7
1/2"	H7

Flange with stator coupling, ø 65 [2.56]
Flange type 3 and 4
Pitch circle diameter for fixing screws 65 [2.56]
(drawing with cable)

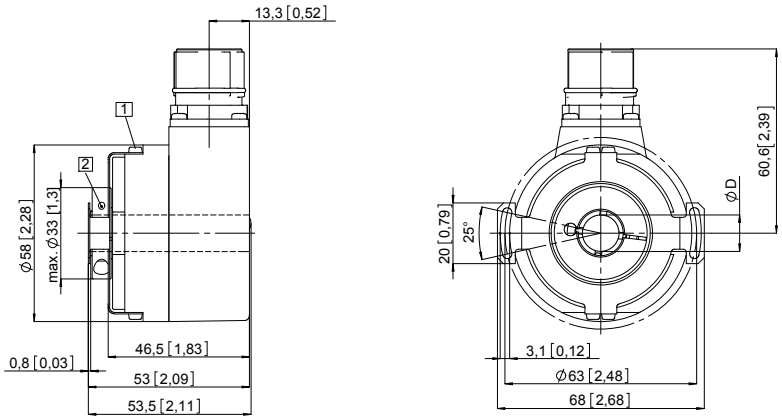
1 Fixing screws DIN 912 M3 x 8 (washer included in delivery)
2 Recommended torque for the clamping ring 0.6 Nm



D	Fit
10 [0.39]	H7
12 [0.47]	H7
14 [0.55]	H7
15 [0.59]	H7
3/8"	H7
1/2"	H7

Flange with stator coupling, ø 63 [2.48]
Flange type 5 and 6
Pitch circle diameter for fixing screws 63 [2.48]
(drawing with M23 connector)

1 Fixing screws DIN 912 M3 x 8 (washer included in delivery)
2 Recommended torque for the clamping ring 0.6 Nm



D	Fit
10 [0.39]	H7
12 [0.47]	H7
14 [0.55]	H7
15 [0.59]	H7
3/8"	H7
1/2"	H7

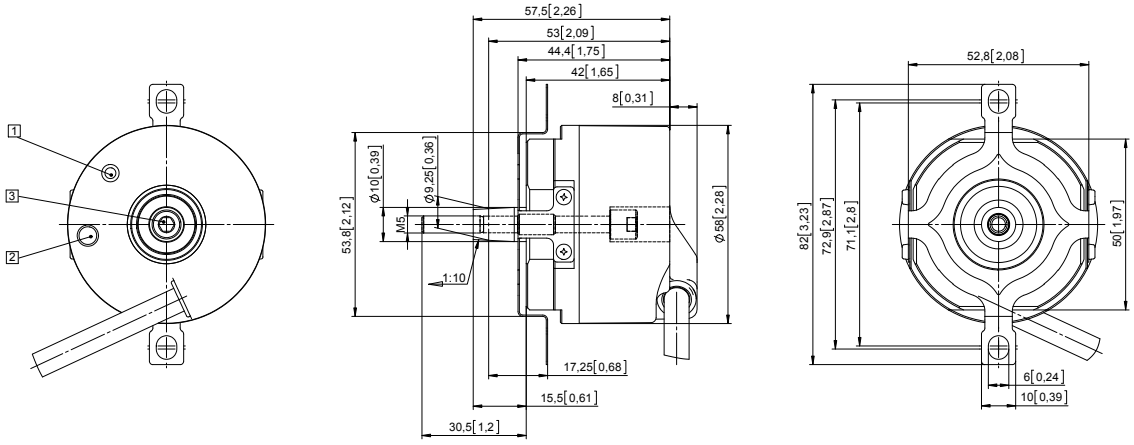
Standard optical	Sendix 5853 / 5873 (shaft / hollow shaft)	SSI / BiSS + incremental

Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with stator coupling, ø 72 [2.83]
Flange type G
(with tapered shaft K and tangential cable)

1 Status LED
2 SET Button
3 Recommended torque for (SW 4) tightening screw 3 $^{+0.5}$ Nm

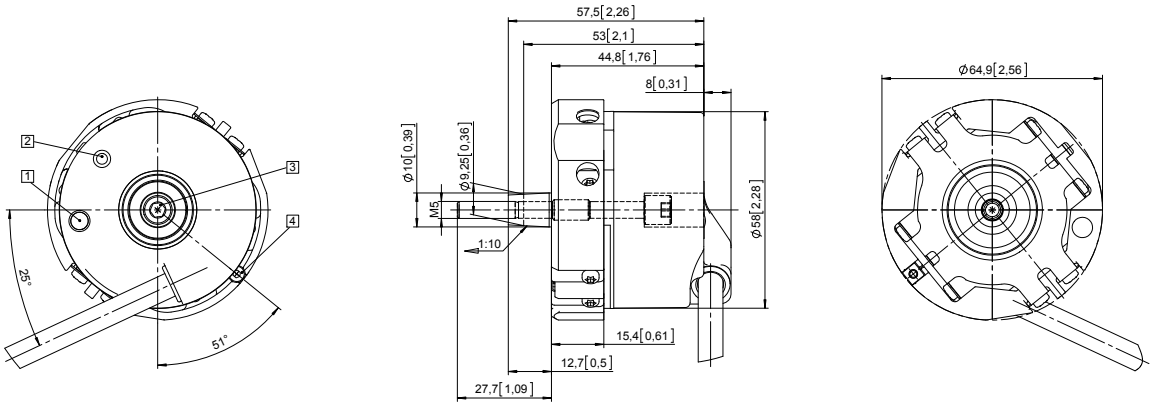


Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with expanding coupling, ø 65 [2.56"]
Flange type H

1 Status-LED
2 SET button
3 Recommended torque for (SW 4) tightening screw 3 $^{+0.5}$ Nm
4 Recommended torque for (SW 2) tightening screw 1 Nm



Standard
SIL3/PLe, optical

Sendix 5853FS3 / 5873FS3 (shaft / hollow shaft)

SSI / BiSS + SinCos

The absolute singleturn encoders 5853FS3 and 5873FS3 of the Sendix family are suited for use in safety-related applications up to SIL3 according to EN 61800-5-2 or PLe to EN ISO 13849-1.

The extra strong Safety-Lock™ Design interlocked bearings, the high integration density of the components based on OptoASIC technology and the rugged die-cast housing make these devices ideal also for demanding applications outdoors up to IP67.

Safety-Lock™ | High rotational speed | Temperature range -40°...+90°C | High protection level IP | High shaft load capacity | Shock / vibration resistant | Magnetic field proof | Reverse polarity protection | SinCos | Optical sensor

Functional Safety

- Encoder with individual certificate from TÜV.
- Suitable for applications up to SIL3 acc. to EN 61800-5-2.
- Suitable for applications up to PLe acc. to EN ISO 13849-1.
- SSI or BiSS interface with incremental SinCos tracks with 2048 ppr.
- Certified mechanical mounting + electronic.

Flexible

- Shaft and hollow shaft versions.
- Cable and connector variants.
- Various mounting options available.

Order code Shaft version

8.5853FS3	.	X	X	X	X	.	X	X	2	X
Type		a	b	c	d		e	f		g

a *Flange*
1 = clamping flange, IP65, ø 58 mm [2.28"]
3 = clamping flange, IP67, ø 58 mm [2.28"]

b *Shaft (ø x L)*
2 = 10 x 20 mm [0.39 x 0.79"], with flat
A = 10 x 20 mm [0.39 x 0.79"], with feather key

c *Interface / supply voltage*
3 = SSI, BiSS + 2048 ppr. SinCos / 5 V DC
4 = SSI, BiSS + 2048 ppr. SinCos / 10 ... 30 V DC

d *Type of connection*
1 = axial cable, 1 m [3.28'] PVC
A = axial cable, special length PVC *)
2 = radial cable, 1 m [3.28'] PVC
B = radial cable, special length PVC *)
3 = axial M23 connector, 12-pin
4 = radial M23 connector, 12-pin

*) Available special lengths (connection types A, B):
2, 3, 5, 8, 10, 15 m [5.56, 9.84, 16.40, 26.25, 32.80, 49.21']
order code expansion .XXXX = length in dm
ex.: 8.5853FS33.124A.G322.0030 (for cable length 3 m)

e *Code*
B = SSI, binary
C = BiSS, binary
G = SSI, gray

f *Resolution* [1]
A = 10 bit
1 = 11 bit
2 = 12 bit
3 = 13 bit
4 = 14 bit
7 = 17 bit

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

Optional on request
- Ex 2/22 (only for variants with IP67) [2]
- other resolutions
- surface protection salt spray

1) Resolution, preset value and count direction are factory-programmable.
2) For the cable connection type, cable material PUR.

Standard SIL3/PLe, optical	Sendix 5853FS3 / 5873FS3 (shaft / hollow shaft)	SSI / BiSS + SinCos

Order code Hollow shaft

8.5873FS3	.	X	X	X	X	.	X	X	2	X
Type		a	b	c	d		e	f		g

a *Flange*
9 = with torque stop FS, flexible, IP65
J = with torque stop FS, flexible, IP67
A = with torque stop FS, rigid, IP65 (incl. torque pin FS)
K = with torque stop FS, rigid, IP67 (incl. torque pin FS)
B = with stator coupling FS, ø 63 mm [2.48"], IP65
L = with stator coupling FS, ø 63 mm [2.48"], IP67

b *Through hollow shaft*
3 = ø 10 mm [0.39"]
4 = ø 12 mm [0.47"]
5 = ø 14 mm [0.55"]
Tapered shaft
K = ø 10 mm [0.39"]

c *Interface / supply voltage*
3 = SSI, BiSS + 2048 ppr. SinCos / 5 V DC
4 = SSI, BiSS + 2048 ppr. SinCos / 10 ... 30 V DC

d *Type of connection*
2 = radial cable, 1 m [3.28'] PVC
B = radial cable, special length PVC *)
E = tangential cable, 1 m [3.28'] PVC
F = tangential cable, special length PVC *)
4 = radial M23 connector, 12-pin

*) Available special lengths (connection types B, F):
2, 3, 5, 8, 10, 15 m [5.56, 9.84, 16.40, 26.25, 32.80, 49.21']
order code expansion .XXXX = length in dm
ex.: 8.5873FS3.B44B.G322.0030 (for cable length 3 m)

e *Code*
B = SSI, binary
C = BiSS, binary
G = SSI, gray

f *Resolution* [1]
A = 10 bit
1 = 11 bit
2 = 12 bit
3 = 13 bit
4 = 14 bit
7 = 17 bit

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

Optional on request
- Ex 2/22 (only for variants with IP67) [2]
  not for type of connection E, F
- other resolutions
- surface protection salt spray

Accessories		Order no.
EMC shield terminal	for top-hat rail mounting	**8.0000.4G06.0312**
Screw retention	Loctite 243, 5 ml	**8.0000.4G05.0000**
Bellows coupling, safety-oriented	You will find an overview of our couplings for Sendix shaft encoders under /accessories.	
Safety modules Safety-M compact	You will find an overview of our systems and components for Functional Safety and the corresponding software under /safety.	
LED SSI display 570 / 575	Electronic position display up to 32 bit. You will find an overview or under /position_display	

Connection technology		Order no.
Cordset, pre-assembled	M23 female connector with coupling nut, 12-pin, cw single ended 2 m [6.56'] PVC cable [3]	**8.0000.6901.0002.0031**
	M23 female connector with coupling nut, 12-pin, cw M23 male connector with external thread, 12-pin, ccw 2 m [6.56'] PVC cable [3]	**8.0000.6905.0002.0032**
Connector, self-assembly	M23 female connector with coupling nut, 12-pin, cw	**8.0000.5012.0000**

Further Kübler accessories can be found at: /accessories
Further Kübler cables and connectors can be found at: /connection-technology

1) Resolution, preset value and count direction are factory-programmable.
2) For the cable connection type, cable material PUR.
3) Other lengths available.

Standard
SIL3/PLe, optical

Sendix 5853FS3 / 5873FS3 (shaft / hollow shaft)

SSI / BiSS + SinCos

Technical data

Notes regarding "Functional Safety"

These encoders are suitable for use in safety-related systems up to SIL3 acc. to EN 61800-5-2 and PLe to EN ISO 13849-1 in conjunction with controllers or evaluation units, which possess the necessary functionality.

Additional functions can be found in the operating manual.

Safety characteristics

Classification	PLe / SIL3
System structure	2 channel (Cat. 4)
PFH_d value [1]	1.09 x 10^{-8} h^{-1}
Mission time / Proof test interval	20 years
Relevant standards	EN ISO 13849-1:2015; EN ISO 13849-2:2012; EN 61800-5-2:2007

Electrical characteristics

Supply voltage		5 V DC (±5 %) or 10 ... 30 V DC
Current consumption (no load)	5 V DC	max. 70 mA
	10 ... 30 V DC	max. 45 mA
Reverse polarity protection of the supply voltage		yes
Short circuit proof outputs		yes [2]

Mechanical characteristics

Maximum speed shaft version		
	up to 70 °C [158 °F]	12000 min^{-1}, 10000 min^{-1} (continuous)
	up to T_{max}	8000 min^{-1}, 5000 min^{-1} (continuous)
Maximum speed hollow shaft version		
	up to 70 °C [158 °F]	9000 min^{-1}, 6000 min^{-1} (continuous)
	up to T_{max}	6000 min^{-1}, 3000 min^{-1} (continuous)
Starting torque - at 20 °C [68 °F]		
	shaft version	< 0.01 Nm
	hollow shaft version	< 0.03 Nm
Mass moment of inertia		
	shaft version	4.0 x 10^{-6} kgm^2
	hollow shaft version	7.0 x 10^{-6} kgm^2
Insertion depth for shaft		
	hollow shaft version	min. 34 mm [1.34"]
Load capacity of shaft	radial	80 N
	axial	40 N
Weight		approx. 0.45 kg [15.87 oz]
Protection acc. to EN 60529		IP65, IP67
Working temperature range		-40 °C ... +90 °C [-40 °F ... +194 °F] [3]
Material	shaft / hollow shaft	stainless steel
	flange	aluminum
	housing	zinc die-cast
	cable	PVC (PUR for Ex 2/22)
Shock resistance acc. to EN 60068-2-27		500 m/s^2, 11 ms
Vibration resistance acc. to EN 60068-2-6		200 m/s^2, 5 ... 2000 Hz

EMC

Relevant standards	EN 55011 class B :2009 / A1:2010 EN 61326-1:2013 EN 61326-3-1:2008

SSI interface

Output driver		RS485 transceiver type
Permissible load / channel		max. +/- 20 mA
Signal level	HIGH	typ. 3.8 V
	LOW at I_{Load} = 20 mA	typ. 1.3 V
Resolution		10 ... 14 bit and 17 bit
Code		binary or gray
SSI clock rate		50 kHz ... 2 MHz
Data refresh rate	ST resolution ≤ 14 bit	≤ 1 µs
	ST resolution ≥ 15 bit	4 µs
Monoflop time		≤ 15 µs

Note: If the clock starts cycling within the monoflop time, a second data transfer starts with the same data. If the clock starts cycling after the monoflop time, the data transfer starts with the new values. The update rate is dependent on the clock speed, data length and monoflop-time.

BiSS interface

Output driver		RS485 transceiver type
Permissible load / channel		max. +/- 20 mA
Signal level	HIGH	typ. 3.8 V
	LOW at I_{Load} = 20 mA	typ. 1.3 V
Resolution		10 ... 14 bit and 17 bit
Code		binary
Clock rate		up to 10 MHz
Max. update rate		< 10 µs, depends on the clock rate and the data length
Data refresh rate	ST resolution ≤ 14 bit	≤ 1 µs
	ST resolution 17 bit	2.4 µs

Note:
- bidirectional, factory programmable parameters are: resolution, code, direction, alarms and warnings
- CRC data verification

SinCos interface

Max. frequency -3dB	400 kHz
Signal level	1 Vpp (±10 %)
Short circuit proof	yes [2]
Pulse rate	2048 ppr

LED

The optional LED (red) serves to display various alarm or error messages.
In normal operation the LED is OFF.

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

In the SSI mode, the fault indication can only be reset by switching off the supply voltage to the device.

1) The specified value is based on a diagnostic coverage of 99 %, that must be achieved with an encoder evaluation unit.
The encoder evaluation unit must meet at least the requirements for SIL3.
2) Short circuit to 0 V or to output, one channel at a time, supply voltage correctly applied.
3) Cable version: -30 °C ... +90 °C [-22 °F ... +194 °F].

Standard
SIL3/PLe, optical

Sendix 5853FS3 / 5873FS3 (shaft / hollow shaft)

SSI / BiSS + SinCos

SET input or SET button

Input		HIGH active
Input type		comparator
Signal level	HIGH	min: 60 % of +V, max: +V
	LOW	max: 25 % of +V (supply voltage)
Input current		< 0.5 mA
Min. pulse duration (SET)		10 ms
Timeout after SET signal		14 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 button (with a pencil, ball-point pen or similar). 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.

If this input is not used, it should be connected to 0 V (Encoder ground GND) in order to avoid interferences.

DIR input

Direction input: A HIGH signal switches the direction of rotation from the default cw to ccw. This function can also be factory-programmed to be inverted. 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.

If this input is not used, it should be connected to 0 V (Encoder ground GND) in order to avoid interferences.

Response time (DIR input)	1 ms

Power-ON

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

Hot plugging of the encoder should be avoided.

Approvals

UL compliant in accordance with	File no. E224618
CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU
ATEX Directive	2014/34/EU (for Ex 2/22 variants)
Machinery Directive	2006/42/EG

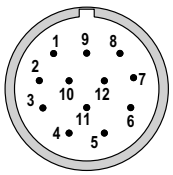
Terminal assignment

Interface	Type of connection	Cable (isolate unused cores individually before initial start-up)													
3, 4	1, 2, A, B, E, F	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	A	$\overline{A}$	B	$\overline{B}$	⏚
		Core color:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU	shield

Interface	Type of connection	M23 connector, 12-pin													
3, 4	3, 4	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	A	$\overline{A}$	B	$\overline{B}$	⏚
		Pin:	1	2	3	4	5	6	7	8	9	10	11	12	PH

+V: Supply voltage encoder +V DC
0 V: Supply voltage encoder ground GND (0 V)
C+, C-: Clock signal
D+, D-: Data signal
SET: Set input
DIR: Direction input
A, $\overline{A}$: Cosine signal
B, $\overline{B}$: Sine signal
PH ⏚: Plug connector housing (shield)

Top view of mating side, male contact base



M23 connector, 12-pin

Standard
SIL3/PLe, optical

Sendix 5853FS3 / 5873FS3 (shaft / hollow shaft)

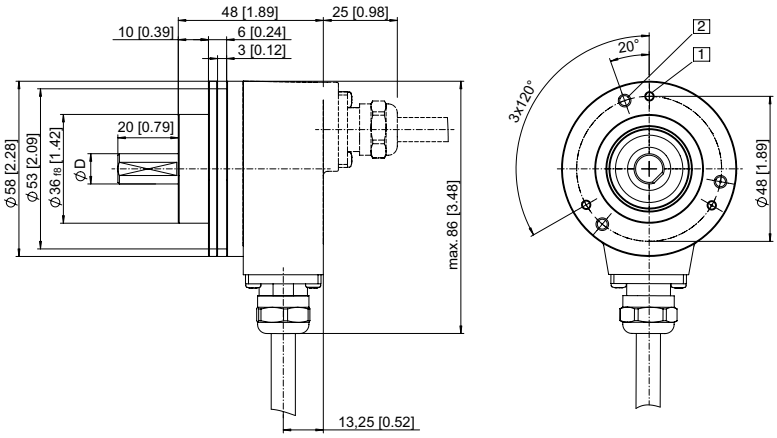
SSI / BiSS + SinCos

Dimensions shaft version

Dimensions in mm [inch]

Clamping flange, ø 58 [2.28]
Flange type 1 + 3 with shaft type 2
(drawing with cable)

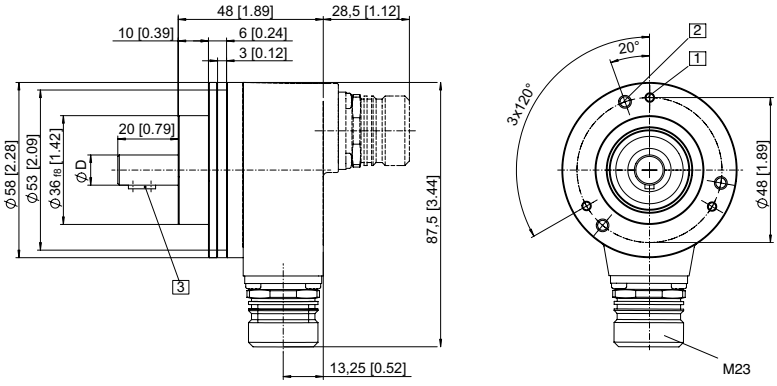
1 3 x M3, 6 [0.24] deep
2 3 x M4, 8 [0.32] deep



D	Fit	L
10 [0.39]	f7	20 [0.79]

Clamping flange, ø 58 [2.28]
Flange type 1 + 3 with shaft type A
(drawing with M23 connector)

1 3 x M3, 6 [0.24] deep
2 3 x M4, 8 [0.32] deep
3 Feather key DIN 6885 - A - 3x3x6



D	Fit	L
10 [0.39]	f7	20 [0.79]

Standard
SIL3/PLe, optical

Sendix 5853FS3 / 5873FS3 (shaft / hollow shaft)

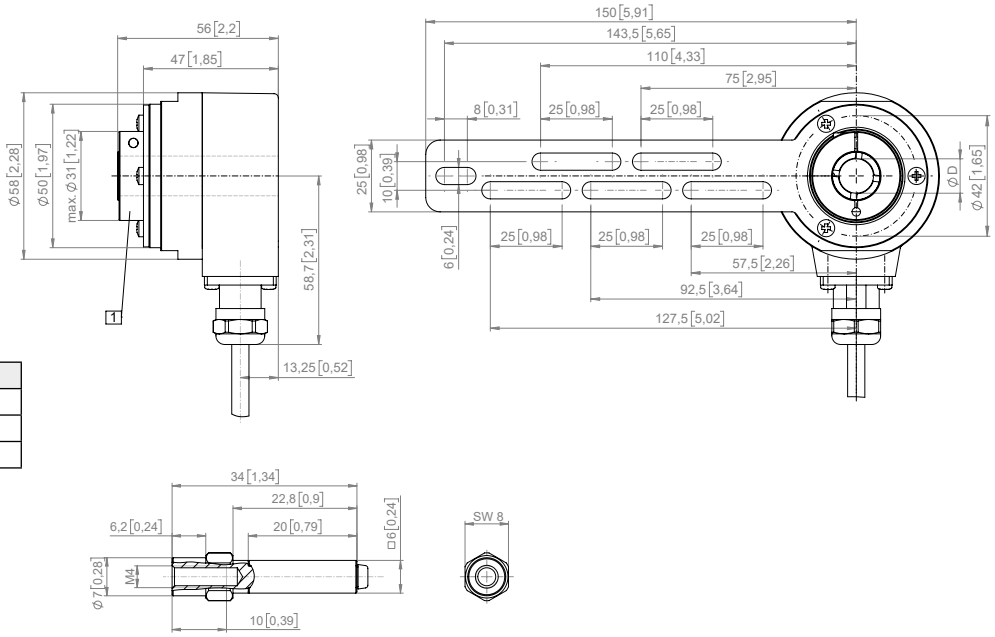
SSI / BiSS + SinCos

Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with torque stop FS, rigid
Flange type A + K
Through hollow shaft
(drawing with cable)

1 SW 3, recommended torque for the clamping ring 2.5 Nm

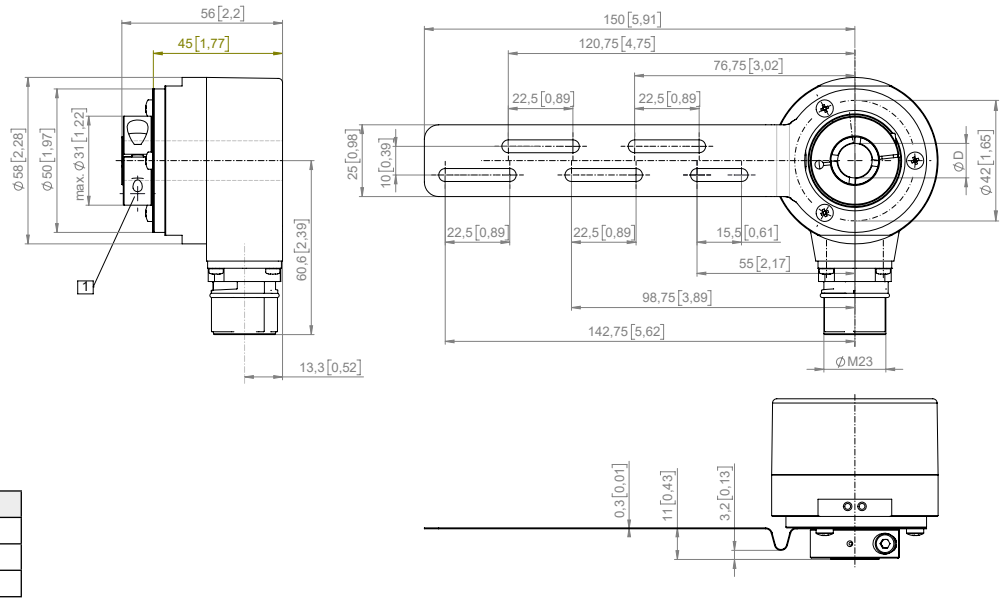


D	Fit
10 [0.39]	H7
12 [0.47]	H7
14 [0.55]	H7

Torque pin with rectangular sleeve with M4 thread

Flange with torque stop FS, flexible
Flange type 9 + J
Through hollow shaft
(drawing with M23 connector)

1 Recommended torque for the clamping ring 2.5 Nm



D	Fit
10 [0.39]	H7
12 [0.47]	H7
14 [0.55]	H7

Standard
SIL3/PLe, optical

Sendix 5853FS3 / 5873FS3 (shaft / hollow shaft)

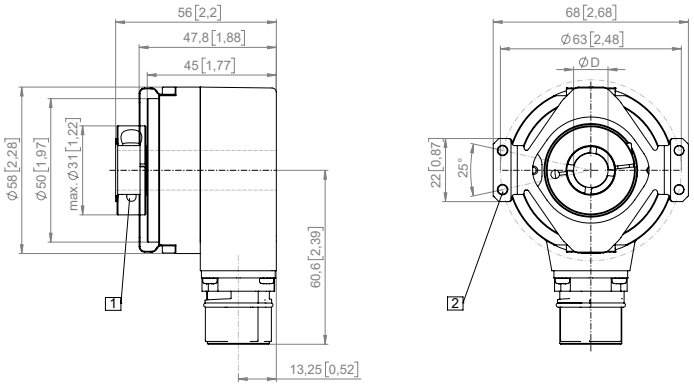
SSI / BiSS + SinCos

Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with stator coupling FS, ø 63 [2.48]
Flange type B + L
Through hollow shaft
(drawing with M23 connector)

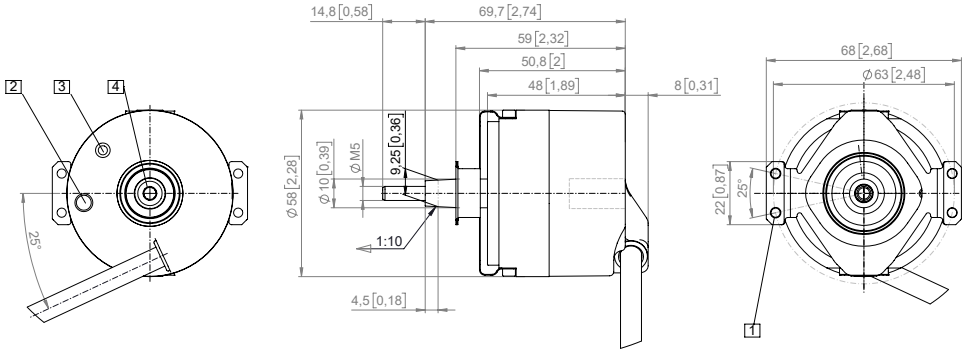
1 SW 3, recommended torque for the clamping ring 2.5 Nm
2 For (4x) M3 screw



D	Fit
10 [0.39]	H7
12 [0.47]	H7
14 [0.55]	H7

Flange with stator coupling FS, ø 63 [2.48]
Flange type B + L
Tapered shaft
(drawing with tangential cable outlet)

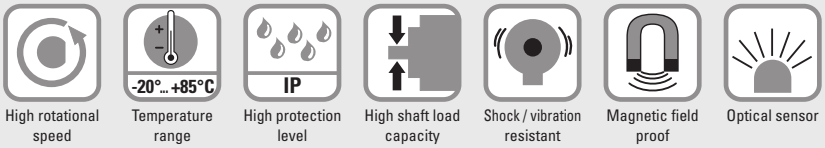
1 For (4x) M3 screw
2 Status-LED
3 SET button
4 Recommended torque for central screw M5 (SW 4) 3.0 $^{+0.5}$ Nm (tapered shaft)



Absolute encoders - singleturn

Standard optical	5852 / 5872 (shaft / hollow shaft)	Parallel, highspeed

The singleturn encoders 5852 and 5872 with parallel interface and optical technology achieve a very high refresh rate of the position data of 40 kHz with a resolution of max. 14 bits.



