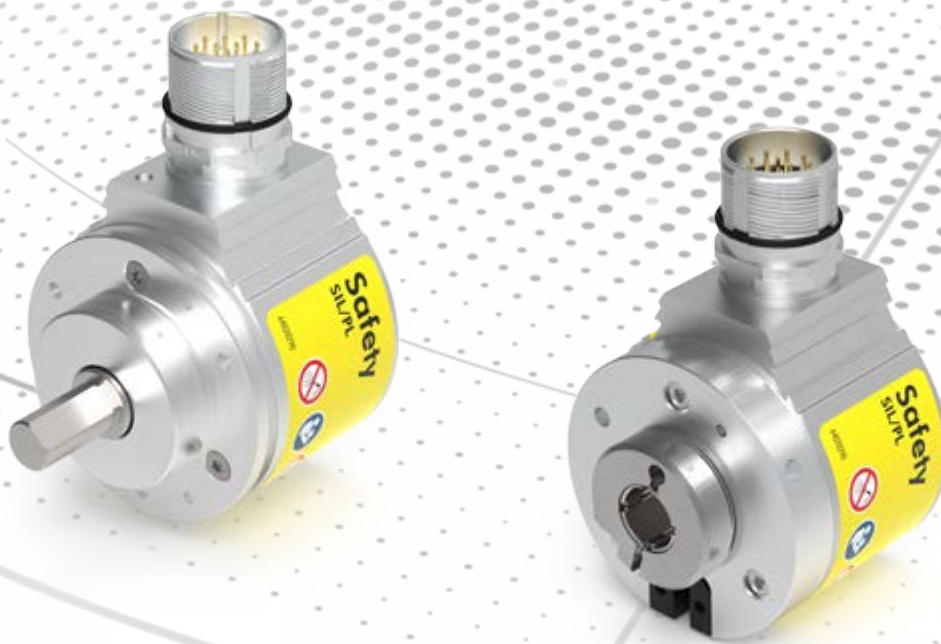
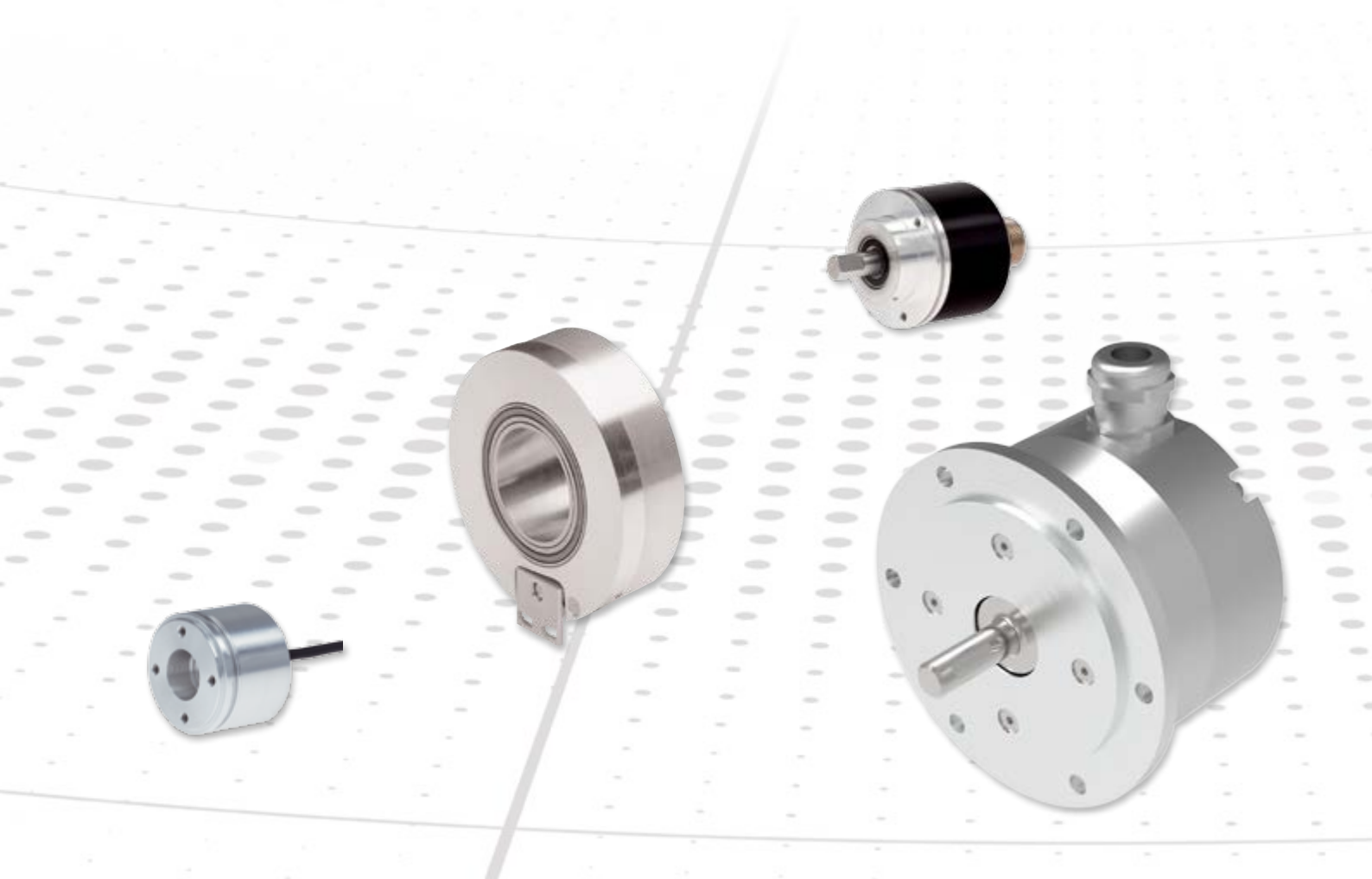


