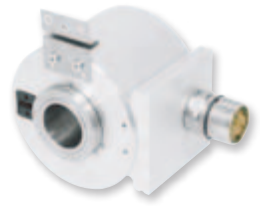


TR-Electronic Rotary Encoder Overview








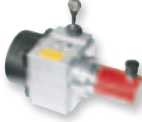







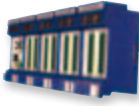







TR-Electronic – Your Partner in Automation

TR-Electronic can look back on more than 25 years of success, and is represented worldwide with an export share of more than 40 %. The core business comprises the development and manufacture of industrial angular and position measuring technology, as well as compact drive technology with integrated position control and measurement. The company is divided into three Business Units (BU) and is thus well positioned for further growth in the future.

Products in the **Rotary Encoder Business Unit** with optical or magnetic scanning precisely acquire position in steel production, wind power plants, cranes and ships as well as in explosion-proof versions in painting lines. Miniature versions ensure the correct position in medical technology. SIL3 approved absolute rotary encoders ensure the necessary safety.

In the **Linear Encoders Business Unit** magnetostrictive position sensors position injection molding machines, for example, or are directly integrated into hydraulic cylinders. Cascadable distance measurement sensors position parting units. With their high precision, glass scales on machine tools ensure precise position. Laser sensors based on phase difference measuring techniques position aisle stackers in warehousing and materials handling technology.

In the **Drives Business Unit** angle sensors are combined with compact drives: no external electronics are required, position, speed and torque controllers, power electronics and absolute rotary encoders are compactly integrated into the drive and thus bring intelligence directly to the drive shaft via the field bus. Compact drives are used for diverse applications in the printing and packaging industry and on palletizers.

					
					
Rotary Encoder	Linear Encoder	Drives	Components	Engineering	Unidor
 Incremental Encoder  Absolute Encoder  Draw Wire Encoder	 Magnetostriction  Glass scale  TOF laser  Barcode Positioning	 Actuator  Positioning Drive  Processing Drive	 I/O Module  Controls  Industrial-PC	Automation Solutions  Retrofit 	Punching and forming Measurement and control systems  Sensors  Process monitoring tools 

The portfolio is supplemented by the affiliated **TRsystems** with customized controls, industrial PCs, hydraulic controls as well as control units and sensors for punching and forming.

An essential factor for the success of **TR-Electronic** are the now more than **300 employees** who actively help to shape the product portfolio with innovations and successfully implement customer projects. Through its commitment to the regional colleges, TR-Electronic supports the high quality training of young employees and thus guarantees the highest level of innovation and quality at its Trossingen location.

A high degree of vertical integration allows customer-specific requirements to be responded to very quickly. The constantly new requirements on the mechanical design of sensors, on innovative new operating interfaces and new plug connectors result in a rapidly increasing product diversity. With **TR-Electronic** you have a partner who can fulfil these requirements.

Content

Our classics for industrial standard applications

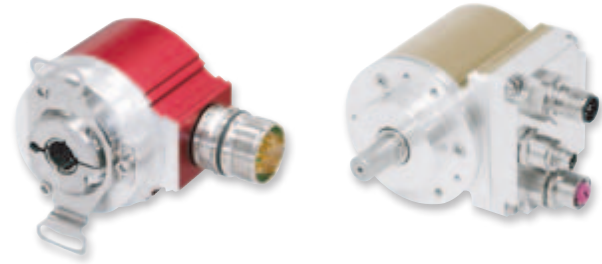
58 mm diameter – compact and programmable	10
65 mm diameter – numerous special features	13

Rotary encoder for special applications

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General

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Products by Model

Absolute rotary encoder	solid shaft	22/36 mm housing	22	
		58 mm housing	20	
		65 mm housing	21	
		58/75 mm housing	24	
		70/84/115 mm housing	23	
hollow shaft		58 mm housing	26	
		80 mm housing	27	
		80/81 mm housing	28	
		110/160 mm housing	29	
		blind shaft		58 mm housing
65 mm housing	31			
bearing free coupling		36 mm housing	31	
		58/65 mm housing	32	
Double rotary encoder	solid shaft	58/70/75 mm housing	33	
	hollow/blind	75/80/58 mm housing	34	
Wire length encoder		22/58/65 mm housing	35	
Incremental	solid shaft	24/36/40 mm housing	36	
		58/92 mm housing	37	
		hollow shaft	58/20 mm housing	38
			76/92 mm housing	39
			120 mm housing	40
	bearing free		36 mm housing	41
	blind shaft		24/58 mm housing	41
			76 mm housing	42
	hand wheel		housing option	43

Products by Shaft Type

Solid shaft	absolute rotary encoder	20–24
	double rotary encoder	33
	wire length encoder	35
	incremental rotary encoder	36/37
	Hollow shaft	absolute rotary encoder
double rotary encoder		34
incremental rotary encoder		38–40
Blind shaft	absolute rotary encoder	30/31
	double rotary encoder	34
	incremental rotary encoder	41/42
bearing free	absolute rotary encoder	31
	incremental rotary encoder	36
Coupling	absolute rotary encoder	32
Hand wheel	housing option	43

Interfaces (others on request)

SSI
ISI
Parallel
SIN/COS
FO



TR-Electronic – Your Partner in Automation

General/Definition



Programmable rotary encoder

The standard of automation technology, available with all current fieldbus systems: PROFIBUS, Interbus, CANopen, DeviceNet and Industrial Ethernet. Including TR-Electronic's variety of mechanics, interfaces and functions.



Absolute Rotary Encoder



Incremental Rotary Encoder

Incremental rotary encoder

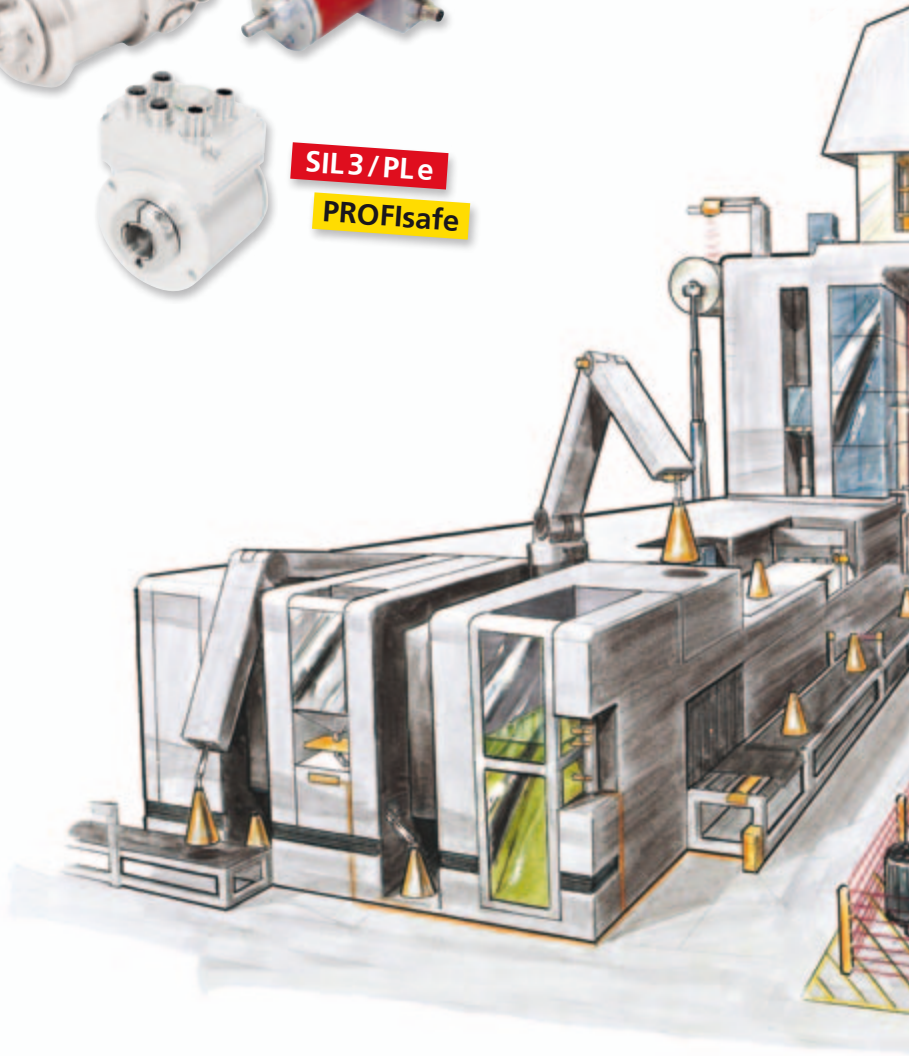
From 24 mm external diameter up to 55 mm hollow shaft – we always have a solution!



Accessories

Motor feedback systems

Feedback encoder for modern positioning drives. Optional integrated or directly mounted on the drive shaft via hollow shaft.



Linear absolute displacement sensors

The compact class for linear absolute measurement. Directly bus-ready, suitable for harsh environmental conditions and for installation in hydraulic cylinders.



Absolute high resolution linear measurement systems

Linear measurement with absolute sub-micron resolution without referencing.



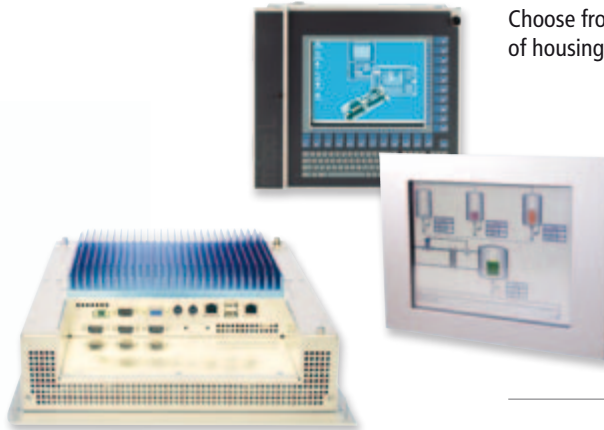
Intelligent positioning drive

Absolute positioning directly via fieldbus. Integrated motor, power electronics, closed loop controller, absolute encoder, PLC functions and fieldbus interface.



Heavy-duty industrial PC

Double shock proof mounted housing isolates the electronics from vibration, while front access (MIPC) simplifies configuration and start up. Choose from our wide selection of housings.



SPC – the PLC for PC

Turns every PC into an efficient PLC under S5/S7 or IEC 1131 protocols. Combines the comfort of PC control with the safety of a separate processor for PLC tasks.



