Standard optical | **Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)** | **Safety over EtherCAT (FSoE)**



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

They are characterized by high-resolution position values, gear factors, variable integration times and many other functionalities and, in combination with Cyber Security, are suitable for the flexible requirements of state-of-the-art industrial environments.

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



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.
- **100 % future-proof**
  - FoE (File over EtherCAT) without required web server.
  - Cyber Security / high system availability, protection against misuse (in accordance with IEC 62443).

Latest EtherCAT functionality

- Can be implemented in networks for hard real-time requirements with clock cycles of up to 350 µs (non-safe) thanks to DC mode support.
- Ideal for highly synchronous applications, such as axis synchronization.
- Equipped for a wide range of applications thanks to versatile encoder functions such as transmission factors (safe/non-safe) or limit value switches etc.

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Standard optical | **Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)** | **Safety over EtherCAT (FSoE)**

Order code Shaft version

8.S5858FS3 . X X B N . B1 3 1
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*
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
A = 10 x 20 mm [0.39 x 0.79“] (feather key DIN 6885 A-3x3x10)
D = 12 x 20 mm [0.47 x 0.79“] (feather key DIN 6885 A-4x4x10)
C = 3/8“ x 7/8“(feather key DIN 6885 A-3x3x10)

c *Interface / Supply voltage*
B = EtherCAT / 10 ... 30 V DC

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

e *Fieldbus profile*
B1 = EtherCAT – FSoE

f *Cyber Security*
3 = with Cyber Security

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

Order code Hollow shaft

8.S5878FS3 . X X B N . B1 3 1
Type — a b c d — e f

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, with feather keyway (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*
B = EtherCAT / 10 ... 30 V DC

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

e *Fieldbus profile*
B1 = EtherCAT – FSoE

f *Cyber Security*
3 = with Cyber Security

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

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Standard optical	Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)	Safety over EtherCAT (FSoE)

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

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Standard optical | **Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)** | **Safety over EtherCAT (FSoE)**

Technical data

Notes regarding "Functional Safety"

These encoders are suitable for use in safety-related systems up to SIL3 acc. to EN 61508 / EN 61800-5-2 / EN IEC 62061 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	
Safety Integrity Level (SIL) acc. to	EN 61508 EN 61800-5-2 EN IEC 62061
Performance Level (PL) acc. to	EN ISO 13849-1

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	5.0 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		
	shaft side	IP67
	on the housing side	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		
Frequency range		5 Hz ... 2000 Hz
Amplitude	5 ... 8,7 Hz	±0,35 mm
Acceleration	8,7 ... 200 Hz	30 m/s^2, (3 g)
	200 ... 2000 Hz	220 m/s^2, (22 g)

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	8 rpm (σ_v < 1 %)

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
Cyber Security the encoder complies with the standards	IEC 62443-4-1 and IEC 62443-4-2 according to Security Level 1

1) The specified value is based on a diagnostic coverage of 96,1 %, 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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Standard optical | **Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)** | **Safety over EtherCAT (FSoE)**

Interface characteristics EtherCAT

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)

Adjustable parameters

Safe and non-safe in each case:
- Preset
- Counting direction
- Resolution per revolution - MUR
- Total resolution - TMR
- Unit Speed
- Speed integration time
- Gear factor
- Limit value switch
- Safe Slave-Adresse
- Module Safe- / Non-Safe

EtherCAT FSoE characteristics

- FSoE
- CoE
- FoE
- Free Run Mode
- DC Mode - Non Safe up to 350 µs
- Hot Connect

Process data

- Position
- Speed
- Acceleration
- Working range channel 1 / channel 2
- Status
- Failure
- Warnings

