

BRIEF INFORMATION

Angular Position Sensors Single and double sensors

- Single or redundant sensors
- High precision due to internal 14 bit resolution
- High thermal stability and linearity
- High insensitivity to magnetic fields
- Zero position can be individually programmed
- Various connection elements available

PRODUCT FEATURES

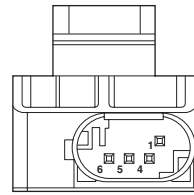


Application

The CIPOS®-type angular position sensors (contactless inductive position sensors) are designed for many different applications to measure angles accurately and reliably even in tough environments. Their insensitivity to magnetic fields and their high level of temperature stability in particular are the characteristic qualities of the CIPOS® technology used in all angular position sensors. Angles are measured inductively using a contactless and thus wear-resistant method.

This guarantees a high degree of measurement accuracy throughout the entire life of the sensor. The redundant sensors (double sensors) are specially designed for failure detection, thus improving the reliability of the overall system.

HOUSING TYPE A – SINGLE SENSORS



Technical specifications

| | |
|---------------------------------------------|------------------------------|
| Mechanical angle range | unlimited (full 360° circle) |
| Supply voltage | U_s 5 V \pm 10 % |
| Output signal 1 | 0.25 V to 4.75 V ratiometric |
| Output signal 2 | PWM |
| Linearity error including temperature drift | \pm 0,6° |
| PWM frequency | 200 Hz |
| Housing type | A |
| Protection class | IP 6K5, IP 6K9K |
| Operating temperature | -40 °C to +125 °C |
| Mating connector ¹⁾ | AMP 1-967616-1 |

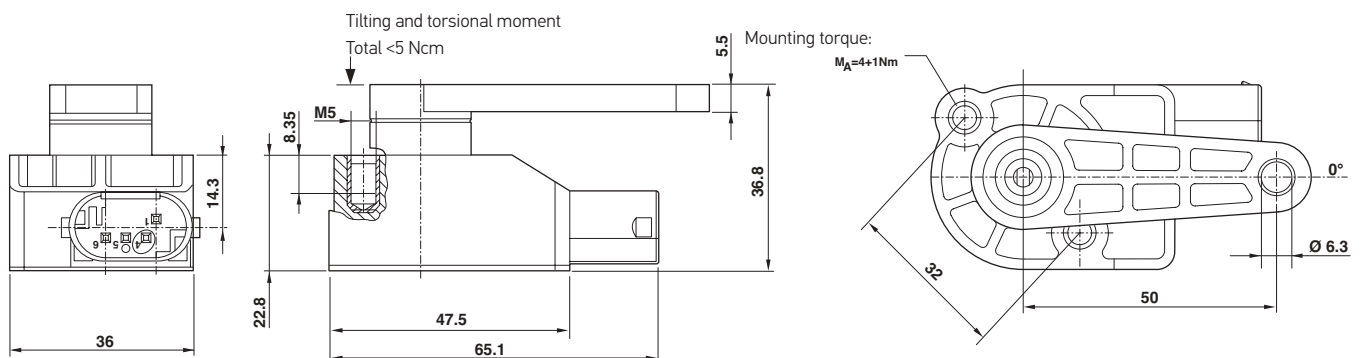
Pin assignment

| | |
|-------|--------------------------------------------|
| Pin 1 | Ground |
| Pin 4 | Output signal 0.25 V to 4.75 V ratiometric |
| Pin 5 | 5 V DC supply |
| Pin 6 | PWM output |

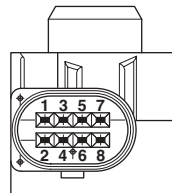
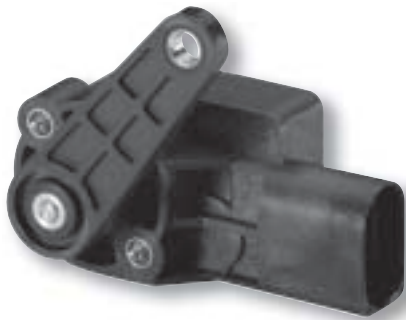
¹⁾ This accessory is not included in the scope of delivery.
It may be purchased from Tyco Electronics.