High rotational speed | Temperature range | High protection level | High shaft load capacity | Shock / vibration resistant | Magnetic field proof | Optical sensor

Adaptable

- Supply voltage 5 V DC or 10 ... 30 V DC.
- Cable or connector M23.

Fast

- Refresh rate of the position data 40 kHz.

Order code Shaft version

8.5852	.	XX	X	X	.	XXX	1
Type		a	b	c		d	

a *Flange, shaft*
12 = clamping flange, ø 58 mm [2.28"] with shaft 10 x 20 mm [0.39 x 0.79"]
21 = synchro flange, ø 58 mm [2.28"] with shaft 6 x 10 mm [0.24 x 0.39"]

b *Interface / supply voltage*
1 = parallel (CMOS-TTL) / 5 V DC
3 = parallel / 10 ... 30 V DC

c *Type of connection*
1 = axial cable, 1 m [3.28'] PVC
A = axial cable, special length PVC *)
2 = radial cable, 1 m [3.28'] PVC
B = radial cable, special length PVC *)
3 = axial M23 connector, 17-pin
5 = radial M23 connector, 17-pin

*) Available special lengths (connection types A, B):
2, 3, 5, 8, 10, 15 m [5.56, 9.84, 16.40, 26.25, 32.80, 49.21']
order code expansion .XXXX = length in dm
ex.: 8.5852.121A.E031.0030 (for cable length 3 m)

d *Code type and division*
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

Optional on request
- other code types
- other divisions

Standard optical	5852 / 5872 (shaft / hollow shaft)	Parallel, highspeed

Order code Hollow shaft

8.5872	.	X	X	X	X	.	XXX	1
Type		a	b	c	d		e	

a *Flange*
1 = with spring element, short
3 = with stator coupling, ø 65 mm [2.56"]

b *Through hollow shaft*
6 = ø 10 mm [0.39"]
8 = ø 12 mm [0.47"]

c *Interface / supply voltage*
1 = parallel (CMOS-TTL) / 5 V DC
3 = parallel / 10 ... 30 V DC

d *Type of connection*
1 = radial cable, 1 m [3.28'] PVC
2 = radial M23 connector, 17-pin

e *Code type and division*
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

Optional on request
- other code types
- other divisions

Reverse count direction

(Only with output type 3 and up to 13 bit gray code available)

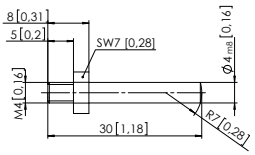
Normal operation:

Rising code values when shaft turning clockwise (cw). Falling code values when shaft turning counterclockwise (ccw), top view of shaft.

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.

Mounting accessory for shaft encoders		Order no.
Coupling	bellows coupling ø 19 mm [0.75"] for shaft 6 mm [0.24"]	**8.0000.1102.0606**
	bellows coupling ø 19 mm [0.75"] for shaft 10 mm [0.39"]	**8.0000.1102.1010**

Mounting accessory for hollow shaft encoders Dimensions in mm [inch]		Order no.
Torque pin, ø 4 mm for flange with spring element (flange type 1)	with fixing thread 	**8.0010.4700.0000**

Cables and connectors		Order no.
Preassembled cables	M23 female connector with coupling nut, 17-pin, ccw single-ended 2 m [6.56'] PVC cable	**8.0000.6741.0002**
Connectors	M23 female connector with coupling nut, 17-pin, ccw	**8.0000.5042.0000**

Further Kübler accessories can be found at: /accessories
Further Kübler cables and connectors can be found at: /connection-technology

Absolute encoders - singleturn

Standard optical	5852 / 5872 (shaft / hollow shaft)	Parallel, highspeed

Technical data

Mechanical characteristics

Maximum speed	shaft version	12000 min^{-1}
	hollow shaft version	6000 min^{-1} 1)
Mass 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 at 20 °C [68 °F]	shaft version	< 0.01 Nm
	hollow shaft version	< 0.05 Nm
Load capacity of shaft	radial	80 N
	axial	40 N
Weight		approx. 0.4 kg [14.11 oz]
Protection acc. to EN 60529	shaft version	IP65
	hollow shaft version	IP66
Working temperature range		-20 °C ... +85 °C 2) [-4 °F ... +185 °F] 2)
Material	shaft / hollow shaft	stainless steel
Shock resistance acc. EN 60068-2-27		2500 m/s^2, 6 ms
Vibration resistance acc. EN 60068-2-6		100 m/s^2, 10 ... 2000 Hz

Approvals

UL compliant in accordance with	File no. E224618
CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU

Electrical characteristics (parallel interface)

Supply voltage (+V)		5 V DC (±5 %)	10 ... 30 V DC
Output driver		CMOS-TTL	Push-pull
Power consumption (no load)	typ.	40 mA	100 mA
	max.	75 mA	159 mA
Permissible load / channel		max. +0.5 / -2.0 mA	max. +/- 10 mA
Refresh rate of the position data		40000/s	40000/s
Signal level	HIGH	min. 3.4 V	min. +V - 2.8 V
	LOW	max. 0.3 V	max. 1.8 V
Rising edge time t_r (without cable)		max. 0.2 µs	max. 1µs
Falling edge time t_f (without cable)		max. 0.2 µs	max. 1µs
Short circuit proof outputs 3)		yes	yes
Reverse polarity protection of the supply voltage		no	yes

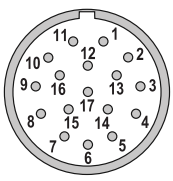
Terminal assignment

Interface	Type of connection		Cable (isolate unused cores individually before initial start-up)																	
1, 3	5852:	1, 2, A, B	Signal	0 V	+V	1	2	3	4	5	6	7	8	9	10	11	12	13	14 ($\overline{MSB}$)	
	5872:	1	Core color:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY PK	RD BU	WH GN	BN GN	WH YE	YE BN	

Interface	Type of connection		M23 connector, 17-pin																		
1, 3	5852:	3, 5	Signal	0 V	+V	1	2	3	4	5	6	7	8	9	10	11	12	13	(14 ($\overline{MSB}$)		⏚
	5872:	2	Pin:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	PH

+V: Supply voltage encoder +V DC
0 V: Supply voltage encoder ground GND (0 V)
Signal : 1 = MSB; 2 = MSB-1; 3 = MSB-2 usw.
$\overline{MSB}$: MSB inverted
PH ⏚: Plug connector housing (shield)

Top view of mating side, male contact base



M23 connector, 17-pin (parallel)

1) For continuous operation max. 1500 min^{-1}.
2) 70 °C [158 °F] for 14 bit version.
3) If supply voltage +V correctly applied.

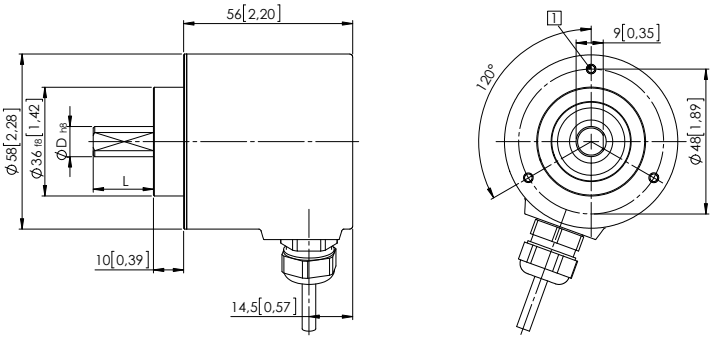
Standard optical	5852 / 5872 (shaft / hollow shaft)	Parallel, highspeed

Dimensions shaft version

Dimensions in mm [inch]

Clamping flange, ø 58 [2.28]
with shaft, ø 10 [0.39]
Flange type 12

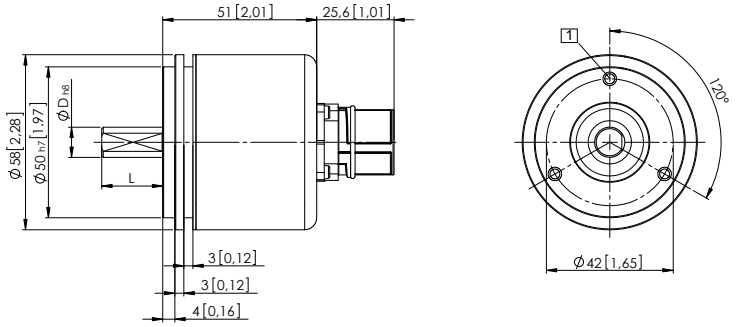
1 3 x M3, 5 [0.20] deep



D	Fit	L
6 [0.24]	h8	10 [0.39]
10 [0.39]	f7	20 [0.79]

Synchro flange, ø 58 [2.28]
with shaft, ø 6 [0.24]
Flange type 21

1 3 x M4, 10 [0.39] deep



D	Fit	L
6 [0.24]	h8	10 [0.39]
10 [0.39]	f7	20 [0.79]

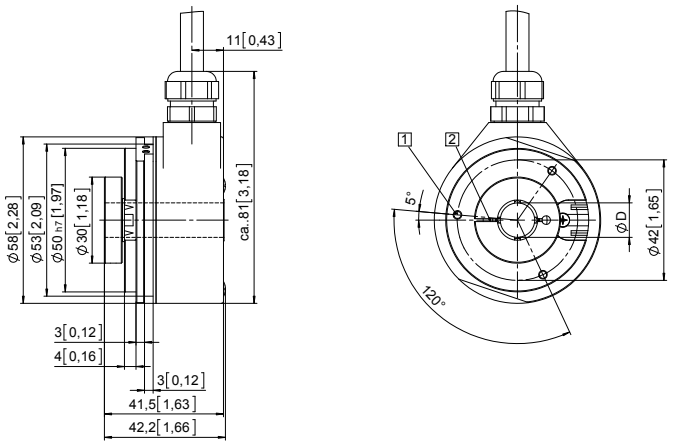
Standard optical	5852 / 5872 (shaft / hollow shaft)	Parallel, highspeed

Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with spring element, short
Flange type 1

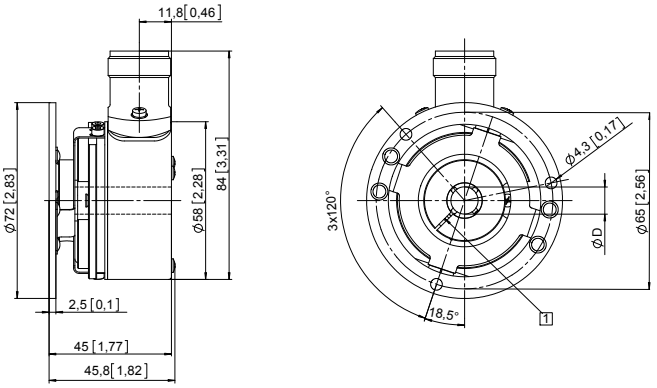
1 3 x M3, 5 [0.20] deep
2 Recommended torque for the clamping ring 0.6 Nm



D	Fit
10 [0.39]	H7
12 [0.47]	H7

Flange with stator coupling, ø 65 [2.56]
Flange type 3

1 Recommended torque for the clamping ring 0.6 Nm



D	Fit
10 [0.39]	H7
12 [0.47]	H7

Standard optical | **Sendix 5858 / 5878 (shaft / hollow shaft)** | **PROFINET IO**

The singleturn encoders 5858 and 5878 with PROFINET interface and optical sensor technology are ideal for use in all applications with a PROFINET interface.

The encoder supports the IRT mode and is therefore ideal for real-time applications.

Safety-Lock™ | High rotational speed | Temperature range -40°... +85°C | High protection level IP | High shaft load capacity | Shock / vibration resistant | Magnetic field proof | Short-circuit proof | Reverse polarity protection | Optical sensor | Surface protection salt spray-tested optional

Reliable

- Ideally suited for all PROFINET applications thanks to the use of encoder profile 4.1.
- Perfect for use in harsh outdoor environments, as a result of IP67 protection and rugged housing construction.

Flexible

- Easy setting of a preset value using a control bit (telegram 860).
- IRT-Mode.
- Cycle time ≥ 1 ms.
- Firmware updater allows for easy expansion of characteristics without having to disassemble the encoder.

Order code Shaft version

8.5858	.	X	X	C	2	.	C2	12
Type		a	b	c	d		e	

a *Flange*
- **1 = clamping flange, IP65 ø 58 mm [2.28"]**
- 3 = clamping flange, IP67 ø 58 mm [2.28"]
- **2 = synchro flange, IP65 ø 58 mm [2.28"]**
- 4 = synchro flange, IP67 ø 58 mm [2.28"]
- 5 = square flange, IP65 □63.5 mm [2.5"]
- 7 = square flange, IP67 □63.5 mm [2.5"]

b *Shaft (ø x L), with flat*
- **1 = 6 x 10 mm [0.24 x 0.39"]** 1)
- **2 = 10 x 20 mm [0.39 x 0.79"]** 2)
- 3 = 1/4" x 7/8"
- 4 = 3/8" x 7/8"

c *Interface / supply voltage*
- **C = PROFINET IO / 10 ... 30 V DC**

d *Type of connection removable bus terminal cover*
- **2 = 3 x M12 connector, 4-pin**

e *Field bus profile*
- **C2= PROFINET IO**

Optional on request
- Ex 2/22
- surface protection salt spray tested

Order code Hollow shaft

8.5878	.	X	X	C	2	.	C2	12
Type		a	b	c	d		e	

a *Flange*
- 1 = with spring element, long, IP65
- 2 = with spring element, long, IP67
- 3 = with stator coupling, IP65 ø 65 mm [2.56"]
- 4 = with stator coupling, IP67 ø 65 mm [2.56"]
- **5 = with stator coupling, IP65 ø 63 mm [2.48"]**
- 6 = with stator coupling, IP67 ø 63 mm [2.48"]

b *Blind hollow shaft (insertion depth max. 30 mm [1.18"])*
- 3 = ø 10 mm [0.39"]
- **4 = ø 12 mm [0.47"]**
- 5 = ø 14 mm [0.55"]
- 6 = ø 15 mm [0.59"]
- 8 = ø 3/8"
- 9 = ø 1/2"

c *Interface / supply voltage*
- **C = PROFINET IO / 10 ... 30 V DC**

d *Type of connection removable bus terminal cover*
- **2 = 3 x M12 connector, 4-pin**

e *Field bus profile*
- **C2= PROFINET IO**

Optional on request
- Ex 2/22
- surface protection salt spray tested

1) Preferred type only in conjunction with flange type 2.
2) Preferred type only in conjunction with flange type 1.

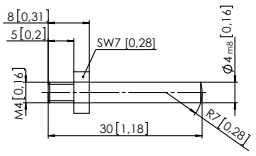
Standard optical | **Sendix 5858 / 5878 (shaft / hollow shaft)** | **PROFINET IO**

Mounting accessory for shaft encoders

		Order no.
Coupling	bellows coupling ø 19 mm [0.75"] for shaft 6 mm [0.24"]	**8.0000.1102.0606**
	bellows coupling ø 19 mm [0.75"] for shaft 10 mm [0.39"]	**8.0000.1102.1010**

Mounting accessory for hollow shaft encoders

Dimensions in mm [inch]

		Order no.
Torque pin, ø 4 mm for flange with spring element (flange type 1 + 2)	with fixing thread 	**8.0010.4700.0000**

Cables and connectors

			Order no.
Preassembled cables	M12 male connector with external thread, 4-pin, D coded, straight single-ended 2 m [6.56'] PUR cable	Bus IN + Bus OUT	**05.00.6031.4411.002M**
	M12 female connector with coupling nut, 4-pin, A coded, straight single-ended 2 m [6.56'] PUR cable	supply voltage	**05.00.6061.6211.002M**
Connectors	M12 male connector with external thread, 4-pin, D coded, straight (metal)	Bus IN + Bus OUT	**05.WASCSY4S**
	M12 female connector with coupling nut, 4-pin, A coded, straight (plastic)	supply voltage	**05.B8141-0**

Further Kübler accessories can be found at: /accessories
Further Kübler cables and connectors can be found at: /connection-technology

Technical data

Mechanical characteristics

Maximum speed	IP65 up to 70 °C [158 °F]	9000 min^{-1}, 7000 min^{-1} (continuous)
	IP65 up to T_{max}	7000 min^{-1}, 4000 min^{-1} (continuous)
	IP67 up to 70 °C [158 °F]	8000 min^{-1}, 6000 min^{-1} (continuous)
	IP67 up to T_{max}	6000 min^{-1}, 3000 min^{-1} (continuous)
Starting torque - at 20 °C [68 °F]	IP65	< 0.01 Nm
	IP67	< 0.05 Nm
Mass moment of inertia		
	shaft version	3.0 x 10^{-6} kgm^2
	hollow shaft version	6.0 x 10^{-6} kgm^2
Load capacity of shaft	radial	80 N
	axial	40 N
Weight		approx. 0.50 kg [17.64 oz]
Protection acc. to EN 60529		
	housing side	IP67
	shaft side	IP65, opt. IP67
Working temperature range		-40 °C ... +85 °C [-40 °F ... +185 °F]
Material	shaft/hollow shaft	stainless steel
	flange	aluminum
	housing	zinc die-cast
Shock resistance acc. to EN 60068-2-27		2500 m/s^2, 6 ms
Vibration resistance acc. to EN 60068-2-6		100 m/s^2, 55 ... 2000 Hz

Electrical characteristics

Supply voltage	10 ... 30 V DC
Power consumption (no load)	max. 200 mA
Reverse polarity protection of the supply voltage	yes

Interface characteristics PROFINET IO

Resolution	1 ... 65535 (16 bit), scalable default: 8192 (13 bit)
Protocol	PROFINET IO

Link 1 and 2, LED (green / yellow)

Two colored	green	active link
	yellow	data transfer

Error LED (red) / PWR LED (green)

Functionality see manual

Approvals

UL compliant in accordance with		File no. E224618
CE compliant in accordance with		
	EMC Directive	2014/30/EU
	RoHS Directive	2011/65/EU
	ATEX Directive	2014/34/EU (for Ex 2/22 variants)

Standard optical | **Sendix 5858 / 5878 (shaft / hollow shaft)** | **PROFINET IO**

General information about PROFINET IO

The PROFINET encoder implements the encoder profile 4.1. (according to the specification Encoder Version 4.1 Dec 2008")

It permits scaling and preset values, as well as many other additional parameters to be programmed via the PROFINET bus.

When switching on, all parameters are loaded from an EEPROM, where they were saved previously to protect them against power-failure, or taken over by the controller in the start-up phase.

Position, speed and many other states of the encoder can be transmitted.

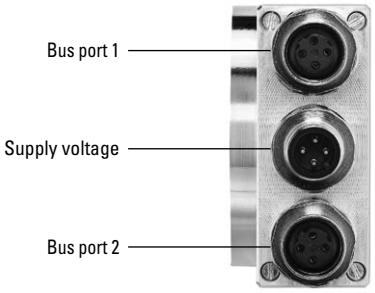
PROFINET IO

The complete encoder profile according to profile encoder version 4.1 as well as the identification & maintenance functionality version 1.16 has been implemented. IM blocks 0, 1, 2, 3 and 4 are supported.

The **M**edia **R**edundancy **P**rotocol is implemented here.
Basically, the advantage of MRP is that the functionality of the components, which are wired in a ring structure, is maintained in case of a failure or of a breakage of the wires in any location.

Terminal assignment bus

Interface	Type of connection	Function	M12 connector, 4-pin					
C	2 (3 x M12 connector)	Bus port 1	Signal:	Transmit data+	Receive data+	Transmit data -	Receive data -	 D coded
			Abbreviation:	TxD+	RxD+	TxD-	RxD-	
			Pin:	1	2	3	4	
		Power supply	Signal:	Voltage +	–	Voltage –	–	
			Abbreviation:	+ V	–	0 V	–	
			Pin:	1	2	3	4	
		Bus port 2	Signal:	Transmit data+	Receive data+	Transmit data -	Receive data -	 D coded
			Abbreviation:	TxD+	RxD+	TxD-	RxD-	
			Pin:	1	2	3	4	



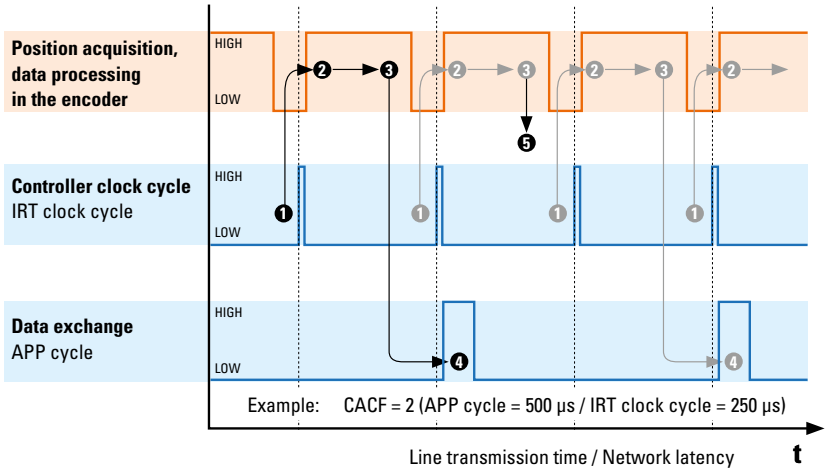
Standard optical | **Sendix 5858 / 5878 (shaft / hollow shaft)** | **PROFINET IO**

Technology in detail

Clock synchronicity – Isochronous Real Time (IRT) in position sensor technology

In general, for time-critical applications, focus is set on very short sensor cycle times. However, in order to achieve high control performance, simply accelerating data acquisition and processing by shortest cycle times is not sufficient. All sensors and actuators are to operate according to the same clock.

This is achieved thanks to a clock used for the whole network, defined by the controller. This transmit clock cycle (IRT clock) is however not necessarily the clock cycle used for process data exchange. Another cycle (application cycle) is used for this purpose, which can also be defined by the customer controller. The illustration below represents the connection between the different clock cycles.



❶ **Clock specification by controller**
IRT clock cycle = Transmit clock

❷ **Data acquisition position signals**
Internal sensor clock synchronizes with the IRT clock. Acquisition of the sensor raw values

❸ **Data processing in the encoder**
Position data is processed and written in the buffer memory of the encoder

❹ **Data transmission via the network**
At every application cycle (APP cycle), data is read from the buffer memory and transmitted to the controller.

❺ **All 2nd positions**
Since the APP cycle is twice as long as the IRT clock cycle, every 2nd position acquired will not be transmitted.
Or: data exchange takes place only every second IRT clock cycle.

When receiving the IRT clock signal, the sensor starts reading its current measured point. This raw value is processed internally (e.g. scaling, speed calculation, etc.) and stored in a buffer memory.

The buffer memory is read at every application cycle. If it contains a value, this value is transmitted to the controller via the network.

If the application cycle is a multiple of the IRT clock cycle, it may happen that the buffered process data is not sent directly, but is overwritten, because, even though this data is acquired with every IRT clock cycle, it is sent only with every application cycle.

The ratio between application cycle and IRT clock cycle represents the CACF (Controller Application Cycle Factor).
In this example, the CACF = 2. This indicates that only every 2nd acquired position will be transmitted to the controller.

The described methodology guarantees a determinism: since the controller defines a clock cycle for the whole network, this allows ensuring that all measured values transmitted by the sensors to the controller are never older than the selected IRT cycle! Therefore, all downstream actuators can always be regulated on the basis of the latest available measured values.