# Incremental rotary encoders IE58+FS



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## Incremental Rotary Encoders



### Programmable, extremely resilient and more

Incremental rotary encoders are used in machines and installations in different resolutions. Thanks to their simple design, incremental rotary encoders are more economical to manufacture than absolute rotary encoders. On the other hand, they only indicate position changes and cannot detect movements without a power supply.

In addition to our programmable all-rounder with 58 mm housing for almost all resolutions, our product portfolio

also includes a wide range of different sizes. In combination with hollow shafts, solid shafts of different diameters and a selection of flanges, you will find the right incremental rotary encoder for your machine's installation situation.

You will also find a multitude of housing options, e.g. ATEX-compliant housings and housings for use in aggressive media or for heavy mechanical stress (heavy-duty).

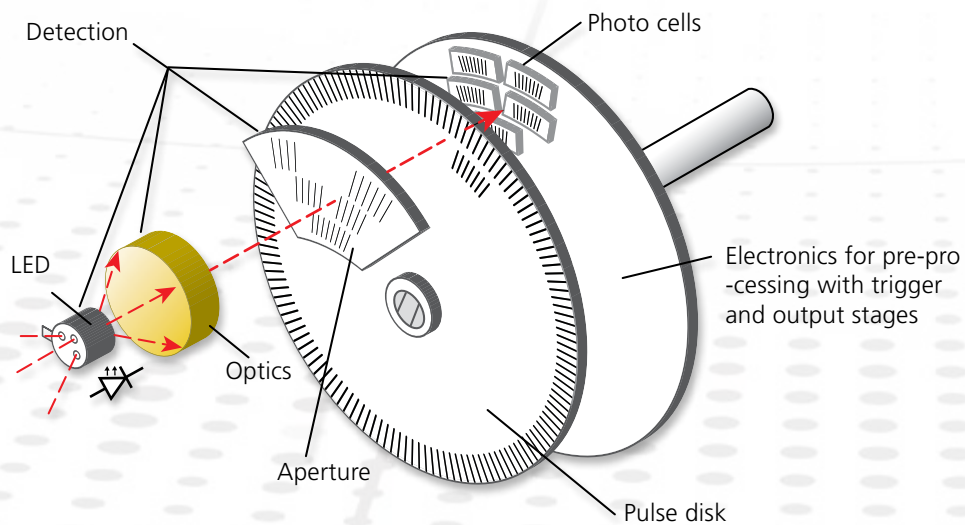


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## Pulse Encoder mode of operation

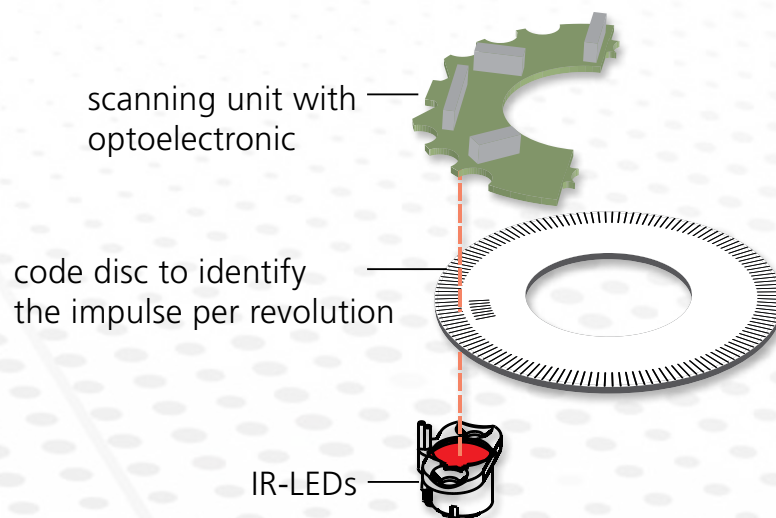


### Consistent mechanical concept

A rotary movement is processed in the incremental rotary encoder (also called a pulse encoder) and output in the form of an electrical signal. Angular increments are recorded via a pulse wheel with a fixed number of cycles per revolution. A scanning unit with integrated optoelectronics generates electrical signals and outputs pulses (measuring increments).

