



### Key Features

- EHEDG: Tested hygienic design
- Salt mist resistant according to DIN EN 60068-2-11
- Ecolab certified - robust against detergents and disinfectants
- IP67 + IP69k allows high pressure /steam jet cleaning
- Ø58 mm housing, Ø10 mm solid shaft
- Stainless steel housing specially surface-finished
- System accuracy < 0.35° (singleturn)
- Gap-less PTFE shaft sealing element
- Singleturn resolution from 1 to 16 bit
- Battery-less and gear-less energy harvesting multiturn true-power-on electronics with 32 bit  $\mu$ Processor
- Multiturn resolution from 1 to 43 bit

### Applications

- Onshore/offshore applications in a high salinity atmosphere
- Food processing industry
- Medical applications
- Machines with a high degree of contamination

### FHx58 encoders are the most robust encoders in MEGATRON's portfolio

The design of the FHx58 is optimized for applications

- which are cleaned with water or steam and both with or without chemical additives
- with high hygiene requirements (e.g. medical technology, food industry)
- which come into contact with salt water such as in coastal regions / near the sea or at sea
- where high radial and axial loads act on the encoder shaft

The contactless magnetic measurement technology is a guarantee for a very long service life. The high system accuracy is ensured by calibrating each encoder to a standard at the factory.

Absolutwertgeber FHB58 mit CANopen oder FHS58 mit SSI	Inkrementalgeber FHI58
<b>Single turn</b> <ul style="list-style-type: none"> <li>▪ System accuracy <math>\pm 0.0878^\circ</math> (<math>\leq 12</math> bit) singleturn</li> <li>▪ Singleturn resolution selectable from 1 to 16 bit</li> </ul>	<ul style="list-style-type: none"> <li>▪ Resolution up to 25000 ppr.</li> <li>▪ Output signals: ABZ, TTL, TTL + RS422 compatible, HTL</li> <li>▪ Optional differential signal output</li> <li>▪ Optional watchdog with early warning output</li> </ul>
<b>Multi turn</b> <ul style="list-style-type: none"> <li>▪ Multiturn resolution selectable from 1 to 43 bit</li> <li>▪ Turn-Power-On (revolutions are correctly detected even without supply voltage), battery-less</li> </ul>	

- General
- Contents
- Drawings
- Mechanical Data
- CAN-Bus (FHB58)
- Serial (FHS58)
- Incremental (FHI58)
- Accessories

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General

Contents

Drawings

Mechanical  
Data

CAN-Bus  
(FHB58)

Serial  
(FHS58)

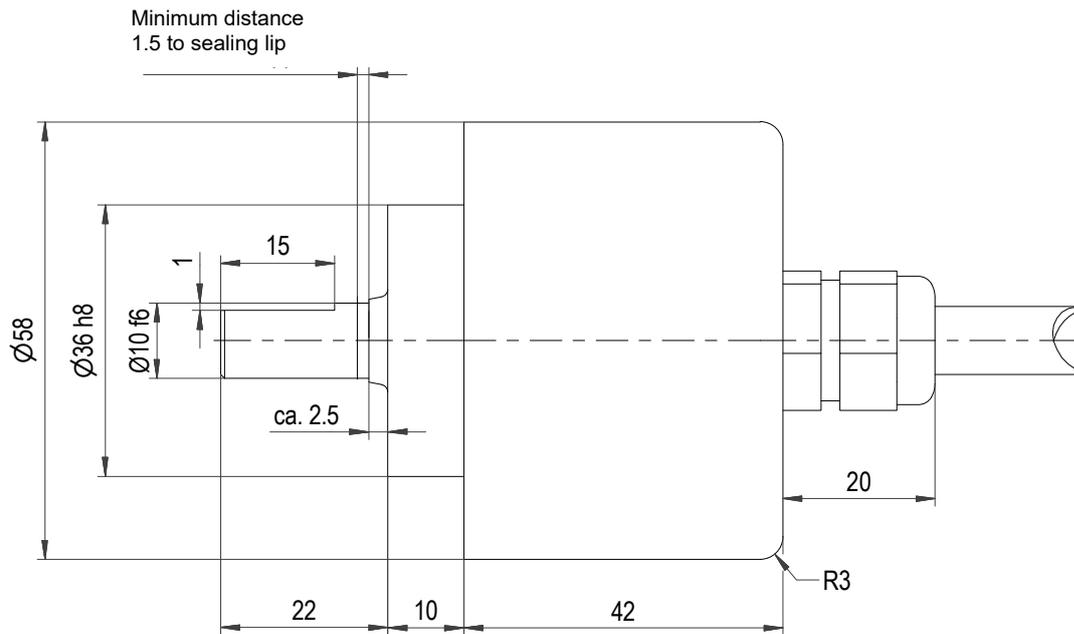
Incremental  
(FHI58)

Accessories

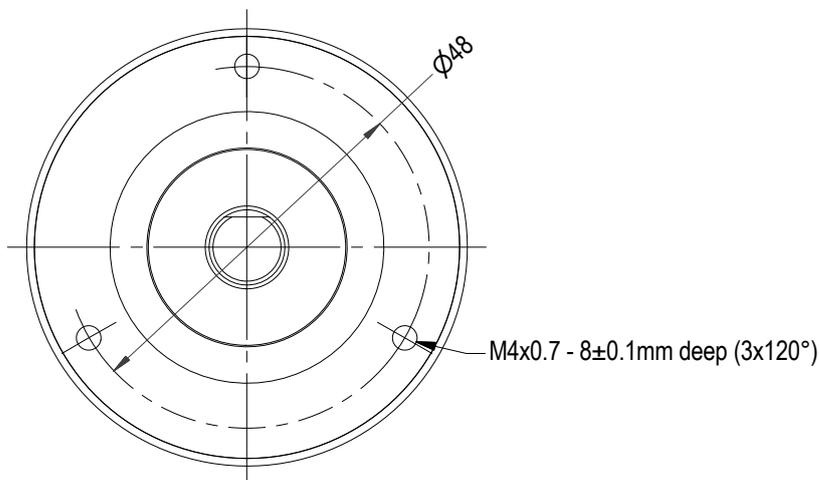
**Drawing FHx58**

**Option PG - cable gland, axial orientation**

Side view:



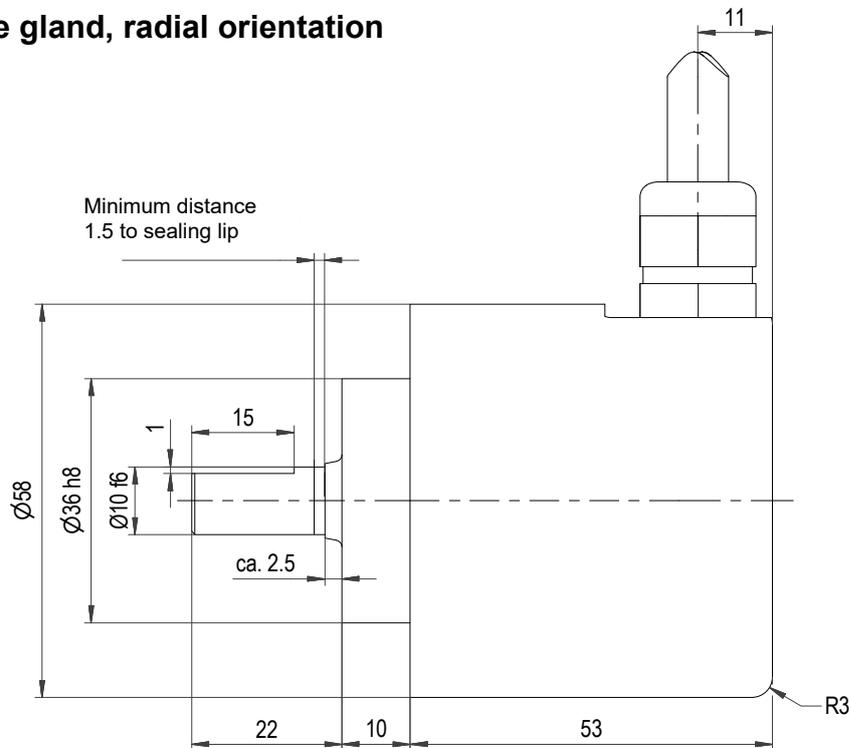
Front view:



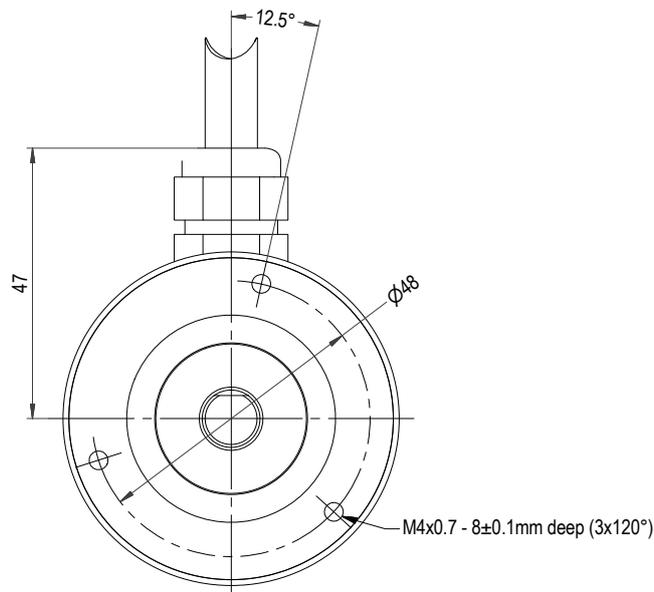
**Drawing FHx58**

**Option PGR - cable gland, radial orientation**

Side view:



Front view:



**Information about the standard signal cable which is included in the option PG, PGR**

Option	Standard Cable Length L	Cable sheath Ø	Single Strands Cross Section	Allowed Tolerance (L)	Minimum Bend Radius
PG, PGR	2000 mm	8,3 mm	VSUP AWG 22 Signal cables AWG 26	-30...+50 mm	6 x D Ø (D= cable sheath diameter Ø)
Shielded signal cable (standard)					

Mechanical and Environmental Data, Miscellaneous - FHx58 family	
Shaft type	Solid shaft
Mechanical angle of rotation 1.)	Endless
Lifetime 2.)	@100 % from max. permissible radial load >1x10E9 shaft revolutions @80 % from max. permissible radial load >1x10E10 shaft revolution @20 % from max. permissible radial load >1x10E11 shaft revolutions
Bearing	2 pcs. precision ball bearings
Max. operational speed (with shaft sealing)	3600 rpm
Breakaway torque	approx. 1 Ncm at ambient temperature
Operating temperature range	-20..+80 °C
Storage temperature range	-20..+80 °C
Protection grade (IEC 60529) front side	IP67
Protection grade (IEC 60529) rear side	IP69k
Vibration (DIN EN 60068-2-6)	30 g / 10 bis 2000 Hz
Shock (DIN EN 60068-2-27)	100 g / 6 ms
Housing diameter	Ø58 mm
Housing depth	Wit electrical connection position (in dependency to the shaft): ▪ axial 42 mm ▪ radial 53 mm
Shaft diameter	Ø10 mm Other shaft diameters on request
Max. radial load (HTx36E S)	100 N (load point 80% - in dependency to the visible shaft length)
Max. axial load	100 N (axial force initiation at the shaft end)
Mass	app. 600 g
Connection type	▪ Cable glands, axial or radial ▪ Shielded round cable 2 m, VSUP AWG22, signal cable AWG26, TPE cable sheath, cable endings tinned
Connection position	Axial or radial
Sensor mounting	3 pcs. screws M4x0,7
Fastening parts included in delivery	None
Fastening torque per screw to fastening the rotary encoder	2 Nm
Material shaft	Stainless steel
Material flange	Stainless steel
Material housing lid	Stainless steel
Material cable gland	TPE