Standard optical | **Sendix 5858 / 5878 (shaft / hollow shaft)** | **PROFINET IO**

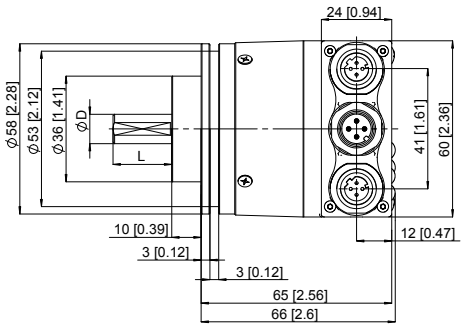
Dimensions shaft version, with removable bus terminal cover

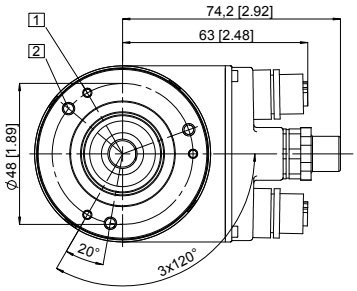
Dimensions in mm [inch]

Clamping flange, ø 58 [2.28]
Flange type 1 and 3

1 3 x M3, 6 [0.24] deep

2 3 x M4, 8 [0.32] deep

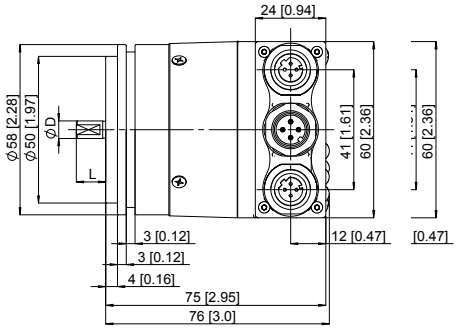


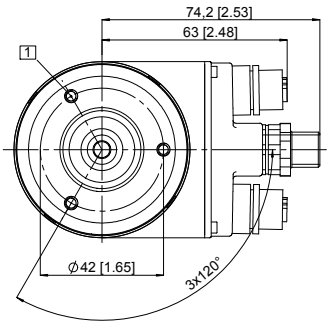


D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h8	7/8"
3/8"	h8	7/8"

Synchro flange, ø 58 [2.28]
Flange type 2 and 4

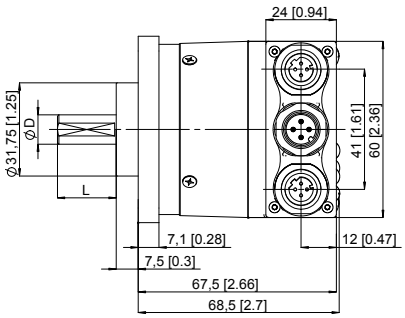
1 3 x M4, 6 [0.24] deep

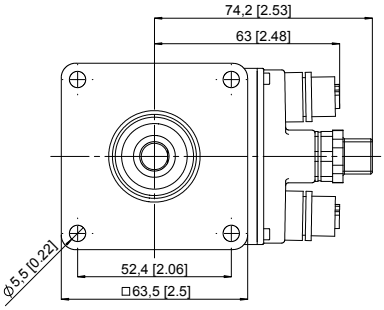




D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h8	7/8"
3/8"	h8	7/8"

Square flange, □ 63.5 [2.5]
Flange type 5 and 7





D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h8	7/8"
3/8"	h8	7/8"

Standard optical | **Sendix 5858 / 5878 (shaft / hollow shaft)** | **PROFINET IO**

Dimensions hollow shaft version (blind hollow shaft), with removable bus terminal cover

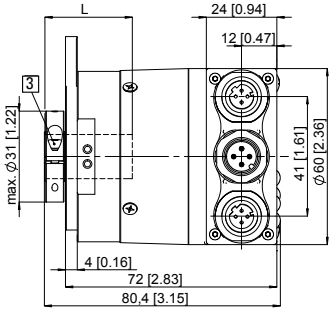
Dimensions in mm [inch]

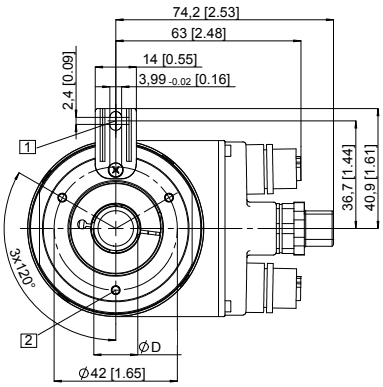
Flange with spring element, long
Flange type 1 and 2

1 Slot spring element, recommendation: cylindrical pin DIN 7, ø 4 [0.16]

2 3 x M3, 5.5 [0.22] deep

3 Recommended torque for the clamping ring 0.6 Nm



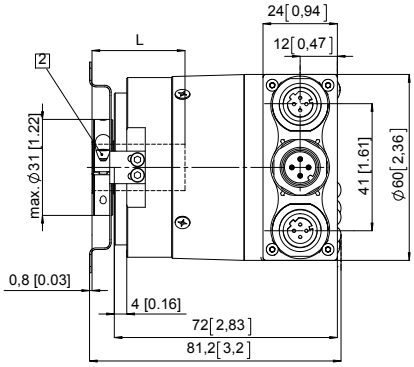


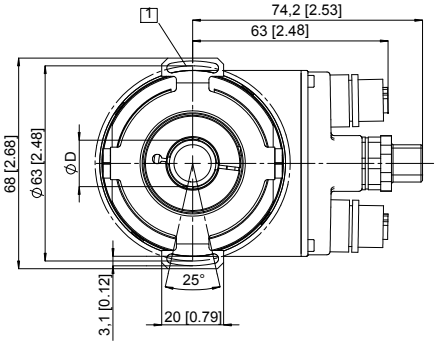
D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

Flange with stator coupling, ø 63 [2.48]
Flange type 5 and 6

1 Fixing screws DIN 912 M3 x 8 (washer included in delivery)

2 Recommended torque for the clamping ring 0.6 Nm

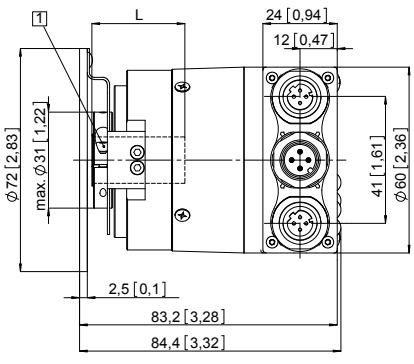


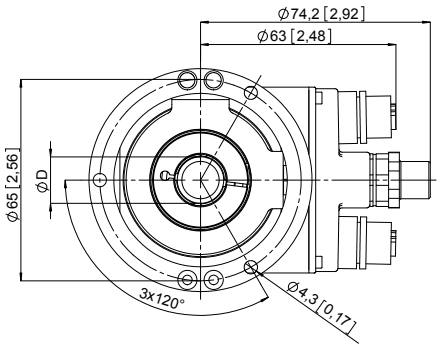


D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

Flange with stator coupling, ø 65 [2.56]
Flange type 3 and 4

1 Recommended torque for the clamping ring 0.6 Nm



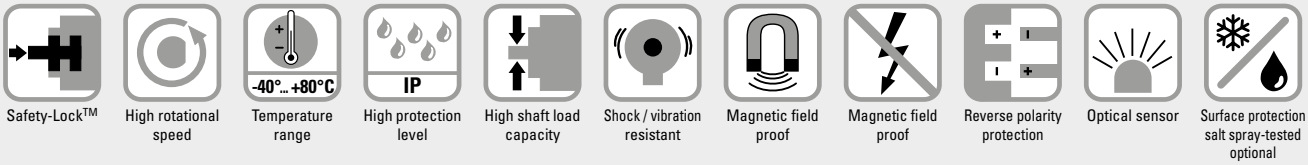


D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

Standard optical | **Sendix 5858 / 5878 (shaft / hollow shaft)** | **CANopen**

The singleturn encoders 5858 and 5878 with CANopen interface and optical sensor technology are ideal for use in all CANopen applications.

They offer a maximum resolution of 16 bits, divided over 360°. These encoders are available with blind hollow shaft up to 15 mm.



Safety-Lock™ | High rotational speed | Temperature range | High protection level | High shaft load capacity | Shock / vibration resistant | Magnetic field proof | Magnetic field proof | Reverse polarity protection | Optical sensor | Surface protection salt spray-tested optional

Reliable

- Tried-and-tested in applications with the highest demands, such as in mobile automation or medical technology.
- Ideal for use outdoors thanks to IP67 protection and wide temperature range from -40 °C up to +80 °C.

Flexible

- Node address can be set via rotary switches or software.
- Baud rate and termination can be set via DIP switches or software.
- With bus terminal cover or fixed connection, as well as M12 connectors or cable connection.

Order code Shaft version

8.5858	.	X	X	2	X	.	21	1	X
Type		a	b	c	d		e		f

a *Flange*

1 = clamping flange, IP65 ø 58 mm [2.28"]
3 = clamping flange, IP67 ø 58 mm [2.28"]
2 = synchro flange, IP65 ø 58 mm [2.28"]
4 = synchro flange, IP67 ø 58 mm [2.28"]
5 = square flange, IP65 □63.5 mm [2.5"]
7 = square flange, IP67 □63.5 mm [2.5"]

b *Shaft (ø x L), with flat*

1 = 6 x 10 mm [0.24 x 0.39"] 1)
2 = 10 x 20 mm [0.39 x 0.79"] 2)
3 = 1/4" x 7/8"
4 = 3/8" x 7/8"

c *Interface / supply voltage*

2 = CANopen DS301 V4.02 / 10 ... 30 V DC

d *Type of connection*
removable bus terminal cover
1 = radial cable gland
2 = 2 x M12 connector, 5-pin
Fixed connection without bus terminal cover
A = radial cable, 2 m [6.56'] PVC
B = radial cable, special length PVC *)
E = 1 x radial M12 connector, 5-pin
F = 2 x radial M12 connector, 5-pin
I = 1 x radial M23 connector, 12-pin
J = 2 x radial M23 connector, 12-pin

*) Available special lengths (connection type B): 3, 5, 8, 10, 15 m [9.84, 16.40, 26.25, 32.80, 49.21'] order code expansion .XXXX = length in dm ex.: 8.5858.112B.2113.0030 (for cable length 3 m)

e *Fieldbus profile*

21 = CANopen

f *Options (service)*
2 = no options
3 = SET button

Optional on request
- Ex 2/22 3)
- surface protection salt spray tested

1) Preferred type only in conjunction with flange type 2.
2) Preferred type only in conjunction with flange type 1.
3) For the cable connection type, cable material PUR.

Standard optical	Sendix 5858 / 5878 (shaft / hollow shaft)	CANopen

Order code Hollow shaft

8.5878	.	X	X	2	X	.	21	1	X
Type		a	b	c	d		e		f

a *Flange*
1 = with spring element, long, IP65
2 = with spring element, long, IP67
3 = with stator coupling, IP65 ø 65 mm [2.56"]
4 = with stator coupling, IP67 ø 65 mm [2.56"]
5 = with stator coupling, IP65 ø 63 mm [2.48"]
6 = with stator coupling, IP67 ø 63 mm [2.48"]

b *Blind hollow shaft*
(insertion depth max. 30 mm [1.18"])
3 = ø 10 mm [0.39"]
4 = ø 12 mm [0.47"]
5 = ø 14 mm [0.55"]
6 = ø 15 mm [0.59"]
8 = ø 3/8"
9 = ø 1/2"

c *Interface / supply voltage*
2 = CANopen DS301 V4.02 / 10 ... 30 V DC

d *Type of connection*
removable bus terminal cover
1 = radial cable gland
2 = 2 x M12 connector, 5-pin
Fixed connection without bus terminal cover
A = radial cable, 2 m [6.56'] PVC
B = radial cable, special length PVC *)
E = 1 x radial M12 connector, 5-pin
F = 2 x radial M12 connector, 5-pin
I = 1 x radial M23 connector, 12-pin
J = 2 x radial M23 connector, 12-pin

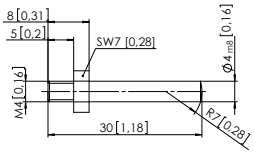
*) Available special lengths (connection type B):
3, 5, 8, 10, 15 m [9.84, 16.40, 26.25, 32.80, 49.21']
order code expansion .XXXX = length in dm
ex.: 8.5878.542B.2113.0030 (for cable length 3 m)

e *Fieldbus profile*
21 = CANopen

f *Options (service)*
2 = no options
3 = SET button

Optional on request
- Ex 2/22 [1]
- surface protection salt spray tested

Mounting accessory for shaft encoders		Order no.
Coupling	bellows coupling ø 19 mm [0.75"] for shaft 6 mm [0.24"]	**8.0000.1102.0606**
	bellows coupling ø 19 mm [0.75"] for shaft 10 mm [0.39"]	**8.0000.1102.1010**

Mounting accessory for hollow shaft encoders Dimensions in mm [inch]		Order no.
Torque pin, ø 4 mm for flange with spring element (flange type 1)	with fixing thread 	**8.0010.4700.0000**

Cables and connectors		Order no.
Preassembled cables	M12 female connector with coupling nut, 5-pin, A coded, straight – Bus in single-ended 5 m [16.40'] PVC cable	**05.00.6091.A211.005M**
	M12 male connector with external thread, 5-pin, A coded, straight – Bus out single-ended 5 m [16.40'] PVC cable	**05.00.6091.A411.005M**
Connectors	M12 female connector with coupling nut, 5-pin, A coded, straight (metal) – Bus in	**8.0000.5116.0000**
	M12 male connector with external thread, 5-pin, A coded, straight (metal) – Bus out	**8.0000.5111.0000**

Further Kübler accessories can be found at: /accessories
Further Kübler cables and connectors can be found at: /connection-technology

1) For the cable connection type, cable material PUR.

Standard optical | **Sendix 5858 / 5878 (shaft / hollow shaft)** | **CANopen**

Technical data

Mechanical characteristics

Maximum speed		
	IP65 up to 70 °C [158 °F]	9000 min^{-1}, 7000 min^{-1} (continuous)
	IP65 up to T_{max}	7000 min^{-1}, 4000 min^{-1} (continuous)
	IP67 up to 70 °C [158 °F]	8000 min^{-1}, 6000 min^{-1} (continuous)
	IP67 up to T_{max}	6000 min^{-1}, 3000 min^{-1} (continuous)
Starting torque - at 20 °C [68 °F]	IP65	< 0.01 Nm
	IP67	< 0.05 Nm
Mass moment of inertia		
	shaft version	3.0 x 10^{-6} kgm^2
	hollow shaft version	6.0 x 10^{-6} kgm^2
Load capacity of shaft	radial	80 N
	axial	40 N
Weight	with bus terminal cover	approx. 0.53 kg [18.69 oz]
	with fixed connection	approx. 0.50 kg [17.64 oz]
Protection acc. to EN 60529		
	housing side	IP67
	shaft side	IP65, opt. IP67
Working temperature range		-40 °C ... +80 °C [-40 °F ... +176 °F] 1)
Material	shaft/hollow shaft	stainless steel
	flange	aluminum
	housing	zinc die-cast
	cable	PVC (PUR for Ex 2/22)
Shock resistance acc. to EN 60068-2-27		2500 m/s^2, 6 ms
Vibration resistance acc. to EN 60068-2-6		100 m/s^2, 55 ... 2000 Hz

Electrical characteristics

Supply voltage	10 ... 30 V DC
Power consumption (no load)	max. 90 mA
Reverse polarity protection of the supply voltage	yes

Interface characteristics CANopen

Resolution	1 ... 65536 (16 bit), scalable default: 8192 (13 bit)
Interface	CAN high-speed acc. to ISO 11898, Basic- and Full-CAN CAN specification 2.0 B
Protocol	CANopen profile DS406 V3.2 with manufacturer-specific add-ons
Baud rate	10 ... 1000 kbit/s can be set via DIP switches, software configurable
Node address	1 ... 127 can be set via rotary switches, software configurable
Termination switchable	can be set via DIP switches, software configurable

General information about CANopen

The CANopen encoders support the latest CANopen communication profile according to DS301 V4.02 . In addition, device specific profiles such as encoder profile DS406 V3.2 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 are loaded from an EEPROM, where they were saved previously to protect them against power-failure.

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 competitively priced alternatives, encoders are also available with a connector or a cable connection, where the device address and baud rate can be changed and configured by means of the software. The models with bus terminal cover and integrated T-coupler allow for extremely simple installation: the bus and supply voltage can be easily connected via M12 connectors. The device address can be set via 2 rotary hex switches. Furthermore, another DIP switch allows for the setting of the baud rate and switching on a termination resistor. Three LEDs 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 DS301 V4.02

Among others, the following functionality is integrated.

Class C2 functionality
- NMT slave.
- Heartbeat protocol.
- High resolution sync protocol.
- Identity object.
- Error behavior 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 V3.2

The following parameters can be programmed:
- Event mode.
- Units for speed selectable (steps/sec or min^{-1}).
- Factor for speed calculation (e.g. circumference of measuring wheel).
- Integration time for the speed value from 1 ... 32.
- 2 working areas with 2 upper and lower limits 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 - 3 LED's.
- Optional - 32 CAMs programmable.
- Customer-specific memory - 16 Bytes.
- "Watchdog controlled" device.

All profiles stated here: key-features
The object 6003h "Preset" is assigned to an integrated key, accessible from the outside.

1) Cable version: -30 °C ... +75 °C [-22 °F ... +167 °F].

Standard optical	Sendix 5858 / 5878 (shaft / hollow shaft)	CANopen

SET button (zero or defined value, option)

Protection against accidental activation.
Button can only be operated with a ball-pen or pencil.

Diagnostic LED (yellow)

LED is ON with the following fault conditions	sensor error (internal code or LED error), voltage too low, over-temperature

Approvals

UL compliant in accordance with	File no. E224618
CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU
ATEX Directive	2014/34/EU (for Ex 2/22 variants)

SET button
for fast, simple
on-site start-up

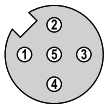
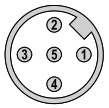
Green, red, yellow LEDs
Fault-free operation immediately
visible on the bus.

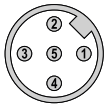
Standard optical | **Sendix 5858 / 5878 (shaft / hollow shaft)** | **CANopen**

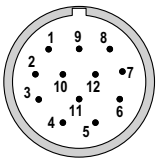
Terminal assignment

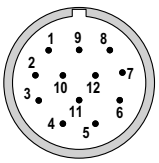
Interface	Type of connection	Cable gland (bus terminal cover with terminal box)										
			Bus OUT					Bus IN				
2	1	Signal:	CAN_GND	CAN_L	CAN_H	0 V supply voltage	+V supply voltage	0 V supply voltage	+V supply voltage	CAN_L	CAN_H	CAN_GND
		Abbreviation:	CG	CL	CH	0 V	+V	0 V	+V	CL	CH	CG

Interface	Type of connection	Cable (isolate unused cores individually before initial start-up)					
			Bus IN				
2	A, B	Signal:	0 V supply voltage	+V supply voltage	CAN_L	CAN_H	CAN_GND
		Core color:	WH	BN	YE	GN	GY

Interface	Type of connection	2 x M12 connector, 5-pin						
			Bus OUT					
2	2, F	Signal:	0 V supply voltage	+V supply voltage	CAN_L	CAN_H	CAN_GND	
		Pin:	3	2	5	4	1	
			Bus IN					
		Signal:	0 V supply voltage	+V supply voltage	CAN_L	CAN_H	CAN_GND	
		Pin:	3	2	5	4	1	

Interface	Type of connection	1 x M12 connector, 5-pin						
			Bus IN					
2	E	Signal:	0 V supply voltage	+V supply voltage	CAN_L	CAN_H	CAN_GND	
		Pin:	3	2	5	4	1	

Interface	Type of connection	2 x M23 connector, 12-pin						
			Bus OUT					
2	J	Signal:	0 V supply voltage	+V supply voltage	CAN_L	CAN_H	CAN_GND	2 x 
		Pin:	10	12	2	7	3	
			Bus IN					
		Signal:	0 V supply voltage	+V supply voltage	CAN_L	CAN_H	CAN_GND	
		Pin:	10	12	2	7	3	

Interface	Type of connection	1 x M23 connector, 12-pin						
			Bus IN					
2	I	Signal:	0 V supply voltage	+V supply voltage	CAN_L	CAN_H	CAN_GND	
		Pin:	10	12	2	7	3	

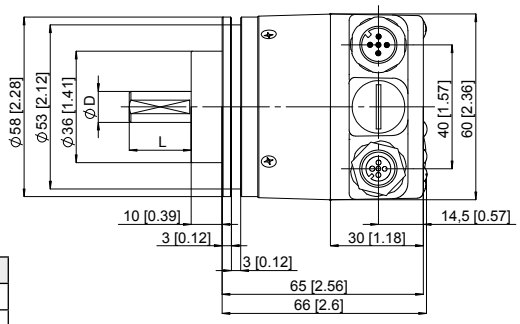
Standard optical | **Sendix 5858 / 5878 (shaft / hollow shaft)** | **CANopen**

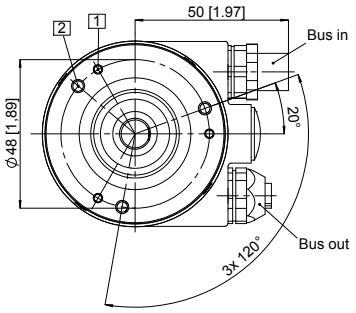
Dimensions shaft version, with removable bus terminal cover

Dimensions in mm [inch]

Clamping flange, ø 58 [2.28]
Flange type 1 and 3
(drawing with 2 x M12 connector)

1 3 x M3, 6 [0.24] deep
2 3 x M4, 8 [0.32] deep

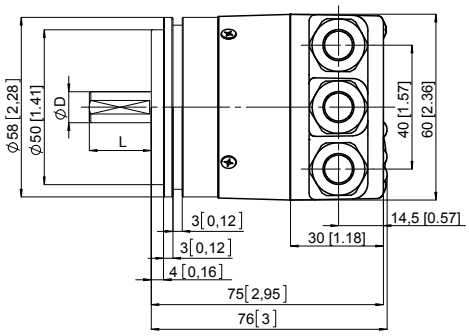


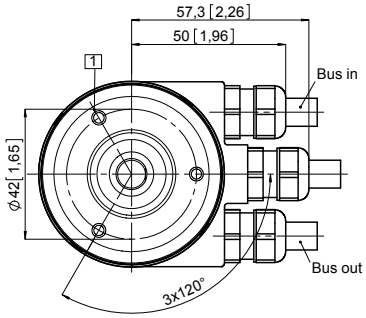


D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h8	7/8"
3/8"	h8	7/8"

Synchro flange, ø 58 [2.28]
Flange type 2 and 4
(drawing with cable)

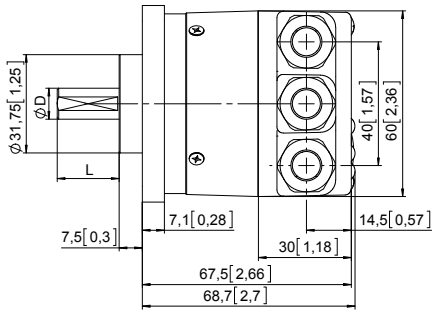
1 3 x M4, 6 [0.24] deep

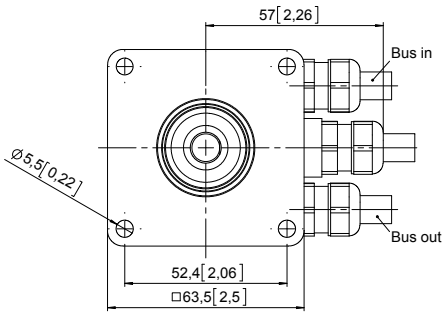




D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h8	7/8"
3/8"	h8	7/8"

Square flange, □ 63.5 [2.5]
Flange type 5 and 7
(drawing with cable)





D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h8	7/8"
3/8"	h8	7/8"

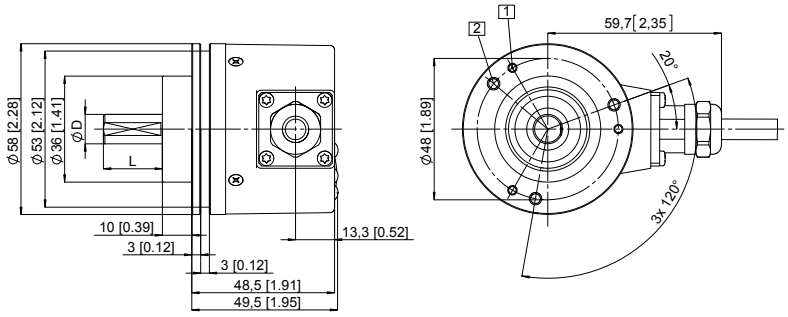
Standard optical | **Sendix 5858 / 5878 (shaft / hollow shaft)** | **CANopen**

Dimensions shaft version, with fixed connection

Dimensions in mm [inch]

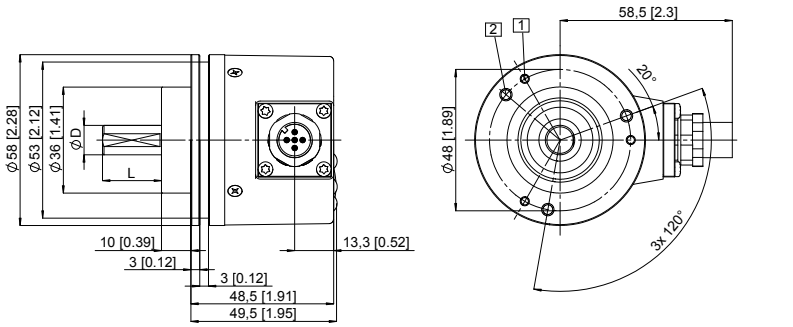
Clamping flange, ø 58 [2.28]
Flange type 1 and 3
(drawing with cable)

1 3 x M3, 6 [0.24] deep
2 3 x M4, 8 [0.32] deep



(drawing with M12 connector)

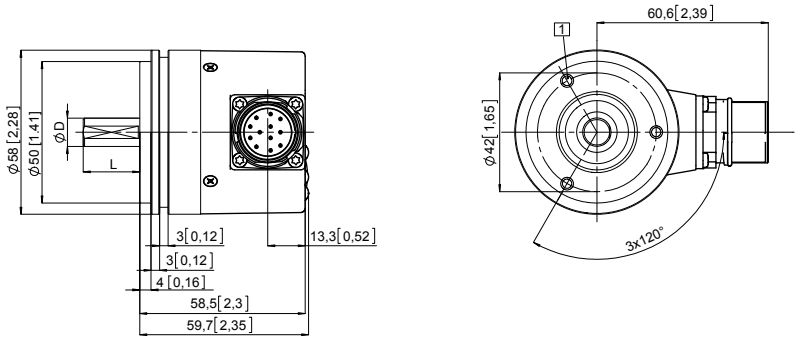
1 3 x M3, 6 [0.24] deep
2 3 x M4, 8 [0.32] deep



D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h8	7/8"
3/8"	h8	7/8"

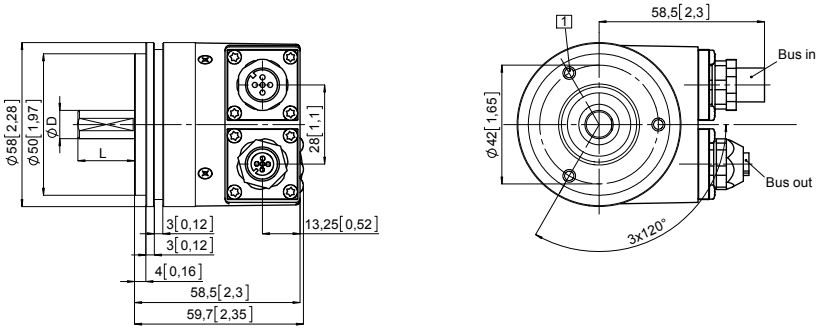
Synchro flange, ø 58 [2.28]
Flange type 2 and 4
(drawing with M23 connector)

1 3 x M4, 6 [0.24] deep



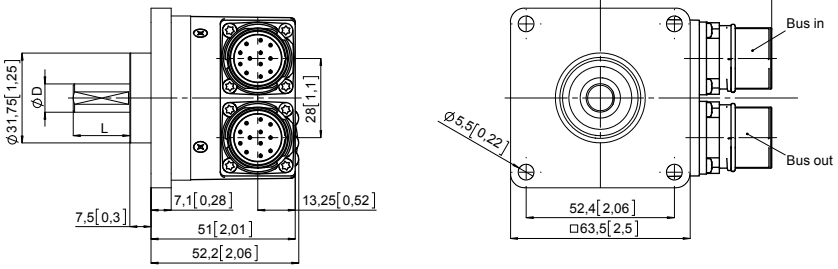
(drawing with M12 connector)

1 3 x M4, 6 [0.24] deep



D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h8	7/8"
3/8"	h8	7/8"