This special version outputs two different signals, i.e. a voltage indicating the angle measured (analogue) and a PWM signal (pulse-width modulated digital signal), ensuring this angular position sensor can be used universally.

Technical drawing housing type A



HOUSING TYPE B – DOUBLE SENSORS



Technical specifications

| | |
|-----------------------------------------------------|------------------------------------------------------------------------------------------|
| Mechanical angle range | unlimited (full 360° circle) |
| Supply voltage | 5 V ± 10 % or 9 V to 32 V |
| "Crossed Scale" output signal | |
| Supply voltage $U_s = 5\text{ V}$ | Output U_{out1} 0.5 V to 4.5 V ratiometric U_{out2} 4.5 V to 0.5 V ratiometric |
| Supply voltage $U_s = 9\text{ V to }32\text{ V}$ | Output U_{out1} 0.5 V to 4.5 V U_{out2} 4.5 V to 0.5 V |
| Linearity error including temperature drift | ± 0.3° |
| Housing type | B |
| Protection class | IP 6K9K |
| Operating temperature | -40 °C to +85 °C |
| Mating connector ¹⁾ | AMP 1394416-1 |

¹⁾ This accessory is not included in the scope of delivery.
It may be purchased from Tyco Electronics.

Pin assignment

Voltage supply at 5 V DC*

| | |
|-------|----------------------------------------------|
| Pin 1 | 5 V DC sensor 2 |
| Pin 2 | Output U_{out1} 0.5 V to 4.5 V ratiometric |
| Pin 3 | Not assigned |
| Pin 4 | 5 V DC sensor 1 |
| Pin 5 | Output U_{out2} 4.5 V to 0.5 V ratiometric |
| Pin 6 | Not assigned |
| Pin 7 | Ground sensor 2 |
| Pin 8 | Ground sensor 1 |

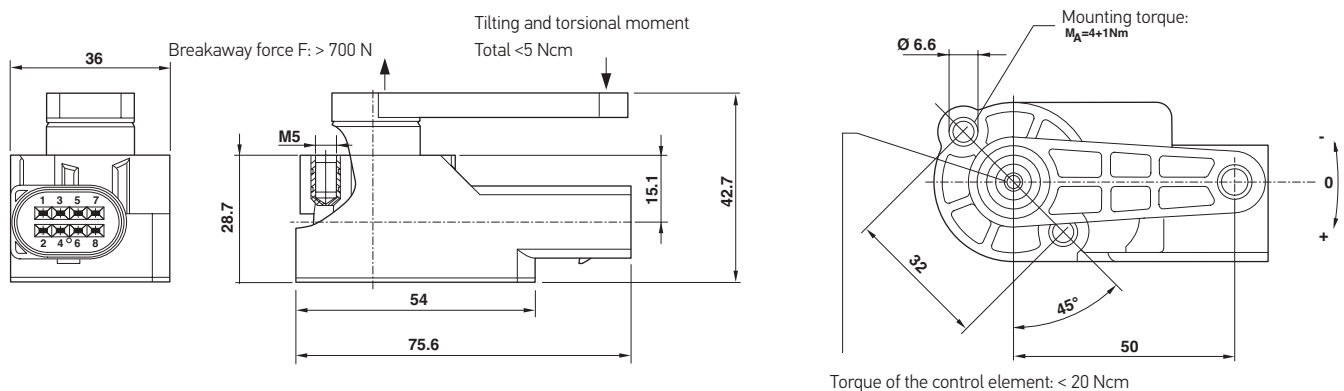
* The power supply lines (pin 1 and pin 4) and the ground supply lines (pin 7 and pin 8) can be bridged externally (e.g. in the mating connector) to reduce the number of wires.

Voltage supply at 9 V to 32 V DC**

| | |
|-------|----------------------------------|
| Pin 1 | Bridge to pin 4 (external) |
| Pin 2 | Output U_{out1} 0.5 V to 4.5 V |
| Pin 3 | 9 V to 32 V DC sensor 1 and 2 |
| Pin 4 | Bridge to pin 1 (external) |
| Pin 5 | Output U_{out2} 4.5 V to 0.5 V |
| Pin 6 | Not assigned |
| Pin 7 | Ground sensor 2 |
| Pin 8 | Ground sensor 1 |

** Pin 1 and pin 4 must be bridged externally (e.g. in the mating connector). The ground supply lines (pin 7 and pin 8) can be bridged externally (e.g. in the mating connector) to reduce the number of wires.

