Inductive angle sensor – Specifications

Technical data

- **Type overview**
  - R5306P1-QR14-LU5X2
  - R5306P1-QR14-LINC5X7

- **Scope of delivery**
  - Angle sensor incl. positioning element

- **Resolution**
  - 12 bit

- **Measuring range**
  - 0…360°

- **Linearity deviation**
  - ≤ 0.3 % f. s.

- **Temperature drift**
  - ≤ ± 0.01 %/K

- **Lateral offset**
  - ≤ 0.09°

- **Residual ripple**
  - ≤ 10 % U_{pp}

- **Rated insulation voltage**
  - ≤ 0.5 kV

- **Short-circuit protection**
  - yes

- **Wire-break/Rev. pol. protection**
  - yes

- **Load resistance voltage**
  - ≤ 0.4 kΩ

- **Load resistance current output**
  - ≥ 4.7 kΩ

- **Sampling rate**
  - 700 Hz

- **Power consumption**
  - < 100 mA

- **Housing**
  - Cuboid-shaped, QR14
  - 53.5 x 49 x 14 mm

- **Housing material**
  - Plastic, PBT-GF30-V0

- **Electrical connection**
  - Cable/Connector

- **Vibration resistance**
  - 55 Hz (1 mm)

- **Shock resistance**
  - 30 g (11 ms)

- **Degree of protection**
  - IP67

- **Power-on indication**
  - LED, green

- **Measuring range indication**
  - Multifunction LED, green

- **Type overview**
  - /MT51/MT56
  - /MT49/MT52
  - /MT53/MT51/MT44/MT53
  - /MT49/MT55/MT44/MT53
  - /MT50/MT57/MT44/MT53
  - /MT248/MT32/MT53/MT44/MT53/MT32/MT40/MT50/MT120/MT41
  - /MT52/MT57
  - Ri360P1-QR14-LiU5X2
  - Ri360P1-QR14-LU4X2/S97
  - Ri360P1-QR14-LiU5X2-0,3-RS4
  - Ri360P1-QR14-LU4X2-0,3-RS4/S97

- **Ambient temperature**
  - -25…+70 °C

- **Operating voltage**
  - 15…30 VDC

- **Voltage output**
  - 0…10 V

- **Current output**
  - 4…20 mA

- **Accessories**
  - Dimension drawing
  - Type code
  - Description
  - Function accessories
  - /MT77/MT101/MT110/MT117
  - /MT83/MT101/MT116
  - /MT49/MT50
  - /MT49/MT50/MT50
  - /MT56/MT48
  - /MT51/MT51
  - /MT77/MT49/MT50/MT32/MT120/MT32/MT49
  - /MT56/MT48
  - /MT51/MT56
  - /MT49/MT52
  - /MT53/MT44/MT53
  - /MT49/MT55/MT44/MT53
  - /MT50/MT57/MT44/MT53
  - /MT248/MT32/MT54/MT32/MT102/MT55
  - /MT51/MT48
  - /MT248/MT32/MT54/MT44/MT53
  - /MT52/MT56/MT44/MT53
  - Positioning element
  - /MT248/MT32/MT52/MT44/MT51
  - /MT248/MT32/MT54
  - /MT49/MT54
  - /MT49/MT56
  - /MT51/MT48
  - /MT248/MT32/MT54/MT44/MT53
  - /MT52
  - Positioning element, operating at a distance of 0…6 mm to the sensor surface
  - P1-Ri-QR14
  - HSA-M6-QR14
  - Hollow/solid shaft adapter
  - Ø 6 mm
  - HSA-M8-QR14
  - Hollow/solid shaft adapter
  - Ø 8 mm

- **Pin wiring**
  - R5306P1-QR14-LU5X2
  - R5306P1-QR14-LINC5X7
  - R5306P1-QR14-LU5X2-L2-84A
  - R5306P1-QR14-LU5X2-L2-0,3-RS4
  - R5306P1-QR14-LU5X2-0,3-RS4/S97

- **Accessories**
  - Function accessories
  - /MT77/MT101/MT110/MT117
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  - HSA-M6-QR14
  - Hollow/solid shaft adapter
  - Ø 6 mm
  - HSA-M8-QR14
  - Hollow/solid shaft adapter
  - Ø 8 mm

- **Spacer sleeve**
  - IO-Ø/QR14
  - Spacer sleeve for straight mounting
Inductive angle sensor – Specifications