Square flange, □ 63.5 [2.5]
Flange type 5 and 7
(drawing with 2 x M23 connector)



D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h8	7/8"
3/8"	h8	7/8"

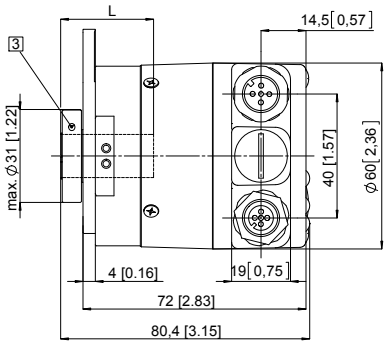
Standard optical | **Sendix 5858 / 5878 (shaft / hollow shaft)** | **CANopen**

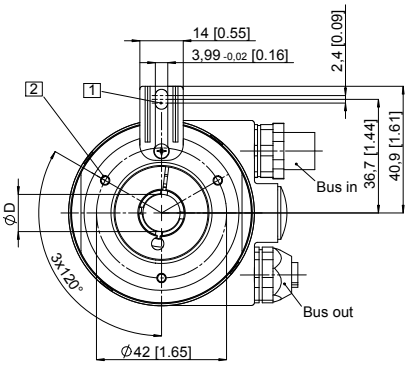
Dimensions hollow shaft version (blind hollow shaft), with removable bus terminal cover

Dimensions in mm [inch]

Flange with spring element, long
Flange type 1 and 2
(drawing with 2 x M12 connector)

1 Slot spring element, recommendation: torque pin DIN 7, ø 4 [0.16]
2 3 x M3, 5.5 [0.22] deep
3 Recommended torque for the clamping ring 0.6 Nm

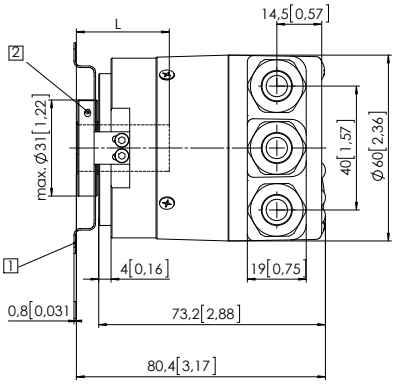


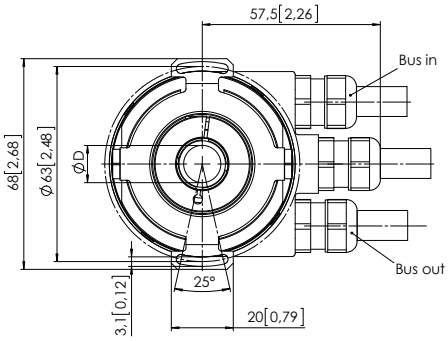


D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

Flange with stator coupling, ø 63 [2.48]
Flange type 5 and 6
Pitch circle diameter for fixing screws 63 [2.48]
(drawing with cable)

1 Fixing screws DIN 912 M3 x 8 (washer included in delivery)
2 Recommended torque for the clamping ring 0.6 Nm

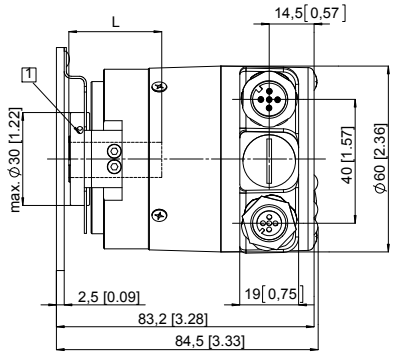


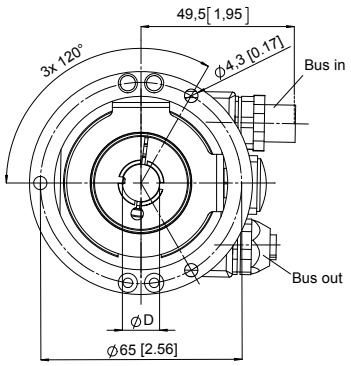


D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

Flange with stator coupling, ø 65 [2.56]
Flange type 3 and 4
Pitch circle diameter for fixing screws 65 [2.56]
(drawing with 2 x M12 connector)

1 Recommended torque for the clamping ring 0.6 Nm





D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

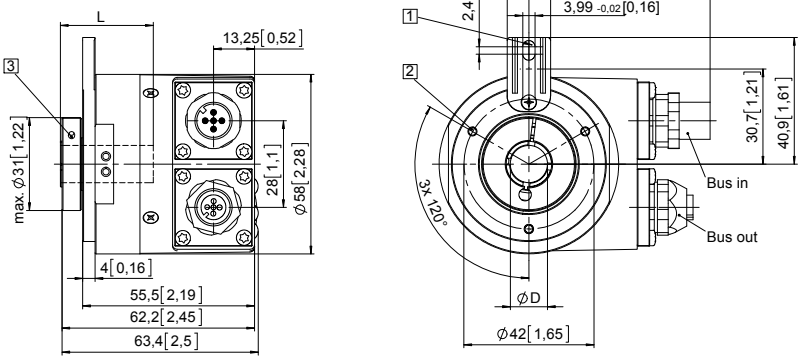
Standard optical | **Sendix 5858 / 5878 (shaft / hollow shaft)** | **CANopen**

Dimensions hollow shaft version (blind hollow shaft), with fixed connection

Dimensions in mm [inch]

Flange with spring element, long
Flange type 1 and 2
(drawing with 2 x M12 connector)

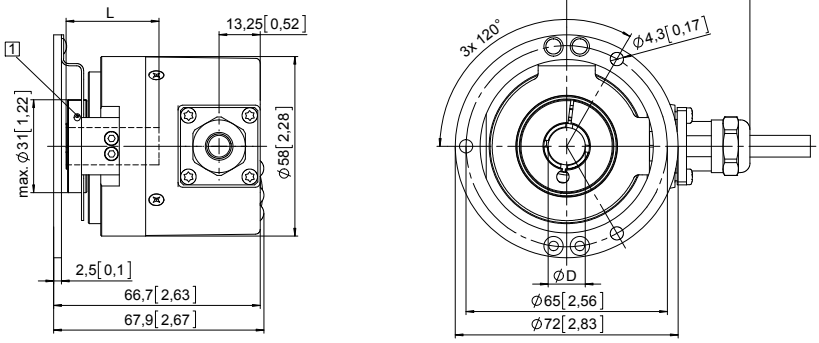
1 Slot spring element, recommendation: cylindrical pin DIN 7, ø 4 [0.16]
2 3 x M3, 5.5 [0.22] deep
3 Recommended torque for the clamping ring 0.6 Nm



D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

Flange with stator coupling, ø 65 [2.56]
Flange type 3 and 4
Pitch circle diameter for fixing screws 65 [2.56]
(drawing with cable)

1 Recommended torque for the clamping ring 0.6 Nm



D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

Standard optical | **Sendix 5858 / 5878 (shaft / hollow shaft)** | **PROFIBUS DP**

The singleturn encoders 5858 and 5878 with Profibus interface and optical sensor technology are the ideal solution for all Profibus applications.

They offer a maximum resolution of 16 bits, divided over 360°. These encoders are available with blind hollow shaft up to 15 mm.

Safety-Lock™ | High rotational speed | Temperature range -40°...+80°C | High protection level IP | High shaft load capacity | Shock / vibration resistant | Magnetic field proof | Short-circuit proof | Reverse polarity protection | Optical sensor | Surface protection salt spray-tested optional

Reliable

- Tried-and-tested in applications with the highest demands, such as in wind energy or mobile automation.
- Ideal for use outdoors thanks to IP67 protection and wide temperature range from -40 °C up to +80 °C.

Flexible

- Fast, simple, error-free connection using versions with M12 connector.
- Wide-ranging programming options thanks to latest encoder profile.

Order code Shaft version

8.5858 . X X 3 X . 31 1 X
Type — a b c d — e — f

a *Flange*
1 = clamping flange, IP65 ø 58 mm [2.28"]
3 = clamping flange, IP67 ø 58 mm [2.28"]
2 = synchro flange, IP65 ø 58 mm [2.28"]
4 = synchro flange, IP67 ø 58 mm [2.28"]
5 = square flange, IP65 □63.5 mm [2.5"]
7 = square flange, IP67 □63.5 mm [2.5"]

b *Shaft (ø x L), with flat*
1 = 6 x 10 mm [0.24 x 0.39"] 1)
2 = 10 x 20 mm [0.39 x 0.79"] 2)
3 = 1/4" x 7/8"
4 = 3/8" x 7/8"

c *Interface / supply voltage*
3 = PROFIBUS DP V0
encoder profile V 1.1, 10 ... 30 V DC

d *Type of connection*
removable bus terminal cover
1 = with radial cable gland fitting
2 = with 3 x radial M12 connectors

e *Fieldbus profile*
31 = PROFIBUS DP V0
encoder profile class 2

f *Options (Service)*
2 = no option
3 = SET button

Optional on request
- Ex 2/22
- surface protection salt spray tested

Order code Hollow shaft

8.5878 . X X 3 X . 31 1 X
Type — a b c d — e — f

a *Flange*
1 = with spring element, long, IP65
2 = with spring element, long, IP67
3 = with stator coupling, IP65 ø 65 mm [2.56"]
4 = with stator coupling, IP67 ø 65 mm [2.56"]
5 = with stator coupling, IP65 ø 63 mm [2.48"]
6 = with stator coupling, IP67 ø 63 mm [2.48"]

b *Blind hollow shaft*
(insertion depth max. 30 mm [1.18"])
3 = ø 10 mm [0.39"]
4 = ø 12 mm [0.47"]
5 = ø 14 mm [0.55"]
6 = ø 15 mm [0.59"]
8 = ø 3/8"
9 = ø 1/2"

c *Interface / supply voltage*
3 = PROFIBUS DP V0
encoder profile V 1.1, 10 ... 30 V DC

d *Type of connection*
removable bus terminal cover
1 = with radial cable gland fitting
2 = with 3 x radial M12 connectors

e *Fieldbus profile*
31 = PROFIBUS DP V0
encoder profile class 2

f *Options (Service)*
2 = no option
3 = SET button

Optional on request
- Ex 2/22
- surface protection salt spray tested

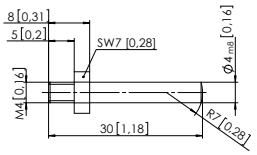
1) Preferred type only in conjunction with flange type 2
2) Preferred type only in conjunction with flange type 1

Standard optical	Sendix 5858 / 5878 (shaft / hollow shaft)	PROFIBUS DP

Mounting accessory for shaft encoders

		Order no.
Coupling	bellows coupling ø 19 mm [0.75"] for shaft 6 mm [0.24"]	**8.0000.1102.0606**
	bellows coupling ø 19 mm [0.75"] for shaft 10 mm [0.39"]	**8.0000.1102.1010**

Mounting accessory for hollow shaft encoders Dimensions in mm [inch]

		Order no.
Torque pin, ø 4 mm for flange with spring element (flange type 1)	with fixing thread 	**8.0010.4700.0000**

Cables and connectors

			Order no.
Preassembled cables	M12 female connector with coupling nut, 5-pin, B coded, straight single-ended 5 m [16.40'] PUR cable	Bus in	**05.00.6011.3211.005M**
	M12 male connector with external thread, 5-pin, B coded, straight single-ended 5 m [16.40'] PUR cable	Bus out	**05.00.6011.3411.005M**
	M12 female connector with coupling nut, 4-pin, A coded, straight Ende offen 2 m PUR-Kabel	supply voltage	**05.00.6061.6211.002M**
Connectors	M12 female connector with coupling nut, 5-pin, B coded, straight (metal)	Bus in	**05.BMWS 8151-8.5**
	M12 male connector with external thread, 5-pin, B coded, straight (metal)	Bus out	**05.BMSWS 8151-8.5**
	M12 female connector with coupling nut, 4-pin, A coded, straight (plastic)	supply voltage	**05.B8141-0**

Further Kübler accessories can be found at: /accessories
Further Kübler cables and connectors can be found at: /connection-technology

Technical data

Mechanical characteristics

Maximum speed		
	IP65 up to 70 °C [158 °F]	9000 min^{-1}, 7000 min^{-1} (continuous)
	IP65 up to T_{max}	7000 min^{-1}, 4000 min^{-1} (continuous)
	IP67 up to 70 °C [158 °F]	8000 min^{-1}, 6000 min^{-1} (continuous)
	IP67 up to T_{max}	6000 min^{-1}, 3000 min^{-1} (continuous)
Starting torque - at 20 °C [68 °F]	IP65	< 0.01 Nm
	IP67	< 0,05 Nm
Mass moment of inertia		
	shaft version	3,0 x 10^{-6} kgm^2
	hollow shaft version	6.0 x 10^{-6} kgm^2
Load capacity of shaft	radial	80 N
	axial	40 N
Weight	with bus terminal cover	approx. 0.53 kg [18.69 oz]
	with fixed connection	approx. 0.50 kg [17.64 oz]
Protection acc. to EN 60529		
	housing side	IP67
	shaft side	IP65, opt. IP67
Working temperature range		-40 °C ... +80 °C [-40 °F ... +176 °F]
Material	shaft/hollow shaft	stainless steel
	flange	aluminum
	housing	zinc die-cast
Shock resistance acc. to EN 60068-2-27		2500 m/s^2, 6 ms
Vibration resistance acc. to EN 60068-2-6		100 m/s^2, 55 ... 2000 Hz

Electrical characteristics

Supply voltage	10 ... 30 V DC
Power consumption (no load)	max. 110 mA
Reverse polarity protection of the supply voltage	yes

SET button (zero or defined value, option)

Protection against accidental activation.
Button can only be operated with a ball-pen or pencil.

Diagnostic LED (yellow)

LED is ON with following errors	sensor error (Profibus error)

Standard optical | **Sendix 5858 / 5878 (shaft / hollow shaft)** | **PROFIBUS DP**

Interface characteristics PROFIBUS DP	
Resolution	1 ... 65536 (16 bit), scalable default: 8192 (13 bit)
Interface	interface specification acc. to PROFIBUS DP 2.0 / standard (DIN 19245 part 3) / RS485 driver galvanically isolated
Protocol	Profibus encoder profile V1.1 class 1 and class 2 with manufacturer-specific add-ons
Baud rate	max. 12 Mbit/s
Device address	1 ... 127 set by rotary switches
Termination switchable	set by DIP switches

Approvals	
UL compliant in accordance with	File no. E224618
CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU
ATEX Directive	2014/34/EU (for Ex 2/22 variants)

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 RS485 max. 12 MB.
- Address programmable via DIP switches.
- Diagnostics LED.
- Full Class 1 and Class 2 functionality.

Terminal assignment terminal box

Interface	Type of connection		BUS IN				BUS OUT				
3	1 (terminal box)	Signal:	B	A	0 V	+V	0 V	+V	B	A	The shield of the connection cable must be connected over a large area via the cable gland.
		Terminal:	1	2	3	4	5	6	7	8	

Interface	Type of connection	Funktion	3 x M12 connector						
3	2 (3 x M12 connector)	Bus in	Signal:	–	PB_A	–	PB_B	Shield	
			Pin:	1	2	3	4	5	
		Power supply	Signal:	+V	–	0 V	–		
			Pin:	1	2	3	4		
		Bus out	Signal:	BUS_VDC [1]	PB_A	BUS_GND [1]	PB_B	Shield	
			Pin:	1	2	3	4	5	

1) For supplying an external Profibus termination resistor.

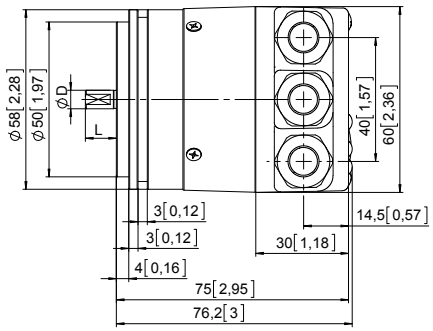
Standard optical | **Sendix 5858 / 5878 (shaft / hollow shaft)** | **PROFIBUS DP**

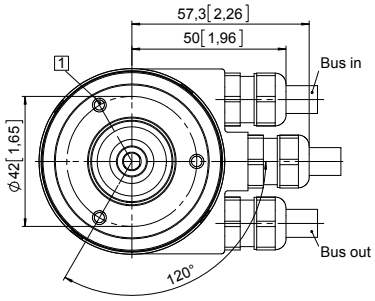
Dimensions shaft version, with removable bus terminal cover

Dimensions in mm [inch]

Synchro flange, ø 58 [2.28]
Flange type 2 and 4
(drawing with cable)

1 3 x M4, 6 [0.24] deep

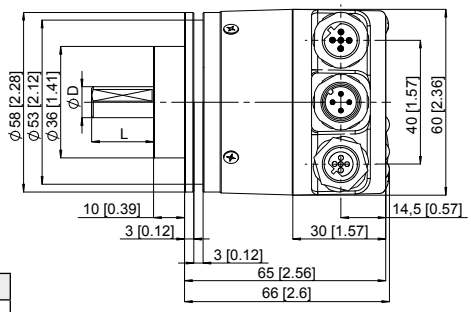


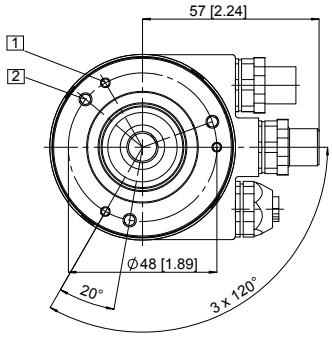


D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h8	7/8"
3/8"	h8	7/8"

Clamping flange, ø 58 [2.28]
Flange type 1 and 3
(drawing with 3 x M12 connector)

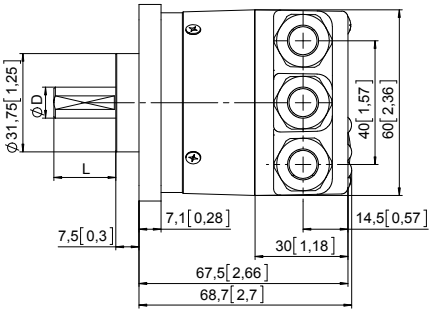
1 3 x M3, 6 [0.24] deep
2 3 x M4, 8 [0.32] deep

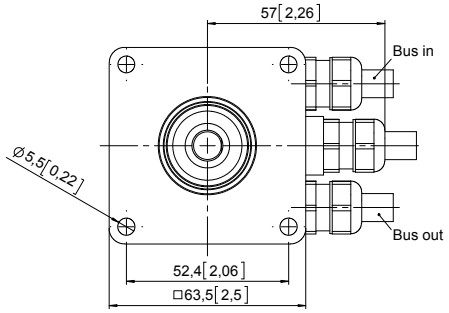




D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h8	7/8"
3/8"	h8	7/8"

Square flange, □ 63.5 [2.5]
Flange type 5 and 7
(drawing with cable)





D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h8	7/8"
3/8"	h8	7/8"

Standard optical | **Sendix 5858 / 5878 (shaft / hollow shaft)** | **PROFIBUS DP**

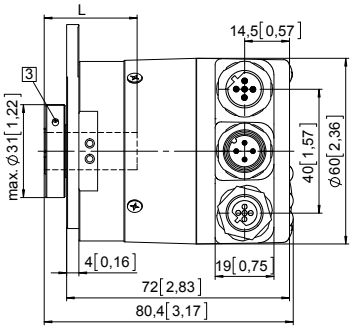
Dimensions hollow shaft version (blind hollow shaft), with removable bus terminal cover

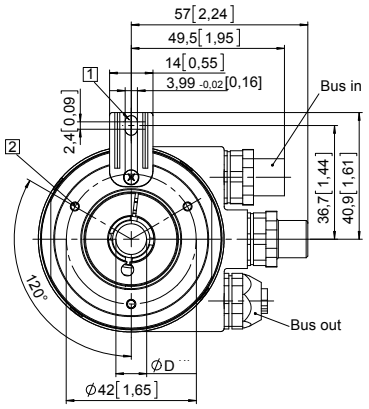
Dimensions in mm [inch]

Flange with spring element, long
Flange type 1 and 2
(drawing with 3 x M12 connector)

1 Slot spring element, recommendation: torque pin DIN 7, ø 4 [0.16]
2 3 x M3, 5.5 [0.22] deep
3 Recommended torque for the clamping ring 0.6 Nm

D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

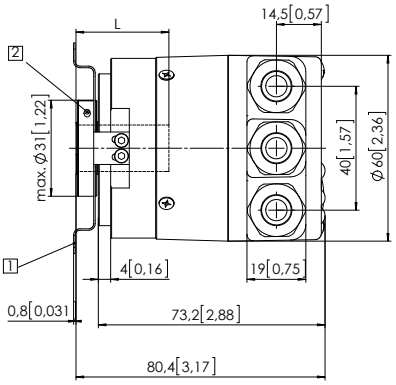


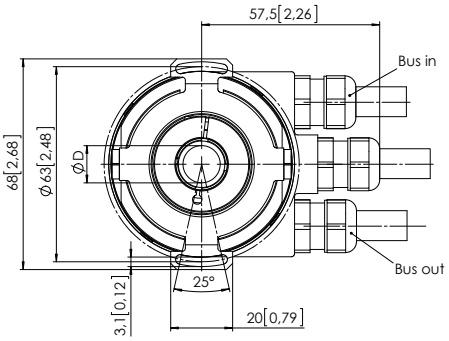


Flange with stator coupling, ø 63 [2.48]
Flange type 5 and 6
Pitch circle diameter for fixing screws 63 [2.48]
(drawing with cable)

1 Fixing screws DIN 912 M3 x 8 (washer included in delivery)
2 Recommended torque for the clamping ring 0.6 Nm

D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

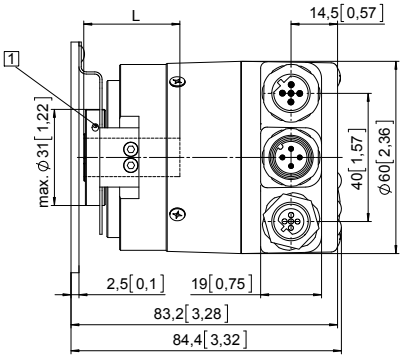


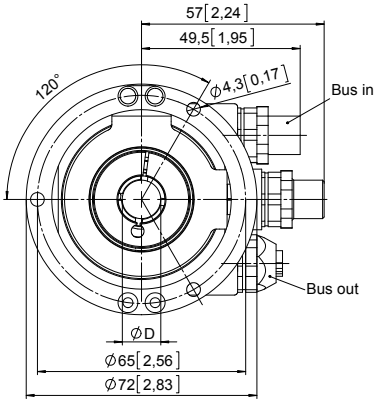


Flange with stator coupling, ø 65 [2.56]
Flange type 3 and 4
Pitch circle diameter for fixing screws, 65 [2.56]
(drawing 3 x M12 connector)

1 Recommended torque for the clamping ring 0.6 Nm

D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		





Standard optical | **Sendix 5858 / 5878 (shaft / hollow shaft)** | **EtherCAT**

The singleturn encoders 5858 and 5878 with second-generation EtherCAT interface and optical sensor technology are ideal for use in all applications with an EtherCAT interface.

The data communication is based on CAN over EtherNet and ideally suited for use in real time applications.

These encoders are available with a solid shaft up to a maximum of 10 mm or a blind hollow shaft up to 15 mm.

c UL us | RoHS | EtherCAT Conformance tested

Safety-Lock™ | High rotational speed | Temperature range | High protection level | High shaft load capacity | Shock / vibration resistant | Magnetic field proof | Short-circuit proof | Reverse polarity protection | Optical sensor | Surface protection salt spray-tested optional

Reliable

- EtherCAT conformance tested.
- Integration of the latest slave – EtherCAT stack from Beckhoff, version 5.01.
- Ideally suited for use in harsh outdoor environments, thanks to IP67 protection and rugged housing construction.

Flexible

- Use of CoE (CAN over EtherNet).
- Genuine new position information as a result of minimal cycle time of 62.5 µs in the DC mode.
- Faster, easier error-free connection thanks to M12 connectors.
- Supports Hot-Connect.

Order code Shaft version

8.5858	.	X	X	B	2	.	B2	12
Type		a	b	c	d		e	

a *Flange*
- **1 = clamping flange, IP65 ø 58 mm [2.28"]**
- 3 = clamping flange, IP67 ø 58 mm [2.28"]
- **2 = synchro flange, IP65 ø 58 mm [2.28"]**
- 4 = synchro flange, IP67 ø 58 mm [2.28"]
- 5 = square flange, IP65 □63.5 mm [2.5"]
- 7 = square flange, IP67 □63.5 mm [2.5"]

b *Shaft (ø x L), with flat*
- **1 = 6 x 10 mm [0.24 x 0.39"]** 1)
- **2 = 10 x 20 mm [0.39 x 0.79"]** 2)
- 3 = 1/4" x 7/8"
- 4 = 3/8" x 7/8"

c *Interface / supply voltage*
- **B = EtherCAT / 10 ... 30 V DC**

d *Type of connection removable bus terminal cover*
- **2 = 3 x M12 connector, 4-pin**

e *Fieldbus profile*
- **B2= EtherCAT with CoE (CAN over EtherNet)**

Optional on request
- Ex 2/22
- surface protection salt spray tested

Order code Hollow shaft

8.5878	.	X	X	B	2	.	B2	12
Type		a	b	c	d		e	

a *Flange*
- 1 = with spring element, long, IP65
- 2 = with spring element, long, IP67
- 3 = with stator coupling, IP65 ø 65 mm [2.56"]
- 4 = with stator coupling, IP67 ø 65 mm [2.56"]
- **5 = with stator coupling, IP65 ø 63 mm [2.48"]**
- 6 = with stator coupling, IP67 ø 63 mm [2.48"]

b *Blind hollow shaft (insertion depth max. 30 mm [1.18"])*
- 3 = ø 10 mm [0.39"]
- **4 = ø 12 mm [0.47"]**
- 5 = ø 14 mm [0.55"]
- 6 = ø 15 mm [0.59"]
- 8 = ø 3/8"
- 9 = ø 1/2"

c *Interface / supply voltage*
- **B = EtherCAT / 10 ... 30 V DC**

d *Type of connection removable bus terminal cover*
- **2 = 3 x M12 connector, 4-pin**

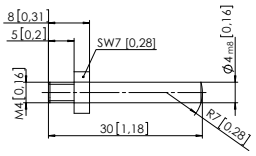
e *Fieldbus profile*
- **B2= EtherCAT with CoE (CAN over EtherNet)**

Optional on request
- Ex 2/22
- surface protection salt spray tested

1) Preferred type only in conjunction with flange type 2.
2) Preferred type only in conjunction with flange type 1.

