Your Global Automation Partner

TURCK

Ri…-DSU35 | …-QR14 | …-QR20
Inductive Angle Sensors

Ri360 – Inductive Angle Sensors

Detect angles contactless

The Ri360 inductive angle sensors from Turck operate according to a revolutionary measuring principle which combines the benefits of conventional measuring systems in a single solution. The angular position is not detected by a magnetic positioning element, but instead by means of an inductive RLC coupling. With a high level of immunity to interference, the robust IP67 plastic housing and a mechanically unlimited service life, the Ri angle sensors are suitable for many fields of application.

The separated design of sensor unit and positioning element, plus error compensation with an offset of up to 3 mm guarantee the user a great deal of flexibility in terms of installation and reliable operation.

The positioning element can be fitted to both solid shafts and hollow shafts. The contactless measuring principle compensates for application-side bearing tolerances, just as reliably as it does for vibrations caused by non-concentricity of shafts.

Measuring principle

The measuring principle of the angle sensor is based on an innovative RLC coupling which offers enormous advantages in comparison to magnetic systems. The sensor housing features extremely precisely manufactured PCB coils, which function as the emitter and receiver coil system. The emitter coil is induced by a high-frequency alternating field and, together with the positioning element, which is known as the resonator, completes an inductive RLC coupling. This has the consequence that the positioning element is in turn inductively coupled with the receiver coils.

The circular geometry of the receiver coils is structured so that, depending on the angle of rotation of the positioning element, different voltages are induced which can be evaluated as a dimension for the sensor signal to be supplied.

Contactless and wear-free
The new measuring principle operates entirely contactless and wear-free. Important features such as accuracy, linearity and tightness are conserved for life and guarantee faultless operation of the sensor at all times.

Approvals (only DSU35)
For wiring into the Ex zones 1 and 21, we offer loop-powered intrinsically safe devices with a 4…20 mA output.

Teachable measuring ranges

The user can adjust the measuring range of the Ri sensors directly on the device. Not only can fixed preset angular ranges be selected, but start and end points for the sensors can be freely defined and the measuring ranges individually configured. .

Various teach functions are available depending on the type. These make it possible to perfectly adapt the sensor to the respective application (e.g. direction of rotation, angle range, etc.).

e1 specification

With an increased interference immunity of 30 V/m in accordance with the e1 type approval as well as protection against conducted interference in accordance with DIN ISO 7637-2 (SAE J 133-11), the sensors of the Ri360…LU4/S97 series fulfil the requirements of the e1 specification and are therefore suitable for use in mobile applications.

Positioning element for Ri-QR14

The design of the QR14 positioning elements makes all mounting scenarios possible: mounting on a shaft, screw mounting via countersunk holes and even mounting on a hollow shaft using special adapter pins.

Rugged housing
The compact sensor is IP67 rated and resistant to many chemicals and oils. Made of high-quality plastic, the housing is very rugged. The two-part build consisting of sensor and positioning element compensates lateral offsets and guarantees easy fitting and operation.

High linearity over 360°
The new angle sensors provide highly precise measuring signals within 360° and a repeatability of 0.09°. The contactless measuring principle reliably compensates bearing tolerances as well as vibration caused by irregularly rotating shafts. This guarantees a high degree of linearity.

Ri-DSU35 for rotary actuators

The Ri-DSU35 angle sensor and the well-established Ni4-DSU35 inductive dual sensor are identical in construction. The user also profits from the enormous mounting flexibility of the device. The sensor can be mounted on all standard rotary actuators thanks to an extensive range of available accessories. Additional mounting accessories may be required for use on very large drives. Turck also offers stable spacer plates with all necessary mounting accessories. A further advantage is that the same sensor/puck combination is used independent of the drive size. A selection aid for all standard drives is available on www.turck.com

Accessories for Ri-DSU35

A complete range of accessories ensures perfect assembly and installation. This increases the functionality while reducing assembly time.

Controlling rotary actuators

By contrast to dual sensors, which in principle can only record two positions, the new Ri-DSU35 sensors are also suitable for controlling 3-way flaps. Additional added value results from the fact that the valves are in a special angular position during the cleaning interval of a system. This special cleaning position can now be individually detected via the 360° angle detection by the sensors.

In addition, the sensors detect worn seals if the open/close position goes beyond the original angle value after numerous switching cycles. This further increases the plant availability.

