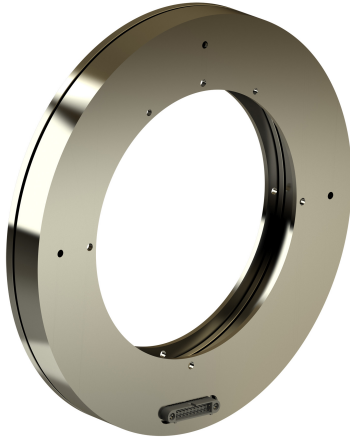




- **Contactless, wear-free sensor system**
- **Includes two interfaces**
 - **Motorfeedback based on SSI or BiSS**
 - **Safety based on FSoE or PROFIsafe**
- **SIL2 and PLd**
- **Safe position and safe speed signal**
- **Resolution up to 2 097 152 steps / 360° <) (21-bit)**
- **Ultra compact version with a diameter of 50 mm and narrow installation height of 15 mm**



KEY INFORMATION OVERVIEW

DESIGN & FUNCTION

Recording of the angular position - absolute singleturn transmission - data output plus parameterisation and diagnosis via PROFINET or EtherCAT - data output via SSI or BiSS.

Robust housing manufactured from seawater-resistant aluminium - electrical connection via connector or cable outlet.

Two-part design with active stator and passive rotor.

Simultaneous position output via the non-safe interface (SSI or BiSS) and the safe interface (FSoE or ProfiSAFE).

FEATURES INTERFACE

The dual use of two interfaces allows different requirements to be covered by just one device.

- A SSI or BiSS interface optimized for low delay for use as a motor feedback sensor.
- A complex safety-oriented interface such as EtherCAT or ProfiSAFE to meet functional safety requirements.
 - FSoE (FailSafe over EtherCAT) protocol. The FSoE protocol is implemented according to the Safety over EtherCAT specification ETG.5100 version 1.2.0.
 - The PROFIsafe protocol is implemented according to the PROFIsafe Profile for Safety Technologie (PNO Order No. 3.192) version 2.4 and version 2.6

GENERAL INFORMATION

The aim of this device is to combine the two applications - fast feedback for a motor and safe signals. For this purpose, the available interfaces with different requirements are selected and implemented.

A selection of interfaces optimized for short delays between sensor value recording and output consists of SSI and BiSS. These interfaces are not intended to change the parameters of the rotary encoder, but are used purely - as directly as possible - to output the position value. Not all signal post-processing is available

via these interfaces.

The much more complex interfaces such as EtherCAT and PROFINET not only allow safe output of position and speed, but also parameterization of the encoder. The extended options for post-processing and parameters result in a longer delay between data acquisition and output for these interfaces. The focus of these interfaces lies on the safe output of position and speed and the wide range of options for parameterizing the encoder behaviour via the PLC.

TECHNICAL DATA

ELECTRICAL DATA

Sensor system	inductive
Operating voltage	+ 9 VDC to + 36 VDC (reverse voltage protection)
Power consumption	< 3 W
Switch-on current	< 500 mA
Resolution	SSI/BiSS: 16-21 bit EtherCAT/PROFIsafe: 16 bit 16 bit - 65 536 steps / 360° 21 bit - 2 097 152 steps / 360°
Measuring range	1 revolution
	Digital multiturn for SSI/BiSS interface up to 24 bit (upon request)
Absolute accuracy of the position value	SSI/BiSS without calibration . . . 12 bit with calibration 15 bit FSOE/PROFIsafe . . . without calibration . . . 12 bit with calibration 17 bit
Absolute accuracy of the speed value	± 0.4 % (related to the maximum value of 32 767 steps/gate time)
Output code	binary
Code path	CW / CCW
Speed signal	16-bit, with prefix, unit: steps / gate time (gate time adjustable in the 10 ... 1000 ms range, default: 10 ms)

INPUT DATA*

EtherCAT	2 bytes status word 4 bytes position data 2 bytes speed data	PROFINET	2 bytes status word 4 bytes position data 4 bytes position data
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OUTPUT DATA*

EtherCAT	2 bytes control word	PROFINET	2 bytes control word 4 bytes reference value
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ETHERCAT DATA

Transfer technology	100 Base-TX
Transfer rate	100 MBit/s
Cable length	Max. 100 m (between two subscribers)

PROFINET DATA

Transfer technology	100 Base-TX
Transfer rate	10 / 100 MBit/s
Cable length	Max. 100 m (between two subscribers)
Minimum transmission cycle	250 µs
Profinet version	V2.45
Profisafe version	V2.6
Encoder profile version	V1.0

* From the point of view of the control system.

TECHNICAL DATA

SYSTEM DATA

Duty cycle (rise time) supply voltage 500 ms (10 % to 90 %)
 Boot up time < 500 ms
 Maximum usage duration 20 years (higher values on demand)

MECHANICAL DATA

Operating speed 30 000 rpm max.
 Acceleration t.b.d.

