

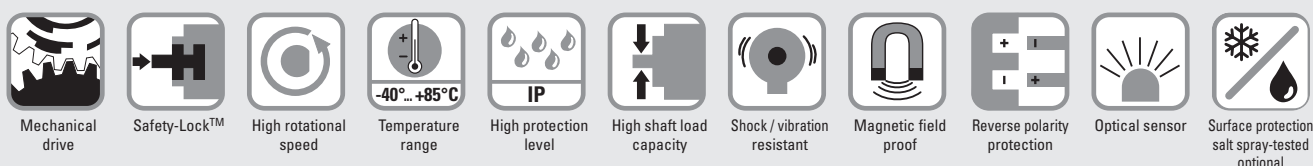
# Absolute encoders – multiturn

<b>Standard mechanical multiturn, optical</b>	<b>Sendix 5868 / 5888 (shaft / hollow shaft)</b>	<b>PROFINET IO</b>
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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.



## 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  $\geq 1$  ms.
- Firmware updater allows for easy expansion of characteristics without having to disassemble the encoder.

<b>Order code</b>	<b>8.5868</b>	<b>. X X C 2 . C 2 12</b>
<b>Shaft version</b>	Type	a b c d e

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces.  
Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



<b>a Flange</b> <u>1 = clamping flange, IP65 ø 58 mm [2.28"]</u> 3 = clamping flange, IP67 ø 58 mm [2.28"] <u>2 = synchro flange, IP65 ø 58 mm [2.28"]</u> 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>b Shaft (ø x L), with flat</b> <u>1 = 6 x 10 mm [0.24 x 0.39"]</u> <sup>1)</sup> <u>2 = 10 x 20 mm [0.39 x 0.79"]</u> <sup>2)</sup> 3 = 1/4" x 7/8" 4 = 3/8" x 7/8"	<b>c Interface / supply voltage</b> <u>C = PROFINET IO / 10 ... 30 V DC</u>	<b>e Fieldbus profile</b> <u>C2 = PROFINET IO</u>
		<b>d Type of connection</b> <u>2 = 3 x M12 connector, 4-pin</u>	Optional on request - Ex 2/22 - surface protection salt spray tested

<b>Order code</b>	<b>8.5888</b>	<b>. X X C 2 . C 2 12</b>
<b>Hollow shaft</b>	Type	a b c d e

If for each parameter of an encoder the underlined preferred option is selected, then the delivery time will be 10 working days for a maximum of 10 pieces.  
Qts. up to 50 pcs. of these types generally have a delivery time of 15 working days.



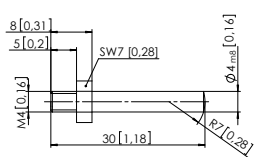
<b>a Flange</b> 1 = with spring element, long, IP65 2 = with spring element, long, IP67 3 = with stator coupling, IP65 ø 65 mm [2.56"] 4 = with stator coupling, IP67 ø 65 mm [2.56"] <u>5 = with stator coupling, IP65 ø 63 mm [2.48"]</u> 6 = with stator coupling, IP67 ø 63 mm [2.48"]	<b>b Blind hollow shaft</b> (insertion depth max. 30 mm [1.18"]) 3 = ø 10 mm [0.39"] <u>4 = ø 12 mm [0.47"]</u> 5 = ø 14 mm [0.55"] 6 = ø 15 mm [0.59"] 8 = ø 3/8" 9 = ø 1/2"	<b>c Interface / supply voltage</b> <u>C = PROFINET IO / 10 ... 30 V DC</u>	<b>e Fieldbus profile</b> <u>C2 = PROFINET IO</u>
		<b>d Type of connection</b> <u>2 = 3 x M12 connector, 4-pin</u>	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.
<b>Coupling</b>	bellows coupling ø 19 mm [0.75"] for shaft 6 mm [0.24"]	<b>8.0000.1102.0606</b>
	bellows coupling ø 19 mm [0.75"] for shaft 10 mm [0.39"]	<b>8.0000.1102.1010</b>