1.) According IEC 60393

2.) Determined by climatic conditions according to IEC 68-1, para. 5.3.1 without load collectives

**General**
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**Immunity / Electrostatic Discharge / REACH / RoHS**

EN 61000-4-3 RF sine wave	Class A
EN 61000-4-6 Conducted sine wave	Class A
EN 61000-4-8 Power frequency magnetic fields	Class A
EN 61000-4-2 ESD	Class B
REACH Regulation (EC) 1907/2006 including the SVHC list	
RoHS Directive 2011/65/EU	

**Salt mist resistance**

EN60068-2-11

**ECOLAB certified - material resistance test against detergents and disinfectants**

According to testing method F&amp;E/P3-E Nr. 40-1, rev. 3

**EHEDG certified hygienic design**

Verified cleanability according to EHEDG recommendations - "Hygienic Design"

### Series FHB58 - Single- /Multiturn rotary encoder with CAN interface

#### Key-features FHB58:

- Interface: CANopen, CAN SAE J 1939
- Resolution singleturn up to 16 Bit, multiturn up to 43 Bit
- Single-or multiturn rotary encoder
- Battery and gear-less multiturn technology (energy harvesting)
- Singleturn accuracy  $\pm 0,0878^\circ$  ( $\leq 12$  Bit), repeatability  $\pm 0,0878^\circ$  ( $\leq 12$  Bit)
- Supply voltage: 10..32 VDC

### Electrical Data FHB58 - Single- /Multiturn rotary encoder with CAN interface

Output signal	CANopen	CAN SAE J1939
Effective electrical angle of rotation 1.)	Singleturn 360° Multiturn up to 43 Bit	Singleturn 360° Multiturn up to 32 Bit
Singleturn accuracy	$\pm 0,0878^\circ$ ( $\leq 12$ Bit)	
Singleturn repeatability	$\pm 0,0878^\circ$ ( $\leq 12$ Bit)	
Resolution	1 up to 16 Bit singleturn 1 up to 43 Bit multiturn	1 up to 16 Bit singleturn 1 bis 32 Bit multiturn
Update rate	$\leq 600 \mu\text{s}$	
Supply voltage	10..32 VDC	
Power consumption (no load)	max. 0.5 W	
MTTF	1000a	

1.) According IEC 60393

### CANopen Specifications

Protocol	CANopen <ul style="list-style-type: none"> <li>▪ Communication profile CiA 301</li> <li>▪ Device profile for encoder CiA 406 V3.2 class C2</li> </ul>
Node number	1 up to 127 (default 127)
Baud rate	10 kBaud up to 1 MBaud with automatic bit rate detection
Ex works parameters / adaptations	The default settings as well as the customer-specific adaptation in the software can be changed via LSS (CiA 305) and the SDO protocol, e.g. PDOs, scaling, heartbeat, node ID, baud rate, etc.
Programmable CAN transfer modes	<p><b>Synchronous mode:</b> When receiving a synchronization telegram (SYNC) from another bus participant PDOs will be sent out autonomous</p> <p><b>Asynchronous mode:</b> An internal event triggers a PDO message (e.g. change of measured value, internal timer or similar)</p>

CAN SAE J1939 specifications	
CAN physical layer	ISO 11898 (High Speed CAN)
Protocol	ISO 11898 (High Speed CAN)
Baud rate	Auto-Baud-Detection
Standard factory programming: (*)	
Direction of counting	View on the shaft side, CCW (counter clockwise)
ECU-adress	0x 0A
Process data identifier	0x18FF000A
PGN	0xFF00
Process data mapping	Byte 0-3 32 Bit position value Byte 4 8 Bit error register PDU timer and position preset can be set by PGN configuration 0xEF00 (Prop. A)
PDU-Time	50 ms (default)
Configurations-PGN	0x EF 00 (prop. A)
Byte 0	0x 01
Byte 1	0x FF
Byte 2	PDU Time LSB
Byte 3	PDU Time MSB
Byte 4	Preset LSB
Byte 5, 6	Preset

(\*) Other programmings on request

Further information/manual for FHB58 series with CAN interface are available in the download area of the FHB58 product site <https://www.megatron.de/>

- CAN-Manual for FHB58 series
- Manual: FHB58 CANopen setting Node ID
- Startup instruction manuals

#### Cable and pin assignment FHB58 single-/multiturn rotary encoder with CANopen or CAN SAE J1939 interface

Function:	Option PG(R), CVR
VSUP	brown
GND	orange
CANHigh	green
CANLow	yellow
CANGND / Schield (*)	shield