Standard optical	Sendix 5858 / 5878 (shaft / hollow shaft)	EtherCAT

Mounting accessory for shaft encoders		Order no.
Coupling	bellows coupling ø 19 mm [0.75“] for shaft 6 mm [0.24“]	**8.0000.1102.0606**
	bellows coupling ø 19 mm [0.75“] for shaft 10 mm [0.39“]	**8.0000.1102.1010**

Mounting accessory for hollow shaft encoders Dimensions in mm [inch]		Order no.
Torque pin, ø 4 mm for flange with spring element (flange type 1 + 2)	with fixing thread 	**8.0010.4700.0000**

Cables and connectors			Order no.
Preassembled cables	M12 male connector with external thread, 4-pin, D coded, straight single-ended 2 m [6.56‘] PUR cable	Bus IN + Bus OUT	**05.00.6031.4411.002M**
	M12 female connector with coupling nut, 4-pin, A coded, straight single-ended 2 m [6.56‘] PUR cable	supply voltage	**05.00.6061.6211.002M**
Connectors	M12 male connector with external thread, 4-pin, D coded, straight (metal)	Bus IN + Bus OUT	**05.WASCSY4S**
	M12 female connector with coupling nut, 4-pin, A coded, straight (plastic)	supply voltage	**05.B8141-0**

Further Kübler accessories can be found at: /accessories
Further Kübler cables and connectors can be found at: /connection-technology

Technical data

Mechanical characteristics

Maximum speed	IP65 up to 70 °C [158 °F]	9000 min^{-1}, 7000 min^{-1} (continuous)
	IP65 up to T_{max}	7000 min^{-1}, 4000 min^{-1} (continuous)
	IP67 up to 70 °C [158 °F]	8000 min^{-1}, 6000 min^{-1} (continuous)
	IP67 up to T_{max}	6000 min^{-1}, 3000 min^{-1} (continuous)
Starting torque - at 20 °C [68 °F]	IP65	< 0.01 Nm
	IP67	< 0.05 Nm
Mass moment of inertia		
	shaft version	3.0 x 10^{-6} kgm^2
	hollow shaft version	6.9 x 10^{-6} kgm^2
Load capacity of shaft	radial	80 N
	axial	40 N
Weight		approx. 0.50 kg [17.64 oz]
Protection acc. to EN 60529		
	housing side	IP67
	shaft side	IP65, opt. IP67
Working temperature range		-40 °C ... +80 °C [-40 °F ... +176 °F]
Material	shaft/hollow shaft	stainless steel
	flange	aluminum
	housing	zinc die-cast
Shock resistance acc. to EN 60068-2-27		2500 m/s^2, 6 ms
Vibration resistance acc. to EN 60068-2-6		100 m/s^2, 55 ... 2000 Hz

Electrical characteristics

Supply voltage	10 ... 30 V DC
Power consumption (no load)	max. 110 mA
Reverse polarity protection of the supply voltage	yes

Interface characteristics EtherCAT

Resolution	1 ... 65535 (16 bit), scalable default: 8192 (13 bit)
Protocol	EtherNet / EtherCAT

Approvals

UL compliant in accordance with	File no. E224618
CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU
ATEX Directive	2014/34/EU (for Ex 2/22 variants)

Standard optical	Sendix 5858 / 5878 (shaft / hollow shaft)	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:

Preop-, Safeop and Op-State (EtherCAT status machine)

2 x Link LEDs (yellow)

LED is ON with the following conditions (port IN and port OUT):

Link detected

Modes

Freerun, Distributed Clock

General information about CoE (CAN over EtherNet)

The EtherCAT encoders support the CANopen communication profile according to DS301. In addition device-specific profiles like the encoder profile DS406 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 previously to protect them against power-failure.

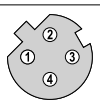
The following output values may be combined as PDO (PDO mapping): **position, speed, temperature values** and **working area state** as well as other process values.

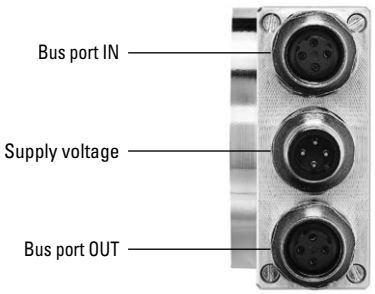
CANopen encoder profile 3.2.10 CoE (CAN over EtherNet)

The following parameters are programmable:

- Position update time of 62.5 µs.
- EtherCAT certificate of conformity.
- Speed with sign.
- Four units for speed calculation: steps/sec, steps/100 ms, steps/10 ms, rotation/min.
- Time stamp as system time at the point in time when the position is read out.
- Two working area state registers.
- Along with the scaled position, the raw data – position as process value – is also mappable.
- Dynamic mapping.
- Gating time: setting of the time interval, via which the speed value can be interpolated.
- Sensor temperature in degrees Celsius.
- Comprehensive plausibility test when downloading parameters to the encoder.
- Alarm and warning messages.
- User interface with visual display of bus and fault status – 4 LEDs.
- Extended error management for position sensing with integrated temperature control.
- Implementation of the latest CANopen profile 3.2.10 from the 18th February 2011.
- Hot-Connect – Support for rapid change of Bus-topology.

Terminal assignment bus

Interface	Type of connection	Function	M12 connector, 4-pin					
B	2 (3 x M12 connector)	Bus port IN	Signal:	Transmit data+	Receive data+	Transmit data -	Receive data -	 D coded
			Abbreviation:	TxD+	RxD+	TxD-	RxD-	
			Pin:	1	2	3	4	
		Power supply	Signal:	Voltage +	–	Voltage –	–	
			Abbreviation:	+ V	–	0 V	–	
			Pin:	1	2	3	4	
		Bus port OUT	Signal:	Transmit data+	Receive data+	Transmit data -	Receive data -	 D coded
			Abbreviation:	TxD+	RxD+	TxD-	RxD-	
			Pin:	1	2	3	4	



Standard optical | **Sendix 5858 / 5878 (shaft / hollow shaft)** | **EtherCAT**

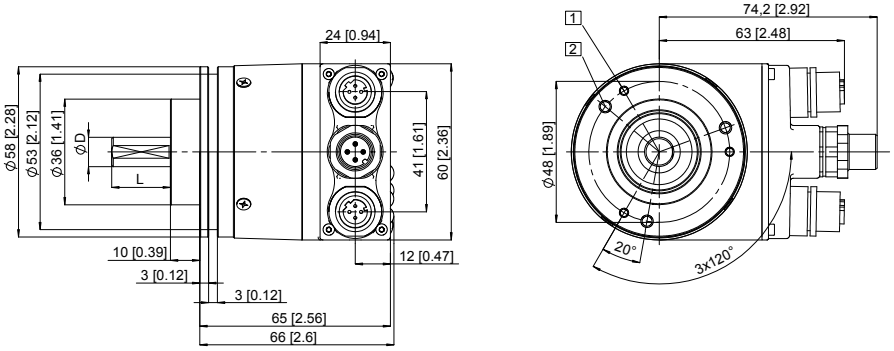
Dimensions shaft version, with removable bus terminal cover

Dimensions in mm [inch]

Clamping flange, ø 58 [2.28]
Flange type 1 and 3

1 3 x M3, 6 [0.24] deep

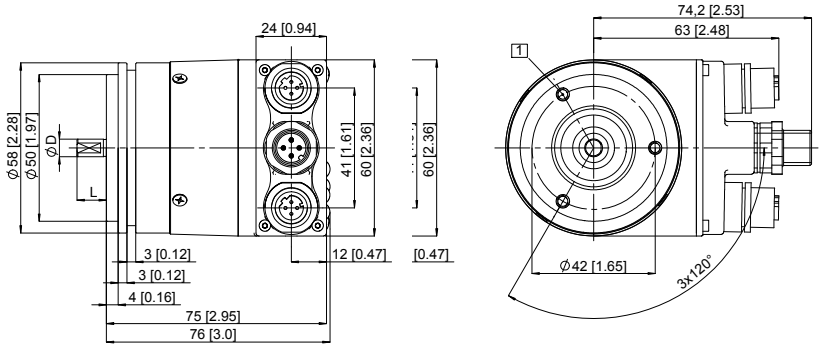
2 3 x M4, 8 [0.32] deep



D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h8	7/8"
3/8"	h8	7/8"

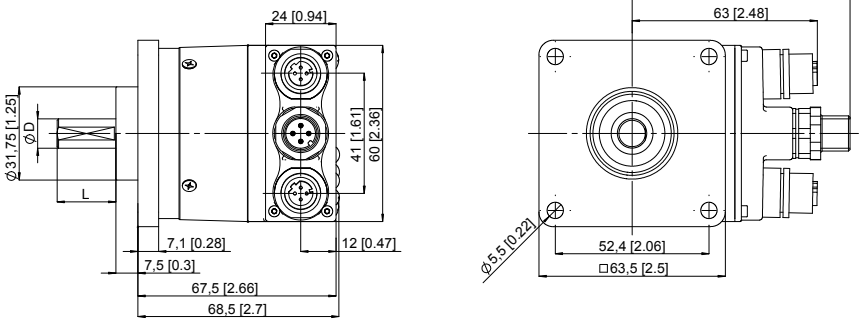
Synchro flange, ø 58 [2.28]
Flange type 2 and 4

1 3 x M4, 6 [0.24] deep



D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h8	7/8"
3/8"	h8	7/8"

Square flange, □ 63.5 [2.5]
Flange type 5 and 7



D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h8	7/8"
3/8"	h8	7/8"

Standard optical | **Sendix 5858 / 5878 (shaft / hollow shaft)** | **EtherCAT**

Dimensions hollow shaft version (blind hollow shaft), with removable bus terminal cover

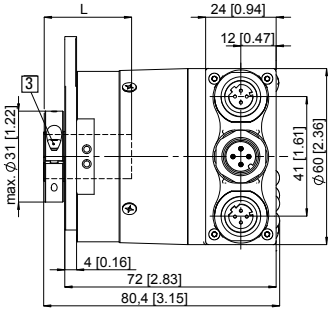
Dimensions in mm [inch]

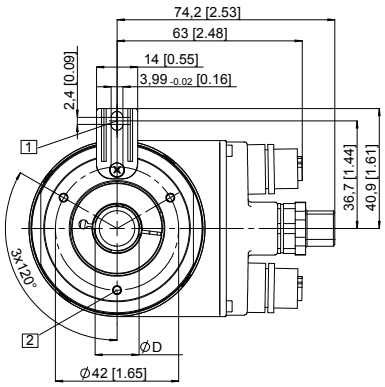
Flange with spring element, long
Flange type 1 and 2

1 Slot spring element, recommendation: torque pin DIN 7, ø 4 [0.16]

2 3 x M3, 5.5 [0.22] deep

3 Recommended torque for the clamping ring 0.6 Nm



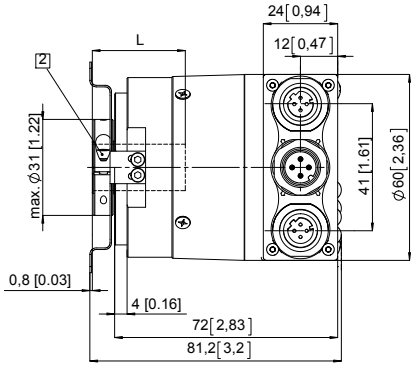


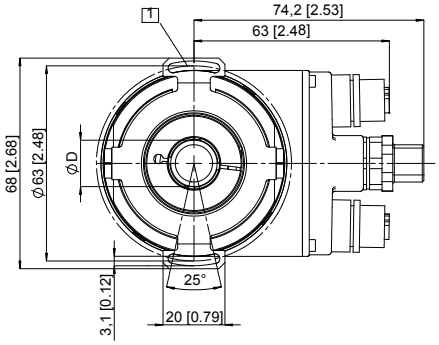
D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

Flange with stator coupling, ø 63 [2.48]
Flange type 5 and 6

1 Fixing screws DIN 912 M3 x 8 (washer included in delivery)

2 Recommended torque for the clamping ring 0.6 Nm

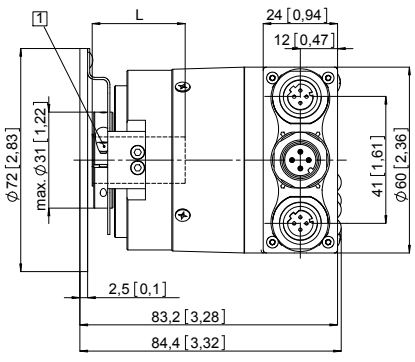


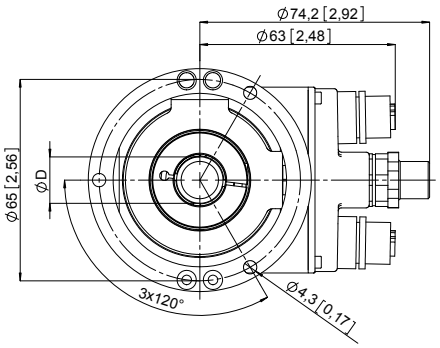


D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

Flange with stator coupling, ø 65 [2.56]
Flange type 3 and 4

1 Recommended torque for the clamping ring 0.6 Nm





D	Fit	L
10 [0.39]	H7	30 [1.18]
12 [0.47]	H7	30 [1.18]
14 [0.55]	H7	30 [1.18]
15 [0.59]	H7	30 [1.18]
3/8"	H7	30 [1.18]
1/2"	H7	30 [1.18]
L = insertion depth max. blind hollow shaft		

Standard, ATEX/IECEx – zone 1/21 optical | **Sendix 7053 / 7073 (shaft / hollow shaft)** | **SSI / BiSS**

The Sendix 7053 / 7073 absolute encoders – singleturn offer Ex protection in a compact 70 mm seawater durable aluminum housing, with an SSI or BiSS interface and optical sensor technology.

These shock and vibration-resistant encoders operate flexibly with a resolution of up to 17 bits; they are also available with axial and radial cable outlets.

Ex approval | Safety-Lock™ | High rotational speed | High protection level | High shaft load capacity | Shock / vibration resistant | Magnetic field proof | Short-circuit proof | Reverse polarity protection | Optical sensor | Seawater durable

Compact and safe

- Can be used even when space is tight.
- Minimal installation depth, diameter 70 mm.
- Compact cable outlet axial or radial.
- Can be operated in marine environments – housing and flange manufactured from seawater durable aluminum.
- Remains sealed even in harsh everyday use and ensures highest safety against field breakdowns (IP67 protection).

Explosion protection

- "Flameproof-enclosure" version.
- ATEX with EU type examination certificate.
- IECEx with certificate of conformity (CoC).

Order code Shaft version

8.7053	.	1	X	2	X	.	X	X	2	1	.	XXXX
Type		a	b	c	d		e	f	g	h		i [1]

a *Flange*
1 = clamping / synchronous flange, ø 70 mm [2.76"]

b *Shaft (ø x L)*
2 = 10 x 20 mm [0.39 x 0.79"], with flat
1 = 12 x 25 mm [0.47 x 0.98"], with keyway for 4 x 4 mm [0.16 x 0.16"] key

c *Interface / supply voltage*
2 = SSI, BiSS / 10 ... 30 V DC

d *Type of connection*
1 = axial cable, 2 m [6.56'] PUR
2 = radial cable, 2 m [6.56'] PUR
A = axial cable, length > 2 m [6.56']
B = radial cable, length > 2 m [6.56']

e *Code*
B = SSI, binary
C = BiSS, binary
G = SSI, gray

f *Resolution* [2]
A = 10 bit
1 = 11 bit
2 = 12 bit
3 = 13 bit
4 = 14 bit
7 = 17 bit

g *Inputs / outputs* [2]
2 = SET, DIR input
additional status output

h *Options*
1 = no option

i *Cable length in dm* [1]
0050 = 5 m [16.40']
0100 = 10 m [32.81']
0150 = 15 m [49.21']

Optional on request
- special cable length
- other resolutions
- seawater resistant (stainless steel V4A)

1) Not applicable with connection types 1 and 2.
2) Resolution, preset value and counting direction factory-programmable.

Standard, ATEX/IECEx – zone 1/21 optical | **Sendix 7053 / 7073 (shaft / hollow shaft)** | **SSI / BiSS**

Order code Hollow shaft

8.7073 . X X 2 X . X X 2 1 . XXXX
Type — a b c d — e f g h — i [1]

a *Flange*
1 = with spring element, short
5 = with stator coupling, ø 65 mm [2.56"]

b *Blind hollow shaft*
(insertion depth max. 41.5 mm [1.63"])
1 = ø 12 mm [0.47"]
2 = ø 14 mm [0.55"]

c *Interface / supply voltage*
2 = SSI, BiSS / 10 ... 30 V DC

d *Type of connection*
1 = axial cable, 2 m [6.56'] PUR
2 = radial cable, 2 m [6.56'] PUR
A = axial cable, length > 2 m [6.56']
B = radial cable, length > 2 m [6.56']

e *Code*
B = SSI, binary
C = BiSS, binary
G = SSI, gray

f *Resolution* [2]
A = 10 bit
1 = 11 bit
2 = 12 bit
3 = 13 bit
4 = 14 bit
7 = 17 bit

g *Inputs / outputs* [2]
2 = SET, DIR input
additional status output

h *Options*
1 = no option

i *Cable length in dm* [1]
0050 = 5 m [16.40']
0100 = 10 m [32.81']
0150 = 15 m [49.21']

Optional on request
- special cable length
- other resolutions
- seawater resistant (stainless steel V4A)

Mounting accessory for shaft encoders		Order no.
Coupling	bellows coupling ø 19 mm [0.75"] for shaft 10 mm [0.39"]	**8.0000.1102.1010**

Further Kübler accessories can be found at: /accessories
Further Kübler cables and connectors can be found at: /connection-technology

Technical data

Explosion protection

ATEX

EU type-examination certificate	IBExU 15 ATEX 1091 X
Category (gas)	
Sendix 7053 – 6000 rpm	Ex II 2G Ex db IIC T4 Gb
Sendix 7053 – 2000 rpm	Ex II 2G Ex db IIC T5 Gb
Sendix 7073 – 3000 rpm	Ex II 2G Ex db IIC T4 Gb
Sendix 7073 – 2000 rpm	Ex II 2G Ex db IIC 120°C (T4) Gb
Category (dust)	
Sendix 7053 – 6000 rpm	Ex II 2D Ex tb IIIC T135°C Db
Sendix 7053 – 2000 rpm	Ex II 2D Ex tb IIIC T100°C Db
Sendix 7073 – 3000 rpm	Ex II 2D Ex tb IIIC T135°C Db
Sendix 7073 – 2000 rpm	Ex II 2D Ex tb IIIC T120°C Db
Relevant standards	EN 60079-0:2018
ATEX guideline 2014/34/EU	EN 60079-1:2014
	EN 60079-31:2014

IECEx

Certificate of Conformity (CoC)	IECEx IBE 15.0020 X
Category (gas)	
Sendix 7053 – 6000 rpm	Ex db IIC T4 Gb
Sendix 7053 – 2000 rpm	Ex db IIC T5 Gb
Sendix 7073 – 3000 rpm	Ex db IIC T4 Gb
Sendix 7073 – 2000 rpm	Ex db IIC 120°C (T4) Gb
Category (dust)	
Sendix 7053 – 6000 rpm	Ex tb IIIC T135°C Db
Sendix 7053 – 2000 rpm	Ex tb IIIC T100°C Db
Sendix 7073 – 3000 rpm	Ex tb IIIC T135°C Db
Sendix 7073 – 2000 rpm	Ex tb IIIC T120°C Db
Relevant standards	IEC 60079-0:2017
	IEC 60079-1:2014
	IEC 60079-31:2013

Electrical characteristics

Supply voltage	10 ... 30 V DC
Current consumption (no load)	max. 45 mA
Reverse polarity protection for supply voltage	yes
Short-circuit proof outputs	yes [3]

EMC

Relevant standards	EN 55011 class B
	EN (IEC) 61326-1

1) Not applicable with connection types 1 and 2.
2) Resolution, preset value and counting direction factory-programmable.
3) Short-circuit with 0 V or output, only one channel at a time, supply voltage correctly applied.

Standard, ATEX / IECEx – zone 1 / 21 optical | **Sendix 7053 / 7073 (shaft / hollow shaft)** | **SSI / BiSS**

Mechanical characteristics

Maximum speed	shaft	6000 min^{-1} (continuous)
	hollow shaft	3000 min^{-1} (continuous)
Starting torque - at 20 °C [68 °F]		< 0.05 Nm
Mass moment of inertia		4.0 x 10^{-6} kgm^2
Load capacity of shaft	radial	80 N
	axial	40 N
Weight		approx. 1.5 kg [52.91 oz]
Protection acc. to EN 60529		IP67
Ambient temperature		-40 °C ... +60 °C [-40 °F ... +140 °F] Please note the specifications for temperature class in EU type-examination certificate!
Material	shaft	stainless steel
	flange / housing	seawater durable Al, type AlSiMgMn (EN AW-6082)
	cable	PUR
Shock resistance to EN/IEC 60068-2-27		2500 m/s^2, 6 ms
Vibration resistance to EN/IEC 60068-2-6		100 m/s^2, 55 ... 2000 Hz

SSI interface

Output driver		RS485 transceiver type
Permissible load / channel		max. +/- 20 mA
Signal level	HIGH	typ 3.8 V
	LOW at I_{Load} = 20 mA	typ 1.3 V
Resolution		10 ... 14 bit and 17 bit
Code		binary or gray
SSI clock rate		50 kHz ... 2 MHz
Data refresh rate		
	ST resolution ≤ 14 bit	< 1 µs
	ST resolution ≥ 15 bit	4 µs
Monoflop time		≤ 15 µs

Note: if clock starts cycling within monoflop time a second data transfer starts with the same data. If clock starts cycling after monoflop time, the data transfer starts with updated values. The update rate depends on clock speed, data length and monoflop time.

BiSS interface

Output driver		RS485 transceiver type
Permissible load / channel		max. +/- 20 mA
Signal level	HIGH	typ 3.8 V
	LOW at I_{Load} = 20 mA	typ 1.3 V
Resolution		10 ... 14 bit and 17 bit
Code		binary
Clock rate		up to 10 MHz
Max. update rate		< 10 µs, depends on the clock rate and the data length
Data refresh rate		
	ST resolution ≤ 14 bit	≤ 1 µs
	ST resolution 17 bit	2.4 µs

Note:
- bidirectional, factory programmable parameters are: resolution, code, direction, alarms and warnings
- CRC data verification

Status output

Output driver		open collector, internal pull-up resistor 22 kOhm
Permissible load		max. 20 mA
Signal level	HIGH	+V
	LOW	< 1 V
Active at		LOW

The status output serves to display various alarm or error messages.
The status output is HIGH (open collector with internal pull-up 22 kOhm) in normal operation.

SET input

Input		HIGH active
Input type		comparator
Signal level (+V = supply voltage)	HIGH	min. 60% of +V
		max. +V
	LOW	max. 25% of +V
Input current		< 0.5 mA
Min. pulse duration (SET)		10 ms
Timeout after SET signal		14 ms

The encoder can be set to zero at any position by means of a HIGH signal on the SET input. Other preset values can be factory-programmed.
The SET input has a signal delay time of approximately 1 ms. Once the SET function has been triggered, the encoder requires an internal processing time of approximately 15 ms before the new position data can be read.

If this input is not used, it should be connected to 0 V (Encoder ground GND) in order to avoid interferences.

DIR input

Direction 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 reversed when the device is already switched on, this will be interpreted as an error. The status output switches to LOW.

If this input is not used, it should be connected to 0 V (Encoder ground GND) in order to avoid interferences.

Response time (DIR input)	1 ms

Power-ON

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

Hot plugging of the encoder should be avoided.

Approvals

CE compliant in accordance with

EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU
ATEX Directive	2014/34/EU

Standard, ATEX / IECEx – zone 1 / 21 optical | **Sendix 7053 / 7073 (shaft / hollow shaft)** | **SSI / BiSS**

Terminal assignment

Interface	Type of connection	Features	Cable (isolate unused cores individually before initial start-up)										
2	1, 2, A, B	SET, DIR	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	Stat	⏚	⏚
			Core marking:	1	2	3	4	5	6	7	8	9	YE/GN	shield

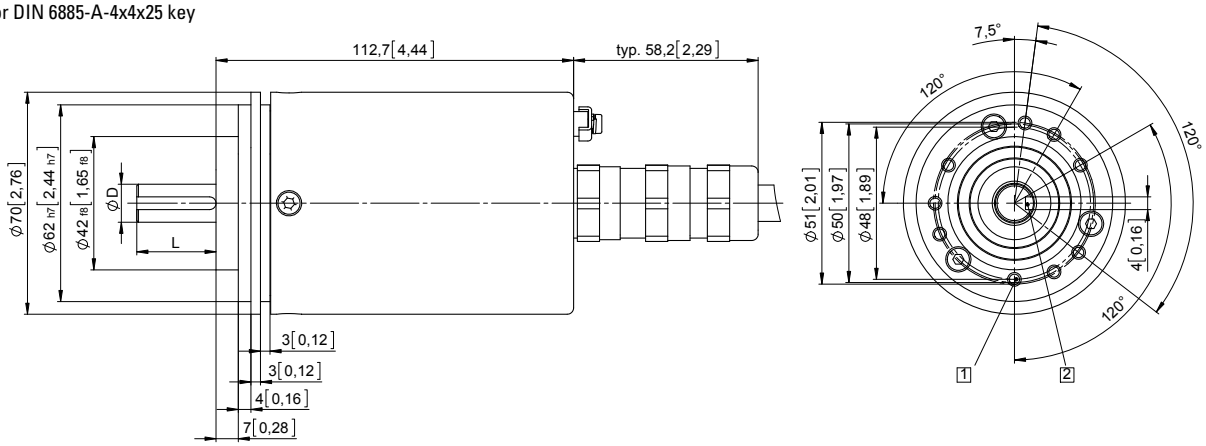
+V: Supply voltage encoder +V DC
0 V: Supply voltage encoder ground GND (0 V)
C+, C-: Clock signal
D+, D-: Data signal
SET: Set input
DIR: Direction input
Stat: Status output
⏚: Protective earth

Dimensions shaft version

Dimensions in mm [inch]

Clamping / synchronous flange, ø 70 [2.76]
Shaft type 1 with axial cable outlet

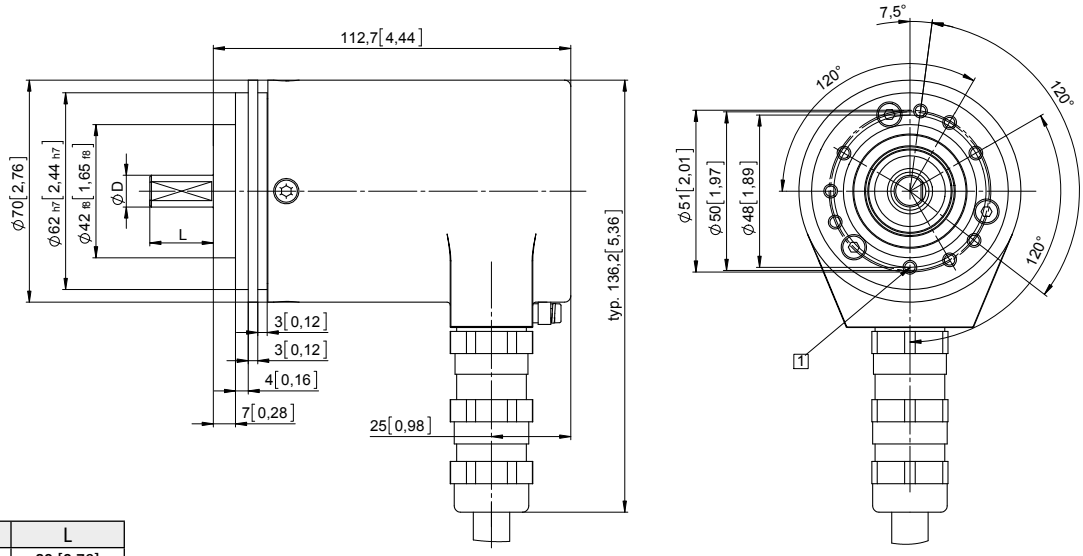
1 9 x M4, 10 [0.39] deep
2 Keyway for DIN 6885-A-4x4x25 key