Mounting accessory for hollow shaft encoders	Dimensions in mm [inch]	Order no.
<b>Torque pin, ø 4 mm</b> for flange with spring element (flange type 1 + 2)	with fixing thread 	<b>8.0010.4700.0000</b>

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

Further Kübler accessories can be found at: [kuebler.com/accessories](http://kuebler.com/accessories)

Further Kübler cables and connectors can be found at: [kuebler.com/connection-technology](http://kuebler.com/connection-technology)

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## Technical data

Mechanical characteristics		
<b>Maximum speed</b>	IP65 up to 70 °C [158 °F]	9000 min <sup>-1</sup> , 7000 min <sup>-1</sup> (continuous)
	IP65 up to T <sub>max</sub>	7000 min <sup>-1</sup> , 4000 min <sup>-1</sup> (continuous)
	IP67 up to 70 °C [158 °F]	8000 min <sup>-1</sup> , 6000 min <sup>-1</sup> (continuous)
	IP67 up to T <sub>max</sub>	6000 min <sup>-1</sup> , 3000 min <sup>-1</sup> (continuous)
<b>Starting torque - at 20 °C [68 °F]</b>	IP65	< 0.01 Nm
	IP67	< 0.05 Nm
<b>Mass moment of inertia</b>	shaft version	3.0 x 10 <sup>-6</sup> kgm <sup>2</sup>
	hollow shaft version	7.5 x 10 <sup>-6</sup> kgm <sup>2</sup>
<b>Load capacity of shaft</b>	radial	80 N
	axial	40 N
<b>Weight</b>	approx. 0.54 kg [19.05 oz]	
<b>Protection</b> acc. to EN 60529	housing side	IP67
	shaft side	IP65, opt. IP67
<b>Working temperature range</b>	-40 °C ... +85 °C [-40 °F ... +185 °F]	
<b>Material</b>	shaft/hollow shaft	stainless steel
	flange	aluminum
	housing	zinc die-cast
<b>Shock resistance</b> acc. to EN 60068-2-27	2500 m/s <sup>2</sup> , 6 ms	
<b>Vibration resistance</b> acc. to EN 60068-2-6	100 m/s <sup>2</sup> , 55 ... 2000 Hz	

Electrical characteristics	
<b>Supply voltage</b>	10 ... 30 V DC
<b>Power consumption</b> (no load)	max. 200 mA
<b>Reverse polarity protection of the supply voltage</b>	yes

Interface characteristics PROFINET IO		
<b>Resolution singleturn (MUR)</b>	scalable	1 ... 65 536 (16 bit)
	default	8 192 (13 bit)
<b>Number of revolutions (NDR)</b>		1 ... 4 096 (12 bit) scalable only via the total resolution
<b>Total resolution (TMR)</b>	scalable	1 ... 268 435 456 (28 bit)
	default	33 554 432 (25 bit)
<b>Protocol</b>		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		
<b>UL compliant</b> in accordance with	File no. E224618	
<b>CE compliant</b> in accordance with	EMC Directive	2014/30/EU
	RoHS Directive	2011/65/EU
	ATEX Directive	2014/34/EU (for Ex 2/22 variants)
<b>UKCA compliant</b> in accordance with	EMC Regulations	S.I. 2016/1091
	RoHS Regulations	S.I. 2012/3032
	UKEX Regulations	S.I. 2016/1107 (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.



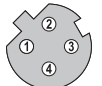
The **M**edia **R**edundancy **P**rotocol is implemented here.

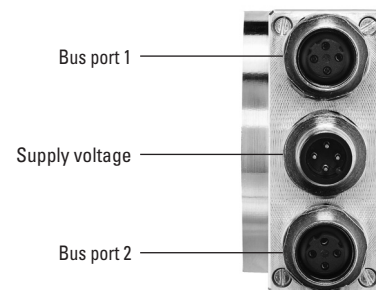
Basically, the advantage of MRP is that the functionality of the components, which are wired in a ring structure, is maintained in case of a failure or of a breakage of the wires in any location.

