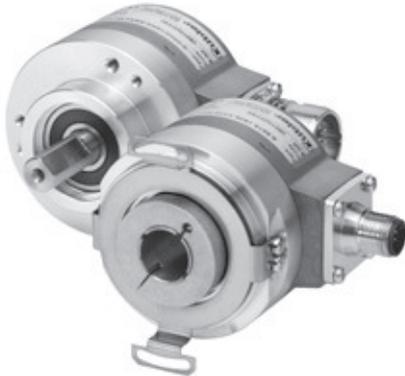# Absolute Encoders - Singleturn

Standard, optical	Sendix 5853 / 5873 (Shaft / Hollow shaft)	SSI / BiSS

The Sendix 5853 and Sendix 5873 singleturn encoders with SSI or BiSS interface and optical sensor technology can achieve a resolution of max. 17 bits.

These encoders are also available with an optional SinCos output or RS422 incremental track.

Ex 2/22   c(UL)us   RoHS   SSI   BiSS INTERFACE

| Safety-Lock™ | Temperature -40° +90° | High IP value | High shaft load capacity | Shock / vibration resistant | Magnetic field proof | Short-circuit proof | Reverse polarity protection | SinCos | Optical sensor | Seawater-resistant version on request |

Reliable and magnetically 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 incremental outputs SinCos and RS422
- Short control cycles, clock rate with SSI up to 2 MHz / with BiSS up to 10 MHz

---

Order code
Shaft version

8.5853 . XXXX . XX2X
Type   a b c d   e f g h

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.

10 by 10

a *Flange*
1 = clamping flange, ø 58 mm, IP65
2 = synchro flange, ø 58 mm, IP65
3 = clamping flange, ø 58 mm, IP67
4 = synchro flange, ø 58 mm, IP67
5 = square flange, 63,5 mm (2,5"), IP65
7 = square flange, 63,5 mm (2,5"), IP67

b *Shaft (ø x L), with flat*
1 = 6 x 10 mm [1]
2 = 10 x 20 mm [2]
3 = 6,35 x 22,2 mm (1/4" x 7/8")
4 = 9,5 x 22,2 mm (3/8" x 7/8")

c *Interface / Power supply*
1 = SSI or BiSS / 5 V DC
2 = SSI or BiSS / 10 … 30 V DC
3 = SSI or BiSS, 2048 ppr SinCos / 5 V DC
4 = SSI or BiSS, 2048 ppr SinCos / 10 … 30 V DC
5 = SSI or BiSS / 5 V DC, with sensor output for monitoring the voltage on the encoder
6 = SSI oder BiSS, 2048 ppr SinCos / 5 V DC, with sensor output for monitoring the voltage on the encoder
7 = SSI or BiSS and 2048 ppr incremental signals RS422 (TTL-comp.) / 5 V DC
8 = SSI or BiSS and 2048 ppr incremental signals RS422 (TTL-comp.) / 10 … 30 V DC
9 = SSI or BiSS and 2048 ppr incremental signals RS422 (TTL-comp.) / 5 V DC, with sensor output for monitoring the voltage on the encoder

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

e *Code*
B = SSI, Binary
C = BiSS, Binary
G = SSI, Gray

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

g *Inputs / Outputs* [3]
2 = SET, DIR input
    additional status output

h *Options (Service)*
1 = no option
2 = Status LED
3 = SET button and Status LED

optional on request
- Ex 2/22
- seawater-resistant
- special cable length

---

1) Preferred type only in conjunction with Flange type 2
2) Preferred type only in conjunction with Flange type 1
3) Resolution, preset value and counting direction factory-programmable
4) Can be combined only with output circuits 1 and 2

Absolute Encoders - Singleturn

Standard, optical	Sendix 5853 / 5873 (Shaft / Hollow shaft)	SSI / BiSS

Order code Hollow shaft	8.5873 . XXXX . XX2X Type ⓐⓑⓒⓓ ⓔⓕⓖⓗ	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.	10 by 10

ⓐ *Flange*
1 = with torque stop set, IP65
2 = with torque stop set, IP67
3 = with stator coupling, ø 65, IP65
4 = with stator coupling, ø 65, IP67
5 = with stator coupling, ø 63, IP65
6 = with stator coupling, ø 63, IP67

ⓑ *Hollow shaft*
3 = ø 10 mm
4 = ø 12 mm
5 = ø 14 mm
6 = ø 15 mm
8 = ø 9.52 mm [3/8"]
9 = ø 12.7 mm [1/2"]