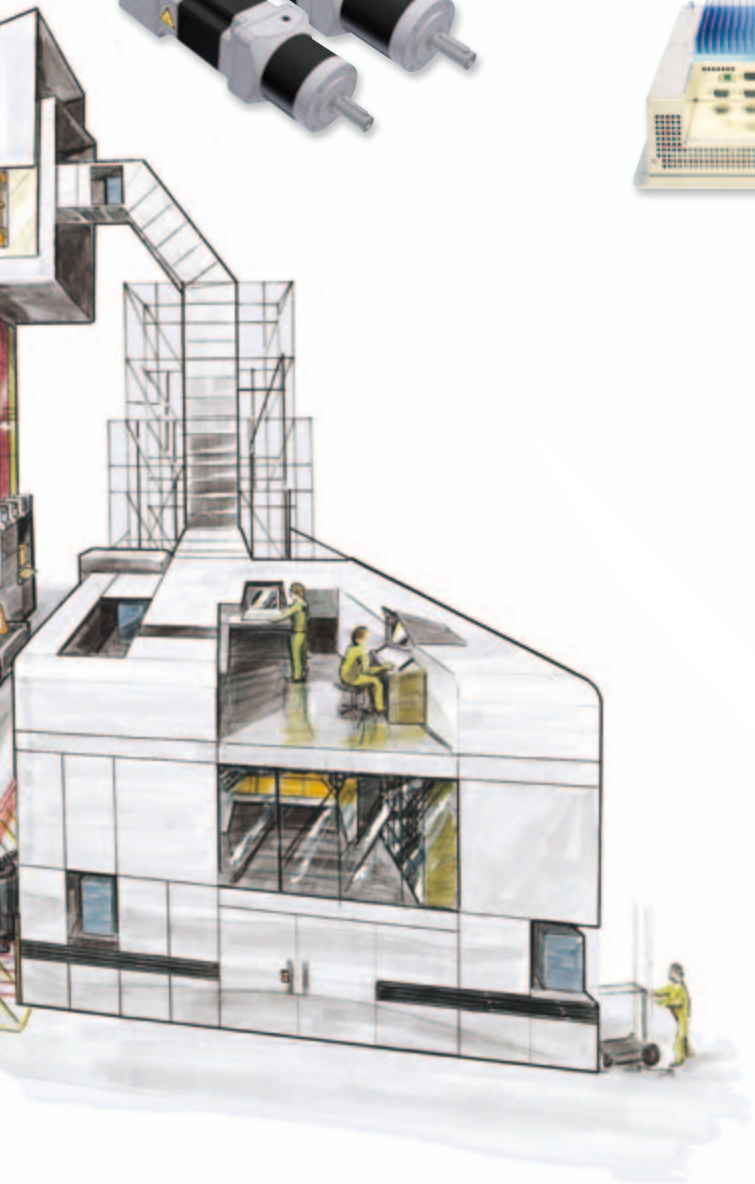
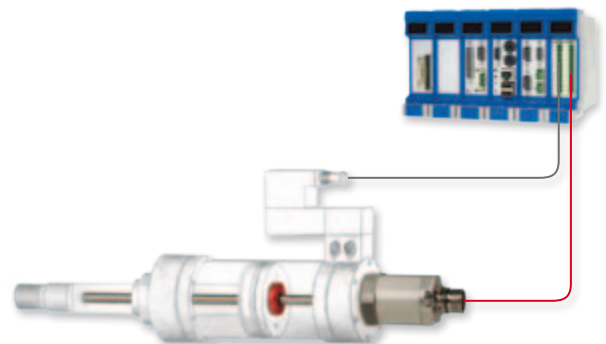
@ctivelO – more than fieldbus modules

Modular, rugged fieldbus node system I/O-node, small-scale PLC, decentralized axis controller, high performance cam controller, DIN-rail mounted industrial PC, servo controller for the hydraulic ... with commercial fieldbus systems, such as Profibus-DP, CANopen, DeviceNet, LightBus ... and ETH-ERNET as option!



Laser distance measuring systems

Absolute and wear-free measurement of distances up to 200 m via SSI, fieldbus and Ethernet.



TR-Electronic – For Each Sector the Perfect Solution

Storage and logistics

It is especially important for storage equipment such as rack feeders, transfer units and cranes to have an effective, decentralized measurement and control technology for easy project planning and fast start up.



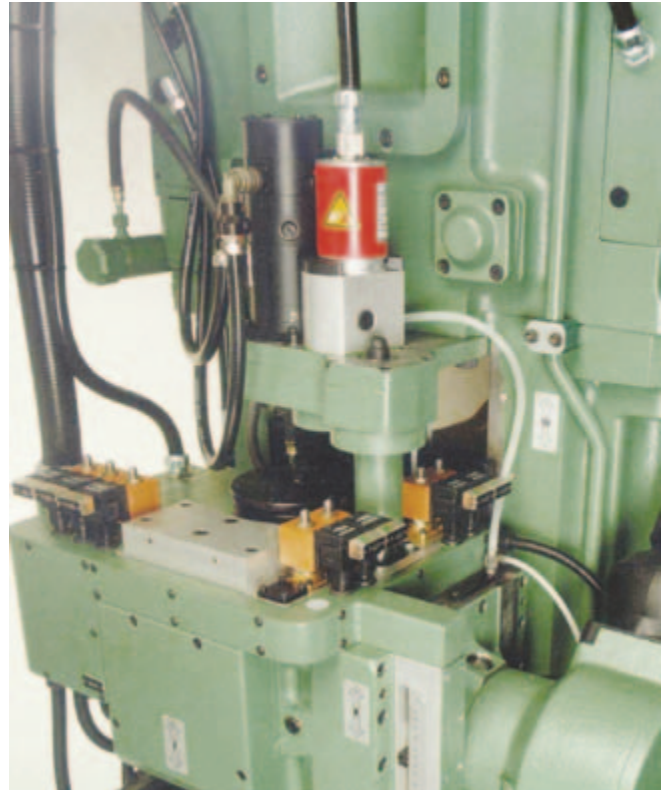
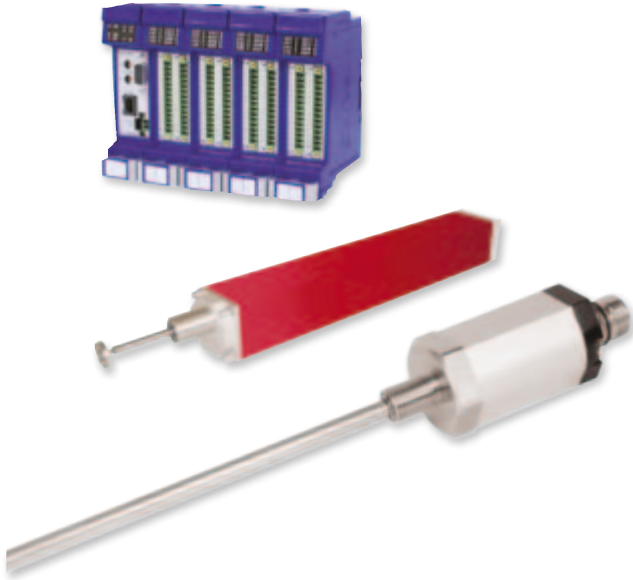
Packaging industry

Flexible automation solutions according to our customers' wishes are the intelligent base for a successful machine concept within the packaging industry. High processing speed, enables fast cycle times and larger lot sizes. Absolute measurement systems save time consuming Homing Sequences. Highly integrated, intelligent sensors also allow for distributed control. When it comes to needing higher precision, we have a perfect solution.



Metal working

For years the world of presses and stamping has been a specialty of TR-Electronic. We design and develop products from the beginning, in such a way that they resist high shock and vibration impacts.



Wood working

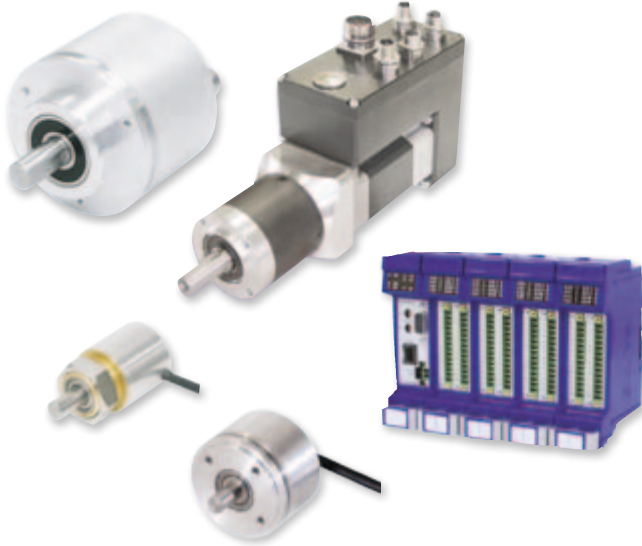
Intelligent, decentralized controlling concepts, efficient sensors with on-site signal processing and components that work reliably despite high temperature fluctuations, are the base for automation solutions within the wood-working industry. Our specialty is to equip and network transfer machines, machine centers and installation fields, especially if you have particular requirements for your machine.



TR-Electronic – For Each Sector the Perfect Solution

Print technology and paper conversion

Fast signal processing for printing machines enables higher accuracy and decentralized compact drives automate adjusting procedures. With stainless steel housings, rotary encoders even sustain aggressive mediums like groundwood pulp in paper machines. Small absolute rotary encoders measure movements in tight spaces.



Event technology

Our rotary encoders offer safety in all required classes for stage technology and other SAFE applications. From rotary encoders with additional incremental tracks up to SIL 3 certified safety rotary encoders, we offer the right solution for safety.

SAFETY INSIDE

SIL3/PLe
PROFIsafe



General/Definition
Absolute Rotary Encoder
Incremental Rotary Encoder
Accessories

Renewable energy

With intelligent tracking of photovoltaic constructions the efficiency is improved and the automation accelerated. High resolution rotary encoders enable exact positioning. Compact drives reduce the number of connected components and provide years of orientation of your construction towards the sun.



Plastics processing

Various measurement tasks within plastic processing machines require fast signal processing and high precision. Linear measurement systems, for implementing into hydraulic cylinders, blend smoothly into injection molding machines. Industrial PCs are an universal platform for user specific control systems for series production and special machines.



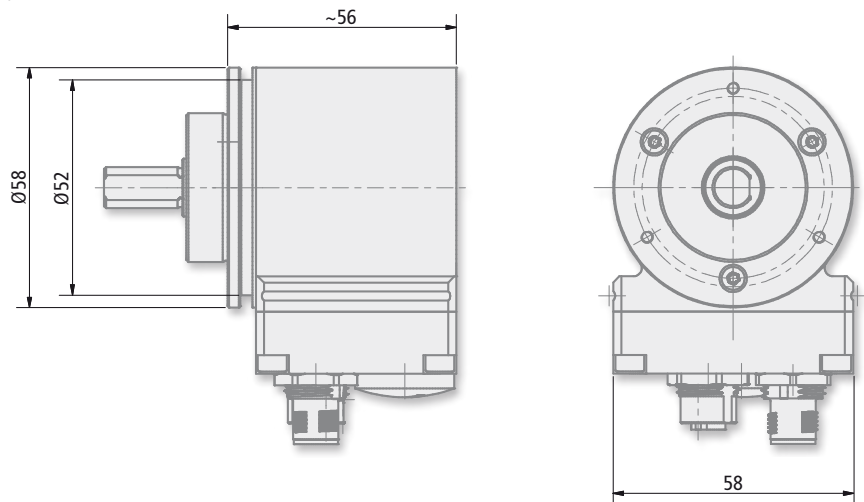
Rotary Encoder for Industrial Standard Applications in a 58 mm Housing

The 58 mm encoder size is a widespread established industrial standard for absolute and incremental rotary encoders. The standard of TR-Electronic is something that other companies consider specialties. The 58 mm absolute rotary encoders are built on a modular concept allowing rapid customization.

- + industrial standard model size 58 mm
- + optimized costs through various resolution ranges
- + multiple interfaces
- + compatible with a multitude of controllers
- + shaft and mounting varieties
- + same mechanics with different interfaces
- + compact connector technology – for serial machines
- + for individual projects – because programmable by the user
- + for customer specific connector technology
- + partly with UL permit

Drawings

example CEV 58 M
 CANopen
 connected via 2 x M12 connector
 8.192 steps/revolution
 4.096 revolutions
 flange with centering ring 36 mm
 shaft 10 mm with flat
 protection class IP 65



Interfaces

(others on request)
 SSI
 ISI
 Parallel
 SIN/COS



CANopen



EtherCAT



Three scanning options for optimal cost-benefit ratios

O optical high-resolution scanning

Thanks to modern opto-asic technology you can generate within a single revolution up to 18 bits (262.144 steps). In addition, you can scan absolute 32.768 revolutions. Signal processing is in FPGA speed. This scanning is always used, when positioning values have to be captured really fast. You recognize this type of the scanning by the abbreviation "O".