D	Fit	L
12 [0.47]	g6	25 [0.98]

Clamping / synchronous flange, ø 70 [2.76]
Shaft type 2 with radial cable outlet

1 9 x M4, 10 [0.39] deep



D	Fit	L
10 [0.39]	f7	20 [0.79]

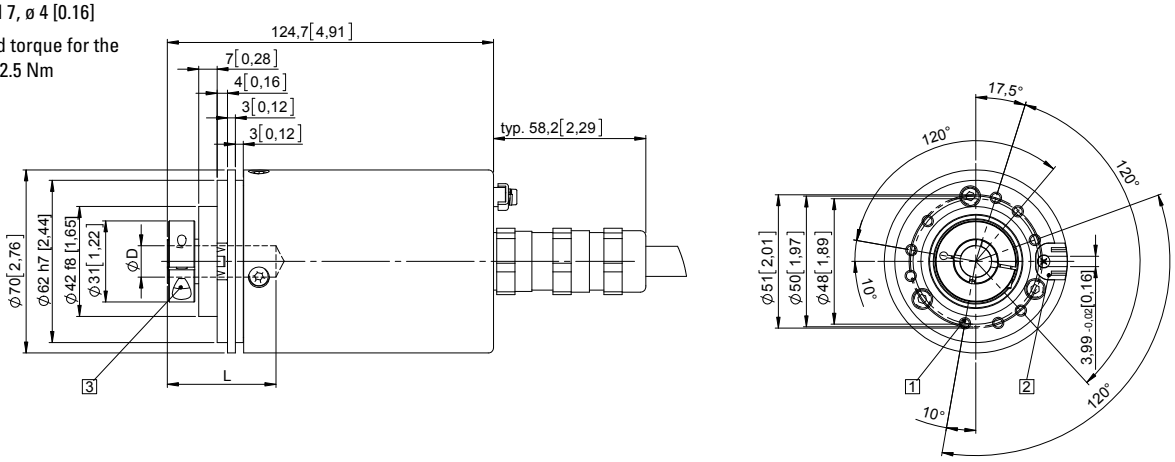
Standard, ATEX/IECEx – zone 1/21 optical | **Sendix 7053 / 7073 (shaft / hollow shaft)** | **SSI / BiSS**

Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with spring element, short
Flange type 1

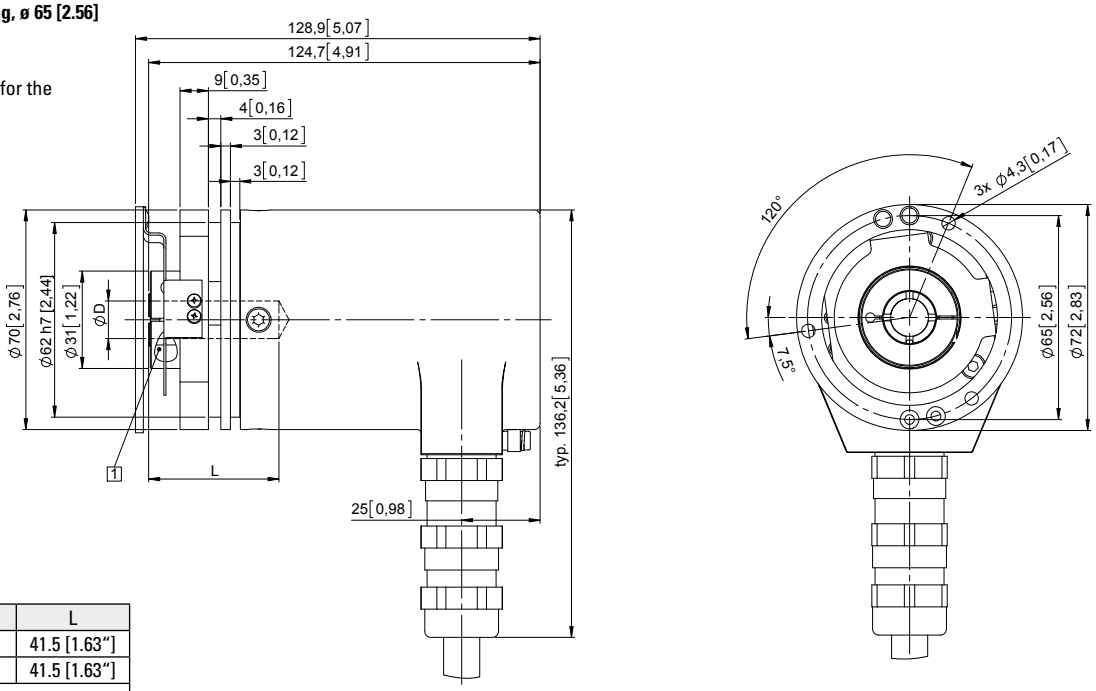
1 9 x M4, 10 [0.39] deep
2 Slot spring element, recommendation: torque pin DIN 7, ø 4 [0.16]
3 Recommended torque for the clamping ring 2.5 Nm



D	Fit	L
12 [0.47]	H7	41.5 [1.63“]
14 [0.55]	H7	41.5 [1.63“]
L = insertion depth max. blind hollow shaft		

Flange with stator coupling, ø 65 [2.56]
Flange type 5

1 Recommended torque for the clamping ring 2.5 Nm



D	Fit	L
12 [0.47]	H7	41.5 [1.63“]
14 [0.55]	H7	41.5 [1.63“]
L = insertion depth max. blind hollow shaft		

Standard
SIL2/PLd, optical

Sendix 5853FS2 / 5873FS2 (shaft / hollow shaft)

SSI / BiSS + SinCos

The absolute singleturn encoders 5853FS2 and 5873FS2 of the Sendix family are suited for use in safety-related applications up to SIL2 according to EN 61800-5-2 or PLd to EN ISO 13849-1.

The extra strong Safety-Lock™ design interlocked bearings, the high integration density of the components based on OptoASIC technology and the rugged die-cast housing make these devices ideal also for demanding applications outdoors up to IP67.

Safety-Lock™ | High rotational speed | Temperature range -40°...+90°C | High protection level IP | High shaft load capacity | Shock / vibration resistant | Magnetic field proof | Reverse polarity protection | SinCos | Optical sensor

Functional Safety

- Encoder with individual certificate from TÜV.
- Suitable for applications up to SIL2 acc. to EN 61800-5-2.
- Suitable for applications up to PLd acc. to EN ISO 13849-1.
- SSI or BiSS interface with incremental SinCos tracks with 2048 ppr.
- Certified mechanical mounting + electronic.

Flexible

- Shaft and hollow shaft versions.
- Cable and connector variants.
- Various mounting options available.

Order code Shaft version

8.5853FS2	.	X	X	X	X	.	X	X	2	X
Type		a	b	c	d		e	f		g

a *Flange*
1 = clamping flange, IP65, ø 58 mm [2.28"]
3 = clamping flange, IP67, ø 58 mm [2.28"]

b *Shaft (ø x L)*
2 = 10 x 20 mm [0.39 x 0.79"], with flat
A = 10 x 20 mm [0.39 x 0.79"], with feather key

c *Interface / supply voltage*
3 = SSI, BiSS + 2048 ppr. SinCos / 5 V DC
4 = SSI, BiSS + 2048 ppr. SinCos / 10 ... 30 V DC

d *Type of connection*
1 = axial cable, 1 m [3.28'] PVC
A = axial cable, special length PVC *)
2 = radial cable, 1 m [3.28'] PVC
B = radial cable, special length PVC *)
3 = axial M23 connector, 12-pin
4 = radial M23 connector, 12-pin

*) Available special lengths (connection types A, B):
2, 3, 5, 8, 10, 15 m [5.56, 9.84, 16.40, 26.25, 32.80, 49.21']
order code expansion .XXXX = length in dm
ex.: 8.5853FS2.124A.G322.0030 (for cable length 3 m)

e *Code*
B = SSI, binary
C = BiSS, binary
G = SSI, gray

f *Resolution* [1]
A = 10 bit
1 = 11 bit
2 = 12 bit
3 = 13 bit
4 = 14 bit
7 = 17 bit

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

Optional on request
- Ex 2/22 (only for variants with IP67) [2]
- other resolutions
- surface protection salt spray

1) Resolution, preset value and count direction are factory-programmable.
2) For the cable connection type, cable material PUR.

Standard SIL2/PLd, optical	Sendix 5853FS2 / 5873FS2 (shaft / hollow shaft)	SSI / BiSS + SinCos

Order code Hollow shaft

8.5873FS2 . X X X X . X X 2 X
Type — a b c d — e f — g

a *Flange*
9 = with torque stop FS, flexible, IP65
J = with torque stop FS, flexible, IP67
A = with torque stop FS, rigid, IP65 (incl. torque pin FS)
K = with torque stop FS, rigid, IP67 (incl. torque pin FS)
B = with stator coupling FS, ø 63 mm [2.48"], IP65
L = with stator coupling FS, ø 63 mm [2.48"], IP67

b *Through hollow shaft*
3 = ø 10 mm [0.39"]
4 = ø 12 mm [0.47"]
5 = ø 14 mm [0.55"]
Tapered shaft
K = ø 10 mm [0.39"]

c *Interface / supply voltage*
3 = SSI, BiSS + 2048 ppr. SinCos / 5 V DC
4 = SSI, BiSS + 2048 ppr. SinCos / 10 ... 30 V DC

d *Type of connection*
2 = radial cable, 1 m [3.28'] PVC
B = radial cable, special length PVC *)
E = tangential cable, 1 m [3.28'] PVC
F = tangential cable, special length PVC *)
4 = radial M23 connector, 12-pin

*) Available special lengths (connection types B, F):
2, 3, 5, 8, 10, 15 m [5.56, 9.84, 16.40, 26.25, 32.80, 49.21']
order code expansion .XXXX = length in dm
ex.: 8.5873FS2.B44B.G322.0030 (for cable length 3 m)

e *Code*
B = SSI, binary
C = BiSS, binary
G = SSI, gray

f *Resolution* [1]
A = 10 bit
1 = 11 bit
2 = 12 bit
3 = 13 bit
4 = 14 bit
7 = 17 bit

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

Optional on request
- Ex 2/22 (only for variants with IP67) [2]
  not for type of connection E, F
- other resolutions
- surface protection salt spray

Accessories		Order no.
EMC shield terminal	for top-hat rail mounting	**8.0000.4G06.0312**
Screw retention	Loctite 243, 5 ml	**8.0000.4G05.0000**
Bellows coupling, safety-oriented	You will find an overview of our couplings for Sendix shaft encoders under /accessories.	
Safety modules Safety-M compact	You will find an overview of our systems and components for Functional Safety and the corresponding software under /safety.	
LED SSI display 570 / 575	Electronic position display up to 32 bit. You will find an overview or under /position_display	

Connection technology		Order no.
Cordset, pre-assembled	M23 female connector with coupling nut, 12-pin, cw single ended 2 m [6.56'] PVC cable [3]	**8.0000.6901.0002.0031**
	M23 female connector with coupling nut, 12-pin, cw M23 male connector with external thread, 12-pin, ccw 2 m [6.56'] PVC cable [3]	**8.0000.6905.0002.0032**
Connector, self-assembly	M23 female connector with coupling nut, 12-pin, cw	**8.0000.5012.0000**

Further Kübler accessories can be found at: /accessories
Further Kübler cables and connectors can be found at: /connection-technology

1) Resolution, preset value and count direction are factory-programmable.
2) For the cable connection type, cable material PUR.
3) Other lengths available.

Standard
SIL2/PLd, optical

Sendix 5853FS2 / 5873FS2 (shaft / hollow shaft)

SSI / BiSS + SinCos

Technical data

Notes regarding "Functional Safety"

These encoders are suitable for use in safety-related systems up to SIL2 acc. to EN 61800-5-2 and PLd to EN ISO 13849-1 in conjunction with controllers or evaluation units, which possess the necessary functionality.

Additional functions can be found in the operating manual.

Safety characteristics

Classification	PLd / SIL2
System structure	2 channel (Cat. 3)
PFH_d value [1]	2.16 x 10^{-8} h^{-1}
Mission time / Proof test interval	20 years
Relevant standards	EN ISO 13849-1:2015; EN ISO 13849-2:2012; EN 61800-5-2:2007

Electrical characteristics

Supply voltage		5 V DC (±5 %) or 10 ... 30 V DC
Current consumption (no load)	5 V DC	max. 70 mA
	10 ... 30 V DC	max. 45 mA
Reverse polarity protection of the supply voltage		yes
Short circuit proof outputs		yes [2]

Mechanical characteristics

Maximum speed shaft version		
	up to 70 °C [158 °F]	12000 min^{-1}, 10000 min^{-1} (continuous)
	up to T_{max}	8000 min^{-1}, 5000 min^{-1} (continuous)
Maximum speed hollow shaft version		
	up to 70 °C [158 °F]	9000 min^{-1}, 6000 min^{-1} (continuous)
	up to T_{max}	6000 min^{-1}, 3000 min^{-1} (continuous)
Starting torque - at 20 °C [68 °F]		
	shaft version	< 0.01 Nm
	hollow shaft version	< 0.03 Nm
Mass moment of inertia		
	shaft version	4.0 x 10^{-6} kgm^2
	hollow shaft version	7.0 x 10^{-6} kgm^2
Insertion depth for shaft		
	hollow shaft version	min. 34 mm [1.34"]
Load capacity of shaft	radial	80 N
	axial	40 N
Weight		approx. 0.45 kg [15.87 oz]
Protection acc. to EN 60529		IP65, IP67
Working temperature range		-40 °C ... +90 °C [-40 °F ... +194 °F] [3]
Material	shaft / hollow shaft	stainless steel
	flange	aluminum
	housing	zinc die-cast
	cable	PVC (PUR for Ex 2/22)
Shock resistance acc. to EN 60068-2-27		500 m/s^2, 11 ms
Vibration resistance acc. to EN 60068-2-6		200 m/s^2, 5 ... 2000 Hz

EMC

Relevant standards	EN 55011 class B :2009 / A1:2010 EN 61326-1:2013 EN 61326-3-1:2008

SSI interface

Output driver		RS485 transceiver type
Permissible load / channel		max. +/- 20 mA
Signal level	HIGH	typ. 3.8 V
	LOW at I_{Load} = 20 mA	typ. 1.3 V
Resolution		10 ... 14 bit and 17 bit
Code		binary or gray
SSI clock rate		50 kHz ... 2 MHz
Data refresh rate	ST resolution ≤ 14 bit	≤ 1 µs
	ST resolution ≥ 15 bit	4 µs
Monoflop time		≤ 15 µs

Note: If the clock starts cycling within the monoflop time, a second data transfer starts with the same data. If the clock starts cycling after the monoflop time, the data transfer starts with the new values. The update rate is dependent on the clock speed, data length and monoflop-time.

BiSS interface

Output driver		RS485 transceiver type
Permissible load / channel		max. +/- 20 mA
Signal level	HIGH	typ. 3.8 V
	LOW at I_{Load} = 20 mA	typ. 1.3 V
Resolution		10 ... 14 bit and 17 bit
Code		binary
Clock rate		up to 10 MHz
Max. update rate		< 10 µs, depends on the clock rate and the data length
Data refresh rate	ST resolution ≤ 14 bit	≤ 1 µs
	ST resolution 17 bit	2.4 µs

Note:
- bidirectional, factory programmable parameters are: resolution, code, direction, alarms and warnings
- CRC data verification

SinCos interface

Max. frequency -3dB	400 kHz
Signal level	1 Vpp (±10 %)
Short circuit proof	yes [2]
Pulse rate	2048 ppr

LED

The optional LED (red) serves to display various alarm or error messages.
In normal operation the LED is OFF.

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

In the SSI mode, the fault indication can only be reset by switching off the supply voltage to the device.

1) The specified value is based on a diagnostic coverage of 90 %, that must be achieved with an encoder evaluation unit.
The encoder evaluation unit must meet at least the requirements for SIL2.

2) Short circuit to 0 V or to output, one channel at a time, supply voltage correctly applied.
3) Cable version: -30 °C ... +90 °C [-22 °F ... +194 °F].

Standard
SIL2/PLd, optical

Sendix 5853FS2 / 5873FS2 (shaft / hollow shaft)

SSI / BiSS + SinCos

SET input or SET button

Input		HIGH active
Input type		comparator
Signal level	HIGH	min: 60 % of +V, max: +V
	LOW	max: 25 % of +V (supply voltage)
Input current		< 0.5 mA
Min. pulse duration (SET)		10 ms
Timeout after SET signal		14 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 button (with a pencil, ball-point pen or similar). 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.

If this input is not used, it should be connected to 0 V (Encoder ground GND) in order to avoid interferences.

DIR input

Direction input: A HIGH signal switches the direction of rotation from the default cw to ccw. This function can also be factory-programmed to be inverted. 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.

If this input is not used, it should be connected to 0 V (Encoder ground GND) in order to avoid interferences.

Response time (DIR input)	1 ms

Power-ON

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

Hot plugging of the encoder should be avoided.

Approvals

UL compliant in accordance with	File no. E224618
CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU
ATEX Directive	2014/34/EU (for Ex 2/22 variants)
Machinery Directive	2006/42/EG

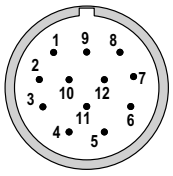
Terminal assignment

Interface	Type of connection	Cable (isolate unused cores individually before initial start-up)													
3, 4	1, 2, A, B, E, F	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	A	$\overline{A}$	B	$\overline{B}$	⏚
		Core color:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY-PK	RD-BU	shield

Interface	Type of connection	M23 connector, 12-pin													
3, 4	3, 4	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	A	$\overline{A}$	B	$\overline{B}$	⏚
		Pin:	1	2	3	4	5	6	7	8	9	10	11	12	PH

+V: Supply voltage encoder +V DC
0 V: Supply voltage encoder ground GND (0 V)
C+, C-: Clock signal
D+, D-: Data signal
SET: Set input
DIR: Direction input
A, $\overline{A}$: Cosine signal
B, $\overline{B}$: Sine signal
PH ⏚: Plug connector housing (shield)

Top view of mating side, male contact base



M23 connector, 12-pin

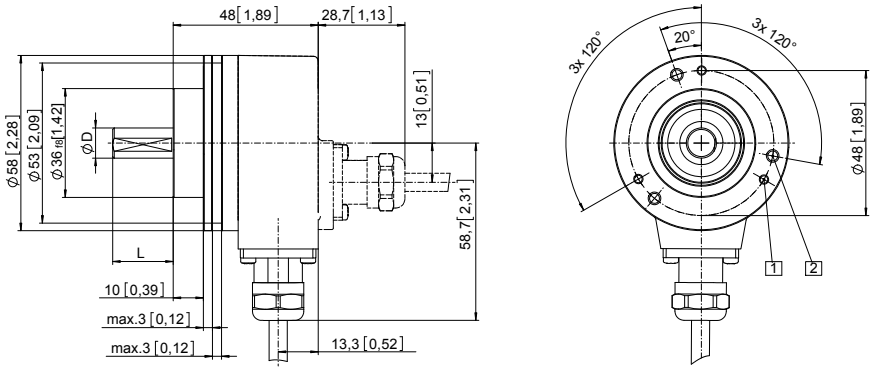
Standard
SIL2/PLd, optical | **Sendix 5853FS2 / 5873FS2 (shaft / hollow shaft)** | **SSI / BiSS + SinCos**

Dimensions shaft version

Dimensions in mm [inch]

Clamping flange, ø 58 [2.28]
Flange type 1 + 3 with shaft type 2
(drawing with cable)

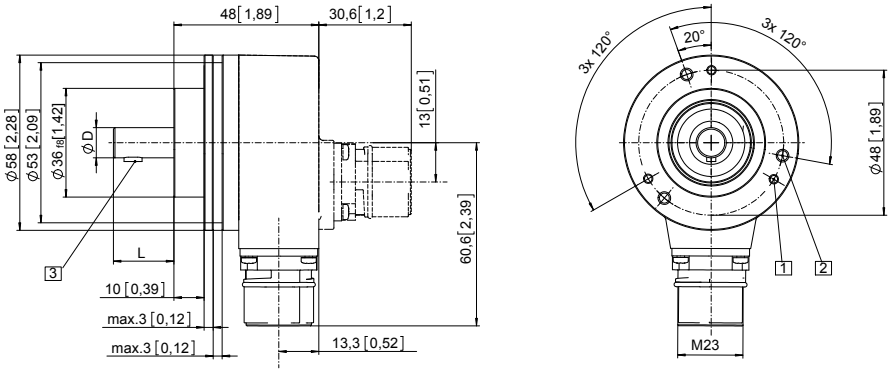
1 3 x M3, 6 [0.24] deep
2 3 x M4, 8 [0.32] deep



D	Fit	L
10 [0.39]	f7	20 [0.79]

Clamping flange, ø 58 [2.28]
Flange type 1 + 3 with shaft type A
(drawing with M23 connector)

1 3 x M3, 6 [0.24] deep
2 3 x M4, 8 [0.32] deep
3 Feather key DIN 6885 - A - 3x3x6



D	Fit	L
10 [0.39]	f7	20 [0.79]

Standard
SIL2/PLd, optical

Sendix 5853FS2 / 5873FS2 (shaft / hollow shaft)

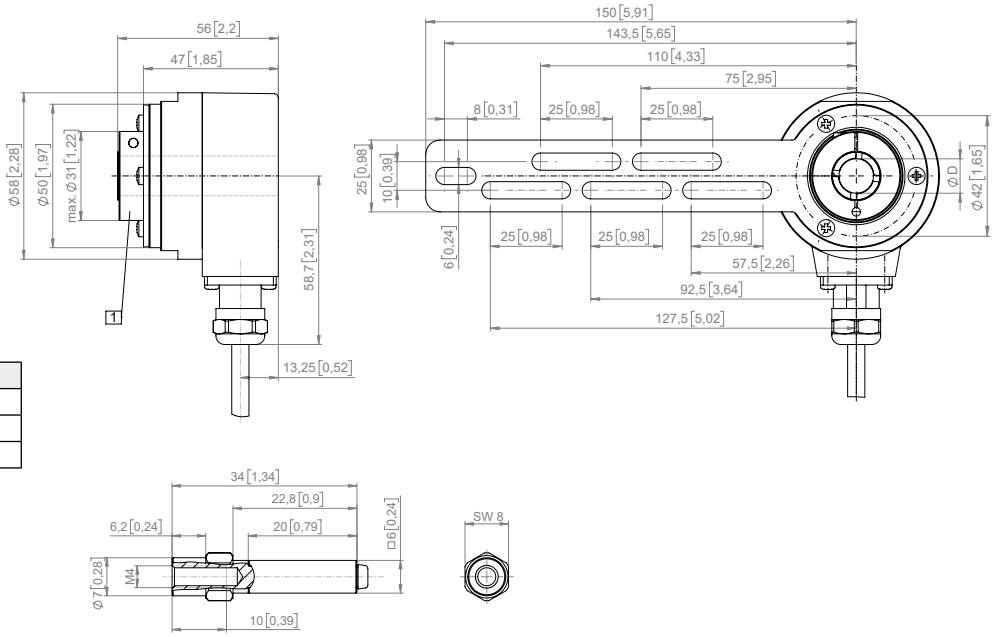
SSI / BiSS + SinCos

Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with torque stop FS, rigid
Flange type A + K
Through hollow shaft
(drawing with cable)

1 SW 3, recommended torque for the clamping ring 2.5 Nm

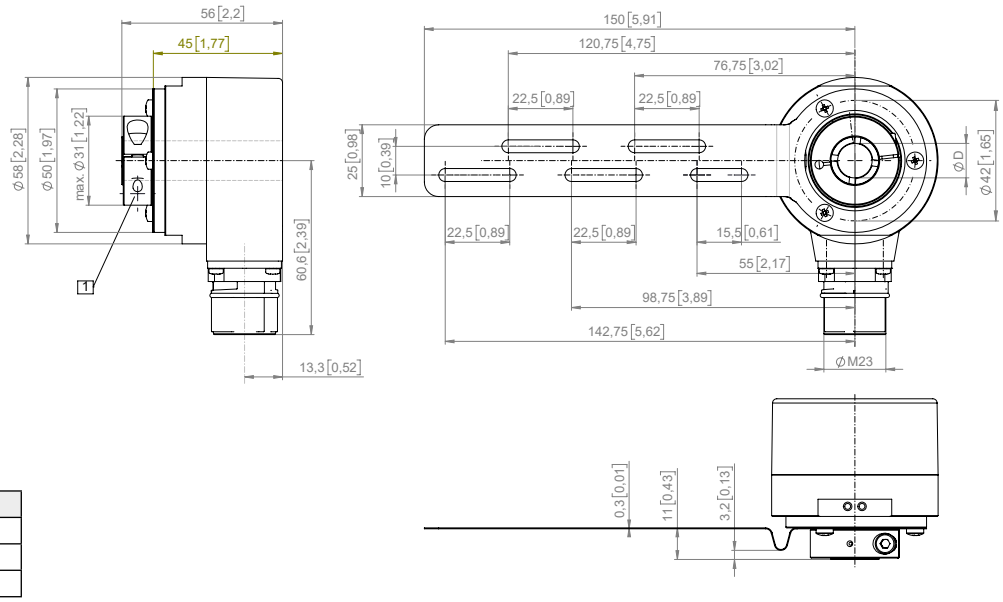


D	Fit
10 [0.39]	H7
12 [0.47]	H7
14 [0.55]	H7

Torque pin with rectangular sleeve with M4 thread

Flange with torque stop FS, flexible
Flange type 9 + J
Through hollow shaft
(drawing with M23 connector)

1 Recommended torque for the clamping ring 2.5 Nm



D	Fit
10 [0.39]	H7
12 [0.47]	H7
14 [0.55]	H7

Standard
SIL2/PLd, optical

Sendix 5853FS2 / 5873FS2 (shaft / hollow shaft)

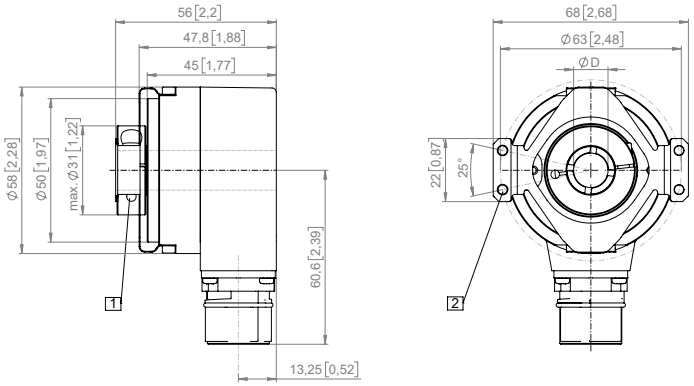
SSI / BiSS + SinCos

Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with stator coupling FS, ø 63 [2.48]
Flange type B + L
Through hollow shaft
(drawing with M23 connector)

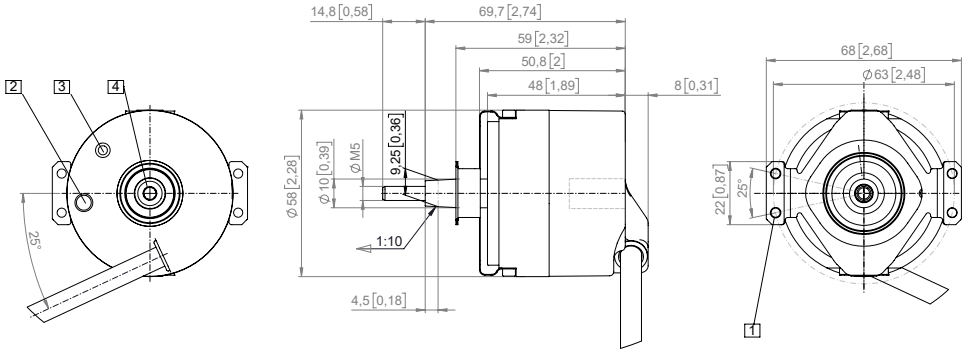
1 SW 3, recommended torque for the clamping ring 2.5 Nm
2 For (4x) M3 screw



D	Fit
10 [0.39]	H7
12 [0.47]	H7
14 [0.55]	H7

Flange with stator coupling FS, ø 63 [2.48]
Flange type B + L
Tapered shaft
(drawing with tangential cable outlet)

1 For (4x) M3 screw
2 Status-LED
3 SET button
4 Recommended torque for central screw M5 (SW 4) 3.0 $^{+0.5}$ Nm (tapered shaft)



Standard, ATEX/IECEx – mining M2 optical | **Sendix 7153 / 7173 (shaft / hollow shaft)** | **SSI / BiSS**

The Sendix 7153 / 7173 absolute singleturn encoders in a compact 70 mm stainless-steel housing, with a an SSI or BiSS interface and optical sensor technology have an ATEX/IECEx mining M2 approval.