Monitoring dancer rollers

The wear-free angle sensors of the Ri series can be used in printing machines, among other applications. There, the sensors continuously monitor the position of the dancer rollers to ensure a constant web tension. This ensures reliable handling of the paper during the printing process, preventing machine stops and guaranteeing print quality. The Ri sensors are also ideally suited for measuring the height positioning of paper stacks.

The contactless principle of the Ri angle sensors reduces downtimes and thus ensures a high level of machine availability.

Adaptable to any application
The DSU35 and QR14 types provide many freedom in terms of connectibility. While the DSU35 has the positioning element mounted in front, the QR14 features the active face on top.

Flexible process connection
Different types of outputs are also available: You can choose between 0…10 V, 4…20 mA and 0.5…4.5 V and an SSI interface. Standard M12 × 1 connector or cable connection are provided, making the use of special connectors redundant.

Ri360-QR20 – Miniature Encoder

Ideal for Mobile Machinery

Turck's compact and wear-free Ri360-QR20 miniature encoder is especially designed for use in mobile machinery. The new encoder series with IP68/IP69K protection rating exceeds the e1/E1 requirements and comes in a compact 71 × 64 × 20 mm housing. It is based on the contactless resonator measuring principle like its "big brother", the QR24.

The highlight: The housing fully surrounds the positioning element and provides full protection from the outside environment. Alternatively, the positioning element can also be mounted above the housing. This design principle ensures high mounting flexibility and offers mechanical protection as well as protection against dust or moisture when mounted with cover. The housing is also permanently sealed. Even the often problematic potential points of leakage such as LED lenses are eliminated since the QR20 fully consists of a translucent plastic, where status LEDs are still visible.

The encoder offers very high interference immunity and is protected from line-conducted interference, the so-called load dump. Salt spray or rapid temperature changes, as well as diesel, kerosene or vibrations have no effect on the device. With a temperature range from -40 to +85 °C there are virtually no conditions that could become critical. The Ri360-QR20 has an output resolution of around 0.09°. The output signal ranges from 0.5 to 4.5 VDC (LU4). If the sensor does not detect a positioning element, the value jumps to 5 volts.

Your Benefits

- Maintenance-free
- No additional protection or auxiliary constructions needed
- Simple diagnostics
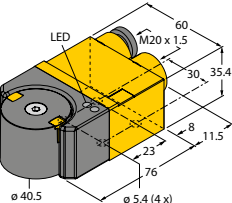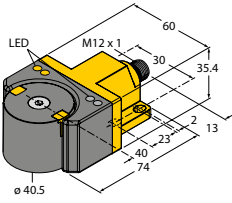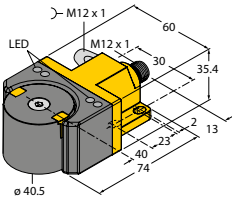- Highest mounting flexibility
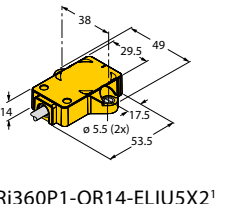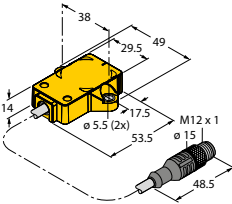
Multiple variants
Four connection types, eight angle ranges; each application and task can be solved by a sensor from the standard portfolio.

Mounting options
The positioning element can be protected by the housing or freely mounted on the active surface, just as it fits best.

Ri360-DSU35 | …-QR14 – Types and Features

Ri360-DSU35 Dimensions/Type code	Measuring range	Ambient temperature	Operating voltage	Output	Resolution
 Ri360P1-DSU35TC-ELI-EXI[2]	0…360°	-20…+75 °C	14…30 VDC	4…20 mA, loop powered	12 bit
 Ri360P1-DSU35-ELIU5X2-H1151[2] Ri360P1-DSU35-2UP6X4-H1151[2]	0…360° 0…360°	-20…+75 °C -20…+75 °C	15…30 VDC 10…30 VDC	0…10 V/4…20 mA PNP, normally open/ closed	12 bit 12 bit
 Ri360P1-DSU35-CNX4-H1650[2]	0…360°	-20…+70 °C	10…30 VDC	CANopen, Profil DS406	16 bit

