Standard
mechanical multiturn, optical | **Sendix 5868 / 5888 (shaft / hollow shaft)** | **PROFINET IO**

The multiturn encoders Sendix 5868 and 5888 with PROFINET interface and optical sensor technology are ideal for use in all applications with PROFINET technology.

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

Mechanical drive | Safety-Lock™ | High rotational speed | Temperature range (-40°... +85°C) | High protection level (IP) | High shaft load capacity | Shock / vibration resistant | Magnetic field 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

8.5868 . 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 *Fieldbus profile*
C2= PROFINET IO

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

Order code Hollow shaft

8.5888 . 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 *Fieldbus 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.

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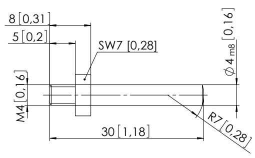
Mounting accessory for shaft encoders		Order no.
Coupling	bellows coupling ø 19 mm [0.75"] for shaft 6 mm [0.24"]	**8.0000.1102.0606**
	bellows coupling ø 19 mm [0.75"] for shaft 10 mm [0.39"]	**8.0000.1102.1010**

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

Standard
mechanical multiturn, optical

Sendix 5868 / 5888 (shaft / hollow shaft)

PROFINET IO

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	7.5 x 10^{-6} kgm^2
Load capacity of shaft	radial	80 N
	axial	40 N
Weight		approx. 0.54 kg [19.05 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 PRROFINET IO

Resolution singleturn (MUR)		
	scalable	1 ... 65 536 (16 bit)
	default	8 192 (13 bit)
Number of revolutions (NDR)		1 ... 4 096 (12 bit) scalable only via the total resolution
Total resolution (TMR)		
	scalable	1 ... 268 435 456 (28 bit)
	default	33 554 432 (25 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)

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.

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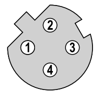
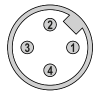
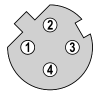
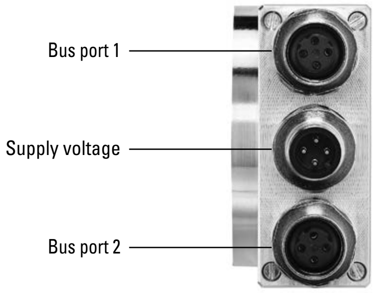
Terminal assignment

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		

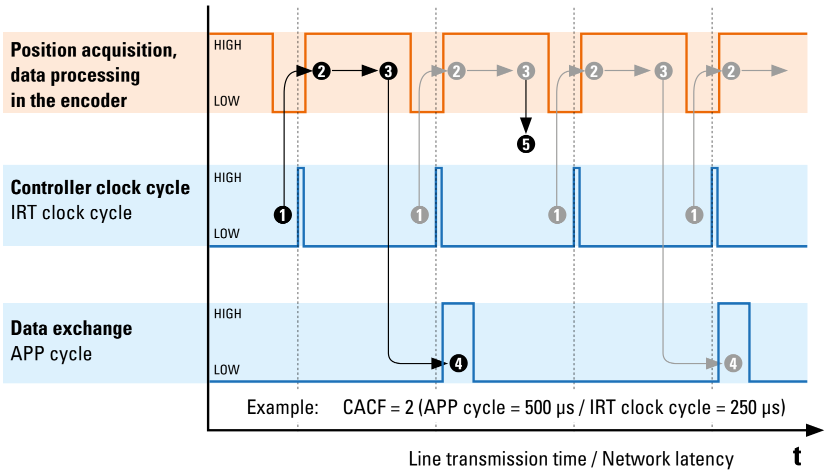


Technology in detail

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.

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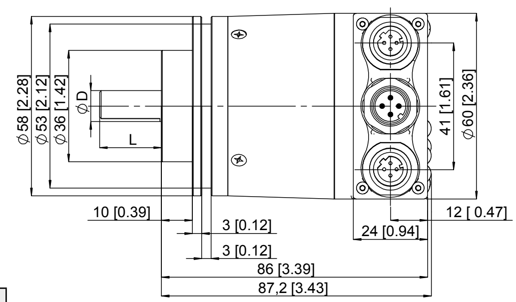
Dimensions shaft version, with removable bus terminal cover

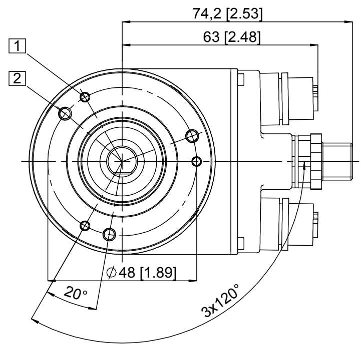
Dimensions in mm [inch]