E optical scanning for industrial standard applications

The majority of industrial applications use rotary encoders with a resolution up to 15 bit per revolution and up to 4.096/256.000 scanned revolutions.

Signal processing within the processor enables multiple evaluation functions and optimal adjustments to new requirements. Signals like an end switch and speed control can also be generated. You recognize this type of scanning by the abbreviation "E".

M magnetical scanning for price-sensitive applications

Magnetic rotary encoders offer lower resolutions but provide a price conscious alternative to optical encoders. The resolution of a revolution is 11 bit and is supplemented with 4.096 absolute scanned revolutions. There is no signal processing, though the resolution of this device is programmable. You recognize this type of the scanning by the abbreviation "M".

Shaft varieties



solid shaft



hollow shaft



blind shaft



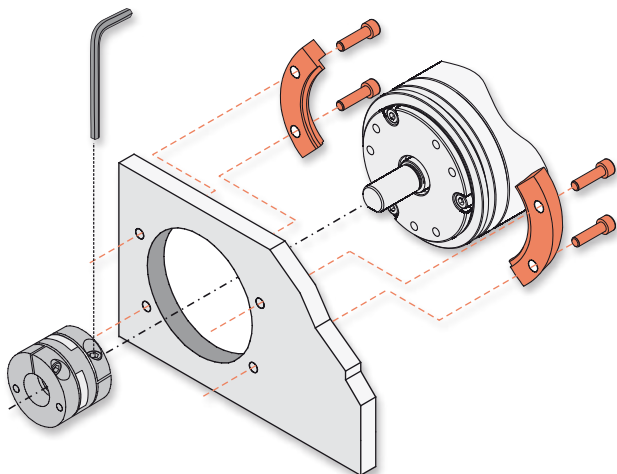
coupling

Persistent machine concept

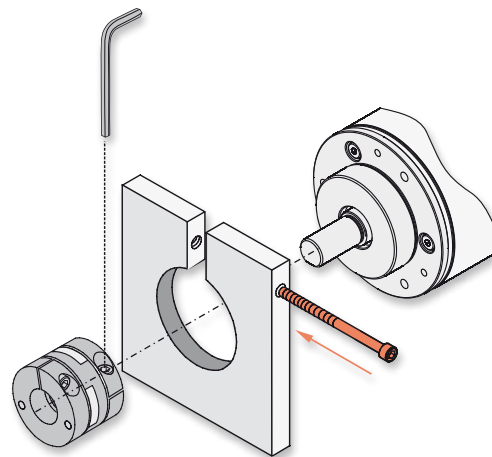
The 58 mm series of the compact rotary encoder was consequently developed for diverse mounting variations. Therefore, there will always be a fitting device for any installation situation available. Functions that you need with a solid shaft, are also available with a hollow shaft. Our rotary encoders with solid shaft are available with many coupling options, for easy integration.

The variety of the mechanical solutions enhances your room for innovative constructions. You will find an extraction of the numerous mounting possibilities in the following overview. Important: not all possible combinations will be shown.

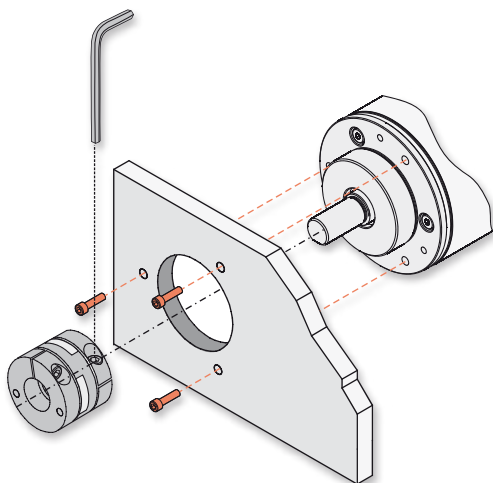
Mouting variations of the solid shaft



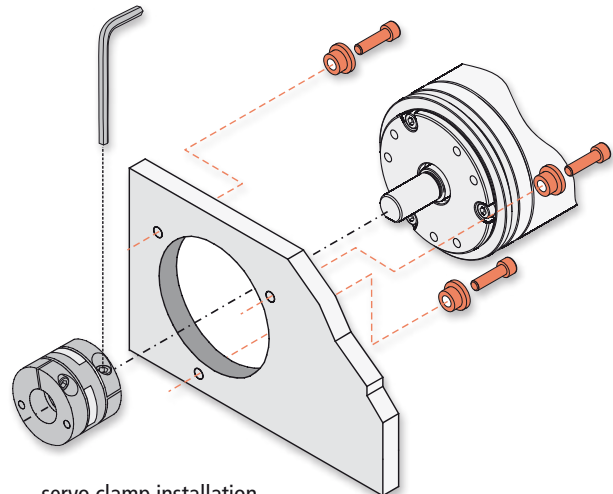
clamping claw installation



flange installation



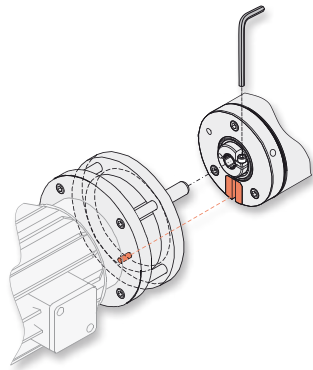
servo flange installation



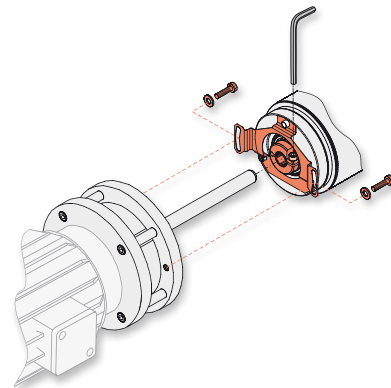
servo clamp installation

Mounting variations for hollow and blind shafts

Distortion lock, mounting position of the pin/torque support spring

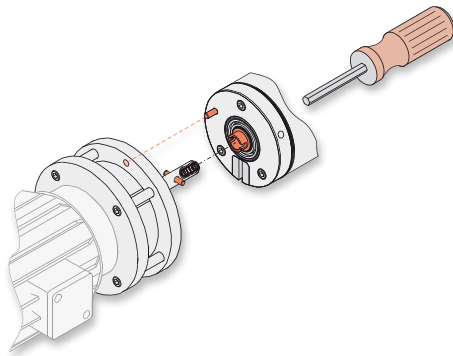


pin/groove axial, pin within the flange of the machine



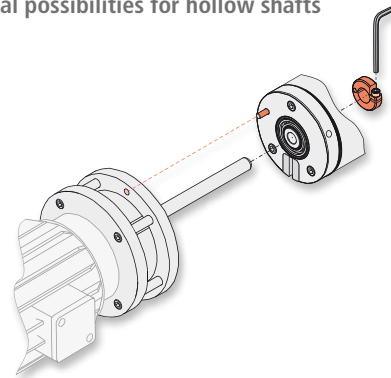
torque support spring with clamping ring

Additional possibilities for blind shafts



pin/groove axial with V-groove and axial screw

Additional possibilities for hollow shafts

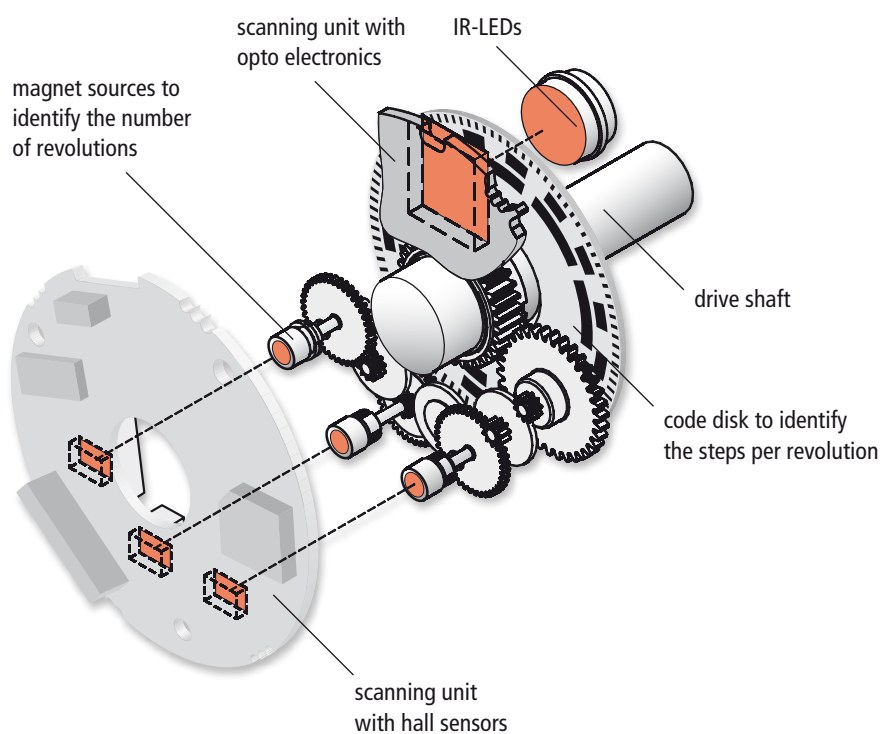


pin/groove axial with clamping ring on the side of the cover

Functional description for the optical scanning

In contrast to incremental measuring systems, the absolute measuring system provides the current position value instantaneously. If this measuring system is moved mechanically while power is off, the current position can be read out directly as soon as the voltage supply is switched on again.

TR-Electronic's absolute measuring systems can be delivered as single turn or multi turn versions depending on the type required.



Space for More Functions Within the 65 mm Housing

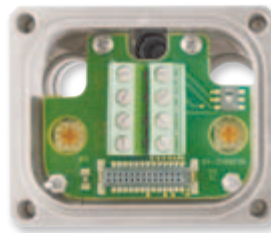
The larger diameter makes it possible to implement additional functions, which are not accessible in the small size series of 58 mm.

The specialty of our 65 mm rotary encoder is the output of a cam signal. On up to 32 cam tracks, 4 cams can be shown. Therefore, complex controlling tasks in a machine module can be solved directly from the rotary encoder.

- + comfortable connection of the fieldbus cable
- + higher holding capacity of the cable glands
- + optimal adjustment due to a bigger selection of connectors
- + incremental signal for converter and fieldbuses for the controller are out of one rotary encoder
- + machine parts are controlled via cams in the encoder
- + rare interfaces are possible

Generous connection space for fieldbuses

In special engineering applications, it has been proven that the use of cable from a roll to connect field devices saves costs. The cables will be cut and connected when installed. The fieldbus hood of the 65mm series offers comfortable connection space. Less bend in the bend cable and a generous clamping area makes it easier to connect on-site. Due to the bigger cable gland, a wider variety of fieldbus cable can be used.



58 mm housing



65 mm housing

More interface possibilities

Rotary encoders size 65 mm of TR-Electronic allow total communication flexibility. The combination of point-to-point interfaces or the networking of fieldbuses such as PROFIBUS or CANopen with one or more point-to-point interfaces – the 65 mm series rotary encoder has enough space.