(\*) The cable shield is conductively connected to the rotary encoder housing

Order Code FHB58 - single- /multiturn rotary encoder with CAN interface									
Description	Selection: <b>standard=black/bold</b> , possible <i>options=grey/cursive</i>								
<b>Series FHB58</b>	<b>FHB58</b>								
<b>Shaft type:</b> <b>Solid shaft</b>	<b>S</b>								
<b>Single- or Multiturn:</b> <b>Singleturn</b> (If 0 Bit is selected as multiturn resolution) <b>Multiturn</b> (If ≥ 1 Bit is selected as multiturn resolution)		<b>-</b> <b>PM</b>							
<b>Shaft diameter:</b> <b>Shaft diameter Ø6 mm</b> <i>Option: user defined shaft diameter [mm] (*)</i>			<b>10</b> <b>XX</b>						
<b>Multiplication symbol [x]:</b>				<b>x</b>					
<b>Shaft length of the rotary encoder:</b> <b>Shaft length 22 mm</b> <i>Option: user defined shaft length [mm] (*)</i>					<b>22</b> <b>XX</b>				
<b>Supply voltage / output signal:</b> <b>VSUP=24 V (10...32 V) / CANopen</b> <b>VSUP=24 V (10...32 V) / CAN SAE J1939</b>						<b>24CA</b> <b>24CJ</b>			
<b>Terminating resistor:</b> <b>Without terminating resistor</b> <i>Option: integrated 120 Ohm terminating resistor (Integrated in the rotary encoder)</i>							<b>-</b> <b>T</b>		
<b>Singleturn resolution:</b> <b>Singleturn resolution 12 Bit</b> <i>Option: singleturn resolution 1 up to 16 Bit</i>							<b>12</b> <b>XX</b>		
<b>Multiturn resolution:</b> <b>Resolution 12 Bit (4096 turns)</b> <i>Option: resolution 0 Bit (singleturn rotary encoder)</i> <i>Option: resolution ≥ 1 Bit (Multiturn rotary encoder)</i> <i>(Maximum multiturn resolution 43 Bit for CANopen, 32 Bit for CAN SAE J1939)</i>								<b>12</b> <b>0</b> <b>XX</b>	
<b>Electrical connection, cable length, position:</b> <b>2 m round cable, cable gland, axial</b> <b>2 m round cable, cable gland, radial</b> <i>Option: customer specific cable length, cable gland, axial (*)</i> <i>Option: customer specific cable length, cable gland, radial (*)</i>									<b>PG</b> <b>PGR</b> <i>PG X,XX</i> <i>PGR X,XX</i>

(\*) This option is linked to a minimum order quantity (MOQ)

**Order example 1: FHB58 - singleturn rotary encoder with CANopen interface**
**Requirement:**

Solid shaft Ø10 mm, shaft length 22 mm, VSUP=24 V / OUT=CANopen, without integrated 120 Ohm termination resistor, singleturn resolution 12 Bit (resolution per turn, thus  $360^\circ/4096=0.088^\circ$ ), multiturn resolution 0 Bit (0 Bit stands for singleturn rotary encoder), round cable 2 m, cable outlet position axial (in dependency to the shaft)

**Example for order code:**

FHB58 S 10x22 S 24CA 12 0 PG

**Order example 2: FHB58 PM - multiturn rotary encoder with CANopen interface**
**Requirement:**

Solid shaft Ø10 mm, shaft length 22 mm, VSUP=24 V / OUT=CANopen, without integrated 120 Ohm termination resistor, singleturn resolution 12 Bit (resolution per turn, thus for  $360^\circ \Rightarrow 360^\circ/4096=0.088^\circ$ ), multiturn resolution 12 Bit (4096 turns x  $360^\circ = 1.474.560^\circ$  effective electrical angle), round cable 2 m, cable outlet position axial (in dependency to the shaft)

**Example for order code:**

FHB58 S PM 10x22 24CA 12 12 PG

**Series FHS58 - single-/multiturn rotary encoder with SSI interface**
**Key-features FHS58 with SSI interface:**

- Signal output: SSI, binary- or Gray- code
- Resolution singleturn up to 16 Bit, Multiturn up to 43 Bit
- Single- or multiturn rotary encoder
- Battery and gear-less multiturn technology (energy harvesting)
- Singleturn accuracy  $\pm 0,0878^\circ$  ( $\leq 12$  Bit), repeatability  $\pm 0,0878^\circ$  ( $\leq 12$  Bit)
- Supply voltage: 4.75 to 32 VDC

**Electrical data FHS58 - single- /multiturn rotary encoder with SSI output**

Effective electrical angle of rotation 1.)	Singleturn 360°, multiturn up to 43 Bit
Singleturn accuracy	$\pm 0,0878^\circ$ ( $\leq 12$ Bit)
Singleturn repeatability	$\pm 0,0878^\circ$ ( $\leq 12$ Bit)
Output signal	SSI binary or SSI Gray
Resolution	1 up to 16 Bit singleturn, 1 up to 43 Bit multiturn
Update rate	$\leq 600 \mu\text{s}$
Supply voltage	4,75..32 V
Current consumption (no load)	typ. 50 mA
Power consumption	max. 0.44 W
MTTF	1000a

1.) According IEC 60393

**SSI specifications**

Clock input	Via opto-coupler
Clock frequency	100 kHz up to 500 kHz (*)
Data output	RS485/RS422 compatible
Output code	Binary or Gray
SSI-output	Angular-/position value
Parity bit	Optional (even/odd)
Error bit	Optional
Turn on time	< 1.5 s
Configuration inputs	DIR = GND => CW
Positive direction of counting (view on shaft)	DIR = VSUP => CCW
Set to zero	Set: preset = VSUP for 2 sec Deactivate: preset = GND

(\*) Up to 2 MHz clock frequency on request

**Cable- and pin assignment FHS58 - single-/multiturn rotary encoder with SSI interface**

Function:	Option PG(R)
GND	white
VSUP	brown
CLK+	green
CLK-	yellow
DATA+	grey
DATA-	pink
PRESET	blue
DIR	red
Shield	housing