The resolution of the measuring system is defined by the number of light/dark segments (number of graduation marks per revolution) on the pulse wheel. For example, in the case of a pulse encoder with 1,000 graduation marks, a signal sequence of 1,000 pulses is output during one revolution. To evaluate the counting direction, a second signal sequence with a 90° phase offset is generated. A rev counter can be controlled with an additional zero pulse.

- \_ Programmable rotary encoders
- \_ Non-programmable incremental rotary encoders
- \_ Solid shaft, hollow shaft, blind shaft design and type with integrated coupling
- \_ For \_\_ F36 with separate bearing



## Programmable incremental encoders The all-rounder in a 58 mm housing

Our programmable incremental rotary encoders offer the optimal basis for every requirement and are available with solid shaft, continuous hollow shaft, blind shaft or integrated coupling. You can adapt the resolution of our programmable incremental encoders to your requirements using software.

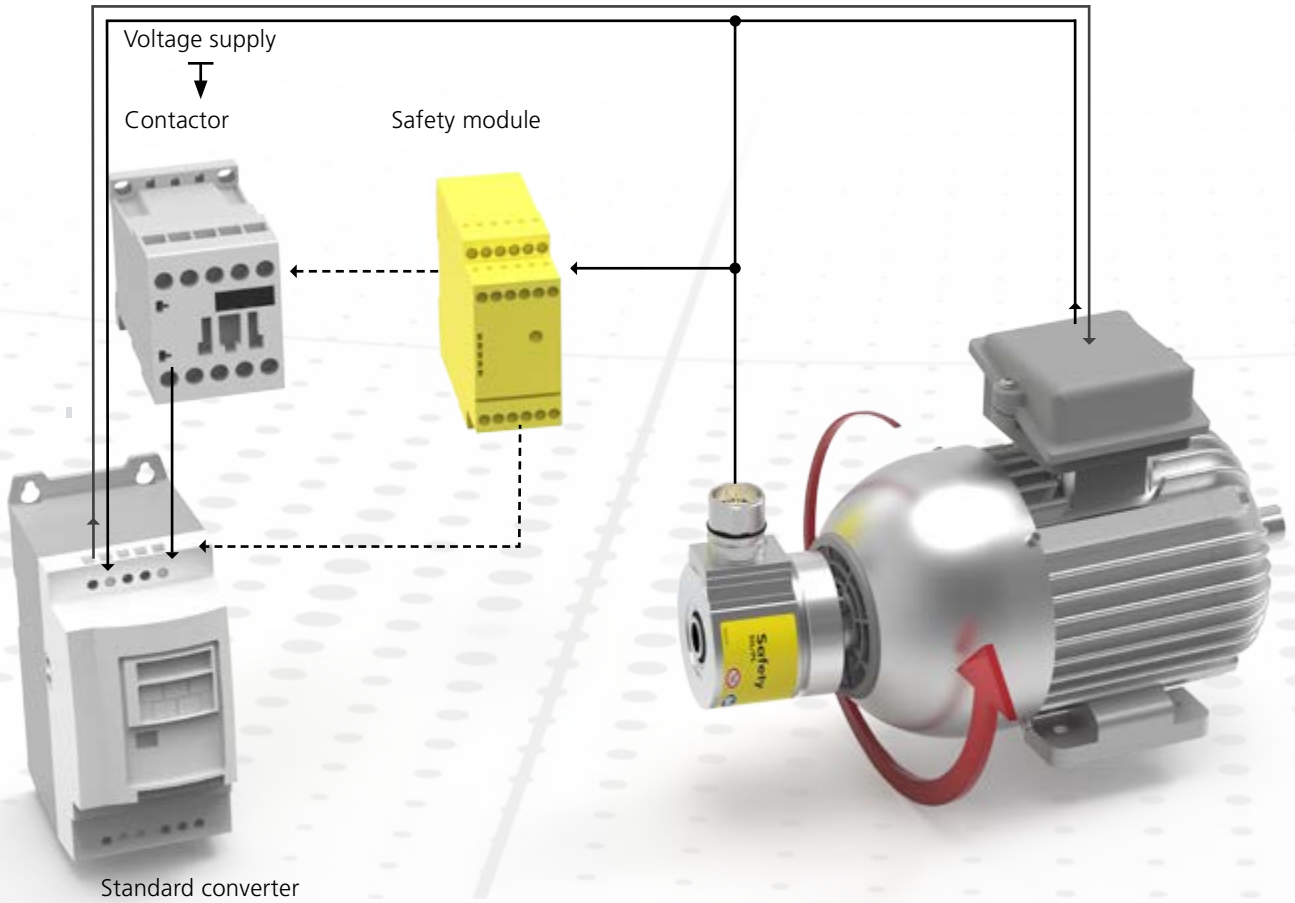
The new generation I\_58:2 offers wide range input of 4.5 ... 32 V DC and number of graduation marks up to 62,450 increments per revolution as well as a hollow shaft diameter up to 15 mm or ½".