Common combination possibilities for point-to-point interfaces:

- SSI + analog,
- SSI + digital output (end switch, standstill monitor, speed monitor)
- parallel output (retro-fitting, spares ...)
- cam
- special connectors

Combination of fieldbus and point-to-point interfaces:

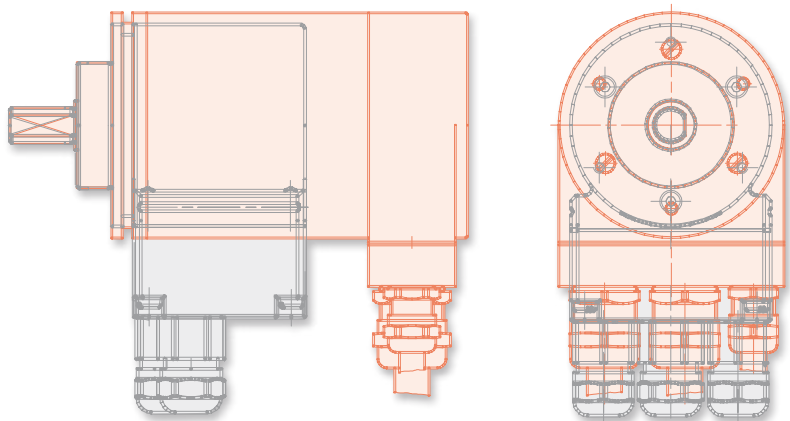
- fieldbus + analog (speed or position)
- fieldbus + SSI
- fieldbus + incremental signal (as feedback to the servo converter)
- fieldbus + SSI + incremental signal

Interfaces for special market niches

- FiberOptic I/O (FO)
- Interbus on FO
- FIPIO
- (others on request)

Comparison of the models

- 58 mm housing
- 65 mm housing



Individually Manufactured Rotary Encoder for Your Drive

We are able to design and develop rotary encoder systems according to your requirements that are considerably different from the usual models. The mechanical construction of the rotary encoder will be developed particularly to your needs and wishes. This service is offered when ordering higher quantities. You can integrate your Kit-Encoder within the motor housing of your drive.

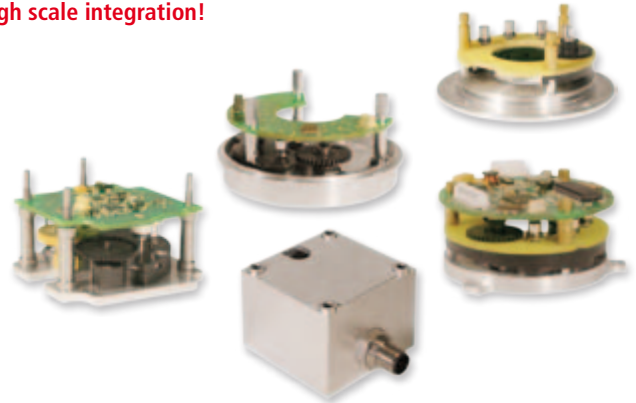
For example, you can use the encoder in a positioning or processing drive, in particular as a motor feedback system. In this case, we construct the rotary encoder without its shaft bearing. The shaft of your drive installs into the encoder and the mechanic of the rotary encoder is driven over a jaw clutch coupling or a pinion gear. Depending on the sampling variation, a resolution up to 2.048 steps/revolution or 8.192 steps/revolution of up to 4.096 revolutions is possible.

Options:

- + additional options like heating or cooling are possible
- + the connection technology is individually chosen
- + an encoder variation in SSI and fieldbus as a double encoder is also possible

Supply voltage	11 ... 27 V DC or 5 V DC
Temperature range	-20 ... +100 °C
Programmability	TRWinProg, Bus (optional)
Interfaces	SSI, ASI, Parallel, Analog, Cam, CANopen, DeviceNet, PROFIBUS, Fiber Optics, Interbus. Further interfaces on request.

Small designed space through high scale integration!



Your advantage:

- + the amount of prefabricated parts is low for your device
- + your production process is more cost efficient through our delivery of suitable components for integration to your product
- + also with a lower frequency the rotary encoders are vibration resistant up to 25 g and shock resistant up to 100 g
- + housings up to IP 67 or oil-tight are optional
- + you receive a flange connection and a housing out of aluminum and on request made of other materials such as stainless steel, special synthetic material and others

Example – unlimited variations are imaginable

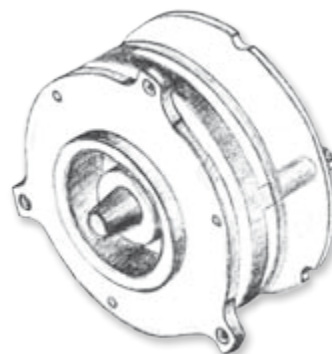
Each Kit-Encoder is individual – it is uniquely customized, developed and built. An overview of each possible variation would generate an enormous catalogue. The sketches should inspire you to challenge us.

For example, you can create the mounting flange according to your needs. The encoder will be attached to the motor.

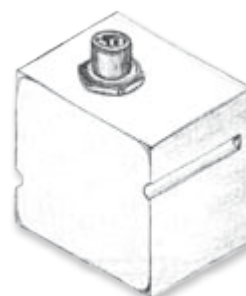
The mounting holes can be put exterior.



Like in the sketch, the mounting can be done from behind, passing through the encoder housing. Even a special flat mounting flange can be realized this way.



The magnet of the central scanning can be attached excentric respectively within the turn of the gear.






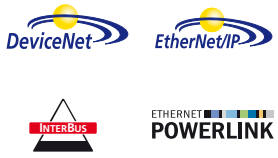


In this sketch, the shaft of the motor is external into the bottom edge of the housing. The housing is rectangular and will be custom-fit into your drive.



The Development Process – Cooperative and Suitable for Production

In 10 steps to your individual rotary encoder

<p>1 Collaboration of the requirements Together we define the features of your Kit-Encoder and match your individual wishes with a possibility of construction.</p>	<p>2 Integration of already existing parts We deliver suitable for production. If necessary and possible we construct the rotary encoder so that already existing components of your drive will be integrated. The advantage is that you will gain space, time and save costs.</p>	<p>3 Housing variation The housing can be created so that the mounting flange of the encoder is simultaneously the end shield of your motor. Of course, you don't have to use the housing at all.</p>	<p>4 Housing form With the form of the housing you can take our standard forms or you can choose your own form, fitting to your application.</p> 
<p>5 Construction You can create the mounting flange according to your needs. For example, an extreme flat mounting flange or four instead of three mounting points would be imaginable.</p> 	<p>6 Coupling We carry over the rotary movement with an integrated coupling or directly over a gear into the kit.</p> 	<p>7 Place of the shaft By default, the shaft is in the middle. If needed, it also can be repositioned.</p> 	<p>8 Interfaces Beside the standard interfaces, on request we provide customized interfaces.</p> 
<p>9 Other options There are many available options. For example, we offer our encoders with heating, cooling or stainless steel housings.</p>	<p>10 Delivery suitable for production We fit our logistics to the batch sizes of your manufacturing. Even the transport packaging we adjust to your manufacturing needs, so it is most convenient for you.</p>	<p>Through this customized delivery, you can optimize your production process. Together with you, we gladly implement special wishes and requirements.</p> 	

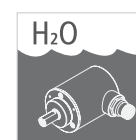
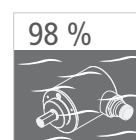
“Seal Pack” – an option for high resolution absolute rotary encoders with a 58 mm housing

The optional package “Seal Pack” has an additionally sealed housing cover. For absolute rotary encoders, it coordinated combines measures to ensure the following performances:

- + density for occasional dipping (IP 67, tested according to DIN EN 60529)
- + hermetically sealed against penetrating humidity in humid environment (test according to DIN EN 60068-2-30)
- + especially tight against creeping oil such as honing oil.

The “Seal Pack” is available for our industrial standard encoder with blind shaft and solid shaft in the 58 mm housing. The bearing of the encoders will be sealed additionally with a gasket. The plug socket is

backfilled when assembled. Therefore, liquid cannot get through and damage the encoder when it is insufficiently connected or has badly mounted cable to the connector. The housing cover is additionally sealed to gain a higher tightness. The test stand has been increased from IP 54, respectively IP 65 to IP 67 (clean water at 20 °C). The housing of the encoder with “Seal Pack” option is airtight. This means, even when there are high temperature and air pressure differences no vapor or water will be sucked in. Therefore, the systems are absolute tropicalized. The device with “Seal Pack” is just 7 mm longer and has the same outer and mounting measures as the standard encoder.



Rotary Encoder for Special Applications

Redundant hollow shaft rotary encoder with SIL3/PL e certificate

Functional safety. Reliable protection.

The double rotary encoder system with hollow shaft and multi turn scanning fulfils the requirement of EN61508 and is since 2008 certified according to SIL3 and PL e.

The use of certified individual components makes it easier for the system integrator to fulfil safety requirements of the whole application, for example with event technology or general storage and logistic technology.

- + certified according to EN 61508 SIL3, EN ISO 13849 PL e
- + two redundant SSI interfaces or PROFIsafe over PROFIBUS/PROFINET
- + hollow shaft up to 20 mm with nut
- + resolution SSI: 13 bit × 4.096 revolutions in system 1
13 bit × 4.096 revolutions in system 2
- PROFIsafe: 13 bit × 32.768 revolutions
- + application areas: drive technology, conveying system, mechanical engineering, automation technology, wind energy, event technology and so on.

Resolution	13 bit / revolution, 4.096 revolutions
Protection class	IP 54
Interfaces	2 × SSI or PROFIsafe (PROFIBUS/PROFINET)

Further information you will find on page 34



applicable for SIL3 and PL e



Compact single turn rotary encoder in a 36 mm housing

Developed for Increasing Requirements

The new, compact singleturn rotary encoder CMV 36 S has a completely encapsulated electronics unit. There is no rotating feedthrough, the position information is transferred contactlessly through a fixed housing wall.

It is protected from dust and water, and is also used in applications with changing temperatures (condensation) or for speed monitoring. The maximum achievable tightness corresponds to IP 69 k. Therefore, this rotary encoder can be used without problem in vehicle manufacture, for mobile machines and other outdoor applications. The position is acquired absolutely within the revolution.

- + extremely robust and extremely tight (IP 69 k)
- + compact design, only 36 mm diameter
- + completely wear-free with separate bearing
- + for areas with changing temperature (condensation)
- + professional solution for your outdoor applications

Resolution	12 bit / revolution, 1 revolution
Shaft	integral bearing or bearing free
Interfaces	1 × SSI, 2 × SSI incremental

Further information you will find on page 22, 31, 36, 41

completely encapsulated with IP 69 k



General/Definition

Absolute Rotary Encoder

Incremental Rotary Encoder

Accessories

16 up to 27 mm hollow shaft in a 80 mm housing

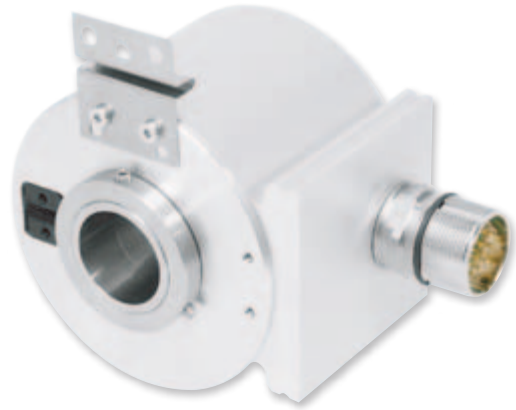
The COH 80 is a compact hollow shaft rotary encoder for mechanical engineering using bigger hollow shafts. As an absolute encoder, an actual position value is provided without any use of battery or counter. The rotary encoder can be carried by the hollow shaft. You have either a compact torque support spring made of steel or a fixing pin for a flange sided nut.