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

1 3 x M3, 6.0 [0.24] deep

2 3 x M4, 8.0 [0.31] deep

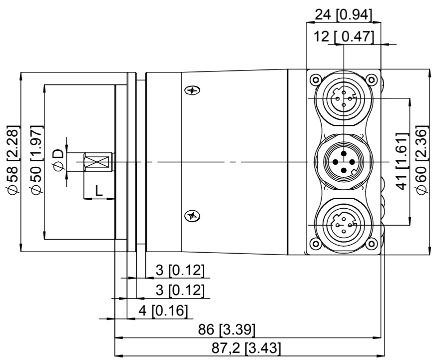


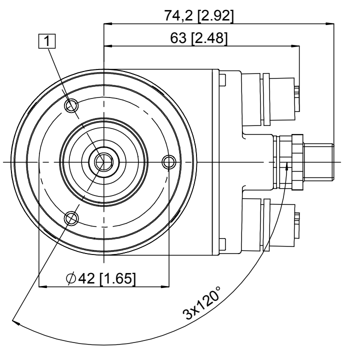


D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4“	h7	7/8“
3/8“	h7	7/8“

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

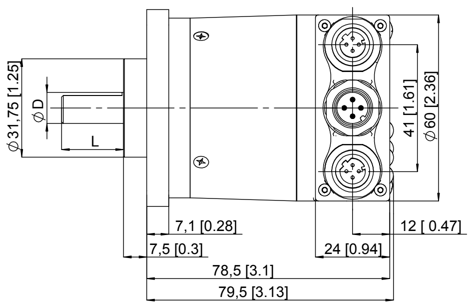
1 3 x M4, 6.0 [0.24] deep

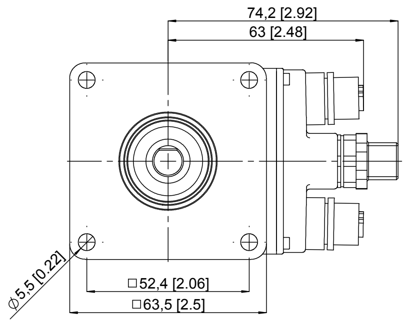




D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4“	h7	7/8“
3/8“	h7	7/8“

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

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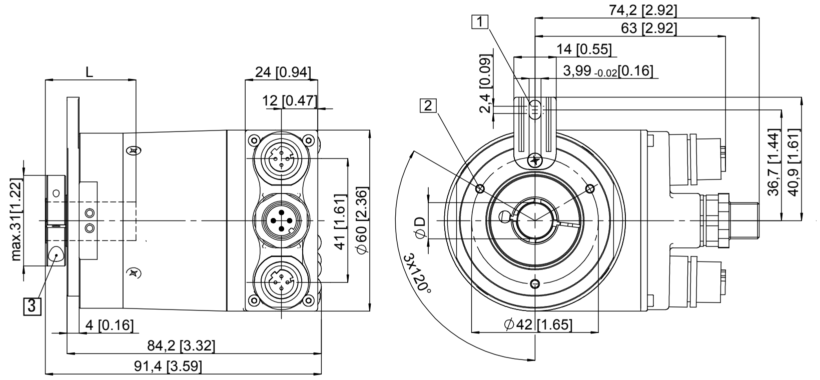
Dimensions hollow shaft version (blind hollow shaft), with removable bus terminal cover

Dimensions in mm [inch]

Flange with spring element, long
Flange type 1 and 2

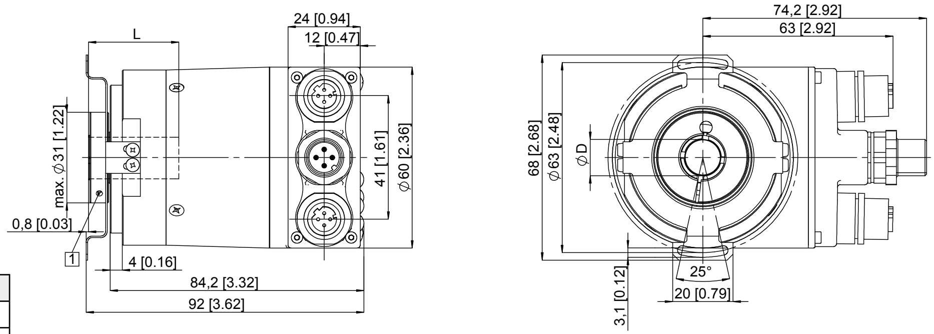
1. Slot spring element recommendation: torque pin DIN 7, ø 4 [0.16]
2. 3 x M3, 5.5 [0.22] deep
3. Recommended torque for the clamping ring 0.6 Nm



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

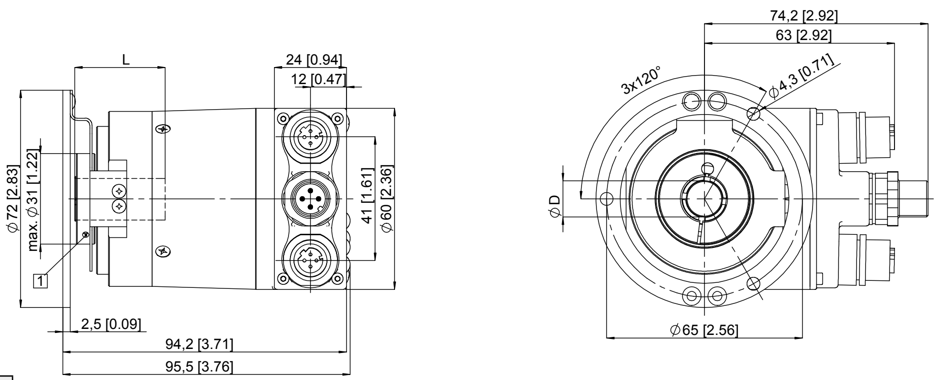
1. Recommended torque for the clamping ring 0.6 Nm



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		