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

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

ⓔ *Code*
B = SSI, Binary
C = BiSS, Binary
G = SSI, Gray

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

ⓖ *Inputs / Outputs* [1]
2 = SET, DIR input
    additional status output

ⓗ *Options (Service)*
1 = no option
2 = Status LED
3 = SET button and Status LED

optional on request
- Ex 2/22
- seawater-resistant
- special cable length

Mounting accessory for shaft encoders		
Coupling	Bellows coupling ø 19 mm for shaft 6 mm	**8.0000.1101.0606**
	Bellows coupling ø 19 mm for shaft 10 mm	**8.0000.1101.1010**

Mounting accessory for hollow shaft encoders		
Cylindrical pin, long for torque stops	With fixing thread	**8.0010.4700.0000**

Connection Technology		
Connector, self-assembly	M12	**05.CMB-8181-0**
	M23	**8.0000.5012.0000**
Cordset, pre-assembled with 2 m PVC cable	M12	**05.WAKS8-2/P00**
	M23	**8.0000.6901.0002.0031**

Further accessories can be found in the Accessories section or in the Accessories area of our website at: www.kuebler.com/accessories.
Additional connectors can be found in the Connection Technology section or in the Connection Technology area of our website at: www.kuebler.com/connection_technology.

1) Resolution, preset value and counting direction factory-programmable
2) Can be combined only with output circuits 1 and 2

Absolute Encoders - Singleturn

Standard, optical	Sendix 5853 / 5873 (Shaft / Hollow shaft)	SSI / BiSS

Mechanical characteristics

Max. speed, shaft version

without shaft seal (IP65) up to 70°C	12 000 min^{-1}, 10 000 min^{-1} (continuous)
without shaft seal (IP65) up to T$_{max}$	8 000 min^{-1}, 5 000 min^{-1} (continuous)
with shaft seal (IP67) up to 70°C	11 000 min^{-1}, 9 000 min^{-1} (continuous)
with shaft seal (IP67) up to T$_{max}$	8 000 min^{-1}, 5 000 min^{-1} (continuous)

Max. speed, hollow shaft version

without shaft seal (IP65) up to 70°C	9 000 min^{-1}, 6 000 min^{-1} (continuous)
without shaft seal (IP65) up to T$_{max}$	6 000 min^{-1}, 3 000 min^{-1} (continuous)
with shaft seal (IP67) up to 70°C	8 000 min^{-1}, 4 000 min^{-1} (continuous)
with shaft seal (IP67) up to T$_{max}$	4 000 min^{-1}, 2 000 min^{-1} (continuous)

Starting torque, shaft version

without shaft seal (IP65)	< 0.01 Nm
with shaft seal (IP67)	< 0.05 Nm

Starting torque, hollow shaft version

without shaft seal (IP65)	< 0.03 Nm

Moment of inertia

Shaft version	3.0 x 10^{-6} kgm^2
Hollow shaft version	6.0 x 10^{-6} kgm^2

| Load capacity of shaft | radial | 80 N |
| | axial | 40 N |

Weight	approx. 0.35 kg

| **Protection EN 60 529** | housing side | IP67 |
| | shaft side | IP65, opt. IP67 |

EX approval for hazardous areas	optional Zone 2 and 22
Working temperature range	-40°C ... +90°C [1]

Materials	shaft/hollow shaft	stainless steel
	flange	aluminium
	housing	zinc die-cast housing
	cable	PVC

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

General electrical characteristics

Power supply		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 connection of the supply voltage (U$_B$)		yes (at 10 ... 30 V DC)
UL-certified		File 224618
CE compliant acc. to		EN 61000-6-2, EN 61000-6-4 and EN 61000-6-3
RoHS compliant acc. to		EU guideline 2002/95/EG

General interface characteristics

Output driver		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
Short circuit proof outputs		yes [2]

SSI Interface

Singleturn resolution		10…14 bit and 17 bit [3]
Code		Binary or Gray
SSI clock rate	≤ 14 bit	50 kHz ... 2 MHz
	≥ 15 bit	50 kHz ... 125 kHz
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.

Data refresh rate	< 1 µs	up to 14 bit
	4 µs	with 15 ... 17 bit
Status and Parity bit		on request

BiSS Interface

Singleturn resolution	10…14 bit and 17 bit, Programmable at the customer [3]
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	≤ 1 µs

Note::
– Bidirectional, programmable parameters are: resolution, code, direction, alarms and warnings
– CRC data verification

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
Response time (DIR input)		1 ms

The encoder can be set to zero at any position by means of a HIGH signal on the SET input or by pressing the optional SET 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.

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 22k).

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 power-supply to the device.

Absolute Encoders Singleturn

Standard, optical	**Sendix 5853 / 5873 (Shaft / Hollow shaft)**	**SSI / BiSS**

DIR 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.