- + compact and robust rotary encoder with a 27 mm hollow shaft
- + with inserts you can realize a smaller shaft diameter
- + programmable
- + measuring range up to 36 bit

Resolution	18 bit/revolution, 4.096 revolutions
Protection class	IP 54
Interfaces	SSI, PROFIBUS, DeviceNet, CANopen

Further information you will find on page 27

robust and compact
up to 27 mm hollow shaft



Absolute multi turn rotary encoder with an 80 mm hollow shaft

For mechanical engineering, torque motors.

If size matters, the CEH 160 with a housing diameter of 160 mm and a shaft diameter of 80 mm is the right choice. With the CEH 160 you will have a real multi turn encoder which gives you an actual position value without any battery or counter.

With inlays you can decrease the diameter of the hollow shaft. A torque support spring with an adjustable ball, joint bar or a spring secures against rotation. For Industrial Ethernet, caps with standardized M12 – connectors will be used.

- + hollow shaft up to 80 mm
- + programmable over TRWinProg or bus
- + Over SSI the absolute data of the position will be conveyed.
Industrial Ethernet for PC based control technology with realtime bus systems.

Resolution	15 bit/revolution, 4.096 revolutions
Protection class	IP 65
Interfaces	SSI + Incremental + EtherCAT / PROFINET / Powerlink / EtherNet/IP

Further information you will find on page 29

hollow shaft 80 mm
housing 160 mm



Rotary Encoder for Special Applications

CO_ 58 – rotary encoder with higher resolution in a 58 mm housing

For a compact constructed size.

The successful absolute rotary encoder series in the 58 mm housing, you now get in variations with higher resolution. The mechanical diversity from the solid, hollow and blind shaft as well as the integrated coupling you receive with a resolution up to 262.144 steps per revolution (18 bit) at 4.096 revolutions. Higher revolution ranges are optional possible. Therewith, you have a measuring range which expands from 30 bit to 36 bit depending on the interface.

You can adjust the rotary encoder via TRWinProg to the requirements of your application that the output of the measuring value is directly possible in the plant unit.

maximum resolution 36 bit



- + high resolution rotary encoder
- + continuous system from 10 to 18 bit resolution / revolution
- + compact 58 mm housing (industrial standard)
- + solid shaft, hollow shaft, blind shaft or integrated coupling

Resolution	18 bit / revolution, 4.096 revolutions
Protection class	max. IP 65 (hollow shaft IP 54), optional IP 67
Interfaces	SSI, PROFIBUS, CANopen, DeviceNet, EtherCAT PROFINET, EtherNet/IP (others on request)

Further information you will find on page 20, 26, 30, 32

CMV 22 M – our smallest absolute multi turn encoder

Small. Robust. Compact.

Within the CMV 22 M, we have incorporated the in-depth, accumulated experience that we have gained from over 25 years of innovative rotary encoder technology and ideas. At only 22 mm in diameter, it is our smallest absolute, multi-turn rotary encoder of its kind.

Amazingly compact, it can be easily mounted in the most confined machine spaces, while its low mass and resistance to shock and vibration make the CMV 22 M ideal for use in demanding environments.

- + absolute rotary encoder:
 - in each operating condition the right position
- + no reference pass procedure
- + due to its size it is an ideal replacement for a potentiometer
- + shaft is bedded in ball bearing – therefore higher speed, bears a higher shaft load, long life time
- + programmable
- + shock- und vibration resistant – ideal for demanding conditions
- + 22 mm diameter: small enough for tight spaces
- + improved machine performance and functionality

- Your advantage:
- + higher resolution
 - + standardized interfaces
 - + no dead-stop
 - + wear-free

Resolution	12 bit / revolution, 256 revolutions
Protection class	IP 64
Interfaces	Analog, ASI, SSI

22 mm multi turn as poti replacement



Further information you will find on page 22



Programmable incremental rotary encoder in a 58 mm housing

Incremental rotary encoder are simpler constructed and therefore more cost-efficient. They are placed in various machines with different resolutions. It is important when you make your decision that you fast get your requested rotary encoder with the right resolution. We fast implement your wishes.

With the IOV 58 (solid shaft) and the IOH 58 (hollow shaft) you can realize arbitrarily each resolution between 2 and 36.000 steps/revolution. Beside the industrial standard flange and shaft combination, we also offer you an increasing choice of special features like inch-measurement for the US market.

The requested resolution you programm directly over TRWinProg!

- + from 2 up to 36.000 steps
- + programmable over TRWinProg
- + cost-efficient
- + fast deliver times
- + inch-measurement for the US market

Resolution	2 ... 36.000 steps
Protection class	IP 65
Special function	speed control

Further information you will find on page 37/38, 41/42

incremental rotary encoder
up to 36.000 steps/revolution



More flexibility. Fail-safe.

Profibus & Co. are no water under the bridge. The cross linking of industrial facilities is following the example of office networks. By taking out the power supply cable, "Power over Ethernet" (PoE) is using one less cable.

The power supply of the device comes directly over the data cable. Therefore, the network planning is easier and more independent from sockets and control cabinets. You can install our PoE rotary encoder in positions where a lot of cable would disturb. You can save on installation costs in difficult accessible areas. Using an uninterrupted power supply (UPS) lowers the risk of your connected devices when having a power outage.

- + thanks to "Power over Ethernet" you just have to connect on network cable – the power supply cable drops out
- + network planning is independent of sockets and control cabinets
- + speed of Industrial Ethernet
- + fail-safe when using an uninterruptable power supply (UPS)




















Resolution	18 bit/revolution, 4.096 revolutions
Protection class	IP 65
Interfaces	EtherCAT

Further information you will find on page 20/21

















save the
power supply cable



Absolute Rotary Encoder with a Solid Shaft in a 58 mm Housing

	CEV 58 S/M	COV 58 S/M	CMV 58 S/M
Specifics and specifications	The compact industrial standard, optimized for connector technology	High resolution and fast signal processing within a compact model	Cost-efficient solution when it comes to accuracy and time response
Product picture			
Supply voltage	11 ... 27 V DC	11 ... 27 V DC	11 ... 27 V DC
Capacitance	Multi turn: ≤ 30 bit Single turn: ≤ 15 bit	Multi turn: ≤ 36 bit Single turn: ≤ 18 bit	Multi turn: ≤ 23 bit Single turn: ≤ 11 bit
Steps per revolution	≤ 8.192/32.768	≤ 262.144	≤ 2.048/4.096
Number of revolutions	Multi turn: ≤ 4.096/256.000 Single turn: 1	Multi turn: ≤ 4.096/256.000 Single turn: 1	Multi turn: ≤ 4.096 Single turn: 1
Mechanical permissible speed	≤ 12.000 min ⁻¹	≤ 12.000 min ⁻¹	≤ 12.000 min ⁻¹
Available shaft diameter	6 ... 12 mm	6 ... 12 mm	6 ... 12 mm
Life time - Speed - Operating temperature	≥ 3,9 × 10 ¹⁰ revolutions ≤ 6.000 min ⁻¹ ≤ 60 °C	≥ 3,9 × 10 ¹⁰ revolutions ≤ 6.000 min ⁻¹ ≤ 60 °C	≥ 3,9 × 10 ¹⁰ revolutions ≤ 6.000 min ⁻¹ ≤ 60 °C
Interfaces (others on request)	SSI Parallel (Single turn) ASI ISI       EtherCAT 	SSI Parallel ASI       EtherCAT 	SSI Analog  
Vibration, DIN EN 60068-2-6	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz
Shock, DIN EN 60068-2-27	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , half-sine, 11 ms
Working temperature max.	-20 °C ... +70 °C	-20 °C ... +70 °C	-20 °C ... +70 °C
Protection class, DIN EN 60529	IP 65	IP 65 (IP 67 optional)	IP 65
More options and accessories	Stainless steel housing: CEV 70 (p. 23) With sting pot box (p. 35) Explosion proof: AEV 70 (p. 23) "Seal Pack" (p. 15) Protection housing CDV 115	Stainless steel housing: CEV 70 (p. 23) Explosion proof: AEV 70 (p. 23) "Seal Pack" (p. 15)	With draw wire box (p. 35) Capacitance: Multi turn: ≤ 24 bit Single turn: ≤ 12 bit











Absolute Rotary Encoder with a Solid Shaft in a 65 mm Housing

	CEV 65 S/M	COV 65 S/M	CMV 65 S/M
Specifics and specifications	The widest range of available interfaces	High resolution meets Industrial Ethernet	This is how cost-efficient PNO class 2 can be.
Product picture			
Supply voltage	11 ... 27 V DC	11 ... 27 V DC	11 ... 27 V DC
Capacitance	Multi turn: ≤ 25 bit Single turn: ≤ 13 bit	Multi turn: ≤ 36 bit Single turn: ≤ 18 bit	Multi turn: ≤ 24 bit Single turn: ≤ 12 bit
Steps per revolution	≤ 8.192	≤ 262.144	≤ 4.096
Number of revolutions	Multi turn: ≤ 4.096/256.000 Single turn: 1	Multi turn: ≤ 4.096/256.000 Single turn: 1	Multi turn: ≤ 4.096 Single turn: 1
Mechanical permissible speed	≤ 6.000 min ⁻¹	≤ 6.000 min ⁻¹	≤ 6.000 min ⁻¹
Available shaft diameter	6 ... 14 mm	6 ... 14 mm	6 ... 14 mm
Life time - speed - operating temperature	≥ 3,9 × 10 ¹⁰ revolutions ≤ 3.000 min ⁻¹ ≤ 60 °C	≥ 3,9 × 10 ¹⁰ revolutions ≤ 3.000 min ⁻¹ ≤ 60 °C	≥ 3,9 × 10 ¹⁰ revolutions ≤ 3.000 min ⁻¹ ≤ 60 °C
Interfaces (others on request)	SSI  ISI  Parallel  SIN / COS  LWL  Analog  Cam 	SSI     EtherCAT 	
Vibration, DIN EN 60068-2-6	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz
Shock, DIN EN 60068-2-27	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , half-sine, 11 ms
Working temperature max.	-20 °C ... +70 °C	-20 °C ... +70 °C	-20 °C ... +70 °C
Protection class, DIN EN 60529	IP 65	IP 65	IP 65
More options and accessories	Stainless steel housing: CEV 84 (p. 23) Draw-Wire (p. 35) Protective housing (p. 23) Increased density	Stainless steel housing: CEV 84 (p. 23) Draw-Wire (p. 35) Protective housing (p. 23) Increased density	-