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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	



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**Standard  
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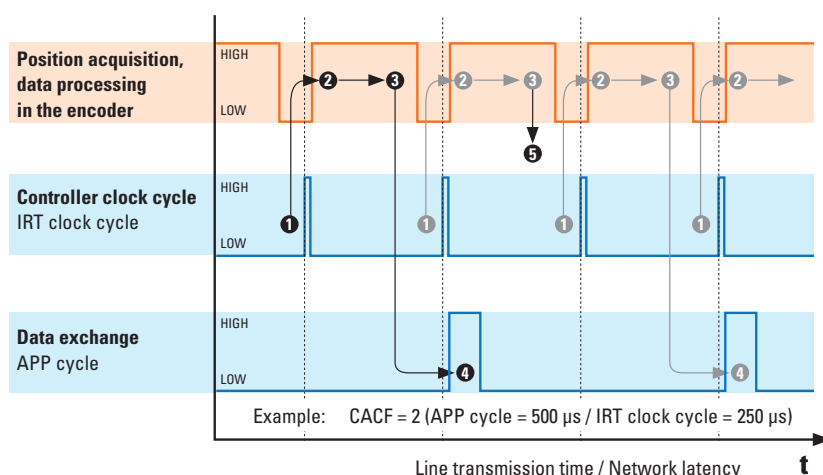
**PROFINET IO**

## 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.



#### 1 Clock specification by controller

IRT clock cycle = Transmit clock

#### 2 Data acquisition position signals

Internal sensor clock synchronizes with the IRT clock.  
Acquisition of the sensor raw values

#### 3 Data processing in the encoder

Position data is processed and written in the buffer memory of the encoder

#### 4 Data transmission via the network

At every application cycle (APP cycle), data is read from the buffer memory and transmitted to the controller.

#### 5 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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PROFINET IO

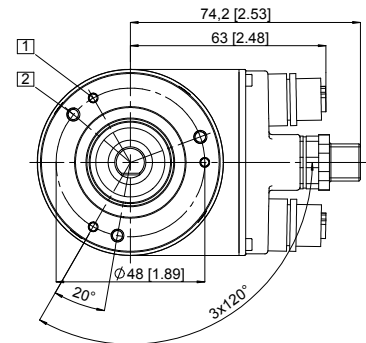
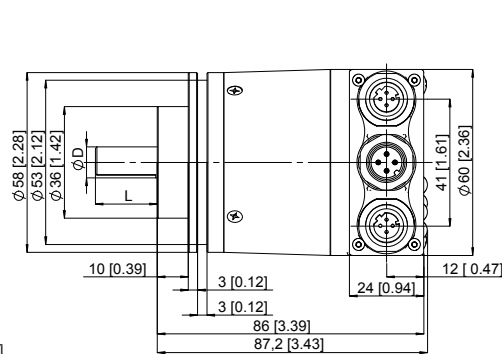
### Dimensions shaft version, with removable bus terminal cover

Dimensions in mm [inch]

#### Clamping flange, ø 58 [2.28]

##### Flange type 1 and 3

- 1 3 x M3, 6.0 [0.24] deep
- 2 3 x M4, 8.0 [0.31] deep

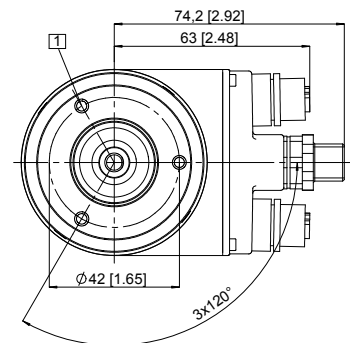
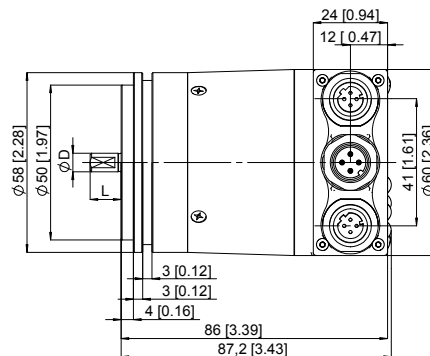