These shock and vibration-resistant encoders operate flexibly with a resolution of up to 17 bits; they are also available with axial and radial cable outlets.

Ex approval | Safety-Lock™ | High rotational speed | High protection level | High shaft load capacity | Shock / vibration resistant | Magnetic field proof | Short-circuit proof | Reverse polarity protection | Optical sensor

Compact and safe

- Can be used even when space is tight.
- Minimal installation depth, diameter 70 mm.
- Compact cable outlet axial or radial.
- Remains sealed even in harsh everyday use and ensures highest safety against field breakdowns (IP67 protection).

Explosion protection

- Mining M2 approval.
- "Flame-proof enclosure" construction.
- ATEX with EU type examination certificate.
- IECEx with certificate of conformity (CoC).

Order code Shaft version

8.7153	.	2	X	2	X	.	X	X	2	1	.	XXXX
Type		a	b	c	d		e	f	g	h		i 1)

a *Flange*
2 = clamping / synchronous flange, ø 70 mm [2.76"]

b *Shaft (ø x L)*
2 = 10 x 20 mm [0.39 x 0.79"], with flat
1 = 12 x 25 mm [0.47 x 0.98"], with keyway for 4 x 4 mm [0.16 x 0.16"] key

c *Interface / supply voltage*
2 = SSI, BiSS / 10 ... 30 V DC

d *Type of connection*
1 = axial cable, 2 m [6.56'] PUR
2 = radial cable, 2 m [6.56'] PUR
A = axial cable, length > 2 m [6.56']
B = radial cable, length > 2 m [6.56']

e *Code*
B = SSI, binary
C = BiSS, binary
G = SSI, gray

f *Resolution* 2)
A = 10 bit
1 = 11 bit
2 = 12 bit
3 = 13 bit
4 = 14 bit
7 = 17 bit

g *Inputs / outputs* 2)
2 = SET, DIR input
additional status output

h *Options*
1 = no option

i *Cable length in dm* 1)
0050 = 5 m [16.40']
0100 = 10 m [32.81']
0150 = 15 m [49.21']

Optional on request
- special cable length
- other resolutions

1) Not applicable with connection types 1 and 2
2) Resolution, preset value and counting direction factory-programmable.

Standard, ATEX / IECEx – mining M2 optical | **Sendix 7153 / 7173 (shaft / hollow shaft)** | **SSI / BiSS**

Order code Hollow shaft

8.7173 . X X 2 X . X X 2 1 . XXXX
Type — a b c d — e f g h — i [1]

a *Flange*
2 = with spring element, short
6 = with stator coupling, ø 65 mm [2.56"]

b *Blind hollow shaft*
(insertion depth max. 41.5 mm [1.63"])
1 = ø 12 mm [0.47"]
2 = ø 14 mm [0.55"]

c *Interface / supply voltage*
2 = SSI, BiSS / 10 ... 30 V DC

d *Type of connection*
1 = axial cable, 2 m [6.56'] PUR
2 = radial cable, 2 m [6.56'] PUR
A = axial cable, length > 2 m [6.56']
B = radial cable, length > 2 m [6.56']

e *Code*
B = SSI, binary
C = BiSS, binary
G = SSI, gray

f *Resolution* [2]
A = 10 bit
1 = 11 bit
2 = 12 bit
3 = 13 bit
4 = 14 bit
7 = 17 bit

g *Inputs / outputs* [2]
2 = SET, DIR input
additional status output

h *Options*
1 = no option

i *Cable length in dm* [1]
0050 = 5 m [16.40']
0100 = 10 m [32.81']
0150 = 15 m [49.21']

Optional on request
- special cable length
- other resolutions

Technical data

Explosion protection

ATEX

EU type-examination certificate	IBExU 15 ATEX 1057 X
Category	
Sendix 7153 – 6000 rpm	Ex I M2 Ex db I/IIC T4 Mb
Sendix 7153 – 2000 rpm	Ex I M2 Ex db I/IIC T5 Mb
Sendix 7173 – 3000 rpm	Ex I M2 Ex db I/IIC T4 Mb
Sendix 7173 – 2000 rpm	Ex I M2 Ex db I/IIC 120°C (T4) Mb
Relevant standards	EN 60079-0:2018
ATEX guideline 2014/34/EU	EN 60079-1:2014

IECEx

Certificate of Conformity (CoC)	IECEx IBE 15.0019 X
Category	
Sendix 7153 – 6000 rpm	Ex db I/IIC T4 Mb
Sendix 7153 – 2000 rpm	Ex db I/IIC T5 Mb
Sendix 7173 – 3000 rpm	Ex db I/IIC T4 Mb
Sendix 7173 – 2000 rpm	Ex db I/IIC 120°C (T4) Mb
Relevant standards	IEC 60079-0:2017
	IEC 60079-1:2014

EMC

Relevant standards	EN 55011 class B
	EN (IEC) 61326-1

Electrical characteristics

Supply voltage	10 ... 30 V DC
Current consumption (no load)	max. 45 mA
Reverse polarity protection for supply voltage	yes
Short-circuit proof outputs	yes [3]

Mechanical characteristics

Maximum speed	shaft	6000 min^{-1} (continuous)
	hollow shaft	3000 min^{-1} (continuous)
Starting torque - at 20 °C [68 °F]		< 0.05 Nm
Mass moment of inertia		4.0 x 10^{-6} kgm^2
Load capacity of shaft	radial	80 N
	axial	40 N
Weight		approx. 2.8 kg [98.77 oz]
Protection acc. to EN 60529		IP67
Ambient temperature		-40 °C ... +60 °C [-4 °F ... +140 °F] Please note the specifications for temperature class in EU type-examination certificate!
Material	shaft	stainless steel
	flange / housing	stainless steel
	cable	PUR
Shock resistance acc. to EN/IEC 60068-2-27		1000 m/s^2, 6 ms
Vibration resistance acc. to EN/IEC 60068-2-6		100 m/s^2, 55 ... 2000 Hz

1) Not applicable with connection types 1 and 2
2) Resolution, preset value and counting direction factory-programmable.
3) Short-circuit with 0 V or output, only one channel at a time, supply voltage correctly applied.

Standard, ATEX/IECEx – mining M2 optical | **Sendix 7153 / 7173 (shaft / hollow shaft)** | **SSI / BiSS**

SSI interface

Output driver		RS485 transceiver type
Permissible load / channel		max. +/- 20 mA
Signal level	HIGH	typ 3.8 V
	LOW at I_{Load} = 20 mA	typ 1.3 V
Resolution		10 ... 14 bit and 17 bit
Code		binary or gray
SSI clock rate		50 kHz ... 2 MHz
Data refresh rate		
	ST resolution ≤ 14 bit	≤ 1 µs
	ST resolution ≥ 15 bit	4 µs
Monoflop time		≤ 15 µs

Note: if clock starts cycling within monoflop time a second data transfer starts with the same data. If clock starts cycling after monoflop time, the data transfer starts with updated values. The update rate depends on clock speed, data length and monoflop time.

BiSS interface

Output driver		RS485 transceiver type
Permissible load / channel		max. +/- 20 mA
Signal level	HIGH	typ 3.8 V
	LOW at I_{Load} = 20 mA	typ 1.3 V
Resolution		10 ... 14 bit and 17 bit
Code		binary
Clock rate		up to 10 MHz
Max. update rate		< 10 µs, depends on the clock rate and the data length
Data refresh rate		
	ST resolution ≤ 14 bit	≤ 1 µs
	ST resolution 17 bit	2.4 µs

Note:
- bidirectional, factory programmable parameters are: resolution, code, direction, alarms and warnings
- CRC data verification

Status output

Output driver		open collector, internal pull-up resistor 22 kOhm
Permissible load		max. 20 mA
Signal level	HIGH	+V
	LOW	< 1 V
Active at		LOW

The status output serves to display various alarm or error messages.
The status output is HIGH (open collector with internal pull-up 22 kOhm) in normal operation.

SET input

Input		HIGH active
Input type		comparator
Signal level (+V = supply voltage)	HIGH	min. 60% of +V
		max. +V
	LOW	max. 25% of +V
Input current		< 0.5 mA
Min. pulse duration (SET)		10 ms
Timeout after SET signal		14 ms

The encoder can be set to zero at any position by means of a HIGH signal on the SET input. Other preset values can be factory-programmed.
The SET input has a signal delay time of approximately 1 ms. Once the SET function has been triggered, the encoder requires an internal processing time of approximately 15 ms before the new position data can be read.

If this input is not used, it should be connected to 0 V (Encoder ground GND) in order to avoid interferences.

DIR input

Direction 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 reversed when the device is already switched on, this will be interpreted as an error. The status output switches to LOW.

If this input is not used, it should be connected to 0 V (Encoder ground GND) in order to avoid interferences.

Response time (DIR input)	1 ms

Power-ON

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

Hot plugging of the encoder should be avoided.

Approvals

CE compliant in accordance with

EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU
ATEX Directive	2014/34/EU

Terminal assignment

Interface	Type of connection	Features	Cable (isolate unused cores individually before initial start-up)											
2	1, 2, A, B	SET, DIR	Signal:	0 V	+V	C+	C-	D+	D-	SET	DIR	Stat	⏚	⏚
			Core marking:	1	2	3	4	5	6	7	8	9	YE/GN	shield

+V: Supply voltage encoder +V DC
0 V: Supply voltage encoder ground GND (0 V)
C+, C-: Clock signal
D+, D-: Data signal
SET: Set input
DIR: Direction input
Stat: Status output
⏚: Protective earth

Standard, ATEX / IECEx – mining M2 optical | **Sendix 7153 / 7173 (shaft / hollow shaft)** | **SSI / BiSS**

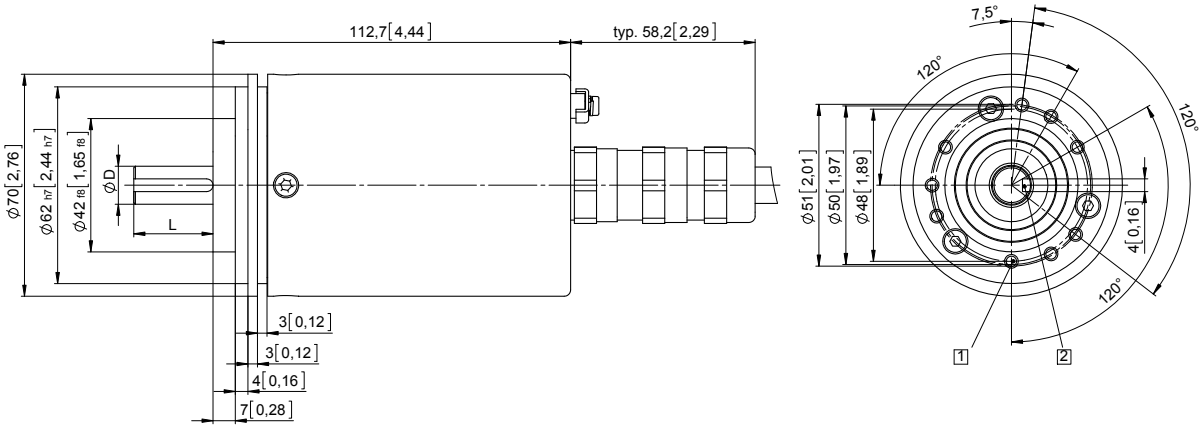
Dimensions shaft version

Dimensions in mm [inch]

Clamping / synchronous flange, ø 70 [2.76]
Shaft type 1 with axial cable outlet

1 9 x M4, 10 [0.39] deep

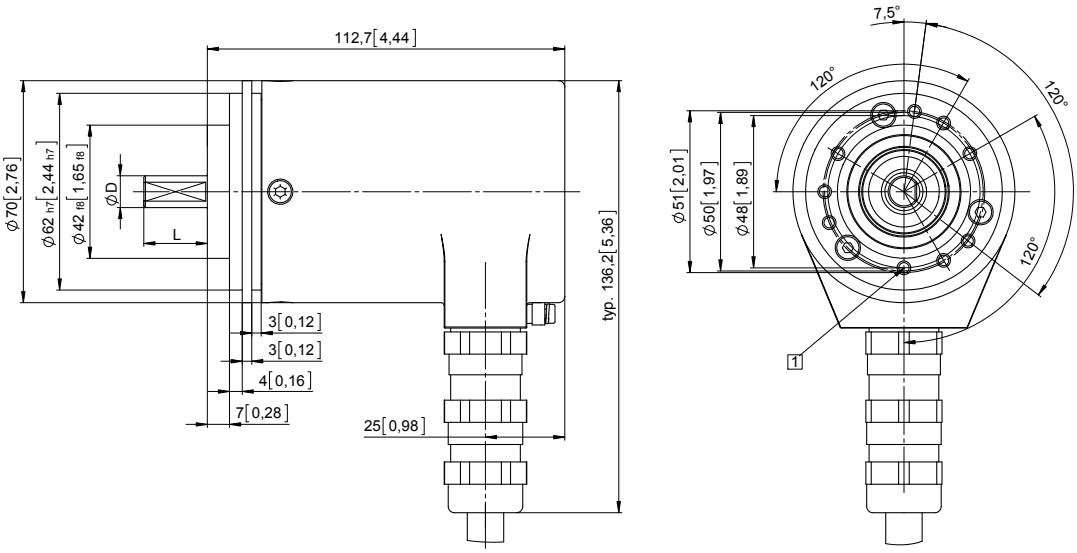
2 Keyway for DIN 6885-A-4x4x25 key



D	Fit	L
12 [0.47]	g6	25 [0.98]

Clamping / synchronous flange, ø 70 [2.76]
Shaft type 2 with radial cable outlet

1 9 x M4, 10 [0.39] deep



D	Fit	L
10 [0.39]	f7	20 [0.79]

Standard, ATEX/IECEx – mining M2 optical | **Sendix 7153 / 7173 (shaft / hollow shaft)** | **SSI / BiSS**

Dimensions hollow shaft version

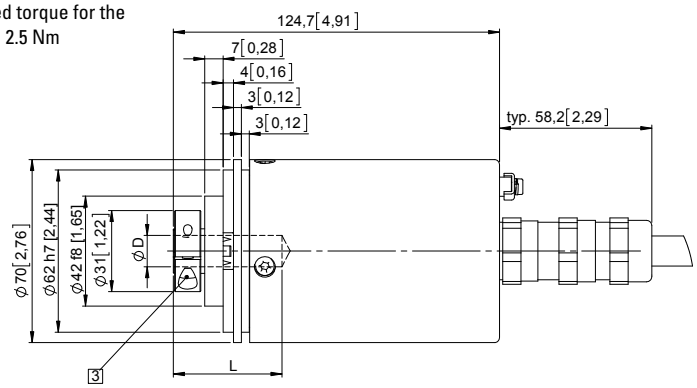
Dimensions in mm [inch]

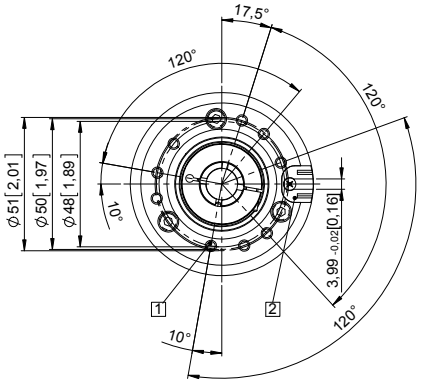
Flange with spring element, short
Flange type 2

1 9 x M4, 10 [0.39] deep

2 Slot spring element, recommendation: torque pin DIN 7, ø 4 [0.16]

3 Recommended torque for the clamping ring 2.5 Nm

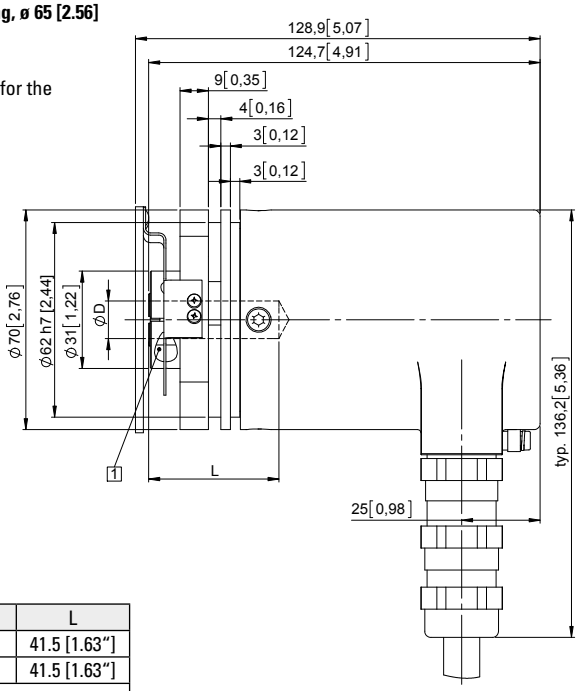


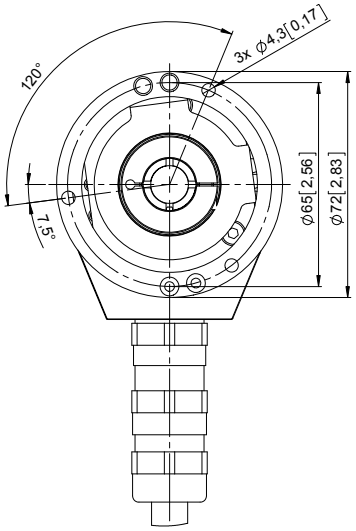


D	Fit	L
12 [0.47]	H7	41.5 [1.63“]
14 [0.55]	H7	41.5 [1.63“]
L = insertion depth max. blind hollow shaft		

Flange with stator coupling, ø 65 [2.56]
Flange type 6

1 Recommended torque for the clamping ring 2.5 Nm





D	Fit	L
12 [0.47]	H7	41.5 [1.63“]
14 [0.55]	H7	41.5 [1.63“]
L = insertion depth max. blind hollow shaft		

Standard, ATEX/IECEx – zone 1/21 optical | **Sendix 7058 / 7078 (shaft / hollow shaft)** | **PROFIBUS DP**

The Sendix 7058 / 7078 absolute singleturn encoders offer Ex protection in a compact 70 mm seawater durable aluminum housing, with a Profibus interface and optical sensor technology.

These shock and vibration-resistant encoders operate flexibly with a resolution of up to 16 bits; they are also available with axial and radial cable outlets.

Ex approval | Safety-Lock™ | High rotational speed | High protection level (IP) | High shaft load capacity | Shock / vibration resistant | Magnetic field proof | Short-circuit proof | Reverse polarity protection | Optical sensor | Seawater durable

Compact and safe

- Can be used even when space is tight.
- Minimal installation depth, diameter 70 mm.
- Compact cable outlet axial or radial.
- Can be operated in marine environments – housing and flange manufactured from seawater durable aluminum.
- Remains sealed even in harsh everyday use and ensures highest safety against field breakdowns (IP67 protection).

Explosion protection

- "Flameproof-enclosure" version.
- ATEX with EU type examination certificate.
- IECEx with certificate of conformity (CoC).

Order code Shaft version

8.7058	.	1	X	3	X	.	31	11	.	XXXX
Type		a	b	c	d		e			f 1)

a *Flange*
1 = clamping / synchronous flange, ø 70 mm [2.76"]

b *Shaft (ø x L)*
2 = 10 x 20 mm [0.39 x 0.79"], with flat
1 = 12 x 25 mm [0.47 x 0.98"], with keyway for 4 x 4 mm [0.16 x 0.16"] key

c *Interface / Supply voltage*
3 = PROFIBUS DP V0 / 10 ... 30 V DC

d *Type of connection*
1 = axial cable, 2 m [6.56'] PUR
2 = radial cable, 2 m [6.56'] PUR
A = axial cable, length > 2 m [6.56']
B = radial cable, length > 2 m [6.56']

e *Fieldbus profile*
31 = PROFIBUS DP V0 encoder profile class 2

f *Cable length in dm* 1)
0050 = 5 m [16.40']
0100 = 10 m [32.81']
0150 = 15 m [49.21']

Optional on request
- special cable length
- seawater resistant (stainless steel V4A)

1) Not applicable with connection types 1 and 2.

Standard, ATEX/IECEx – zone 1/21 optical | **Sendix 7058 / 7078 (shaft / hollow shaft)** | **PROFIBUS DP**

Order code Hollow shaft

8.7078	.	X	X	3	X	.	31	11	.	XXXX
Type		a	b	c	d		e			f [1]

a *Flange*
1 = with spring element, short
5 = with stator coupling, ø 65 mm [2.56"]

b *Blind hollow shaft (insertion depth max. 41.5 mm [1.63"])*
1 = ø 12 mm [0.47"]
2 = ø 14 mm [0.55"]

c *Interface / Supply voltage*
3 = PROFIBUS DP V0 / 10 ... 30 V DC

d *Type of connection*
1 = axial cable, 2 m [6.56'] PUR
2 = radial cable, 2 m [6.56'] PUR
A = axial cable, length > 2 m [6.56']
B = radial cable, length > 2 m [6.56']

e *Fieldbus profile*
31 = PROFIBUS DP V0 encoder profile class 2

f *Cable length in dm* [1]
0050 = 5 m [16.40']
0100 = 10 m [32.81']
0150 = 15 m [49.21']

Optional on request
- special cable length
- seawater resistant (stainless steel V4A)

Mounting accessory for shaft encoders		Order no.
Coupling	bellows coupling ø 19 mm [0.75"] for shaft 10 mm [0.39"]	**8.0000.1102.1010**

Further Kübler accessories can be found at: /accessories
Further Kübler cables and connectors can be found at: /connection-technology

Technical data

Explosion protection

ATEX

EU type-examination certificate		IBExU 15 ATEX 1091 X
Category (gas)		
	Sendix 7058 – 6000 rpm	Ex II 2G Ex db IIC T4 Gb
	Sendix 7058 – 2000 rpm	Ex II 2G Ex db IIC T5 Gb
	Sendix 7078 – 3000 rpm	Ex II 2G Ex db IIC T4 Gb
	Sendix 7078 – 2000 rpm	Ex II 2G Ex db IIC 120°C (T4) Gb
Category (dust)		
	Sendix 7058 – 6000 rpm	Ex II 2D Ex tb IIIC T135°C Db
	Sendix 7058 – 2000 rpm	Ex II 2D Ex tb IIIC T100°C Db
	Sendix 7078 – 3000 rpm	Ex II 2D Ex tb IIIC T135°C Db
	Sendix 7078 – 2000 rpm	Ex II 2D Ex tb IIIC T120°C Db
Relevant standards		EN 60079-0:2018
ATEX guideline 2014/34/EU		EN 60079-1:2014
		EN 60079-31:2014

IECEx

Certificate of Conformity (CoC)		IECEx IBE 15.0020 X
Category (gas)		
	Sendix 7058 – 6000 rpm	Ex db IIC T4 Gb
	Sendix 7058 – 2000 rpm	Ex db IIC T5 Gb
	Sendix 7078 – 3000 rpm	Ex db IIC T4 Gb
	Sendix 7078 – 2000 rpm	Ex db IIC 120°C (T4) Gb
Category (dust)		
	Sendix 7058 – 6000 rpm	Ex tb IIIC T135°C Db
	Sendix 7058 – 2000 rpm	Ex tb IIIC T100°C Db
	Sendix 7078 – 3000 rpm	Ex tb IIIC T135°C Db
	Sendix 7078 – 2000 rpm	Ex tb IIIC T120°C Db
Relevant standards		IEC 60079-0:2017
		IEC 60079-1:2014
		IEC 60079-31:2013

EMC

Relevant standards	EN 55011 class B
	EN (IEC) 61326-1

Electrical characteristics

Supply voltage	10 ... 30 V DC
Current consumption (no load)	max. 110 mA
Reverse polarity protection for supply voltage	yes

Mechanical characteristics

Maximum speed	shaft	6000 min^{-1} (continuous)
	hollow shaft	3000 min^{-1} (continuous)
Starting torque – at 20 °C [68 °F]		< 0.05 Nm
Mass moment of inertia		4.0 x 10^{-6} kgm^2
Load capacity of shaft	radial	80 N
	axial	40 N
Weight		approx. 1.5 kg [52.91 oz]
Protection acc. to EN 60529		IP67
Ambient temperature		-40 °C ... +60 °C [-4 °F ... +140 °F] Please note the specifications for temperature class in EU type-examination certificate!
Material	shaft	stainless steel
	flange / housing	seawater durable Al, type AlSiMgMn (EN AW-6082)
	cable	PUR
Shock resistance to EN/IEC 60068-2-27		2500 m/s^2, 6 ms
Vibration resistance to EN/IEC 60068-2-6		100 m/s^2, 55 ... 2000 Hz

1) Not applicable with connection types 1 and 2.

Standard, ATEX/IECEx – zone 1/21 optical | **Sendix 7058 / 7078 (shaft / hollow shaft)** | **PROFIBUS DP**

Interface characteristics PROFIBUS DP

Resolution	1 ... 65536 (16 bit), behavior default: 8192 (13 bit)
Interface	specification according to PROFIBUS DP 2.0 / standard (DIN 19245 part 3) / RS485 driver galvanically isolated
Protocol	Profibus encoder profile V1.1 class 1 and class 2 with manufacturer-specific add-ons
Baud rate	maximum 12 Mbit/s
Device address	software controlled setting of the device address via the SSA service with a class 2 master; default address: 125
Termination	active termination can only be switched on externally

Approvals

CE compliant in accordance with

EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU
ATEX Directive	2014/34/EU

Profibus encoder profile V1.1

The PROFIBUS DP device profile describes the functionality of the communication and the manufacturer-specific component within the PROFIBUS fieldbus system. 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 use of PROFIBUS compatible devices ensures that the systems of today are ready to meet the demands of the future.