Absolute Rotary Encoder with Solid Shaft in a 22/36 mm Housing

	CMV 22 S/M	COV 36 S/M	CMV 36 S/M
General//Definition			
Specifics and specifications	Smallest absolut encoder with a real multi turn gear poti replacement	Motorfeedback solution for high requirements on resolution and time response	Extremely robust and extremely tight (IP 69k optional)
Product picture			
Supply voltage	7 ... 30 V DC	11 ... 27 V DC	11 ... 27 V DC
Capacitance	Multi turn: ≤ 20 bit Single turn: ≤ 12 bit	Multi turn: ≤ 36 bit Single turn: ≤ 18 bit	Single turn: ≤ 13 bit
Steps per revolution	≤ 4.096 (8.192 optional)	≤ 262.144	32, 40, 64, 80, 100, 128, 160, 200, 256, 320, 400, 500, 512, 800, 1.000, 1.024, 1.600, 2.000, 2.048, 4.096, 8.192
Number of revolutions	Multi turn: ≤ 256 Single turn: 1	Multi turn: ≤ 4.096/65.536 Single turn: 1	1
Mechanical permissible speed	≤ 10.000 min ⁻¹	≤ 12.000 min ⁻¹	≤ 6.000 min ⁻¹
Available shaft diameter	6 and 6,33 mm	6 ... 8 mm	6 mm
Life time - Speed - Operating temperature	≥ 30 × 10 ⁹ revolutions ≤ 3.000 min ⁻¹ ≤ 25 °C	≥ 3,9 × 10 ¹⁰ revolutions ≤ 6.000 min ⁻¹ ≤ 60 °C	≥ 3,9 × 10 ⁹ revolutions ≤ 3.000 min ⁻¹ ≤ 60 °C
Accessories	Interfaces (others on request) ASI (U _b 7 ... 26 V DC) SSI (U _b 7 ... 26 V DC) Analog (U _b 14 ... 30 V DC)	SSI SIN/COS	SSI
Vibration, DIN EN 60068-2-6	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz
Shock, DIN EN 60068-2-27	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , half-sine, 11 ms
Working temperature max.	0 °C ... +60 °C	0 °C ... +125 °C	-40 °C ... +70 °C
Protection class, DIN EN 60529	IP 64	IP 65	IP 65
More options and accessories	Customer specific protocols at the ASI interface	-	Max. tightness IP 69k optional, bearing free construction, Customized adaptations upon request

Absolute Rotary Encoder with a Solid Shaft in a 70/84/115 mm Housing











	AEV 70 S/M	CEV 70/84 S/M	CEV 115 S/M
Specifics and specifications	Absolutely qualified for potentially explosive atmospheres Aluminum housing	Protection against aggressive mediums	Protection against outside influences: mechanical and climatical
Product picture			
Supply voltage	11 ... 27 V DC	11 ... 27 V DC	11 ... 27 V DC
Capacitance	Multi turn: ≤ 30 bit Single turn: ≤ 13 bit	Multi turn: ≤ 25 ... 30 bit Single turn: ≤ 13 bit	Multi turn: ≤ 25 bit Single turn: ≤ 13 bit
Steps per revolution	≤ 8.192/32.768	≤ 8.192/32.768	≤ 8.192
Number of revolutions	Multi turn: ≤ 4.096/256.000 Single turn: 1	Multi turn: ≤ 4.096/256.000 Single turn: 1	Multi turn: ≤ 4.096/256.000 Single turn: 1
Mechanical permissible speed	≤ 12.000 min ⁻¹	≤ 6.000 min ⁻¹	≤ 3.600 min ⁻¹
Available shaft diameter	6 ... 12 mm	6 ... 14 mm	8 ... 14 mm
Life time at - Speed - Operating temperature	≥ 3,9 × 10 ¹⁰ revolutions ≤ 6.000 min ⁻¹ ≤ 60 °C	≥ 3,9 × 10 ¹⁰ revolutions ≤ 6.000 min ⁻¹ ≤ 60 °C	≥ 2,8 × 10 ¹⁰ revolutions ≤ 3.000 min ⁻¹ ≤ 60 °C
Interfaces (others on request)	SSI  Parallel 	SSI  Parallel  LWL Analog  ISI 	SSI  ISI  Parallel  Analog    EtherCAT 
Vibration, DIN EN 60068-2-6	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz	< 245 m/s ² , sine 50–2.000 Hz
Shock, DIN EN 60068-2-27	< 1.000 m/s ² , half-sine 11 ms	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , half-sine, 11 ms
Working temperature max.	-20 °C ... +40 °C	-40 °C ... +85 °C	-20 °C ... +70 °C
Protection class, DIN EN 60529	IP 65	IP 67	IP 67
More options and accessories	 II 2 G/D EEx de IIC T6 ATEX string pot and ATEX-conform coupling possible	Suitable connectors, cables and seals as a function of the medium	Heating, cooling, dust explosion-proof: AEV 115 S/M  II 3D Ex tD A22 IP 65 T 95 °C

Absolute Rotary Encoder with Hollow Shaft in a 58 mm Housing

	CEH 58 S/M	COH 58 S/M	CMH 58 S/M
Specifics and specifications	Compact industrial standard, optimized for connector technology	High resolution and fast signal processing in a compact design	Cost-efficient solution for less demands on resolution and time response
Product picture			
Supply voltage	11 ... 27 V DC	11 ... 27 V DC	11 ... 27 V DC
Capacitance	Multi turn: ≤ 33 bit Single turn: ≤ 15 bit	Multi turn: ≤ 36 bit Single turn: ≤ 18 bit	Multi turn: ≤ 23 bit Single turn: ≤ 11 bit
Steps per revolution	≤ 8.192 / 32768	≤ 262.144	≤ 2.048 / 4.096
Number of revolutions	Multi turn: ≤ 4.096 / 32.768 / 256.000 Single turn: 1	Multi turn: ≤ 4.096 / 256.000 Single turn: 1	Multi turn: ≤ 4.096 Single turn: 1
Mechanical permissible speed	≤ 6.000 min ⁻¹	≤ 6.000 min ⁻¹	≤ 6.000 min ⁻¹
Available shaft diameter	8 ... 12 mm	8 ... 12 mm	8 ... 12 mm
Life time - Speed - Operating temperature	≥ 3,9 * 10 ¹⁰ revolutions ≤ 6.000 min ⁻¹ ≤ 60 °C	≥ 3,9 * 10 ¹⁰ revolutions ≤ 6.000 min ⁻¹ ≤ 60 °C	≥ 3,9 * 10 ¹⁰ revolutions ≤ 6.000 min ⁻¹ ≤ 60 °C
Interfaces (others on request)	SSI  Parallel (Single turn)    EtherCAT 	SSI     EtherCAT 	SSI
Vibration, DIN EN 60068-2-6	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz
Shock, DIN EN 60068-2-27	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , half-sine, 11 ms
Working temperature max.	-20 °C ... +70 °C	-20 °C ... +70 °C	-20 °C ... +70 °C
Protection class, DIN EN 60529	IP 54	IP 54	IP 54
More options and accessories	-	-	-

General//Definition
Absolute Rotary Encoder
Incremental Rotary Encoder
Accessories














Absolute Rotary Encoder with Hollow Shaft in a 80 mm Housing

	CEH 80 S/M	COH 80 S/M	QE_H 80 S/M
Specifics and specifications	Variety on interfaces with a hollow shaft over 16 mm	High resolution and precision with a hollow shaft	Flat hollow shaft encoder for mounting directly on to the motor
Product picture			
Supply voltage	11 ... 27 V DC	11 ... 27 V DC	11 ... 27 V DC
Capacitance	Multi turn: ≤ 33 bit Single turn: ≤ 15 bit	Multi turn: ≤ 36 bit Single turn: ≤ 18 bit	Multi turn: ≤ 25 bit Single turn: ≤ 13 bit
Steps per revolution	≤ 32.768	≤ 262.144	≤ 8.192
Number of revolutions	Multi turn: ≤ 4.096/256.000 Single turn: 1	Multi turn: ≤ 4.096/256.000 Single turn: 1	Multi turn: ≤ 4.096/256.000 Single turn: 1
Mechanical permissible speed	≤ 3.000 min ⁻¹	≤ 3.000 min ⁻¹	≤ 3.000 min ⁻¹
Available shaft diameter	16 ... 27 mm	16 ... 27 mm	16 ... 25 mm
Life time bei - Speed - Operating temperature	≥ 3,9 × 10 ¹⁰ revolutions ≤ 3.000 min ⁻¹ ≤ 60 °C	≥ 3,9 × 10 ¹⁰ revolutions ≤ 3.000 min ⁻¹ ≤ 60 °C	≥ 3,9 × 10 ¹⁰ revolutions ≤ 3.000 min ⁻¹ ≤ 60 °C
Interfaces (others on request)	SSI    	SSI  	SSI 
Vibration, DIN EN 60068-2-6	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz
Shock, DIN EN 60068-2-27	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , half-sine, 11 ms
Working temperature max.	-20 °C ... +70 °C	-20 °C ... +70 °C	-20 °C ... +70 °C
Protection class, DIN EN 60529	IP 54	IP 54	IP 54
More options and accessories	Reducing ring Shaft with or without nut	Reducing ring Shaft with or without nut	-



















Absolute Rotary Encoder with Hollow Shaft in 80/81 mm Housing

	QOH 80 S/M	QEH 81 S/M	QOH 81 S/M
Specifics and specifications	High resolution, flat hollow shaft encoder	With terminal box for individual cable allocation	High resolution with terminal box for individual cable allocation
Product picture			
Supply voltage	11 ... 27 V DC	11 ... 27 V DC	11 ... 27 V DC
Capacitance	Multi turn: ≤ 36 bit Single turn: ≤ 18 bit	Multi turn: ≤ 25 bit Single turn: ≤ 13 bit	Multi turn: ≤ 36 bit Single turn: ≤ 18 bit
Steps per revolution	≤ 262.144	≤ 8.192	≤ 262.144
Number of revolutions	Multi turn: ≤ 4.096/256.000 Single turn: 1	Multi turn: ≤ 4.096/256.000 Single turn: 1	Multi turn: ≤ 4.096/256.000 Single turn: 1
Mechanical permissible speed	≤ 3.000 min ⁻¹	≤ 3.000 min ⁻¹	≤ 3.000 min ⁻¹
Available shaft diameter	16 ... 25 mm	16 ... 25 mm	16 ... 25 mm
Life time with - Speed - Operating temperature	≥ 3,9 × 10 ¹⁰ revolutions ≤ 3.000 min ⁻¹ ≤ 60 °C	≥ 3,9 × 10 ¹⁰ revolutions ≤ 3.000 min ⁻¹ ≤ 60 °C	≥ 3,9 × 10 ¹⁰ revolutions ≤ 3.000 min ⁻¹ ≤ 60 °C
Interfaces (others on request)	SSI 	SSI  ISI  Incremental Commutation	SSI 
Vibration, DIN EN 60068-2-6	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz
Shock, DIN EN 60068-2-27	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , half-sine, 11 ms
Working temperature max.	-20 °C ... +70 °C	-20 °C ... +70 °C	-20 °C ... +70 °C
Protection class, DIN EN 60529	IP 54	IP 54	IP 54
More options and accessories		Shaft with or without nut	Shaft with or without nut










Absolute Rotary Encoder with Hollow Shaft in a 110/160 mm Housing

	CEH 110 S/M	COH 110 S/M	CEH 160 S/M
Specifics and specifications	Absolute encoder with hollow shaft	High resolution and precision with hollow shaft	Biggest absolute rotary encoder with hollow shaft at TR-Electronic
Product picture			
Supply voltage	11 ... 27 V DC	11 ... 27 V DC	11 ... 27 V DC
Capacitance	Multi turn: ≤ 33 bit Single turn: ≤ 15 bit	Multi turn: ≤ 36 bit Single turn: ≤ 18 bit	Multi turn: ≤ 27 bit Single turn: ≤ 15 bit
Steps per revolution	≤ 8.192 / 32.768	≤ 262.144	≤ 32.768
Number of revolutions	Multi turn: ≤ 4.096 / 256.000 Single turn: 1	Multi turn: ≤ 4.096 / 256.000 Single turn: 1	Multi turn: ≤ 4.096 Single turn: 1
Mechanical permissible speed	≤ 2.000 min ⁻¹	≤ 2.000 min ⁻¹	≤ 3.000 min ⁻¹
Available shaft diameter	25 ... 50 mm	25 ... 50 mm	max. 80 mm
Life time - Speed - Operating temperature	≥ 3,9 × 10 ¹⁰ revolutions ≤ 2.000 min ⁻¹ ≤ 60 °C	≥ 3,9 × 10 ¹⁰ revolutions ≤ 2.000 min ⁻¹ ≤ 60 °C	≥ 3,9 × 10 ¹⁰ revolutions ≤ 1.500 min ⁻¹ ≤ 60 °C
Interfaces (others on request)	SSI   	SSI   	 + SSI + Incremental   
Vibration, DIN EN 60068-2-6	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz
Shock, DIN EN 60068-2-27	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , half-sine, 11 ms
Working temperature max.	-20 °C ... +70 °C	-20 °C ... +70 °C	0 °C ... +70 °C
Protection class, DIN EN 60529	IP 54	IP 54	IP 65
More options and accessories	Reducing ring Shaft with or without nut	Reducing ring Shaft with or without nut	Reducing ring





