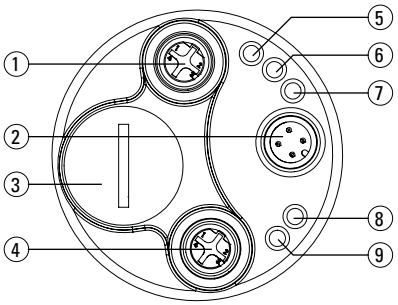
Terminal assignment bus

Interface	Type of connection	Function	M12 connector, 4-pin					
B	N (3 x M12 connector)	Bus Port 1 Port OUT	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 Port IN	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	EtherCAT – Port OUT	
②	Supply voltage	
③	Cover screw	
④	EtherCAT – Port IN	
⑤	L/A - Link Activity	flashes yellow when connected
⑥	ERR - Error	displays network errors *)
⑦	RUN	EtherCAT status *)
⑧	ENC	shows status of encoder *)
⑨	L/A - Link Activity	flashes yellow when connected

*) see manual



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Standard optical | **Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)** | **Safety over EtherCAT (FSoE)**

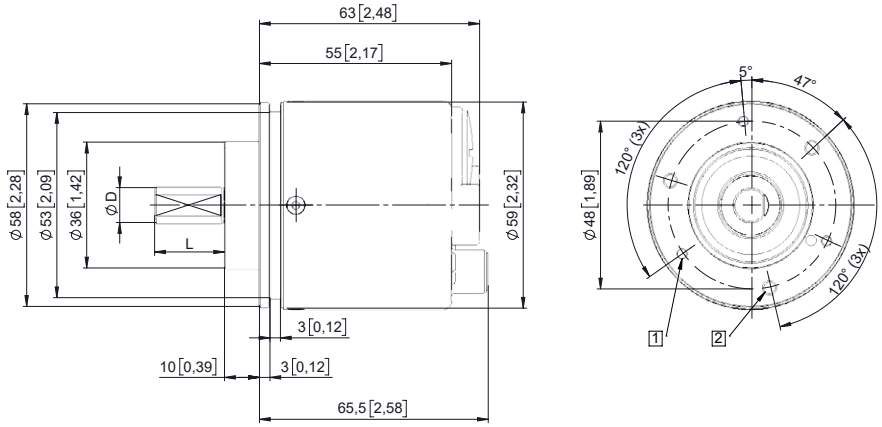
Dimensions shaft version

Dimensions in mm [inch]

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

1 3 x M3, 6 [0.24] deep

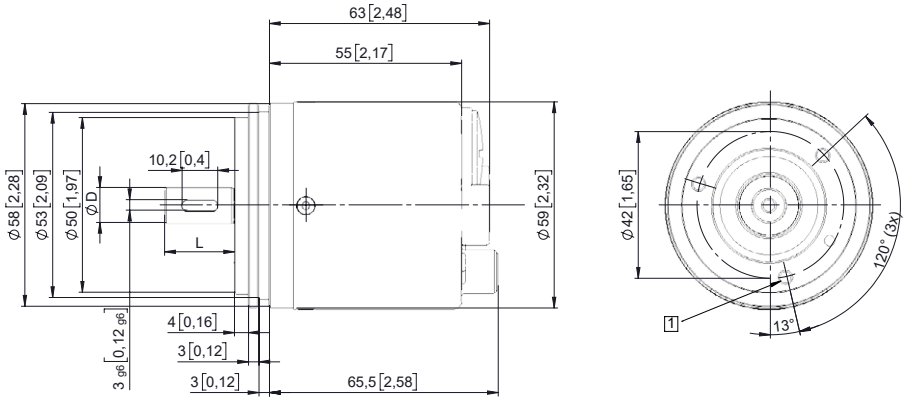
2 3 x M4, 8 [0.31] deep



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

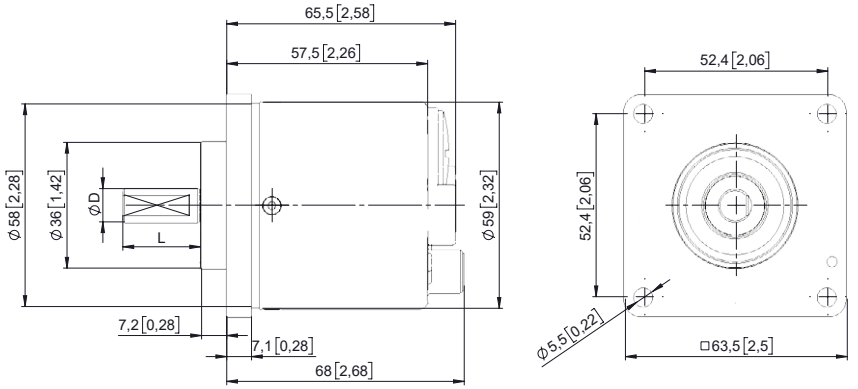
Synchro flange, ø 58 [2.28]
Flange type 2 + 4