## Non-programmable incremental rotary encoders with resolution determined at the factory

Our incremental rotary encoders with resolution preconfigured in the factory can also be used in all applications which require the basic functions of incremental position detection.

The resolution of these incremental rotary encoders is defined ex-factory by fitting a code disk with a defined number of graduation marks or the scanning electronics is configured for the required number of graduation marks. These incremental rotary encoders are available in different sizes from 24 mm to 120 mm. Naturally they are also available with different mechanical connections such as solid shaft, continuous hollow shaft, blind shaft or integrated coupling.

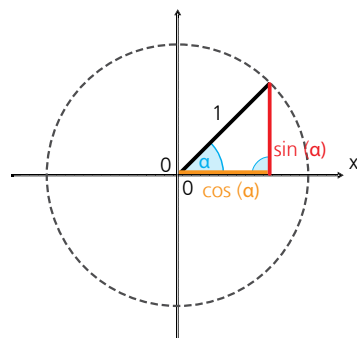
# Safe incremental rotary encoders



## Safe incremental rotary encoders

The solution doesn't always have to be a big one. An incremental rotary encoder is sufficient for the safe detection of speed, direction of rotation or standstill. The use of certified components considerably facilitates the validation of the complete application. TR-Electronic therefore offers the safety-certified incremental rotary encoder IE58+FS.

### SIN/COS



With sine-cosine interface, SIL3 or PLe is possible for specific safety functions. One of the reasons for this is that the transmission channel can be checked by means of a simple calculation from the signal: The following must apply at any time:  $\sin^2(t) + \cos^2(t) = 1$ . If the calculated value differs, the safety module can go into a safe status. With the TTL or HTL interface applications with SIL 2 or PLD are possible. The calculated value differs, the safety module can go into a safe status.

### TTL / HTL

With the TTL or HTL interface

## Proven technology with fully differential electronics

A further element of this high safety classification is the simple design with proven optical scanning with fixed resolution on the glass disk.

The signal paths are designed differentially. As a result the signal is immune to disturbance and failure of a driver can be reliably detected.

## Fixed resolutions ex-works

1.024, 2.048 and 4.096 periods per revolution,  
1 zero pulse, + differential (inverse) signals

## Solid shaft, blind shaft and continuous hollow shaft

**IV-58+FS:** 6 ... 12 mm, ¼', ½'

**IH-58+FS; IS-58+FS:** 8, 10, 12 mm, ¼', ½'

## Continuous form closure for the shaft connection

The form closure necessary for reliable measurement is produced by means of a groove in the shaft – with solid shaft rotary encoders the appropriate spring is included with delivery.

## Possible safety functions\*

- \_ SS1 (safe stop 1)
- \_ SS2 (safe stop 2)
- \_ SOS (safe operating stop)
- \_ SLS (safely-limited speed)
- \_ SLS (safely-limited speed)
- \_ SSR (safe speed range)
- \_ SSM (safe speed monitor)
- \_ SDI (safe direction)
- \_ SLA (safely limited acceleration)
- \_ SLP (safely limited position)

## Can be combined with a variety of commercially available safety modules

Depending on the required safety function, various commercially available safety modules can be used for the evaluation of TTL / HTL / sine-cosine signals.

## Perfect solution for both new systems and retrofits

Whether a new concept or an upgrade – thanks to the modular design with freely selectable safety modules, TR functionally safe rotary encoders can be used in the design of new systems or to upgrade existing machines and systems for current safety regulations.

## Full integration into the TR product range

Especially for simpler, speed-based safety functions, IE-58+FS perfectly complement TR's range of absolute safety rotary encoders. Technically and commercially optimal solutions are thus available for almost all applications, from simple incremental rotary encoders through to efficient Industrial Ethernet Safety Encoders – from one source, in a cohesive design.

## ATEX Zone 2 / 22

IE-58+FS are optionally also available in the same design for application in potentially explosive atmospheres of Zones 2 and 22: AV-582+FS, AS-58+FS, AH-58+FS.

\*Depending on the safety module used

## Incremental rotary encoders – I\_58+FS - Housing 58 mm



### Safety-oriented incremental rotary encoder

For applications that require a safety classification according to SIL / PL, TR-Electronic provides the safety certified incremental encoder IE58-FS. The user can choose between square-wave signals (with TTL or HTL level) and sine-cosine interface. The rotary encoder is certified for applications with SIL 3 or PLe (depending on used safety module). The rotary encoder permits the operating modes SLS, SOS SSR, SDI and SSM in conjunction with an appropriate safety module. The encoders are not programmable; the resolution is provided safely and long term stable by the coded glass disk. 1024,

2048 and 4096 periods per revolution and a zero pulse may be selected. The signal paths are designed differentially. As a result the signal is immune to disturbance and failure of a driver can be reliably detected. The incremental rotary encoder is connected to the driving axis either with a solid shaft, blind shaft (IS58+FS) or a hollow shaft (IH58+FS). The form closure necessary for reliable measurement is implemented through a groove in the shaft - in the case of solid-shaft rotary encoders the appropriate spring is included in the scope of supply.