Order code FHS58 - single- /multiturn rotary encoder with SSI interface									
<b>Description</b>	Selection: <b>standard=black/bold</b> , possible <i>options=grey/cursive</i>								
<b>Series FHS58</b>	<b>FHS58</b>								
<b>Shaft type:</b> <b>Solid shaft</b>	<b>S</b>								
<b>Single- or Multiturn:</b> <b>Singleturn</b> (If 0 Bit is selected as multiturn resolution) <b>Multiturn</b> (If ≥ 1 Bit is selected as multiturn resolution)		<b>-</b> <b>PM</b>							
<b>Shaft diameter:</b> <b>Shaft diameter Ø10 mm</b> <i>Option: user defined shaft diameter [mm] (*)</i>			<b>10</b> <i>XX</i>						
<b>Multiplication symbol [x]:</b>				<b>x</b>					
<b>Visible shaft length of the rotary encoder:</b> <b>Shaft length 22 mm</b> <i>Option: user defined shaft length [mm] (*)</i>					<b>22</b> <i>XX</i>				
<b>Supply voltage / output signal:</b> <b>VSUP=4.75 to 32 V / SSI</b>						<b>SSI</b>			
<b>Code:</b> <b>Binary</b> <b>Gray</b>							<b>B</b> <b>G</b>		
<b>Singleturn resolution:</b> <b>Singleturn resolution 12 Bit</b> <i>Option: singleturn resolution 1 up to 16 Bit</i>								<b>12</b> <i>XX</i>	
<b>Multiturn resolution:</b> <b>Resolution 12 Bit (4096 turns)</b> <i>Option: resolution 0 Bit (singleturn rotary encoder)</i> <i>Option: resolution ≥ 1 Bit (Multiturn rotary encoder)</i> <i>(Maximum multiturn resolution 43 Bit)</i>									<b>12</b> <i>0</i> <i>XX</i>
<b>Electrical connection, cable length, position:</b> <b>2 m round cable, cable gland, axial</b> <b>2 m round cable, cable gland, radial</b> <i>Option: customer specific cable length, cable gland, axial (*)</i> <i>Option: customer specific cable length, cable gland, radial (*)</i>									<b>PG</b> <b>PGR</b> <i>PG X,XX</i> <i>PGR X,XX</i>

(\*) This option is linked to a minimum order quantity (MOQ)

**Order example 1: FHS58 - singleturn rotary encoder with SSI interface**
**Requirement:**

Solid shaft Ø10 mm, shaft length 22 mm, SSI binary, singleturn resolution 12 Bit (resolution per turn, thus  $360^\circ/4096=0.088^\circ$ ), multiturn resolution 0 bit (0 bit stands for singleturn rotary encoder), round cable 2 m, cable outlet position axial (in dependency to the shaft)

**Example for order code:**

FHS58 S 10x22 SSI B 12 0 PG

**Order example 2: FHS58 PM - multiturn rotary encoder with SSI interface**
**Requirement:**

Solid shaft Ø10 mm, shaft length 22 mm, SSI binary code, singleturn resolution 12 Bit (resolution per turn, thus for  $360^\circ \Rightarrow 360^\circ/4096=0.088^\circ$ ), multiturn resolution 12 Bit (4096 (turns) x  $360^\circ = 1.474.560^\circ$  effective electrical angle), round cable 2 m, cable outlet position axial (in dependency to the shaft)

**Example for order code:**

FHS58 S PM 10x22 SSI B 12 12 PG

**Series FHI58 - Single- /Multiturn rotary encoder with CAN interface**

**Key-features FHI58:**

- Very large selection of optical resolutions from 2 ppr. up to 25000 ppr.
- Standard: Channels A, B and Z ( index pulse). Option: differential signal outputs A, A/, B, B/, Z, Z/
- Output electronics with TTL, TTL+RS422 or HTL
- Limit frequency up to 2 MHz
- Electronic early warning system (EWS) - announces an error of the optical system 1000h before a failure

**Electrical Data FHI58 - Singleturn rotary encoder with incremental output**

Output signal (A, B, Z)	TTL	TTL, RS422	HTL
Accuracy	Phase-shift: 90° ± max. 7.5 % from a period duration		
	≤5000 ppr.: Pulse-/pause ratio: 50 % ± max. 7 % Pulse-/pause ratio: 50 % ± max. 10 % Output electronics:		
	05TTL HF	05TTL RS422 N HF 24TTL RS422 N HF	24HTL HF 24HTL N HF
Number of pulses	from 2 ppr. up to 25000 ppr.		
Differential signal output (A, A/, B, B/, Z, Z/)	No	Yes	Option
Limit Frequency	Till 5000 ppr.: max. 200 kHz (optical) Option HF over 1200 ppr.: max. 2 MHz (optical interpolated)		till 5000 ppr.: max. 200 kHz (optical) Option HF over 1200 ppr.: max. 600 kHz (optical interpolated)
Supply voltage / power consumption (no load)	Is related to the resolution, the output electronics, the pulse frequency: (Detailed information can be found in the order matrix) 4.75 VDC until 5.5 VDC: typ. 100 mA 5 VDC bis 30 VDC: typ. 70 mA 10 VDC bis 30 VDC: typ. 100 mA		
Output load	max. 40 mA / per channel		
MTTF	200a		

1.) According IEC 60393

General

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Data

CAN-Bus  
(FHI58)

Serial  
(FHI58)

Incremental  
(FHI58)