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 RS485 max. 12 MB.
- Full class 1 and class 2 functionality.
- Speed value.

Terminal assignment

Interface	Type of connection	Cable (isolate unused cores individually before initial start-up)								
3	1, 2, A, B	Signal:	0 V	+V	PB_A IN	PB_B IN	BUS_GND	BUS_ VDC	PB_A OUT	PB_B OUT
		Core marking:	1	2	4	5	6	7	8	9

Standard, ATEX/IECEx – zone 1/21 optical | **Sendix 7058 / 7078 (shaft / hollow shaft)** | **PROFIBUS DP**

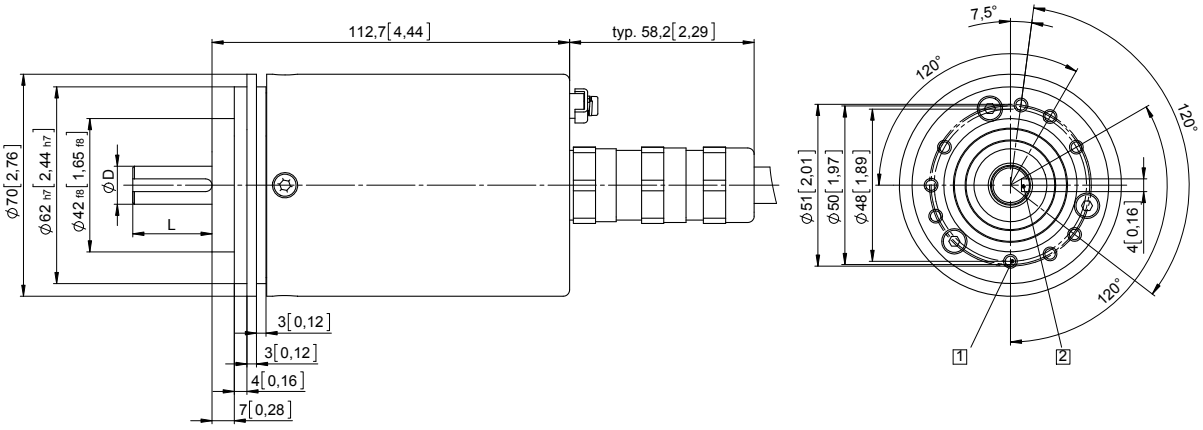
Dimensions shaft version

Dimensions in mm [inch]

Clamping / synchronous flange, ø 70 [2.76]
Shaft type 1 with axial cable outlet

1 9 x M4, 10 [0.39] deep

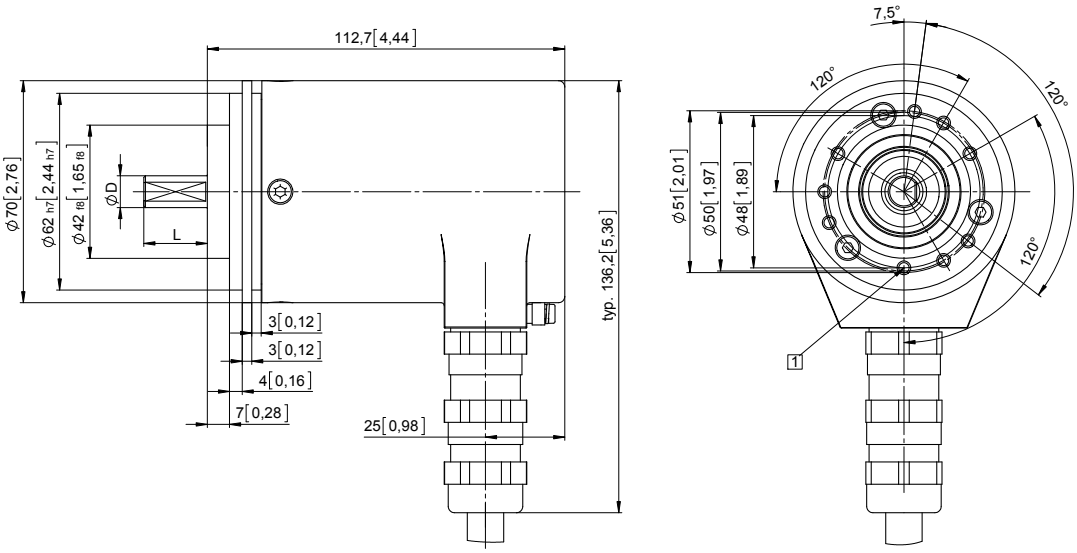
2 Keyway for DIN 6885-A-4x4x25 key



D	Fit	L
12 [0.47]	g6	25 [0.98]

Clamping / synchronous flange, ø 70 [2.76]
Shaft type 2 with radial cable outlet

1 9 x M4, 10 [0.39] deep



D	Fit	L
10 [0.39]	f7	20 [0.79]

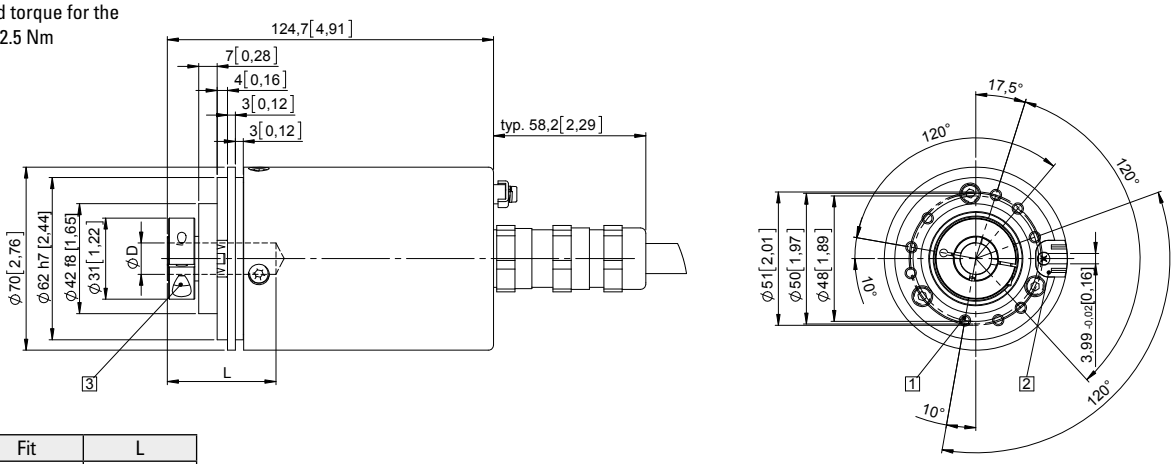
Standard, ATEX/IECEx – zone 1/21 optical | **Sendix 7058 / 7078 (shaft / hollow shaft)** | **PROFIBUS DP**

Dimensions hollow shaft version

Dimensions in mm [inch]

Flange with spring element, short
Flange type 1

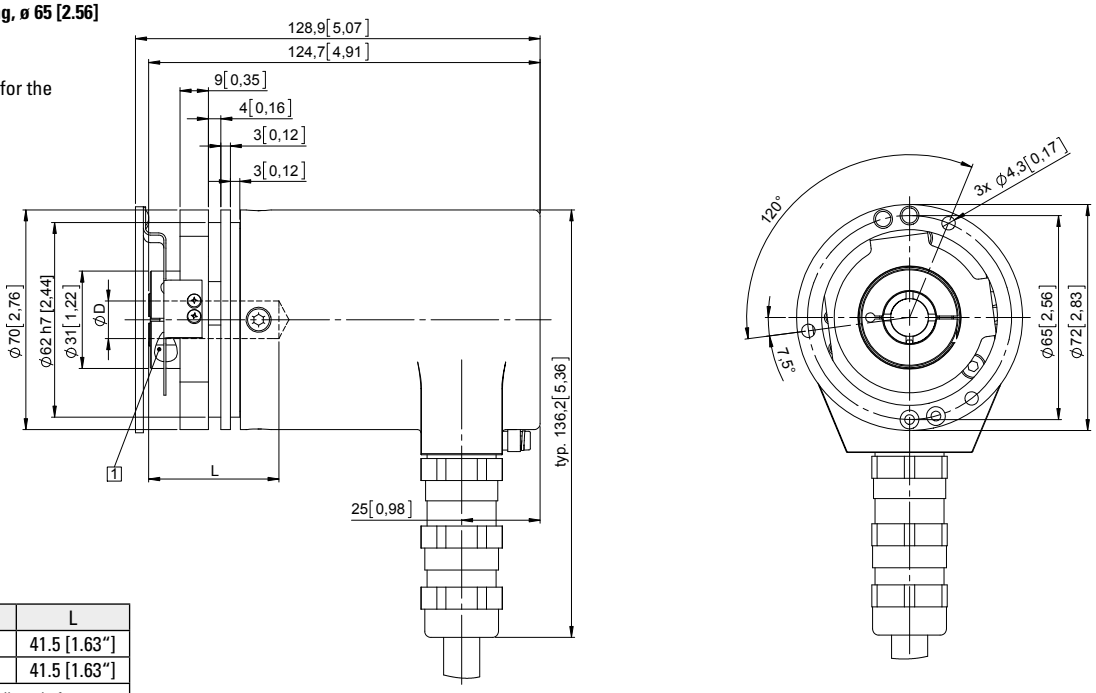
1 9 x M4, 10 [0.39] deep
2 Slot spring element, recommendation: torque pin DIN 7, ø 4 [0.16]
3 Recommended torque for the clamping ring 2.5 Nm



D	Fit	L
12 [0.47]	H7	41.5 [1.63“]
14 [0.55]	H7	41.5 [1.63“]
L = insertion depth max. blind hollow shaft		

Flange with stator coupling, ø 65 [2.56]
Flange type 5

1 Recommended torque for the clamping ring 2.5 Nm



D	Fit	L
12 [0.47]	H7	41.5 [1.63“]
14 [0.55]	H7	41.5 [1.63“]
L = insertion depth max. blind hollow shaft		

Standard, ATEX/IECEx – mining M2 optical | **Sendix 7158 / 7178 (shaft / hollow shaft)** | **CANopen**

The Sendix 7158 / 7178 absolute singleturn encoders in a compact 70 mm stainless-steel housing, with a CANopen interface and optical sensor technology have an ATEX/IECEx mining M2 approval.

These shock and vibration-resistant encoders operate flexibly with a resolution of up to 16 bits; they are also available with axial and radial cable outlets.

Ex approval | Safety-Lock™ | High rotational speed | High protection level (IP) | High shaft load capacity | Shock / vibration resistant | Magnetic field proof | Short-circuit proof | Reverse polarity protection | Optical sensor

Compact and safe

- Can be used even when space is tight.
- Minimal installation depth, diameter 70 mm.
- Compact cable outlet axial or radial.
- Remains sealed even in harsh everyday use and ensures highest safety against field breakdowns (IP67 protection).

Explosion protection

- Mining M2 approval.
- "Flame-proof enclosure" construction.
- ATEX with EU type examination certificate.
- IECEx with certificate of conformity (CoC).

Order code Shaft version

8.7158	.	2	X	2	X	.	21	11	.	XXXX
Type		a	b	c	d		e			f 1)

a *Flange*
2 = clamping / synchronous flange, ø 70 mm [2.76"]

b *Shaft (ø x L)*
2 = 10 x 20 mm [0.39 x 0.79"], with flat
1 = 12 x 25 mm [0.47 x 0.98"], with keyway for 4 x 4 mm [0.16 x 0.16"] key

c *Interface / supply voltage*
2 = CANopen DS301 V4.02 / 10 ... 30 V DC

d *Type of connection*
1 = axial cable, 2 m [6.56'] PUR
2 = radial cable, 2 m [6.56'] PUR
A = axial cable, length > 2 m [6.56']
B = radial cable, length > 2 m [6.56']

e *Fieldbus profile*
21 = CANopen

f *Cable length in dm* 1)
0050 = 5 m [16.40']
0100 = 10 m [32.81']
0150 = 15 m [49.21']

Optional on request
- special cable length

Order code Hollow shaft

8.7178	.	X	X	2	X	.	21	11	.	XXXX
Type		a	b	c	d		e			f 1)

a *Flange*
2 = with spring element, short
6 = with stator coupling, ø 65 mm [2.56"]

b *Blind hollow shaft*
(insertion depth max. 41.5 mm [1.63"])
1 = ø 12 mm [0.47"]
2 = ø 14 mm [0.55"]

c *Interface / supply voltage*
2 = CANopen DS301 V4.02 / 10 ... 30 V DC

d *Type of connection*
1 = axial cable, 2 m [6.56'] PUR
2 = radial cable, 2 m [6.56'] PUR
A = axial cable, length > 2 m [6.56']
B = radial cable, length > 2 m [6.56']

e *Fieldbus profile*
21 = CANopen

f *Cable length in dm* 1)
0050 = 5 m [16.40']
0100 = 10 m [32.81']
0150 = 15 m [49.21']

Optional on request
- special cable length

1) Not applicable with connection types 1 and 2.

Standard, ATEX/IECEx – mining M2 optical | **Sendix 7158 / 7178 (shaft / hollow shaft)** | **CANopen**

Technical data

Explosion protection

ATEX

EU type-examination certificate	IBExU 15 ATEX 1057 X
Category	
Sendix 7158 – 6000 rpm	Ex I M2 Ex db I/IIC T4 Mb
Sendix 7158 – 2000 rpm	Ex I M2 Ex db I/IIC T5 Mb
Sendix 7178 – 3000 rpm	Ex I M2 Ex db I/IIC T4 Mb
Sendix 7178 – 2000 rpm	Ex I M2 Ex db I/IIC 120°C (T4) Mb
Relevant standards	EN 60079-0:2018
ATEX guideline 2014/34/EU	EN 60079-1:2014

IECEx

Certificate of Conformity (CoC)	IECEx IBE 15.0019 X
Category	
Sendix 7158 – 6000 rpm	Ex db I/IIC T4 Mb
Sendix 7158 – 2000 rpm	Ex db I/IIC T5 Mb
Sendix 7178 – 3000 rpm	Ex db I/IIC T4 Mb
Sendix 7178 – 2000 rpm	Ex db I/IIC 120°C (T4) Mb
Relevant standards	IEC 60079-0:2017 IEC 60079-1:2014

EMC

Relevant standards	EN 55011 class B EN (IEC) 61326-1

Approvals

CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU
ATEX Directive	2014/34/EU

Electrical characteristics

Supply voltage	10 ... 30 V DC
Current consumption (no load)	max. 90 mA
Reverse polarity protection for supply voltage	yes

Mechanical characteristics

Maximum speed	shaft	6000 min^{-1} (continuous)
	hollow shaft	3000 min^{-1} (continuous)
Starting torque – at 20 °C [68 °F]		< 0.05 Nm
Mass moment of inertia		4.0 x 10^{-6} kgm^2
Load capacity of shaft	radial	80 N
	axial	40 N
Weight		approx. 2.8 kg [98.77 oz]
Protection acc. to EN 60529		IP67
Ambient temperature		-40 °C ... +60 °C [-4 °F ... +140 °F] Please note the specifications for temperature class in EU type-examination certificate!
Material	shaft	stainless steel
	flange / housing	stainless steel
	cable	PUR
Shock resistance		
acc. to EN/IEC 60068-2-27		1000 m/s^2, 6 ms
Vibration resistance		
acc. to EN/IEC 60068-2-6		100 m/s^2, 55 ... 2000 Hz

Standard, ATEX/IECEx – mining M2 optical | **Sendix 7158 / 7178 (shaft / hollow shaft)** | **CANopen**

Interface characteristics CANopen	
Resolution	1 ... 65536 (16 bit), scalable default: 8192 (13 bit)
Interface	CAN high-speed acc. to ISO 11898, Basic- and Full-CAN, CAN specification 2.0 B
Protocol	CANopen profile DS406 V3.2 with manufacturer-specific add-ons
Baud rate	10 ... 1000 kbit/s software configurable
Node address	1 ... 127 software configurable
Switchable termination	software configurable

General information about CANopen

The CANopen encoders support the latest CANopen communication profile according to DS301 V4.02 .

In addition, device-specific profiles like the encoder profile DS406 V3.2 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 CANbus. When switching the device on, all parameters are loaded from an EEPROM, where they were saved previously to protect them against power-failure.

As output values **position**, **speed**, **acceleration** as well as the **working area status** may be combined freely as PDO (PDO mapping)

CANopen communication profile DS301 V4.02

Among others, the following functionality is integrated:

Class C2 functionality
- NMT slave.
- Heartbeat protocol.
- High resolution sync protocol.
- Identity object.
- Error behavior object.
- Variable PDO mapping self-start programmable (power on to operational), 3 Sending PDO's.
- Node address, baud rate and CANbus termination programmable.

CANopen encoder profile DS406 V3.2

The following parameters can be programmed:

- Event mode.
- Units for speed selectable (steps/sec or min^{-1}).
- Factor for speed calculation (e.g. measuring wheel circumference) 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 of position, speed, acceleration, working 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 CAMs programmable.
- Customer-specific memory - 16 Bytes.

Terminal assignment

Interface	Type of connection	Cable (isolate unused cores individually before initial start-up)								
2	1, 2, A, B	Signal:	0 V	+V	CAN_H	CAN_L	CAN_GND	CAN_H	CAN_L	CAN_GND
		Core marking:	1	2	4	5	6	7	8	9

Standard, ATEX / IECEx – mining M2 optical | **Sendix 7158 / 7178 (shaft / hollow shaft)** | **CANopen**

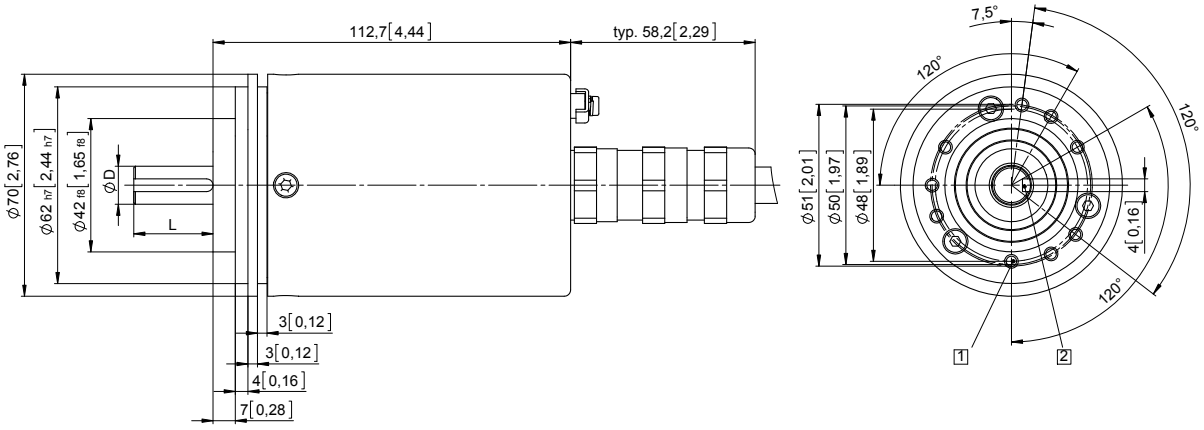
Dimensions shaft version

Dimensions in mm [inch]

Clamping / synchronous flange, ø 70 [2.76]
Shaft type 1 with axial cable outlet

1 9 x M4, 10 [0.39] deep

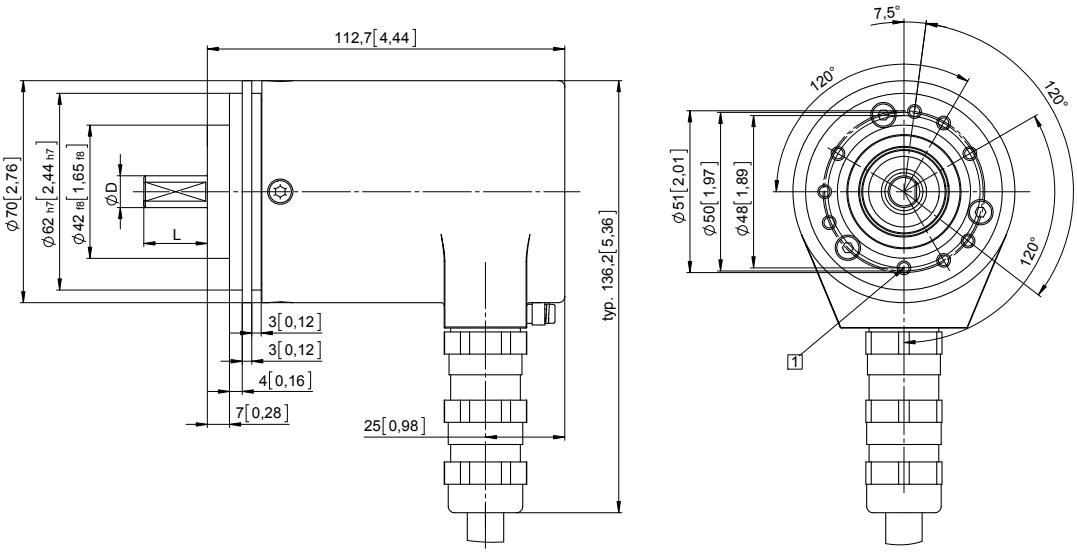
2 Keyway for DIN 6885-A-4x4x25 key



D	Fit	L
12 [0.47]	g6	25 [0.98]

Clamping / synchronous flange, ø 70 [2.76]
Shaft type 2 with radial cable outlet

1 9 x M4, 10 [0.39] deep



D	Fit	L
10 [0.39]	f7	20 [0.79]

Standard, ATEX/IECEx – mining M2 optical | **Sendix 7158 / 7178 (shaft / hollow shaft)** | **CANopen**

Dimensions hollow shaft version

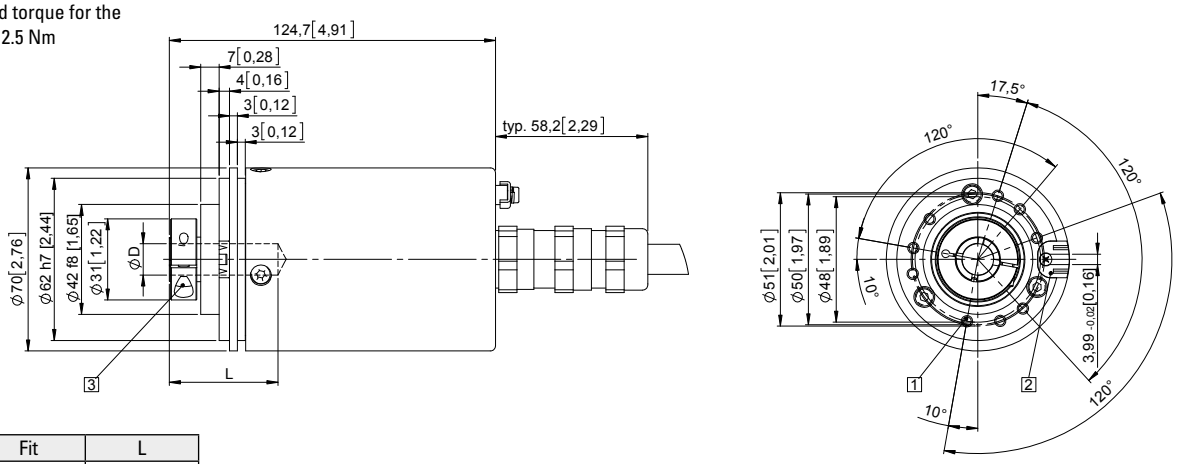
Dimensions in mm [inch]

Flange with spring element, short
Flange type 2

1 9 x M4, 10 [0.39] deep

2 Slot spring element, recommendation: torque pin DIN 7, ø 4 [0.16]

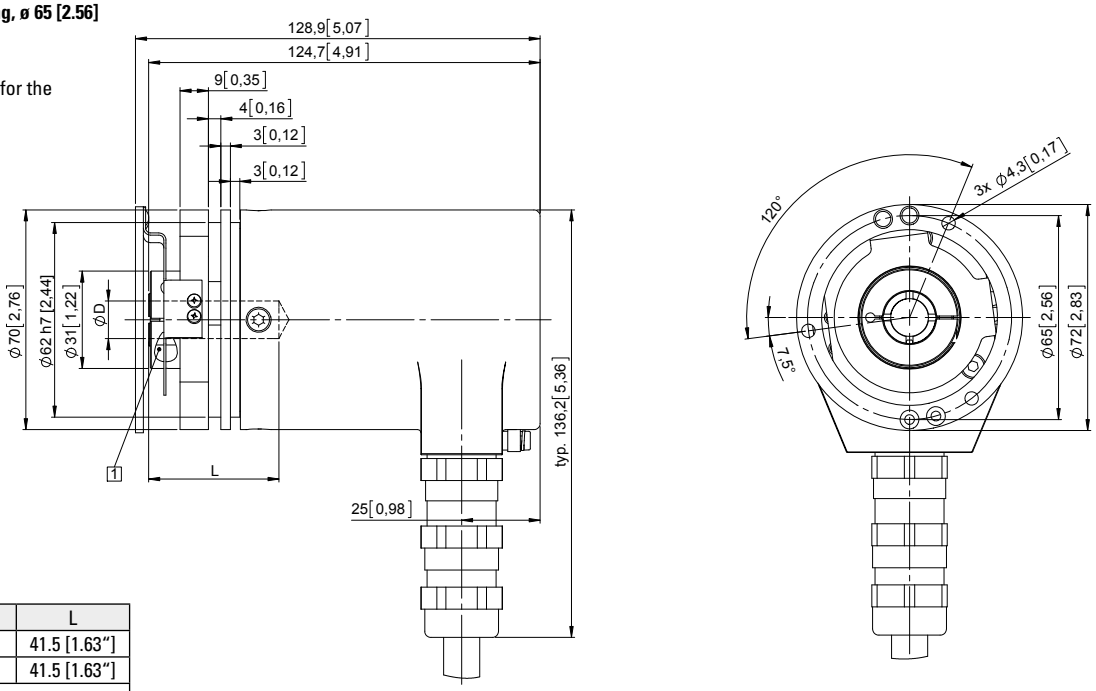
3 Recommended torque for the clamping ring 2.5 Nm



D	Fit	L
12 [0.47]	H7	41.5 [1.63“]
14 [0.55]	H7	41.5 [1.63“]
L = insertion depth max. blind hollow shaft		

Flange with stator coupling, ø 65 [2.56]
Flange type 6

1 Recommended torque for the clamping ring 2.5 Nm



D	Fit	L
12 [0.47]	H7	41.5 [1.63“]
14 [0.55]	H7	41.5 [1.63“]
L = insertion depth max. blind hollow shaft		

По вопросам продаж и поддержки обращайтесь:

Алматы (727)345-47-04
Ангарск (3955)60-70-56
Архангельск (8182)63-90-72
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Благовещенск (4162)22-76-07
Брянск (4832)59-03-52
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