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## Solid shaft

<b>Product</b>	IE58+FS 	IH58+FS 	IS58+FS 
<b>Detection</b>	Optical	Optical	Optical
<b>Supply</b>	10...30 Vdc (SELV/PELV)	10...30 Vdc (SELV/PELV)	10...30 Vdc (SELV/PELV)
<b>Steps per turn</b>	1.024, 2.048, 4.096	1.024, 2.048, 4.096	1.024, 2.048, 4.096
<b>Shafts available</b>	10 mm Solid shaft with keyway/Groove	12 mm hollow shaft with keyway	12 mm blind shaft with keyway
<b>Connectors</b>	M23 12-pin, M12 8-pin, cable, radial or axial	M23 12-pin, M12 8-pin, cable, radial	M23 12-pin, M12 8-pin, cable, radial or axial
<b>Ambient temperature</b>	-40 ... +85 °C	-40 ... +85 °C	-40 ... +85 °C
<b>Protection class</b>	IP65	IP65	IP65
<b>possible Safety functions*</b>	SS1, SS2, SLS, SOS SSR, SDI, SSM, SLA	SS1, SS2, SLS, SOS SSR, SDI, SSM, SLA	SS1, SS2, SLS, SOS SSR, SDI, SSM, SLA
<b>maximum SIL/PL*</b>	SIL3, PL <sub>e</sub>	SIL3, PL <sub>e</sub>	SIL3, PL <sub>e</sub>
<b>Interface</b>	Sinus/Cosinus   Inkremental	Sinus/Cosinus   Inkremental	Sinus/Cosinus   Inkremental
<b>Weblink</b>	<a href="http://www.tr-electronic.com/s/S011005">www.tr-electronic.com/s/S011005</a>	<a href="http://www.tr-electronic.com/s/S011007">www.tr-electronic.com/s/S011007</a>	<a href="http://www.tr-electronic.com/s/S011008">www.tr-electronic.com/s/S011008</a>
<b>QR-Code</b>			

\*depending on safety box used

Can't find the right variant? Please contact us ([info@tr-electronic.de](mailto:info@tr-electronic.de))

## Suggested Products

Order code	Steps per turn	Channels	Shaft / Flange	Connector position	Cable length	Remark
<b>IH58+FS</b>						
IH58-00001	1024	(K1/K2)+Inv; K0 + Inv	12H7/Keyway;	M12, 23 pin, radial		HTL
IH58-00002	1024	(K1/K2)+Inv; K0 + Inv	12H7/Keyway;	M12, 23 pin, radial		SIN/COS
IH58-00003	1024	(K1/K2)+Inv; K0 + Inv	12H7/Keyway;	M12, 23 pin, radial		TTL
IH58-00004	2048	(K1/K2)+Inv; K0 + Inv	12H7/Keyway;	M12, 23 pin, radial		SIN/COS
IH58-00005	2048	(K1/K2)+Inv; K0 + Inv	12H7/Keyway;	M12, 23 pin, radial		TTL
IH58-00006	2048	(K1/K2)+Inv; K0 + Inv	12H7/Keyway;	M12, 23 pin, radial		HTL
IH58-00007	4096	(K1/K2)+Inv; K0 + Inv	12H7/Keyway;	M12, 23 pin, radial		SIN/COS
IH58-00008	4096	(K1/K2)+Inv; K0 + Inv	12H7/Keyway;	M12, 23 pin, radial		TTL
IH58-00009	4096	(K1/K2)+Inv; K0 + Inv	12H7/Keyway;	M12, 23 pin, radial		HTL
<b>IV58+FS</b>						
IV58-00001	1024	(K1/K2)+Inv; K0 + Inv	10 Keyway /19,5; ZB36/D58	M12, 23 pin, radial		HTL
IV58-00002	1024	(K1/K2)+Inv; K0 + Inv	10 Keyway /19,5; ZB36/D58	M12, 23 pin, radial		SIN/COS
IV58-00003	1024	(K1/K2)+Inv; K0 + Inv	10 Keyway /19,5; ZB36/D58	M12, 23 pin, radial		TTL
IV58-00004	2048	(K1/K2)+Inv; K0 + Inv	10 Keyway /19,5; ZB36/D58	M12, 23 pin, radial		SIN/COS
IV58-00005	2048	(K1/K2)+Inv; K0 + Inv	10 Keyway /19,5; ZB36/D58	M12, 23 pin, radial		TTL
IV58-00006	2048	(K1/K2)+Inv; K0 + Inv	10 Keyway /19,5; ZB36/D58	M12, 23 pin, radial		HTL
IV58-00007	4096	(K1/K2)+Inv; K0 + Inv	10 Keyway /19,5; ZB36/D58	M12, 23 pin, radial		SIN/COS
IV58-00008	4096	(K1/K2)+Inv; K0 + Inv	10 Keyway /19,5; ZB36/D58	M12, 23 pin, radial		TTL
IV58-00009	4096	(K1/K2)+Inv; K0 + Inv	10 Keyway /19,5; ZB36/D58	M12, 23 pin, radial		HTL