D	Fit	L
6 [0.24]	h7	10 [0.39]
10 [0.39]	f7	20 [0.79]
1/4"	h7	7/8"
3/8"	h7	7/8"

#### Synchro flange, ø 58 [2.28]

##### Flange type 2 and 4

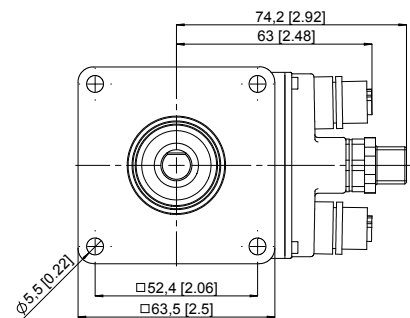
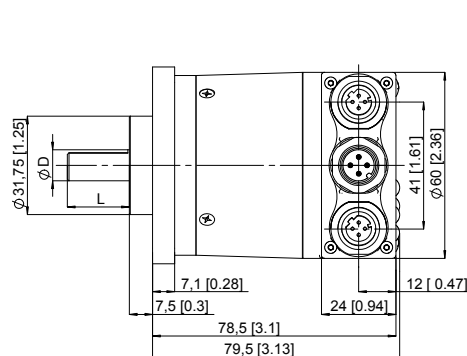
- 1 3 x M4, 6.0 [0.24] deep



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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**Sendix 5868 / 5888 (shaft / hollow shaft)**

**PROFINET IO**

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

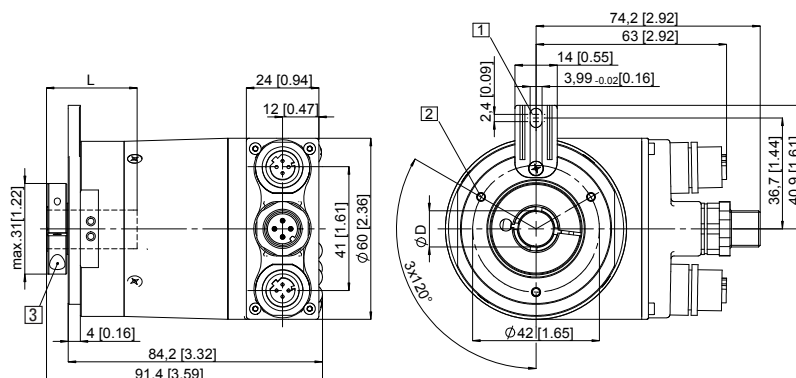
Dimensions in mm [inch]

### Flange with spring element, long Flange type 1 and 2

- 1 Slot spring element  
recommendation:  
torque pin DIN 7,  $\varnothing$  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

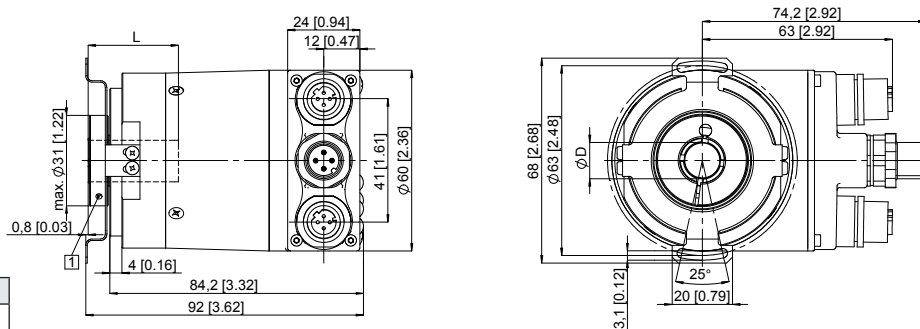


### Flange with stator coupling, $\varnothing$ 63 [2.48] Flange type 5 and 6

- 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, $\varnothing$ 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