Power-ON delay

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

Option Incremental outputs (A/B), 2048 ppr

	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	yes

Terminal assignment

For output circuit 1 or 2 and type of connection 1, 2, 3 or 4 (2 control inputs, 1 status output)

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

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

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

For output circuit 3, 4, 7 or 8 and type of connection 1, 2, 3 or 4 (2 control inputs, incremental track RS422 or SinCos)

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

For output circuit 6 or 9 and type of connection 1, 2, 3 or 4 (SinCos or Incremental track, sensor outputs for voltage)

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

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

Signal:	GND	+V	+C	-C	+D	-D	SET	DIR	Shield/PE
M23 connector:	1	2	3	4	5	6	7	8	PH

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

Top view of mating side, male contact base
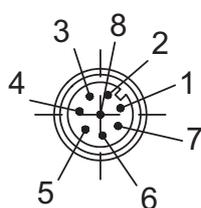
M12 connector, 8-pin
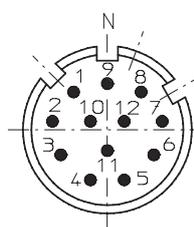
M23 connector, 12-pin

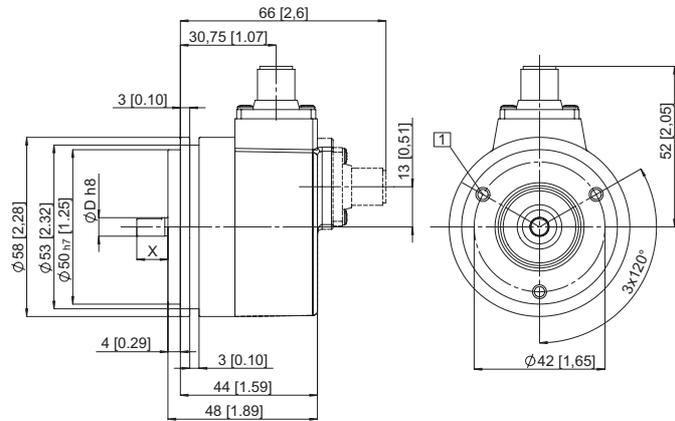| Standard, optical	Sendix 5853 / 5873 (Shaft / Hollow shaft)	SSI / BiSS

Dimensions shaft version

Synchro flange, ø 58 mm, M12, M23 connector, cable version
Flange type 2 and 4
(Drawing with M12 connector)
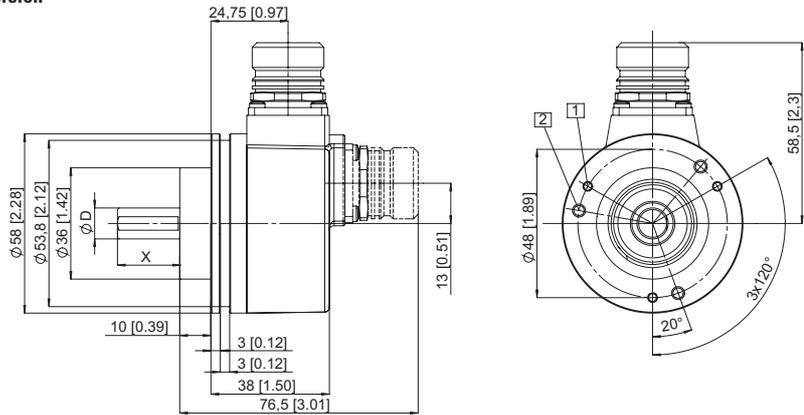
1 3 x M4, 6 [0.24] deep

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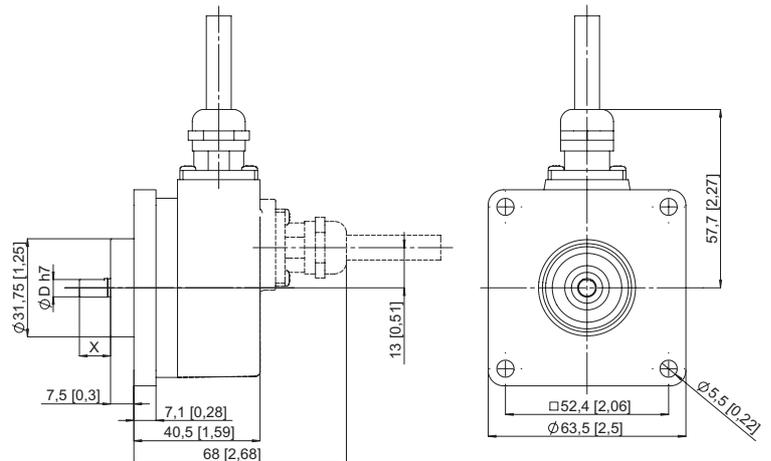(Drawing with M23 connector)