**Technical data**

<table>
<thead>
<tr>
<th>Specification</th>
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<td>Cable/Connector</td>
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<td>Shock resistance</td>
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**Type overview**

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- /MT50/MT57/MT44/MT53
- /MT248/MT32/MT53/MT44/MT53/MT32/MT40/MT50/MT120/MT41
- /MT52/MT57

**Accessories**

- TB4 Analog test box for sensors with analog or switching output, incl. batteries
- HSA-M6-QR14 Hollow/solid shaft adapter Ø 6 mm
- HSA-M8-QR14 Hollow/solid shaft adapter Ø 8 mm
- P1-Ri-QR14 Positioning element, operating at a distance of 0...6 mm to the sensor surface
- DS-Ri-QR14 Spacer sleeve for overhead mounting

**Operating voltage**

- Ri360P1-QR14-LiU5X2: 15...30 VDC
- Ri360P1-QR14-LU4X2/S97: 8...30 VDC

**Current output**

- Ri360P1-QR14-LiU5X2: 0...10 V
- Ri360P1-QR14-LU4X2/S97: 0.5...4.5 V

**Ambient temperature**

- Ri360P1-QR14-LiU5X2: -25...+70 °C
- Ri360P1-QR14-LU4X2/S97: -40...+70 °C

**Industrial Automation**

**INDUCTIVE ANGLE SENSORS**

Sense it! Connect it! Bus it! Solve it!
The new inductive angle sensor from TURCK operates according to a new, revolutionary measuring principle. The positive features of standard measuring systems have been combined and systematically developed further. Rather than being detected by a magnet, the angular position is determined through inductive RLC coupling. The sensor is thus completely immune to magnetic fields, such as generated by large motors for example.

The Ri angle sensor is suited for many applications, thanks to the excellent interference immunity, the IP67 rated plastic housing and the long service life.

Other typical properties are a measuring range of 360° with ±0.005°/°, as well as increased outputs and an easy-to-use interface.

Irregularly rotating shafts cause vibrations and offset of the positioning element. The two-part build consisting of sensor and positioning element, compensates lateral offsets of ±3 mm. As a result, the sensor works reliably and can be mounted almost anywhere.

The absence of shaft and bearing (contactless principle) enables easy adaptation to bearing tolerances on the customer side.

The measuring principle
Inductive RLC coupling provides considerable advantages compared to magnetic measuring systems.

The printed coils are very precisely manufactured and work as a system of emitter and receiver coils. The emitter coil is excited by a high-frequency AC field, inducing inductive RLC coupling between emitter coil and positioning element (resonator). As a result, the resonator and receiver coils are also inductively coupled.

The receiver coils are arranged in a circle. Depending on the resonator's rotation angle, different voltages are induced in the coils, serving as a measure for the sensor signal.

Features:
- Contactless, wear-free operation
- Easy mounting and fitting
- Measuring range up to 360°
- High interference immunity
- Rotary code switch, 24V cooling
- Highly reliable measuring principle and safe operation
- High linearity
- High flexibility
- Rugged plastic housing
- Hardly affected by lateral offset and vibration

Positioning element - flexible mounting
Thanks to the smart design, the positioning element can be mounted in many ways. With blind holes they can be screwed on solid shafts and with special pin adapters they can even be mounted on hollow shafts.

Other typical properties are a measuring range of 360° with ±0.005°/°, as well as increased outputs and an easy-to-use interface.

Frequency converters, large motors, ferritic metals or permanent magnets are no problem at all. The new angle sensor measures the angular position independently of sensor and positioning element as well as roughness in the guidance have no influence on the output signal.

Thanks to the innovative accessories, you can mount the sensor on standard hollow as well as on solid shafts. Adapters are available in sizes of 6 and 8 mm and provide undreamed-of flexibility.

You can choose between different analog outputs: 0…10 V, 4…20 mA, 0.5…4.5 V and an SSI interface. Standard M12 x 1 plug or cable connection are provided, making the use of special connectors redundant.

The new angle sensors provide highly accurate measuring signals. The resolver signal is directly transferred to the encoder's input. The resolver's output signal is transmitted in the housing, thus bearing tolerances are hardly compensated through the contactless principle, as well as vibration caused by irregularly rotating shafts. This guarantees high linearity.

Highly reliable measuring principle and safe operation. The resonator and receiver coils are also inductively coupled.

The resonator coils are arranged in a circle. Depending on the resonator's rotation angle, different voltages are induced in the coils, serving as a measure for the sensor signal.