Accessories

Order Code FHI58 - Singleturn, incremental output						
Description	Selection: <b>standard=black/bold</b> , possible <i>options=grey/cursive</i>					
<b>Series FHI58</b>	<b>FHI58</b>					
<b>Shaft type:</b> <b>Solid shaft</b>	<b>S</b>					
<b>Shaft diameter:</b> <b>Shaft diameter Ø10 mm</b> <i>Option: user defined shaft diameter in [mm] (*)</i>	<b>10</b> X					
<b>Multiplication symbol [x]:</b>			<b>x</b>			
<b>Shaft length:</b> <b>Shaft length 22 mm</b> <i>Option: user defined shaft length in [mm] (*)</i>				<b>22</b> XX		
<b>Number of pulses per revolution (2 up to 25000 ppr.):</b> <b>360, 1024, 3600</b> <i>Option: 2, 5, 10, 15, 20, 24, 25, 30, 36, 40, 48, 50, 60, 64, 72, 87, 90, 100, 120, 125, 127, 128, 150, 160, 180, 200, 216, 236, 240, 250, 254, 256, 300, 314, 320, 400, 500, 512, 571, 600, 625, 720, 750, 768, 800, 810, 900, 1000, 1200, 1250, 1270, 1440, 1500, 1800, 2000, 2048, 2400, 2500, 2880, 3000, 4000, 4096, 4685, 5000, 5760, 6000, 7200, 7500, 8192, 10000, 10240, 12000, 12500, 15000, 16384, 20000, 20480, 25000</i>					<b>X</b> X	
<b>Selection of: Supply voltage (VSUP), output electronics (OUT), differential signal (N), early warning system (EWS), higher limit frequency (HF)</b>						
----- Up to 2500 ppr. -----						
VSUP=12 V (5..30 V), OUT=HTL						12HTL
VSUP=12 V (5..30 V), OUT=HTL, differential						12HTL N
----- Up to 5000 ppr. -----						
VSUP=5 V (4.75..5.5 V), OUT=TTL						05TTL
<b>VSUP=5 V (4.75..5.5 V), OUT=TTL, early warn</b>						<b>05TTL EWS</b>
VSUP=5 V (4.75..5.5 V), OUT=TTL, RS422, differential						05TTL RS422 N
VSUP=5 V (4.75..5.5 V), OUT=TTL, RS422, differential, early warn						05TTL RS422 N EWS
<b>VSUP=24 V (10..30 V), OUT=HTL</b>						<b>24HTL</b>
VSUP=24 V (10..30 V), OUT=HTL, early warn						24HTL EWS
VSUP=24 V (10..30 V), OUT=HTL						24HTL
VSUP=24 V (10..30 V), OUT=HTL, differential						24HTL N
VSUP=24 V (10..30 V), OUT=HTL, differential, early warn						24HTL N EWS
VSUP=24 V (10..30 V), OUT=TTL, RS422, differential						24TTL RS422 N
VSUP=24 V (10..30 V), OUT=TTL, RS422, differential						24TTL RS422 N EWS
----- 1200 ppr up to 25000 ppr. (higher limit frequency) -----						
VSUP=5 V (4.75..5.5 V), OUT=TTL, high frequency						05TTL HF
VSUP=5 V (4.75..5.5 V), OUT=TTL, RS422, differential, higher frequency						05TTL RS422 N HF
VSUP=24 V (10..30 V), OUT=HTL, higher frequency						24HTL HF
VSUP=24 V (10..30 V), OUT=HTL, differential, higher frequency						24HTL N HF
VSUP=24 V (10..30 V), OUT=TTL, RS422, differential, higher frequency						24TTL RS422 N HF
<b>Electrical connection, cable length, position:</b> <b>2 m round cable, cable gland, axial</b> <b>2 m round cable, cable gland, radial</b> <i>Option: customer specific cable length, cable gland, axial (*)</i> <i>Option: Customer specific cable length, cable gland, radial (*)</i>						<b>PG</b> <b>PGR</b> PG X,XX PGR X,XX

(\*) This option is linked to a minimum order quantity (MOQ)

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**Order example 1: FHI58 - incremental rotary encoder**

**Requirement:**

Solid shaft Ø10 mm, shaft length 22 mm, 3600 ppr., VSUP= 4.75..5.5 V, output signals A, B, Z, output circuit TTL, impulse limit frequency 200 kHz, with electronic warning system EWS (gives a fault signal state signal out before 1000 hours before failure of the optical system), roundcable 2 m, cable outlet position axial (in dependency to the shaft)

**Example for order code:**

FHI58 S 10x22 3600 05TTL EWS PG

**Order example 2: FHI58 - incremental rotary encoder**

**Requirement:**

Solid shaft Ø10 mm, shaft length 22 mm, 1024 ppr., VSUP= 10..30 V, output signal A, B, Z, output circuit HTL, impulse limit frequency 200 kHz, with early warning system (EWS), round cable 2 m, cable outlet position axial (in dependency to the shaft)