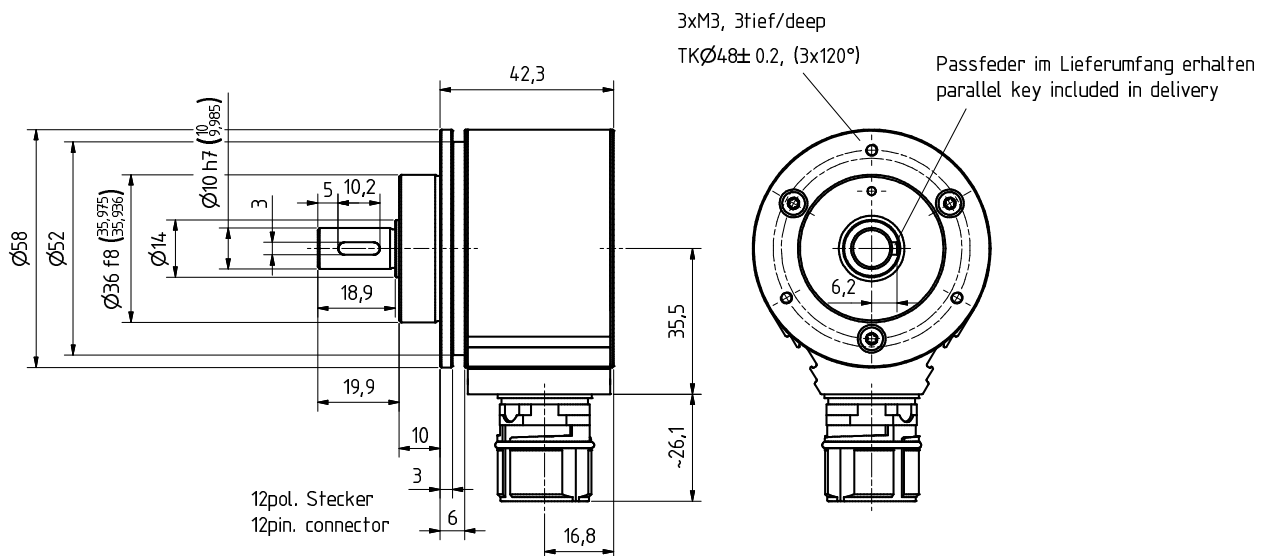
For further product information simply enter the order number in the search field at [www.tr-electronic.com](http://www.tr-electronic.com).

We will help you to select the most suitable products from the complete TR range. Please contact us ([info@tr-electronic.de](mailto:info@tr-electronic.de)).

# Dimensional Drawings

## IE58+FS

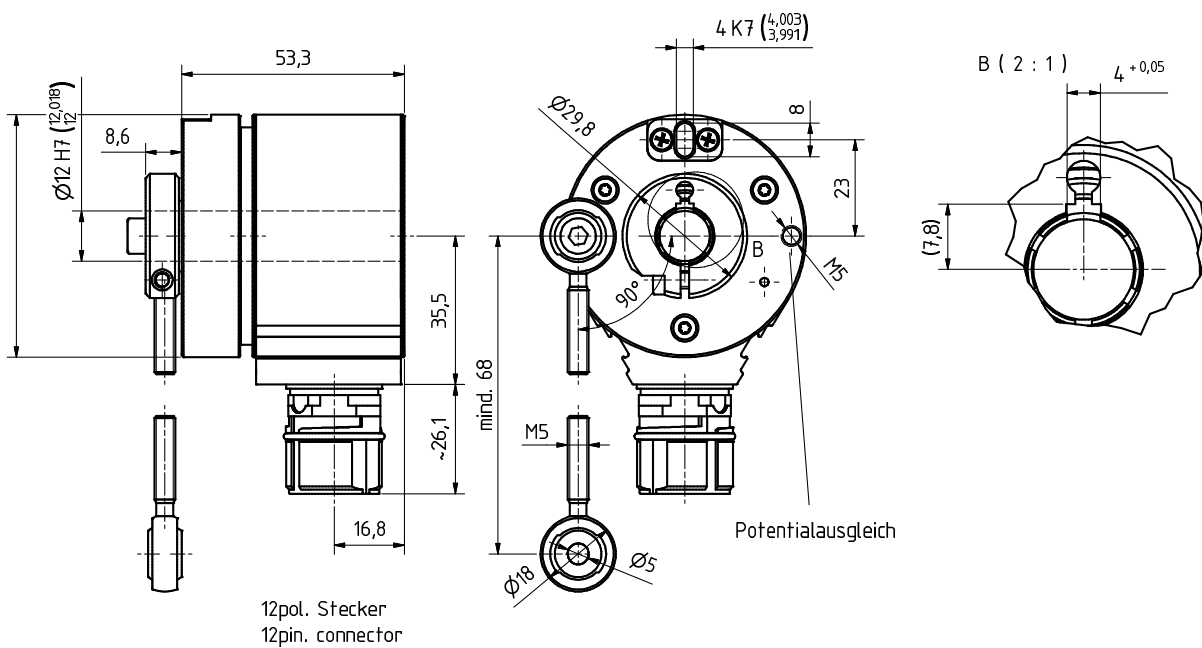
Incremental encoder with solid shaft - up to SIL3/Plc