Features:
- Contactless, wear-free operation
- Easy mounting and fitting
- Measuring range up to 360°
- High interference immunity
- Rotary code switch, 24V cooling
- Highly reliable measuring principle and safe operation
- High linearity
- High flexibility
- Rugged plastic housing
- Hardly affected by lateral offset and vibration
The new inductive angle sensor from TURCK operates according to a new, revolutionary measuring principle.

The positive features of standard measuring systems have been combined and systematically developed further. Rather than being detected by a magnet, the angular position is determined through inductive RLC coupling. The sensor is thus completely immune to magnetic fields, such as generated by large motors for example.

The Ri angle sensor is suited for many applications thanks to the excellent interference immunity, the IP67 rated plastic housing and the long service life.

Other typical properties are a measuring range of 360° with ±3mm positional accuracy, as well as electrical outputs and analog inputs.

Irregularly rotating shafts cause vibration and offset of the positioning element. The two-part build consisting of sensor and positioning element compensates lateral offsets of ±3 mm. As a result, the sensor works reliably and can be mounted almost anywhere.

The absence of shaft and bearing (contactless principle) enables easy adaptation to bearing tolerances on the customer side.

Features:
- Contactless, wear-free operation
- Easy mounting and fitting
- Measuring range up to 360°
- High interference immunity
- Rotary code switch, ‘2M’ cooling
- Highly reliable measuring principle and self-operation
- High linearity
- High flexibility
- Rugged plastic housing
- Highly affected by lateral offset and vibration

The measuring principle
Inductive RLC coupling provides considerable advantages compared to magnetic measuring systems.

The printed coils are very precisely manufactured and work as a system of emitter and receiver coils. The emitter coil is excited by a high frequency AC field, inducing inductive RLC coupling between emitter coil and positioning element (resonator). As a result, the resonator and receiver coils are also inductively coupled.

The receiver coils are arranged in a circle. Depending on the resonator’s rotation angle, different voltages are induced in the coils, serving as a measure for the sensor signal.

Positioning element – flexible mounting
Thanks to the smart design, the positioning element can be mounted in many ways. With blind holes they can be screwed on solid shafts and with special pin adapters they can even be mounted on hollow shafts.

Features:
- Contactless, wear-free operation
- Easy mounting and fitting
- Measuring range up to 360°
- High interference immunity
- High precision
- Inspection of the positioning element can be easily done without deactivating the sensor
- High flexibility
- Rugged plastic housing
- Highly affected by lateral offset and vibration

The new measuring system works with contactless and wear-free technology. Frequency converters, large motors, ferritic metals or permanent magnets are no problem at all. The new angle sensor works contactless and wear-free. Important features such as accuracy, linearity and tightness are conserved for life and guarantee high line operation of the sensor at all times.

The sensor is made of high-quality plastic and is IP67 rated, the housing is highly resistant to moisture and is made of highly abrasion resistant material. The housing is made of high-quality plastic and is IP67 rated, protecting the sensor optically against rain, chemicals and salt. The two-part build consisting of sensor and positioning element compensates lateral offsets of ≤ 3 mm and guarantees easy fitting and operation.

The Ri angle sensor is easily fitted in the swivel mechanism, as there is no shaft to be centered. Thus, new systems can be extended and existing systems modernized with little effort.

Entrance systems – swivel mechanism
Entrance systems of department stores not only welcome customers, they also register customer frequencies and offer theft protection. Thanks to features such as high accuracy, linearity and resolution, contactless angle sensors of the Ri series are easily fitted in the swivel mechanism, as there is no shaft to be centered. Thus, new systems can be extended and existing systems modernized with little effort.
**Inductive angle sensor - Contactless detection of angles**

The new inductive angle sensor from TURCK operates according to a novel, revolutionary measuring principle.

**Features:**
- Contactless, wear-free operation
- Easy mounting and fitting
- Measuring range up to 360°
- High interference immunity
- Rotary code switch, 24-bit
- Highly reliable measuring principle and safe operation
- High flexibility
- Rugged plastic housing
- Highly affected by lateral offset and vibration

**Measuring principle**
Inductive RLC coupling provides considerable advantages compared to magnetic measuring systems.

**Positioning element**
Flexible mounting
Thanks to the smart design, the positioning element can be mounted in many ways. With blind holes they can be screwed on solid shafts and with special pin adapters they can even be mounted on hollow shafts.