Ri360-QR14 Dimensions/Type code	Measuring range	Ambient temperature	Operating voltage	Output	Resolution
 Ri360P1-QR14-ELIU5X2[1] Ri360P1-QR14-ELU4X2/S97[1]	0…360° 0…360°	-25…+70 °C -40…+70 °C	15…30 VDC 8…30 VDC	0…10 V/4…20 mA 0,5…4,5 V	12 bit 12 bit
 Ri360P1-QR14-ELIU5X2-0,3-RS5[1] Ri360P1-QR14-ELU4X2-0,3-RS5/S97[1]	0…360° 0…360°	-25…+70 °C -40…+70 °C	15…30 VDC 8…30 VDC	0…10 V/4…20 mA 0,5…4,5 V	12 bit 12 bit

[1] Positioning element P1-Ri-QR14 included in delivery, [2] Positioning element P1-Ri-DSU3 included in delivery

Ri…-DSU35 | …-QR14 – | …-QR20 Accessories

Ri…DSU35, … QR14

Positioning element Dimensions	Type code/Description
	P1-Ri-QR14 Positioning element for Ri-QR14, distance to the sensor surface 0…6 mm, included in delivery
	P3-Ri-QR14 Flat positioning element. We recommend to use the Alu-shielding plate SP1-QR14.
	P1-Ri-DSU35 Positioning element for Ri-DSU35 for frontal detection of angles, included in delivery (For more DSU35 accessories please visit www.turck.com)
Function accessories Dimensions	
	TB4 Analog test box for sensors with analog or switching output, incl. batteries

Sleeves/Dimensions	Type code/Description
	DS-Ri-QR14 Spacer sleeves for mounting the Ri-QR14 overhead
Teach-Adapter/Dimensions	
	TX1-Q20L60 Teach adapter for easy programming of measuring range (optional)
Adapter/Dimensions	
	HSA-M6-QR14 Adapter pin for mounting on hollow and solid shafts, for P1-Ri-QR14, Ø solid shaft: 6 mm
	HSA-M8-QR14 Adapter pin for mounting on hollow and solid shafts, for P1-Ri-QR14, Ø solid shaft: 8 mm

Ri…QR20

Design/Dimensions	Type code	Ident-no.	Description
	TSS-3S-A-2/TXL	6936796	AMP-connector-cable
	DT06-3S-A-2/TXL	100000367	Deutsch-connector-cable
	RKC4T-2/TXL	6625500	M12-connector-cable

Ri…-QR20 – Types and Features

Dimensions	Type code	Ident-No.	Measuring range
	RI360P1-QR20-LU4X2-0.15-DT04-3P	100000177	360°
	RI20P1-QR20-LU4X2-0.15-DT04-3P	100000179	20°
	RI40P1-QR20-LU4X2-0.15-DT04-3P	100000180	40°
	RI60P1-QR20-LU4X2-0.15-DT04-3P	100000181	60°
	RI90P1-QR20-LU4X2-0.15-DT04-3P	100000183	90°
	RI120P1-QR20-LU4X2-0.15-DT04-3P	100000184	120°
	RI240P1-QR20-LU4X2-0.15-DT04-3P	100000185	240°
	RI360P1-QR20-LU4X2	100000186	360°
	RI20P1-QR20-LU4X2	100000187	20°
	RI40P1-QR20-LU4X2	100000188	40°
	RI60P1-QR20-LU4X2	100000189	60°
	RI90P1-QR20-LU4X2	100000190	90°
	RI120P1-QR20-LU4X2	100000192	120°
	RI240P1-QR20-LU4X2	100000193	240°
	RI360P1-QR20-LU4X2-0.24-AMP01-3P	100000194	360°
	RI20P1-QR20-LU4X2-0.24-AMP01-3P	100000195	20°
	RI40P1-QR20-LU4X2-0.24-AMP01-3P	100000196	40°
	RI60P1-QR20-LU4X2-0.24-AMP01-3P	100000197	60°
	RI90P1-QR20-LU4X2-0.24-AMP01-3P	100000198	90°
	RI120P1-QR20-LU4X2-0.24-AMP01-3P	100000199	120°
	RI240P1-QR20-LU4X2-0.24-AMP01-3P	100000200	240°
	RI360P1-QR20-LU4X2-H1141	100000201	360°
	RI20P1-QR20-LU4X2-H1141	100000202	20°
	RI40P1-QR20-LU4X2-H1141	100000203	40°
	RI60P1-QR20-LU4X2-H1141	100000204	60°
	RI90P1-QR20-LU4X2-H1141	100000205	90°
	RI120P1-QR20-LU4X2-H1141	100000206	120°
	RI240P1-QR20-LU4X2-H1141	100000207	240°

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60 representatives worldwide!

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