Absolute Rotary Encoder with Blind Shaft in a 58 mm Housing

	CES 58 S/M	COS 58 S/M	CMS 58 S/M
Specifics and specifications	Compact industrial standard, optimized for connector technology	High resolution and fast signal processing in a compact design	Cost-efficient solution for less demands on resolution and time response
Product picture			
Supply voltage	11 ... 27 V DC	11 ... 27 V DC	11 ... 27 V DC
Capacitance	Multi turn: ≤ 33 bit Single turn: ≤ 13 bit	Multi turn: ≤ 36 bit Single turn: ≤ 18 bit	Multi turn: ≤ 24 bit Single turn: ≤ 12 bit
Schrittzahl / Revolution	≤ 8.192	≤ 262.144	≤ 2.048 / 4.096
Number of revolutions	Multi turn: ≤ 4.096 / 32.768 / 256.000 Single turn: 1	Multi turn: ≤ 4.096 / 256.000 Single turn: 1	Multi turn: ≤ 4.096 Single turn: 1
Mechanical permissible speed	≤ 12.000 min ⁻¹	≤ 12.000 min ⁻¹	≤ 12.000 min ⁻¹
Available shaft diameter	8 ... 12 mm	8 ... 12 mm	6 ... 10 mm
Life time - Speed - Operating temperature	≥ 3,9 × 10 ¹⁰ revolutions ≤ 6.000 min ⁻¹ ≤ 60 °C	≥ 3,9 × 10 ¹⁰ revolutions ≤ 6.000 min ⁻¹ ≤ 60 °C	≥ 3,9 × 10 ¹⁰ revolutions ≤ 6.000 min ⁻¹ ≤ 60 °C
Interfaces (others on request)	SSI  Parallel (Single turn)      EtherCAT [®] 	SSI      EtherCAT [®] 	SSI  Analog 
Vibration, DIN EN 60068-2-6	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz
Shock, DIN EN 60068-2-27	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , half-sine, 11 ms
Working temperature max.	-20 °C ... +70 °C	-20 °C ... +70 °C	0 °C ... +60 °C
Protection class, DIN EN 60529	IP 65	IP 65	IP 65
More options and accessories	Increased density "Seal Pack" (p. 15)	Increased density "Seal Pack" (p. 15)	-






Absolute Rotary Encoder with Blind Shaft/bearing free in a 65/36 mm Housing

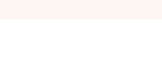
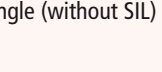
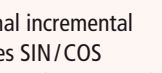
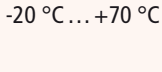
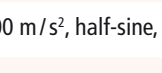
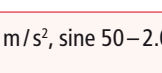
	CES 65 S/M	CMF 36 S
Specifics and specifications	The widest range of available interfaces	Completely wear-free with separate bearing
Product picture		
Supply voltage	11 ... 27 V DC	11 ... 27 V DC
Capacitance	Multi turn: ≤ 30 bit Single turn: ≤ 13 bit	Single turn: ≤ 13 bit
Steps per revolution	≤ 8.192 / 32.768	32, 40, 64, 80, 100, 128, 160, 200, 256, 320, 400, 500, 512, 800, 1.000, 1.024, 1.600, 2.000, 2.048, 4.096, 8.192
Number of revolutions	Multi turn: ≤ 4.096 / 32.768 / 256.000 Single turn: 1	1
Mechanical permissible speed	≤ 6.000 min ⁻¹	-
Available shaft diameter	10 ... 14 mm	13 / 15 mm
Life time - Speed - Operating temperature	≥ 3,9 × 10 ¹⁰ revolutions ≤ 3.000 min ⁻¹ ≤ 60 °C	-
Interfaces (others on request)	SSI  ISI  Parallel  FO  Analog  Cam  	SSI
Vibration, DIN EN 60068-2-6	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz
Shock, DIN EN 60068-2-27	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , half-sine, 11 ms
Working temperature max.	-20 °C ... +70 °C	-40 °C ... +70 °C
Protection class, DIN EN 60529	IP 65	IP 65
More options and accessories	SIN/COS	Max. tightness IP69k optional

Absolute Rotary Encoder with Coupling in a 58/65 mm Housing

	CEK 58 S/M	COK 58 S/M	CEK 65 S/M
Specifics and specifications	Integrated coupling combines the precision of a solid shaft with the advantages of a space saving hollow shaft	Coupling for high resolution applications	More construction space, more interfaces and more possibilities
Product picture			
Supply voltage	11 ... 27 V DC	11 ... 27 V DC	11 ... 27 V DC
Capacitance	Multi turn: ≤ 25 bit Single turn: ≤ 13 bit	Multi turn: ≤ 36 bit Single turn: ≤ 18 bit	Multi turn: ≤ 25 bit Single turn: ≤ 13 bit
Schritzzahl / Revolution	≤ 8.192	≤ 262.144	≤ 8.192
Number of revolutions	Multi turn: ≤ 4.096 / 32.768 / 256.000 Single turn: 1	Multi turn: ≤ 4.096 / 256.000 Single turn: 1	Multi turn: ≤ 4.096 / 256.000 Single turn: 1
Mechanical permissible speed	≤ 12.000 min ⁻¹	≤ 12.000 min ⁻¹	≤ 6.000 min ⁻¹
Available shaft diameter	-	-	-
Life time - Speed - Operating temperature	≥ 3,9 × 10 ¹⁰ revolutions ≤ 6.000 min ⁻¹ ≤ 60 °C	≥ 3,9 × 10 ¹⁰ revolutions ≤ 6.000 min ⁻¹ ≤ 60 °C	≥ 3,9 × 10 ¹⁰ revolutions ≤ 3.000 min ⁻¹ ≤ 60 °C
Interfaces (others on request)	SSI Parallel      	SSI     EtherCAT [®]	SSI ISI Parallel SIN / COS FO Analog Cam       
Vibration, DIN EN 60068-2-6	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz
Shock, DIN EN 60068-2-27	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , half-sine, 11 ms
Working temperature max.	-20 °C ... +70 °C	-20 °C ... +70 °C	-20 °C ... +70 °C
Protection class, DIN EN 60529	IP 65	IP 65	IP 65
More options and accessories	Construction aid for the shaft end of the customer	Construction aid for the shaft end of the customer	Construction aid for the shaft end of the customer SIN/COS

Double Rotary Encoder with Solid Shaft in a 58/70/75 mm Housing

	CDV 58 S/M	CDV 70 S/M	CDV 75 M
Specifics and specifications	Two independent encoder systems having the same shaft in a compact housing	Double encoder with combination of fieldbuses	"Whisper encoder" for stage technology applications, absolute and multi turn with SIL 3 certificate
Product picture			
Supply voltage	11 ... 27 V DC	11 ... 27 V DC	11 ... 28 V DC
Capacitance	Multi turn: ≤ 25 bit Single turn: ≤ 13 bit	Multi turn: ≤ 36 bit Single turn: ≤ 18 bit	Multi turn: ≤ 28 bit
Steps per revolution	≤ 8.192	≤ 262.144	8.192
Number of revolutions	Multi turn: ≤ 4.096 / 256.000 Single turn: 1	Multi turn: ≤ 4.096 / 256.000 Single turn: 1	Multi turn: ≤ 4.056 / 32.768
Mechanical permissible speed	≤ 6.000 min ⁻¹	≤ 6.000 min ⁻¹	≤ 6.000 min ⁻¹
Available shaft diameter	6 ... 12 mm	6 ... 12 mm	10 mm
Life time - Speed - Operating temperature	≥ 3,9 × 10 ¹⁰ revolutions ≤ 6.000 min ⁻¹ ≤ 60 °C	≥ 3,9 × 10 ¹⁰ revolutions ≤ 3.000 min ⁻¹ ≤ 60 °C	≥ 3,9 × 10 ¹⁰ revolutions ≤ 3.000 min ⁻¹ ≤ 60 °C
Interfaces (others on request)	1. encoder:	2. encoder:	2 × SSI
	SSI ASI ISI FO Parallel or   	SSI or Incremental	
Vibration, DIN EN 60068-2-6	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz
Shock, DIN EN 60068-2-27	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , half-sine, 11 ms	< 600 m/s ² , half-sine, 5 ms
Working temperature max.	-20 °C ... +70 °C	-20 °C ... +70 °C	-20 °C ... +70 °C
Protection class, DIN EN 60529	IP 65	IP 65	IP 54
More options and accessories	-	-	Additional incremental interfaces SIN / COS or rectangle (without SIL)



Double Rotary Encoder with Hollow Shaft and Blind Shaft in a 75/80/58 mm Housing

	CDH 75 M	QDH 80 S/M	CDS 58 S/M
General//Definition			
Specifics and specifications	"Whisper encoder" for stage technology applications, absolute and multi turn with SIL 3 certificate	"Whisper encoder" for theater applications, common disc, double detection	Double encoder with blind shaft
Product picture			
Supply voltage	11 ... 27 V DC	11 ... 27 V DC	11 ... 27 V DC
Capacitance	Multi turn: ≤ 28 bit	Multi turn: ≤ 25 bit Single turn: ≤ 13 bit	Multi turn: ≤ 25 bit Single turn: ≤ 13 bit
Steps per revolution	8.192	≤ 8.192	≤ 8.192
Number of revolutions	Multi turn: ≤ 4.096 / 32.768	Multi turn: ≤ 4.096 / 256.000 Single turn: 1	Multi turn: ≤ 4.096 / 256.000 Single turn: 1
Mechanical permissible speed	≤ 3.000 min ⁻¹	≤ 3.000 min ⁻¹	≤ 6.000 min ⁻¹
Available shaft diameter	20 mm Nut	up to 25 mm	8 ... 12 mm
Life time - Speed - Operating temperature	≥ 3,9 × 10 ¹⁰ revolutions ≤ 1.500 min ⁻¹ ≤ 60 °C	≥ 3,9 × 10 ¹⁰ revolutions ≤ 3.000 min ⁻¹ ≤ 60 °C	≥ 3,9 × 10 ¹⁰ revolutions ≤ 6.000 min ⁻¹ ≤ 60 °C
Interfaces (others on request)	2 × SSI  Functional Safety Type Approved TUVRheinland FS	SSI or  multi turn Two scanings: Incremental or SSI single turn	1. encoder: SSI ISI ASI Parallel FO or    2. encoder: SSI or Incremental
Vibration, DIN EN 60068-2-6	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz
Shock, DIN EN 60068-2-27	< 600 m/s ² , half-sine, 5 ms	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , half-sine, 11 ms
Working temperature max.	-20 °C ... +70 °C	-20 °C ... +70 °C	-20 °C ... +70 °C
Protection class, DIN EN 60529	IP 54	IP 54	IP 65
More options and accessories	Additional incremental interfaces SIN/COS or rectangle (without SIL)	-	-