**Features:**
- Contactless, wear-free operation
- Long measuring and fitting
- Measuring range up to 360°
- High interference immunity
- Rotary code switch, 24-bit
- Highly reliable measuring principle and safe operation
- High linearity
- Measuring range up to 360°
- Highly interference immune
- Rugged housing and easy mounting
- Highly reliable measuring principle and safe operation
- High linearity and vibration resistance
- Hollow/solid shaft adaptable
- Flexible process connection

**Entrance systems - swivel mechanism**
Entrance systems of department stores not only welcome customers, they also register customer frequencies and offer theft protection. Thanks to features such as high accuracy, linearity and resolution, contactless angle sensors of the Ri series are easily fitted in the swivel mechanism, as there is no shaft to be centered. Thus, new systems can be extended and existing systems modernized with little effort.

**Wind turbines – blade pitch**
Wind turbines with pitch control enable direct interventions on turbines. A change of pitch allows the power consumption and the drive torque to be adjusted according to the current situation. The Ri angle sensor measures the pitch and feeds the blade control continuously with precise data. Light vibrations and electro-magnetic fields are easily compensated and damaging is reliably avoided.

**Solar tracking**
The panels on solar trackers or similar systems are adapted according to the sun’s position. The movement takes place usually in a horizontal plane. The angular measurement required to avoid mutual shadowing of the panels, is achieved with Ri angle sensors.

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Inductive angle sensor – Specifications

### Technical data

- **Type of delivery**
  - Incl. positioning element

- **Temperature range**
  - Sensing range
    - 0...360°
  - Temperature drift
    - ≤ ±0.01%/°C
  - Resolution
    - 0.09°
  - Lateral offset
    - ≤ 3 mm

- **Residual ripple**
  - ≤ 10 % \(U_{pp}\)

- **Rated insulation voltage**
  - ≤ 0.5 kV

- **Short-circuit protection**
  - Yes

- **Wire-break/Rev. polar. protection**
  - Yes/fully

- **Load resistance voltage**
  - ≤ 0.4 kΩ

- **Load resistance current output**
  - ≥ 4.7 kΩ

- **Sampling rate**
  - 700 Hz

- **Power consumption**
  - < 100 mA

- **Housing**
  - Cuboid-shaped, QR14
  - 53.5 x 49 x 14 mm
  - Plastic, PBT-GF30-V0

- **Electrical connection**
  - Cable/Connector

- **Vibration resistance**
  - 55 Hz (1 mm)

- **Shock resistance**
  - 30 g (11 ms)

- **Degree of protection**
  - IP67

- **Power-on indication**
  - LED, green

- **Measuring range indication**
  - Multifunction LED, green

### Type overview

- **/MT51/MT56**
- **/MT49/MT52**
- **/MT53/MT51/MT44/MT53**
- **/MT49/MT55/MT44/MT53**
- **/MT50/MT57/MT44/MT53**
- **/MT248/MT32/MT53/MT44/MT53/MT32/MT40/MT50/MT120/MT41**
- **/MT52/MT57**

### Operating voltage

- **Ri360P1-QR14-LiU5X2 Ambient temperature**
  - -25…+70 °C
  - Operating voltage: 15…30 VDC
  - Voltage output: 0…10 V
  - Current output: 4…20 mA

- **Ri360P1-QR14-LU4X2/S97 Ambient temperature**
  - -40…+70 °C
  - Operating voltage: 8…30 VDC
  - Voltage output: 0.5…4.5 V

### Accessories

- **Dimension drawing**
  - Type code
  - Description

- **Function accessories**
  - /MT77/MT101/MT110/MT117
  - /MT83/MT101/MT116
  - /MT49/MT50
  - /MT49/MT50/MT44/MT53
  - /MT56/MT48
  - /MT51/MT51
  - /MT77/MT49/MT50/MT32/MT120/MT32/MT49

- **Adapter**
  - HSA-M6-QR14
  - Hollow/solid shaft adapter Ø 6 mm

- **Positioning element**
  - P1-Ri-QR14
  - Operating at a distance of 0…6 mm to the sensor surface

- **Spacer sleeve**
  - DS-Ri-QR14
  - For overhead mounting

- **Pin wiring**
  - Ri360P1-QR14-LiU5X2
  - Ri360P1-QR14-LU4X2/S97
  - Ri360P1-QR14-LiU5X2-0,3-RS4
  - Ri360P1-QR14-LU4X2-0,3-RS4/S97