# Dimensional Drawings

## IH58+FS

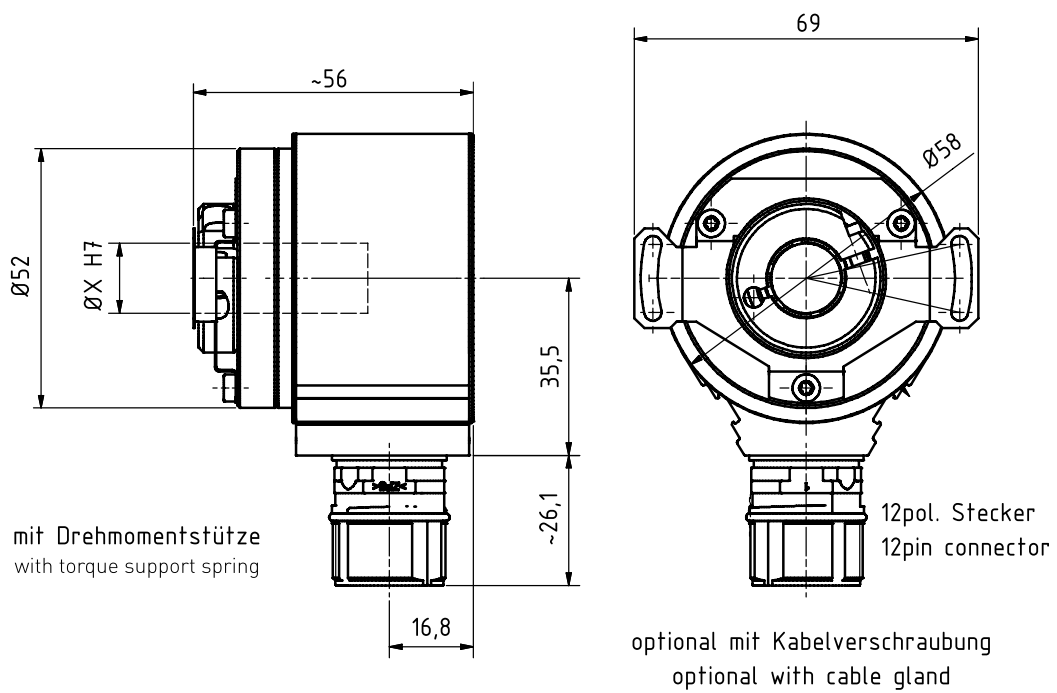
Incremental encoder with hollow shaft - up to SIL3/Ple



# Dimensional Drawings

## IS58+FS

Incremental encoder with blind shaft - up to SIL3/PLd



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# TR-Electronic – your partner in automation

## Rotary encoders

**Absolute encoder, incremental rotary encoder, wire-actuated encoder**

Rotary encoders with optical and magnetic scanning function register the precise position in a wide variety of applications and industries. In medical engineering, miniature versions ensure correct positioning while SIL3-approved absolute rotary encoders provide the necessary safety. We offer not only high-quality rotary encoders (from Ø 22 to 160 mm) for almost any application but also comprehensive accessories.