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“

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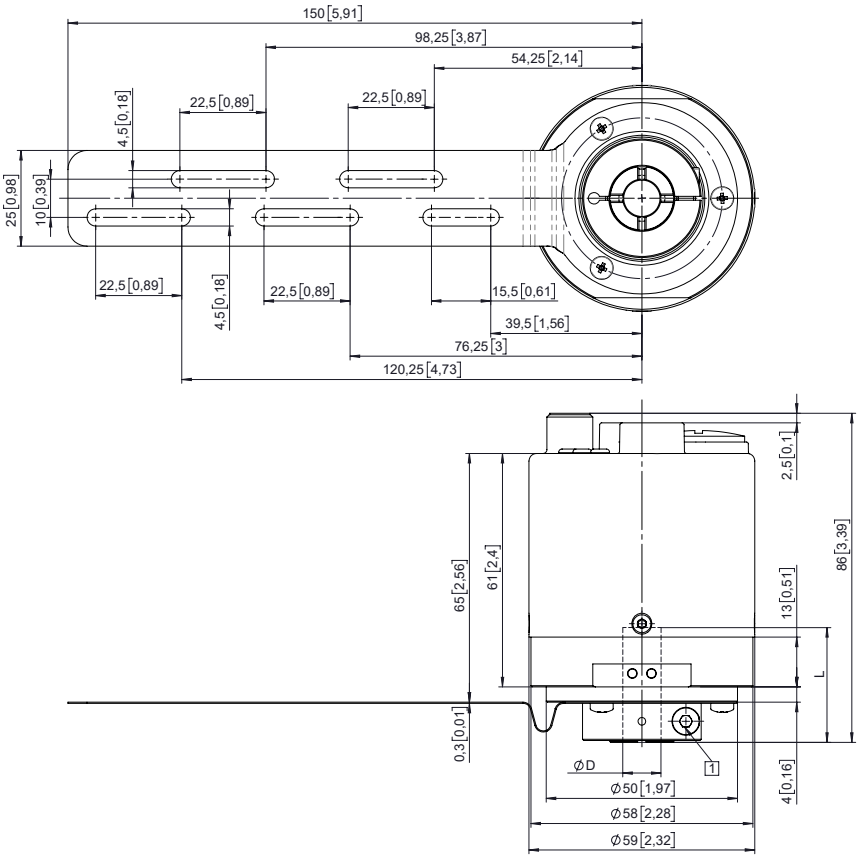
Standard optical | **Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)** | **Safety over EtherCAT (FSoE)**

Dimensions hollow shaft version

Dimensions in mm [inch]