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

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

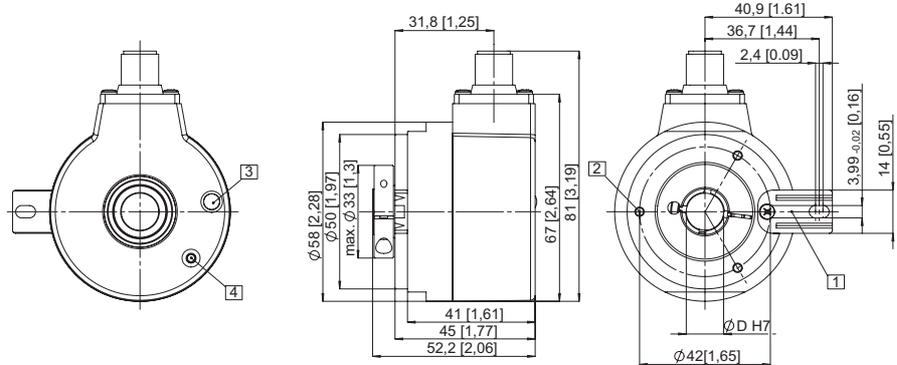| Standard, optical	Sendix 5853 / 5873 (Shaft / Hollow shaft)	SSI / BiSS

Dimensions hollow shaft version

Flange with torque stop set, long, ø 58 mm
M12, M23 connector, cable version
Flange type 1 and 2
(Drawing with M12 connector)

1 Torque stop slot,
Recommendation:
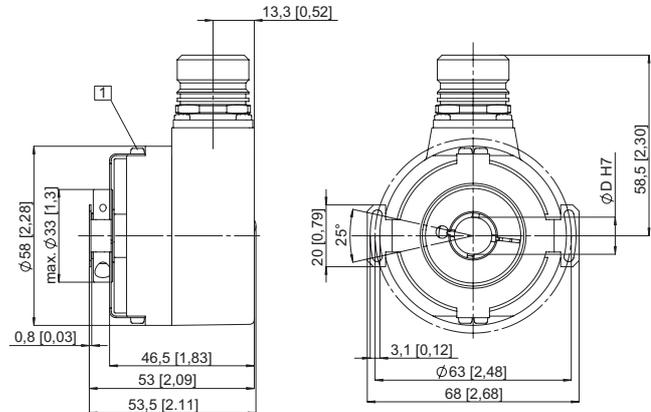Cylindrical pin DIN7, ø 4 mm
2 3 x M3, 6 [0.24] deep
3 Status LED
4 SET button

Flange with stator coupling, ø 58 mm
M12, M23 connector, cable version
Flange type 5 and 6
Pitch circle diameter for fixing screws 63 mm
(Drawing with M23 connector)

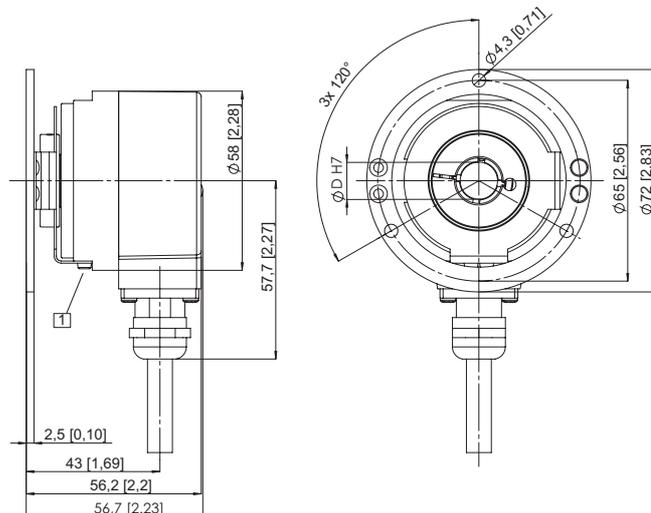1 Fixing screws DIN 912 M3 x 8
(Washer included in delivery)

Flange with stator coupling, ø 58 mm
M12, M23 connector, cable version
Flange type 3 and 4
Pitch circle diameter for fixing screws 65 mm
(Drawing with cable)

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

Flange with torque stop set, long, ø 58 mm
tangential cable outlet

1 Torque stop slot,
Recommendation:
Cylindrical pin DIN7, ø 4 mm
2 3 x M3, 5.5 [0.21] deep
3 Status LED
4 SET button