Technical drawing housing type B

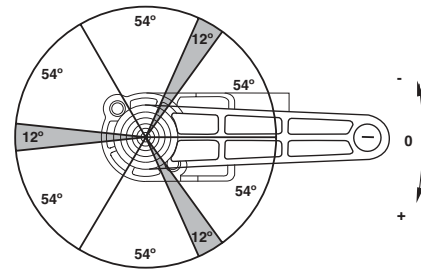


ANGULAR POSITION SENSOR CHARACTERISTIC CURVE

The characteristic curve of the angular position sensor repeats every 120°. The sensor does not therefore have to be installed at the mounting position shown, but can be installed any offset angle that is a multiple of 120°.

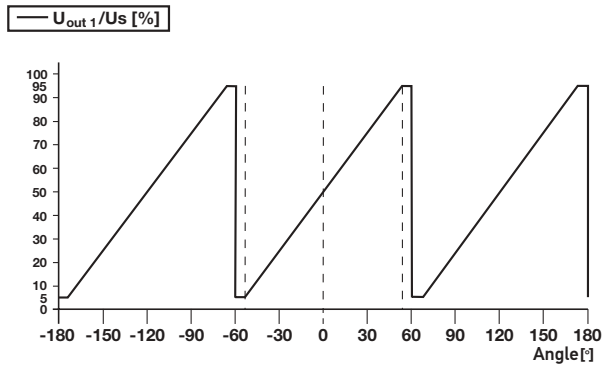
This will not affect the behaviour of the connected system in any way. The measuring angle range is 108°. If the signal continues to fall or rise up to 6°, the output signal remains at the limit value of the measuring range. If the signal exceeds these values, the next section of the characteristic curve is applied. The resulting measuring ranges and zero positions are shown on the graph.

The segments of the circle shown in grey represent the angles that cannot be measured.



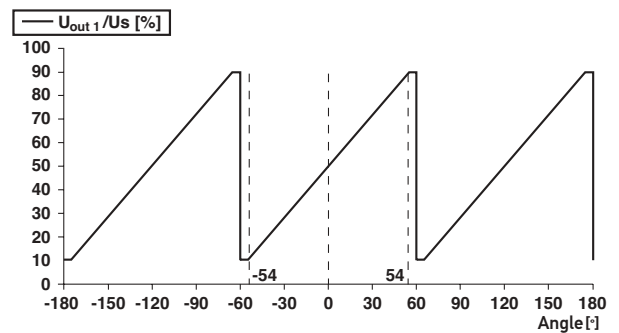
Housing type A

Output signal U_{out1}
with 5 V supply voltage



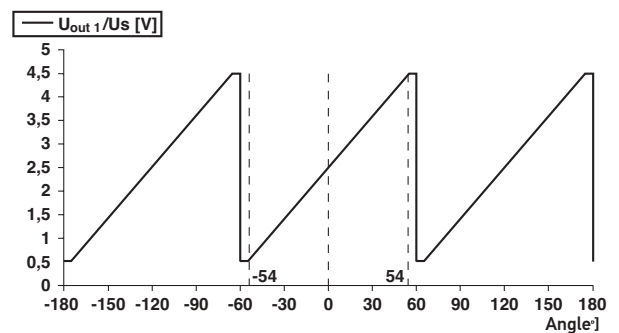
Housing type B

Output signal U_{out1}
with 5 V supply voltage



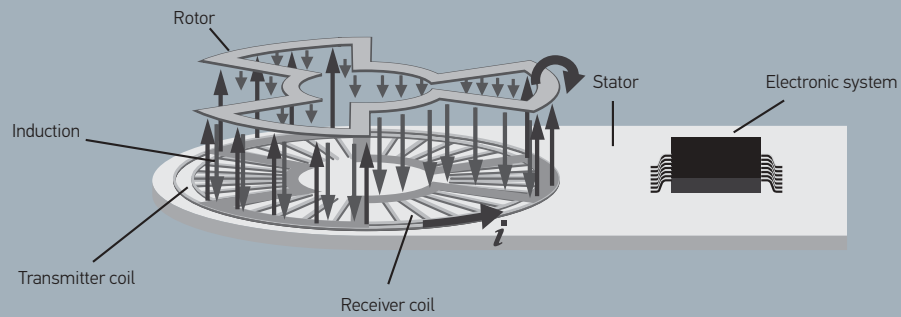
Output signal $U_{out2} = 100\% - U_{out1}/U_s$ [%] (opposite curve)