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

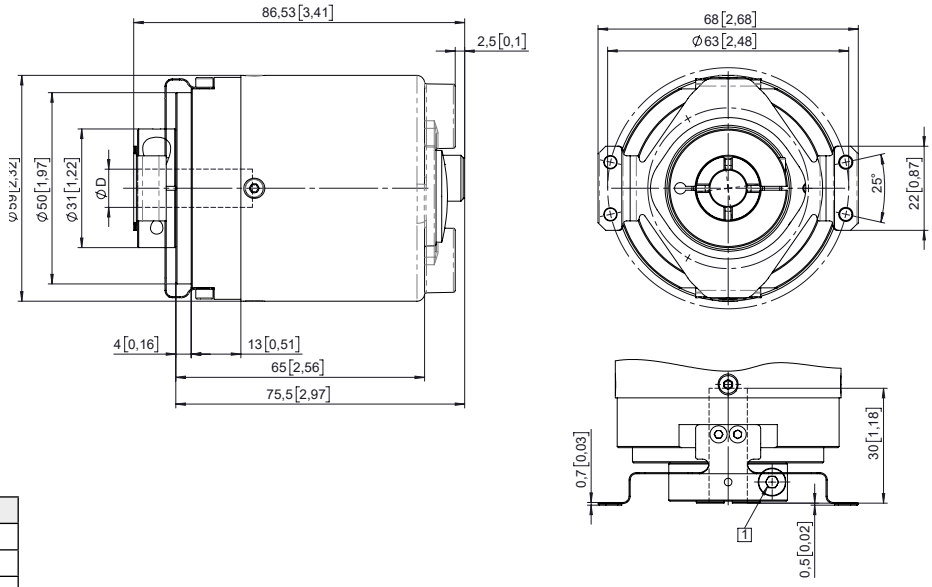
1 Recommended torque for the clamping ring 2.5 Nm



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		

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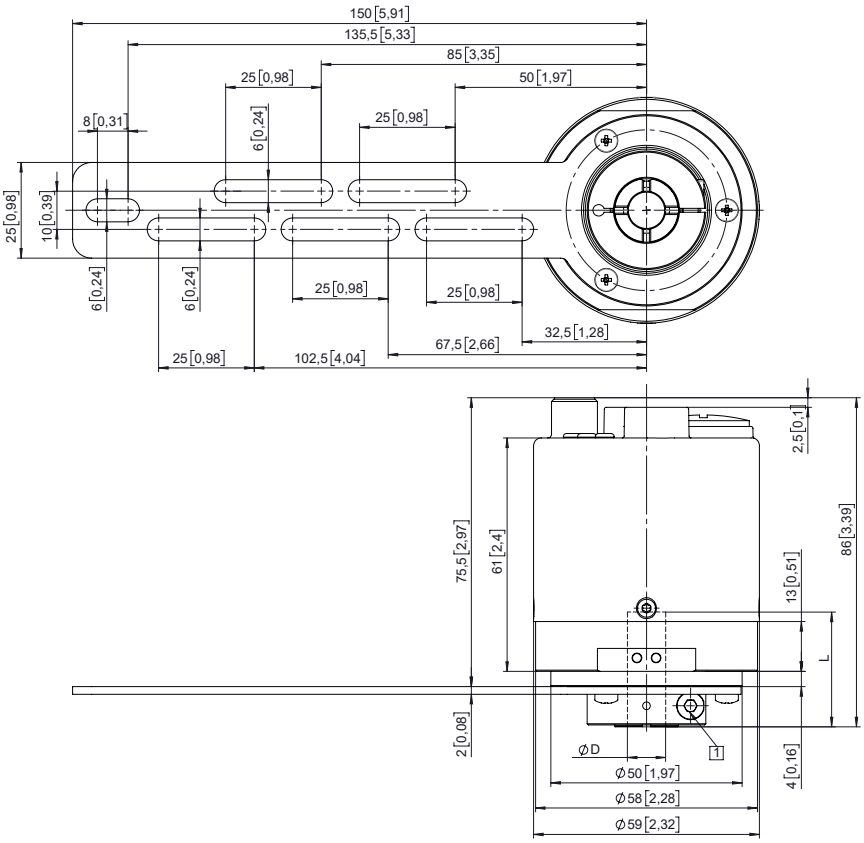
Standard optical | **Sendix S5858FS3 / S5878FS3 (shaft / hollow shaft)** | **Safety over EtherCAT (FSoE)**

Dimensions hollow shaft version

Dimensions in mm [inch]

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

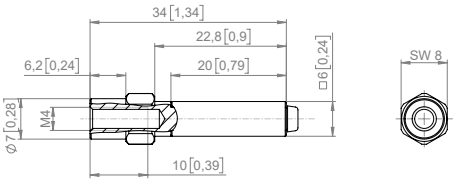
1 Recommended torque for the clamping ring 2.5 Nm



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)



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