Draw-Wire Encoder in a 22/58/65 mm Housing

	CMW 22 M		CMW 58 M			CEW 65 M		
Specifics and specifications	Miniature wire length encoder with wear-free multi turn rotary encoder		The industrial standard for short distances			"Durable runner" with a long measuring length		
Product picture								
Supply voltage	8 ... 30 V DC		11 ... 27 V DC			11 ... 27 V DC		
Measuring range (max.)	0,75 m		5 m			50 m		
Steps per revolution	4.096		8.192			8.192		
Way per revolution	50 mm	75 mm	163,84 mm	259,02 mm	315,57 mm	200,00 mm	325,73 mm	490,196 mm
Adjustment speed (max.)	-		4 m/s			2 m/s	4 m/s	4 m/s
Available measurement lengths	0,5 m	0,75 m	2 m	3 m	5 m	2/3 m	5/10/ 15/20/ 25/30 m	50 m
Housing	Plastics		Aluminum, black anodizes			Aluminum, natural anodized		
Mass in kg (typically)	0,07		1,8	2,2	3,5	1,8 ... 2,4	3,1 ... 10	27 ... 28
Interfaces (others on request)	ASI (U _b 8 ... 30 V DC) SSI (U _b 8 ... 30 V DC) Analog (U _b 0 ... 10 V DC)		SSI  			SSI ISI Parallel SIN/COS FO Analog Cam       		
String outlet	-		with gaiter and wiper			with gaiter and wiper		
String material	Stainless steel with PA cover		Stainless steel with PA cover			Stainless steel		
String end	Becket, brass		Becket, brass			Becket, plastic cover with ball joint		
String diameter	0,36 mm		0,8 mm	0,8 mm	1,0 mm	1,35 mm	0,81 mm	0,81 mm
Mounting	Mounting nuts		Sliding block			Every 2 ... 6 thread bore holes each side		
More options and accessories	-		Pulley			Pulley, cold resistant construction		

Incremental Rotary Encoder With Solid Shaft in a 24/36/44 mm Housing

	IE 24	IMV 36	IE 40
Specifics and specifications	Fixed Resolution	Completely Encapsulated Electronics	Fixed Resolution
Product picture			
Supply voltage	5 ... 27 V DC	5 ... 27 V DC	5 ... 27 V DC
Resolution	1 ... 2.500	8, 10, 16, 20, 25, 32, 40, 50, 64, 80, 100, 125, 128, 200, 250, 256, 400, 500, 512, 1.024, 2.048	1 ... 3.600
Output - Incremental signal - Zero impulse - Output frequency up to	K1, K2 and inverse K0, 1/revolution, invers ≤ 300 kHz	K1, K2 and Inverse K0, 1/revolution, invers ≤ 150 kHz	K1, K2 and inverse K0, 1/revolution, inverse ≤ 300 kHz
Mechanical permissible speed	≤ 10.000 min ⁻¹	≤ 6.000 min ⁻¹	≤ 10.000 min ⁻¹
Available shaft diameter	3 ... 6 mm	6 mm	6 mm
Vibration, DIN EN 60068-2-6	< 100 m/s ² , sine 10-2.000 Hz	< 100 m/s ² , sine 50-2.000 Hz	< 100 m/s ² , sine 10-2.000 Hz
Shock, DIN EN 60068-2-27	< 1.000 m/s ² (100 g), 11 ms	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² (100 g), 11 ms
Working temperature max.	0 °C ... +80 °C	-40 °C ... +70 °C	0 °C ... +80 °C
Protection class, DIN EN 60529	IP 64	IP 65 or IP 69k	IP 64

Notes


General/Definition

Absolute Rotary Encoder

Incremental Rotary Encoder

Accessories



Incremental Rotary Encoder with Hollow shaft in a 58/20 mm Housing

	IEH/IOH 58	IH 58 A/U	IH 20
Specifics and specifications	Resolution and number zero impulse are programmable	Set impulse number	Set impulse number
Product picture			
Supply voltage	5 ... 28 V DC	5 ... 27 V DC	5 ... 27 V DC
Resolution	1 up to 36.000	1 up to 10.000	1 up to 1024
Output - Incremental signal - Zero impulse - Output frequency up to	Push-Pull (line driver) K1, K2 and inverse K0, 1/revolution, inverse ≤ 300 kHz	Push-Pull (Line-driver) K1, K2 and inverse K0, 1/revolution, inverse ≤ 300 kHz	K1, K2 and inverse K0, 1/revolution, inverse ≤ 100 kHz
Mechanical permissible speed	≤ 6.000 min ⁻¹	≤ 10.000 min ⁻¹	≤ 6.000 min ⁻¹
Available shaft diameter	8 ... 12 mm	4 ... 12 mm	20 mm
Vibration, DIN EN 60068-2-6	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz	< 100 m/s ² , sine 50–2.000 Hz
Shock, DIN EN 60068-2-27	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , 11 ms	< 1.000 m/s ² , 11 ms
Working temperature max.	-20 °C ... +70 °C	-20 °C ... +85 °C	-20 °C ... +70 °C
Protection class, DIN EN 60529	IP 54	IP 54	IP 54

Notes

General/Definition
Absolute Rotary Encoder
Incremental Rotary Encoder
Accessories

Incremental Rotary Encoder with Hollow Shaft in a 120 mm Housing

	IH 120	IH 120 V
Specifics and specifications	Fixed Resolution	Fixed Resolution
Product picture		
Supply voltage	5 ... 27 V DC	5 ... 27 V DC
Resolution	1 ... 10.000	9.000, 10.000, 18.000
Output - Incremental signal - Zero impulse - Output frequency up to	K1, K2 and inverse K0, 1/revolution, inverse ≤ 300 kHz	K1, K2 and inverse K0, 1/revolution, inverse ≤ 300 kHz
Mechanical permissible speed	≤ 4.000 min ⁻¹	≤ 4.000 min ⁻¹
Available shaft diameter	27 ... 55 mm	27 ... 55 mm
Vibration, DIN EN 60068-2-6	< 100 m/s ² , sine 20-2.000 Hz	< 100 m/s ² , sine 10-2.000 Hz
Shock, DIN EN 60068-2-27	< 1.000 m/s ² , 11 ms	< 1.000 m/s ² , 11 ms
Working temperature max.	-20 °C ... +70 °C	0 °C ... +80 °C
Protection class, DIN EN 60529	IP 64	IP 64

Notes

Incremental Rotary Encoder with Blind Shaft/bearing free in a 24/36/58 mm Housing

	IS 24	IMF 36	IES/IOS 58
Specifics and specifications	Fixed Resolution	Completely encapsulated Electronics with IP69k	Resolution and number of zero impulse programmable
Product picture			
Supply voltage	5 ... 27 V DC	5 ... 27 V DC	5 ... 28 V DC
Resolution	1 ... 2.500	8, 10, 16, 20, 25, 32, 40, 50, 64, 80, 100, 125, 128, 200, 250, 256, 400, 500, 512, 1.024, 2.048	1 up to 36.000
Output - Incremental signal - Zero impulse - Output frequency up to	K1, K2 and inverse K0, 1/revolution, inverse ≤ 300 kHz	K1, K2 and inverse K0, 1/revolution, inverse 150 kHz	K1, K2 and inverse K0, inverse 300 kHz
Mechanical permissible speed	≤ 10.000 min ⁻¹	-	≤ 12.000 min ⁻¹
Available shaft diameter	3 ... 6 mm	13 / 15 mm	8 ... 12 mm
Vibration, DIN EN 60068-2-6	< 100 m/s ² , sine 10-2.000 Hz	< 100 m/s ² , sine 50-20.000 Hz	< 100 m/s ² , sine 50-20.000 Hz
Shock, DIN EN 60068-2-27	< 1.000 m/s ² , 11 ms	< 1.000 m/s ² , half-sine, 11 ms	< 1.000 m/s ² , half-sine, 11 ms
Working temperature max.	0 °C ... +80 °C	-40 °C ... +70 °C	-20 °C ... +70 °C
Protection class, DIN EN 60529	IP 64	IP 65, IP69k optional	IP 65

Notes

General/Definition

Absolute Rotary Encoder

Incremental Rotary Encoder

Accessories

Megnatocal Hand Wheel as a Housing Option

IH 58 H	
Specifics and specifications	Fixed Resolution
Product picture	
Supply voltage	5 ... 27 V DC
Resolution	1.000
Output - Incremental signal - Zero impuls - Output frequency up to	K1, K2 und Inverse - ≤ 50 kHz
Mechanical permissible speed	≤ 1.000 min ⁻¹
Available shaft diameter	hand wheel
Vibration, DIN EN 60068-2-6	< 100 m/s ²
Shock, DIN EN 60068-2-27	< 200 m/s ² , 11 ms
Working temperature max.	-10 °C ... +70 °C
Protection class, DIN EN 60529	IP 64

Notes

Electrical and Mechanical Accessories

Programming adapter

Connects the device to the PC. Changes signals from USB to encoder programming interface and is electrically isolated. We suggest the use in conjunction with one of our switch cabinet modules. Serial (RS 232) to encoder to encoder conversion on request.



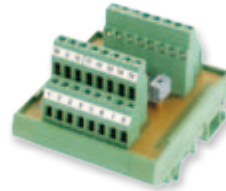
SSI-Parallel converter PU10

Converts absolute position and CAM signals from SSI interface to parallel output bits with max. 32 bit.



Switch cabinet module

The perfect aid for transparent rotary encoder cabling. Correct grounding of signal wires and easy connection to our programming adapter.



Pulse divider for rotary encoder

For rotary encoder signal processing (and incremental tracks of our absolute encoders) we offer a wide range of pulse dividers and signal distributors.



Coupling

CPS-couplings protect the encoder shaft from other than rotation, vibrations and shaft movement.



Additional options

Besides the already shown possibilities, our encoders have to adjust to other requirements you have, for example:

- _ protection housing
- _ stainless steel housing (also with fieldbusses)
- _ string lenght at the string outlet
- _ variations from standard connectors (contact, binder, M 12 with a fieldbus hood)
- _ string pot
- _ oil-proof



Universal display TA-Mini

Is displaying actual values of the SSI measuring system (TR-Electronic and other producers).

Existing SSI connections between measuring system and the controller can be monitored and the position can be shown without influencing the connection.

Is displaying actual values and other parameters of rotary encoder (rotary encoder of TR-Electronic with arbitrary process and programming interfaces). The process interface remains free.



- + comfortable display function
- + scale
- + zero shift
- + decimal, hexadecimal, binary
- + leading zero, prefix ...

_ Programming module

The display itself can be programmed via USB or PC (TRWinProg).

Over the display the measuring system can be programmed (those that are connected to the programming interface). The TA-Mini takes over the function of the PC adapter.

_ Signal converter

Parameters read in over the programming interface can be displayed as SSI value.

Therefore, you easily can retrofit, for example, a LLB 60 Analog with a SSI interface or via programming interface readout speed, ... that can be send via SSI.

_ Linked displays

Values shown can be transmitted to other TA-Minis (display at a machine, master display). The scale can be taken over or independently adjusted.

_ Displaying differences

For each display can be chosen, when having two linked displays with their own SSI measuring system, if one would like to show its own position or the one of the other measuring system or the difference of it.

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