ENVIRONMENTAL DATA

Operating temperature range -40°C to +70°C
 Storage temperature range -40°C to +100°C (without packagin)
 Resistance To shock 500 m/s²; 11 ms (DIN EN 60068-2-27)
 To vibration 250 m/s²; 10 to 2000 Hz (DIN EN 60068-2-6)
 Protection type IP66/IP67, IP69K optional (DIN EN 60529)
 Salt mist test Test Kb according to IEC60068-2-52

EMC STANDARDS

EN 61000-6-4:2006 + A1:2011	EMC Part 6-4: Generic standards-Emission standard for industrial environments
EN 61000-6-2:2005	EMC Part 6-2: Generic standards-Immunity for industrial environments
EN 61000-4-2:2009	EMC Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test
EN 61000-4-3:2006 A1:2008 + A2:2010	EMC Part 4-3: Testing and measurement techniques - Radiated, radio frequency, electromagnetic field immunity test
EN 61000-4-4:2004	EMC Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test
EN 61000-4-5:2006	EMC Part 4-5: Testing and measurement techniques - Surge immunity test
EN 61000-4-6:2009	EMC Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
EN 61000-4-8:2010	EMC Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test. Power frequency magnetic field immunity test: 30 A/m, test criterion A, 100 A/m, test criterion B
EN 61000-4-16:2016	EMC Part 4-16: Testing and measurement techniques - Test for immunity to conducted, common mode disturbance in the frequency range 0 Hz to 150 kHz
EN 61000-4-29:2000	EMC Part 4-8: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests
IEC 61326-3-2:2018	Electrical equipment for measurement, control and laboratory use - EMC requirements Part 3-2: Immunity for safety-related systems and for equipment intended to perform safety related functions (functional safety) - industrial applications with specified electromagnetic environment

TECHNICAL DATA

SAFETY DATA

Safety values acc. to EN 61508	PFH	t.b.d.
	SFF	t.b.d.
	HFT	0
	SIL	SIL2
Safety values acc. to EN 13849-1	MTTFd - 20 years . . .	t.b.d.
	DC	t.b.d
	Category	2
	Performance Level . .	PLd
Max. operating life	20 years (longer operating life on request)	

ELECTRICAL CONNECTION - PINOUT

ELECTRICAL CONNECTION

The encoder itself is equipped with a compact modular plug. This connector contains the signals of all interfaces. The interface-typical plugs are provided via an adapter.

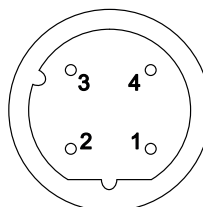
EtherCAT/PROFINET M12 connector D coded, 4 pin, female for port 1 and port 2 or cable output via cable glands
Power supply M12 connector A coded, 4 pin, male or cable output via cable gland.

Other plug designs with customer-specific assignments are possible on request.
Please observe the connection assignment TYxxxxx enclosed with each device.

PROFINET CONNECTOR, 2 X M12, D-CODED, SOCKET/FEMALE

PIN. Function

1 TX+
2 RX+
3 TX-
4 RX-



PROFINET CABLE OUTPUT (2X)

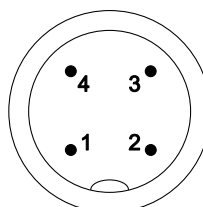
Colour* Function

Yellow TX+
White RX+
Orange TX-
Blue RX-

SUPPLY CONNECTOR, M12, A-CODED, PINS/MALE

PIN. Function

1 +UB (+24 VDC)
2 not used
3 -UB (0 VDC)
4 not used



SUPPLY CABLE OUTPUT

Colour. Function

White +UB (+24 VDC)
Brown -UB (0 VDC)

CABLE OUTPUT ETHERCAT

Cable type PROFINET Type-C, 4 x 0,36 mm² (AWG22)
Cable jacket. PUR, color: green
Temperatur range . . . - 40 °C to + 70 °C
Outer diameter 6,5 mm ± 0,2 mm
Min. bend radius . . . 5 x d fixed installation, 10 x d freely movable

CABLE OUTPUT SUPPLY

Cable type 2 x 0,75 mm², shielded
Cable jacket. PUR, color: gray
Temperatur range . . . - 40 °C to + 80 °C fixed installation, - 5 °C to + 70 °C freely movable
Outer diameter 6 mm
Min. bend radius . . . 6 x d fixed installation, 15 x d freely movable

* Industrial Ethernet cable colours according to ISO/IEC 8802 3

ORDER CODE FORMAT

LB **B** **K** **180** **A** **S** **S** **16** **R** **S** **B** **K** **01** **STANDARD VERSION**

LB	LB Absolute inductive encoder		
B	Interface 1	B E	BiSS SSI
K	Interface 2	K T	EtherCAT / FsoE interface PROFINET / PROFIsafe interface (can be empty)
180	Size	50 - 220	in mm. Approximately to the outer diameter of the sensor unit Individual sizes on request
A	Housing material	A S	Aluminium 3.2315 (AlMgSi1) Stainless steel 1.4305 (AISI 303)
S	Mounting stator	S C	Screw connection Clamp connection
S	Mounting rotor	S C	Screw connection Clamp connection
16	Resolution	16	16 bit = 65 536 Steps / 360° <)
R	Output code	R	Binary code
S	Electrical connection	S	Axial connector
B	Output 1	B E	BiSS-Interface SSI-Interface
K	Output 2	K T	EtherCAT 100Base-TX PROFINET 100Base-TX (can be empty)
01	Electrical and mechanical variants*	01	Standard

* The basic versions according to the data sheet bear the number 01. Deviations are identified with a variant number and are documented at TWK.

DOCUMENTATION

DOCUMENTATION

The following documents can be found in the Internet under www.twk.de/en in the documentation area, model LBxx.

Data sheet	17306
Manual	t.b.d.
Common connection assignment	t.b.d.
	(special variants may have a separate connection assignment on request)
Certificate SIL2	t.b.d.
EtherCAT	Certificate EtherCAT t.b.d.
	Certificate FSoE t.b.d.
	ESI files t.b.d.
PROFINET	Certificate PROFINET t.b.d.
	Certificate PROFIsafe t.b.d.
	GSD files t.b.d.
Reach compliant	QS15286
RoHS compliant	QS13284
CE Declaration of conformity	ZE12467
UKCA Declaration of conformity	ZE16569
Installation instructions	t.b.d.
CRC checksum calculation program	www.twk.de/files/CRC-Calculator20.zip