## Linear encoders

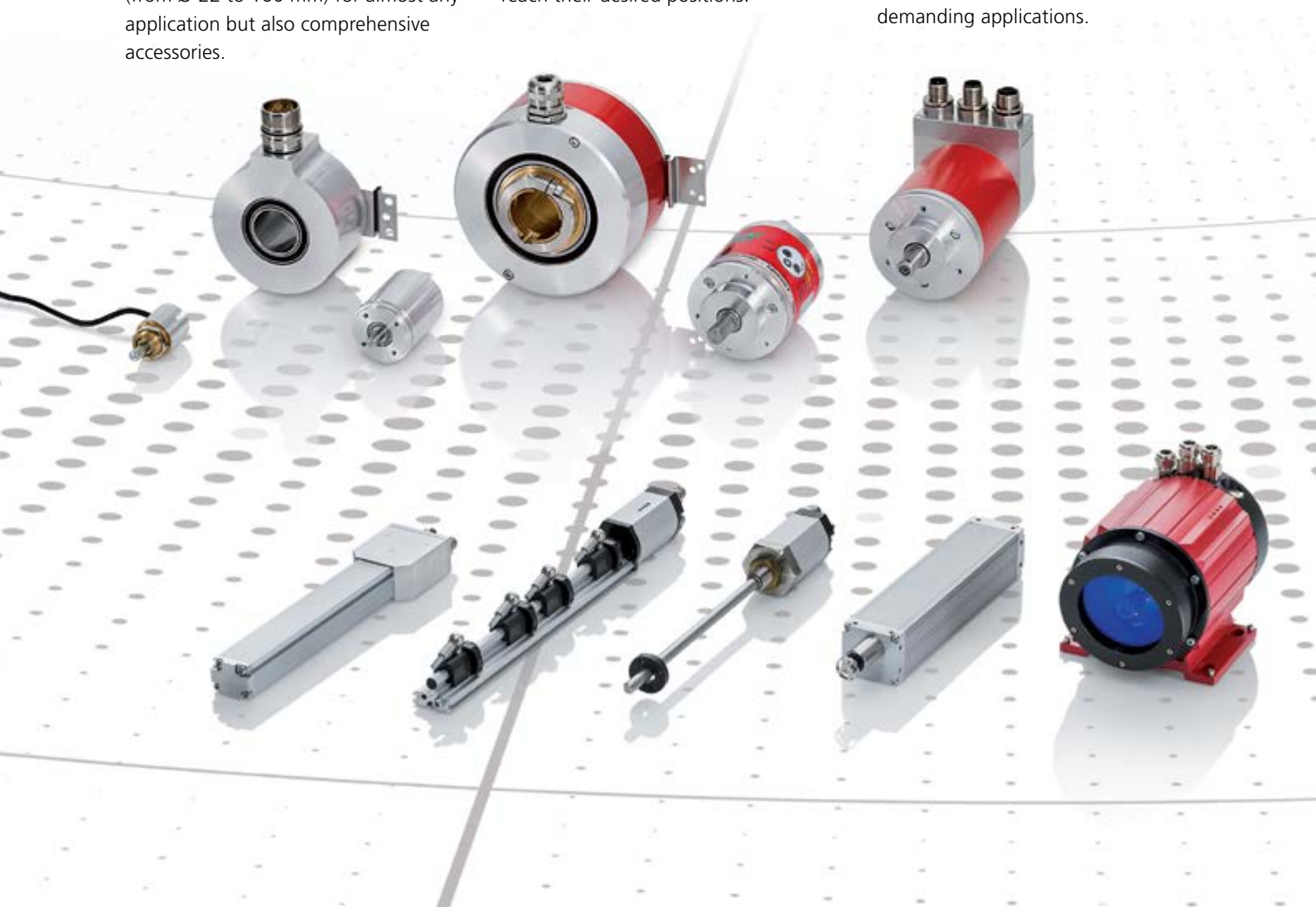
**Linear absolute measuring systems, laser displacement measurement**

Linear encoders register linear motions in machines, tools and systems according to specific requirements using different technologies. Linear encoders allow measuring distances of max. 20 m almost without any wear. This value is max. 240 m for laser measuring systems. Machines and systems can be precisely controlled to reach their desired positions.

## Motion

**Servo drives, compact drives, process drives**

Intelligent encoTRive drives are available with the current field bus systems, such as PROFIBUS, PROFINET and CANopen, within a power range of up to 300 watts. The drives are configured to meet customer requirements and can be freely combined with precision gear, holding brake and I/O. Values of up to 4,350 rpm and powerful 200 Nm are available to cope with demanding applications.



## Components

**Industrial PC, field bus I/O,  
PLC, HMI controller**

Industrial PCs are available in numerous variants and offer customized calculation power for PC-assisted automation. Programmable logic controllers (PLC) are the traditional means for automation. HMI controllers establish the interface to the user. Field bus nodes, I/O modules and cam controllers complete the range of automation components.

## Automation

**Consulting and implementation  
for new machines and retrofit**

You want to set up a largely automated new machine or retrofit and modernize your existing machine with automation systems? Then you just need our extensive expert knowledge and the more than 20 years of our experience.

## Unidor

**Blanking and forming,  
systems, controls and sensors**

Trendsetting blanking and forming technology for more than 30 years. We are your reliable partner in the world of blanking and pressing and can prove this with thousands of machines which we have successfully installed all over the world. Sensors, controls and systems ensure optimal results in machines, tools and retrofit projects.



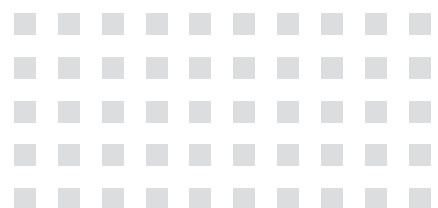
photo background: © iStockphoto.com

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Subject to technology and design modifications.

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