**Example for order code:**

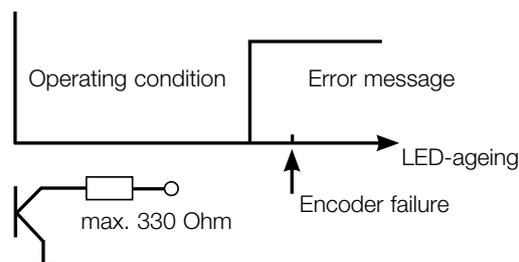
FHI58 S 10x22 1024 24HTL PG

**Cable assignment FHI58 - incremental rotary encoder**

Function:	For Options:	For Options:	For Options:	For Options:
	<ul style="list-style-type: none"> <li>▪ 05HTL</li> <li>▪ 12HTL</li> <li>▪ 24HTL</li> <li>▪ 05HTL HF</li> <li>▪ 24HTL HF</li> </ul>	<ul style="list-style-type: none"> <li>▪ 05HTL EWS</li> <li>▪ 24HTL EWS</li> </ul>	<ul style="list-style-type: none"> <li>▪ 05HTL N</li> <li>▪ 05TTL RS422 N</li> <li>▪ 12HTL N</li> <li>▪ 24HTL N</li> <li>▪ 05TTL RS422 N HF</li> <li>▪ 24HTL N HF</li> <li>▪ 24TTL RS422 N HF</li> </ul>	<ul style="list-style-type: none"> <li>▪ 05TTL RS422 N EWS</li> <li>▪ 24TTL RS422 N EWS</li> </ul>
VSUP	brown	brown	brown	brown
GND	white	white	white	white
A	green	green	green	green
B	yellow	yellow	yellow	yellow
Z	grey	grey	grey	grey
Early warning output (EWS)	-	pink	-	pink
A/	-	-	red	rot
B/	-	-	blue	blau
Z/	-	-	violet	violet
Shield	strand	strand	strand	strand

(\* ) The cable shield is conductively connected to the rotary encoder housing

**Early Warning System (EWS):**

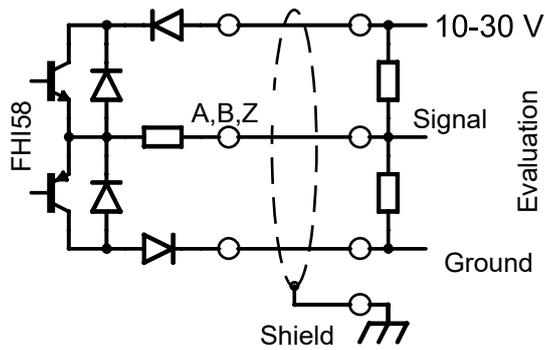


**Function:**

In error-free operation, the output signal of the early warning output (EWS) is "low". If the encoder electronics detect a signal intensity of the optical system of 10% or less, then the early warning output is activated and the signal level changes to "high". The encoder should then renewed within 1000h of operation after activation of the early warning signal.

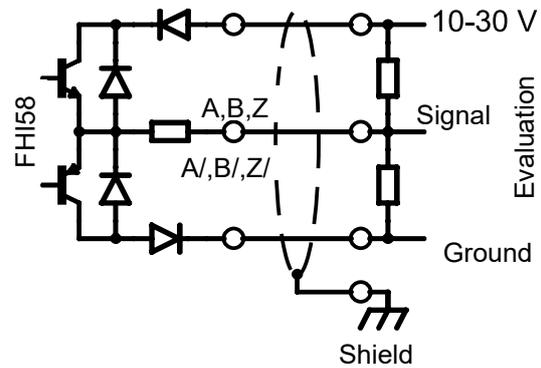
Output circuits:

HTL, VSUP 10..30 V:



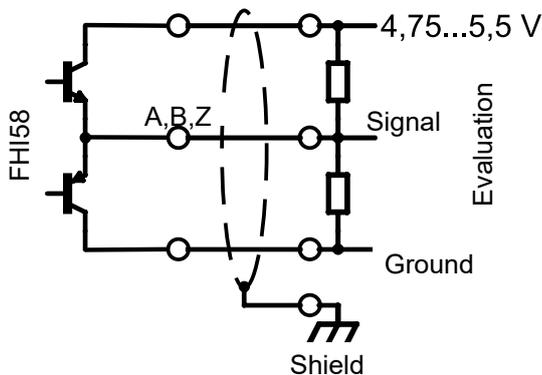
For options: 24HTL, 24HTL EWS, 24HTL HF

HTL, differential, VSUP 10..30 V:



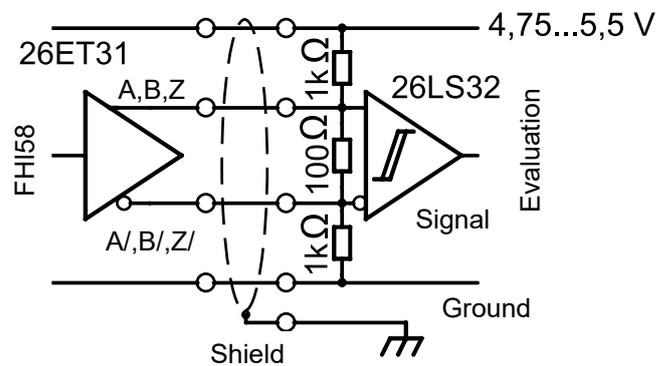
For options: 24HTL N, 24HTL M EWS, 24HTL N HF

TTL, VSUP 4,75..5,5 V:



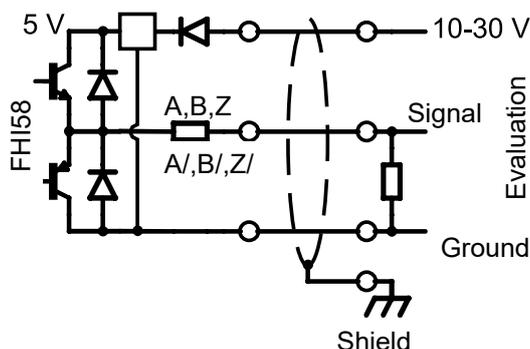
For options: 05TTL, 05TTL EWS, 05TTL HF

TTL, RS422, differential, VSUP 4,75..5,5 V:



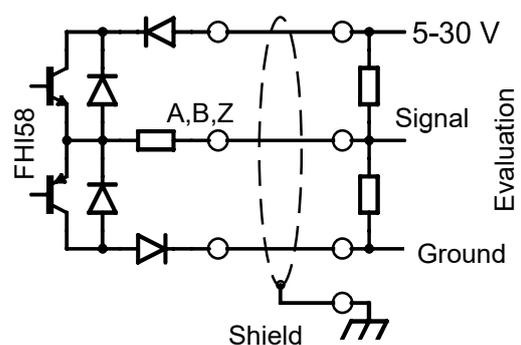
For options: 05TTL RS422 N, 05TTL RS422 N EWS, 05TTL RS422 N HF

TTL, RS422, differential, VSUP 10..30 V:



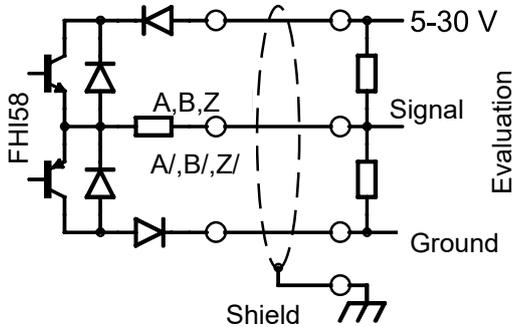
For options:  
24TTL RS422 N, 24TTL RS422 N EWS  
24TTL RS422 N HF

HTL, VSUP 5..30 V:



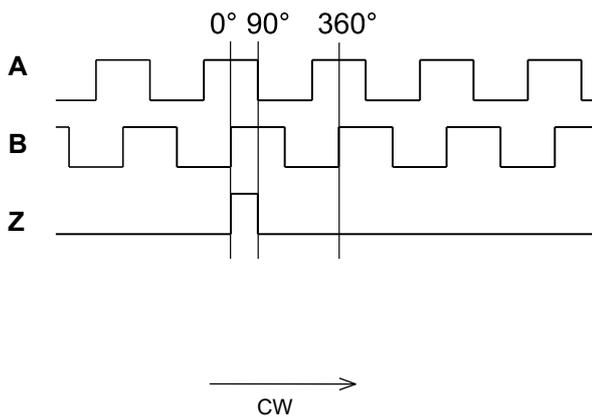
For option: 12HTL

**HTL, differential, VSUP 5..30 V:**

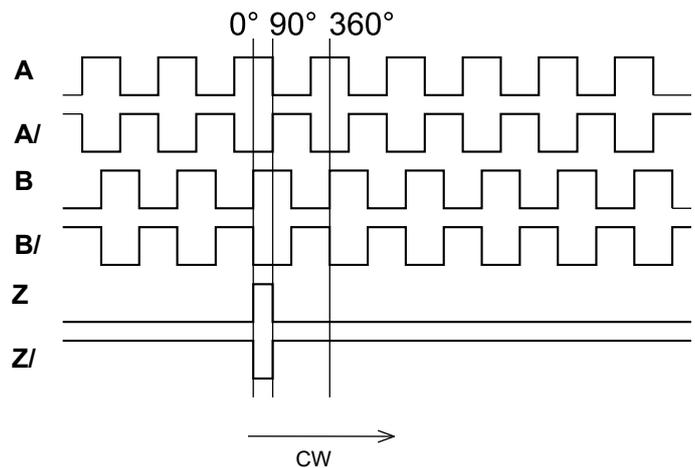


For option: 12HTL N

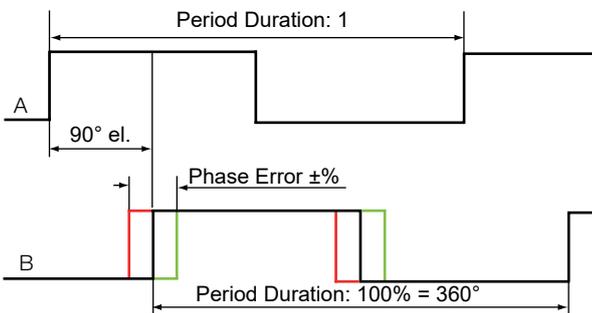
**Output Signals A, B, Z:**



**Output Signals A, A/, B, B/, Z, Z/:**

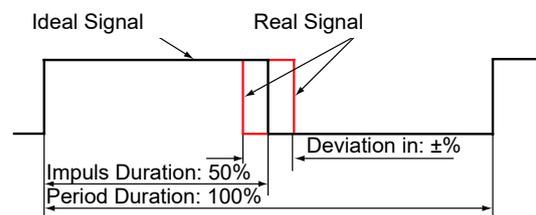


**Phase Shift:**



Phase shift (electric): 90° max. phase error ±7.5% of a period duration

**Pulse-/Pause Ratio:**



- ≤5000 ppr:
- Pulse-/Pause Ratio: 50 % ± max. 7 %
- Pulse-/Pause Ratio: 50 % ± max. 10 %
- For output circuits:
  - 05TTL HF
  - 05TTL RS422 N HF
  - 24HTL HF
  - 24HTL N HF
  - 24TTL RS422 N HF

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Serial (FHS58)

Incremental (FHS58)

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### Shaft couplings for encoders with solid shaft

- Connect two shafts, even with different diameters
- Absorb larger angular and radial deviations
- Have a low inertia
- Do not cause a change in the transmission speed
- Damp torsional vibrations
- Serves as mechanical protection against oversized pairs of forces
- Made of plastic (also with metal hubs) act electrically and heat insulating



### Counter ICs for FHI58 (incremental encoders)

- LS7083 in DIP or SOIC form factor, generates from incremental-signals quadrature-signals
- LS7166 24-Bit counter IC



LS7083/4N-S



LS7166



LS7083/4N

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