Output signal U_{out1}
with 9 V to 32 V supply voltage



Output signal $U_{out2} = 5V - U_{out1}$ [V] (opposite curve)

FUNCTION



Inside the laser-welded polyamide housing (PA66), the rotation of the lever arm is transferred to the rotor and measured by induction. An ASIC (Application Specific Integrated Circuit) accurately computes the rotor position. Various mounting positions are possible thanks to the repeating characteristic curve of the output signal (which depends on the structure of the sensor that is used), which increases the flexibility of the sensor.

SUMMARY OF VERSIONS

| Angle range | Supply voltage | Output signal | Zero position | Lever arm | Part number |
|-----------------------|--------------------|---------------------------------------|---------------|-----------|------------------------|
| Single sensors | | | | | |
| 0° to +45° | 5 V | 0.5 V to 4.5 V ratiometric | 60°/180°/300° | 50 mm | 6PM 011 081-001 |
| -30° to +30° | 5 V | 0.5 V to 4.5 V ratiometric and PWM | 0°/120°/240° | 50 mm | 6PM 008 161-241 |
| -30° to +30° | 9 to 32 V | 0.5 V to 4.5 V absolute | 0°/120°/240° | 50 mm | 6PD 009 583-101 |
| -51° to +51° | 5 V | 0.5 V to 4.5 V ratiometric and PWM | 0°/120°/240° | 50 mm | 6PM 008 161-251 |
| -54° to +54° | 9 to 32 V | 0.5 V to 4.5 V absolute | 0°/120°/240° | 50 mm | 6PD 009 583-111 |
| -54° to +54° | 5 V | 0.25 V to 4.75 V ratiometric | 0°/120°/240° | 70 mm | 6PM 008 161-121 |
| -54° to +54° | 5 V | 0.25 V to 4.75 V ratiometric | 60°/180°/300° | 70 mm | 6PM 008 161-131 |
| -54° to +54° | 5 V | 0.25 V to 4.75 V ratiometric | 30°/150°/270° | 50 mm | 6PM 008 161-141 |
| -54° to +54° | 5 V | 0.25 V to 4.75 V ratiometric | 90°/210°/330° | 50 mm | 6PM 008 161-151 |
| Double sensors | | | | | |
| -30° to +30° | 5 V or 9 V to 32 V | 0.5 V to 4.5 V ratiometric / absolute | 0°/120°/240° | 50 mm | 6PD 009 583-001 |
| -54° to +54° | 5 V or 9 V to 32 V | 0.5 V to 4.5 V ratiometric / absolute | 0°/120°/240° | 50 mm | 6PD 009 583-011 |
| -54° to +54° | 5 V or 9 V to 32 V | 0.5 V to 4.5 V ratiometric / absolute | 0°/120°/240° | 70 mm | 6PD 009 580-017 |
| -54° to +54° | 5 V or 9 V to 32 V | 0.5 V to 4.5 V ratiometric / absolute | 0°/120°/240° | 90 mm | 6PD 009 584-017 |




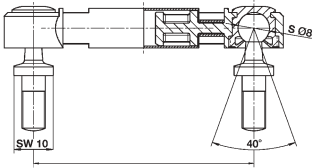

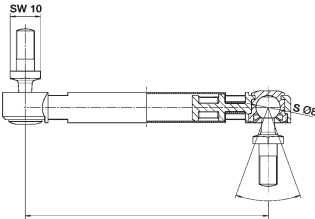

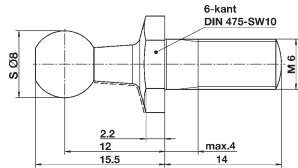
For details and further applications, see
www.hella.com/sensors-actuators

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CONNECTING ELEMENTS

| Product image | Technical drawing | Length | Layout | Part number |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------|---------------------------------|------------------------|
|  |  | 56 mm ± 0.3 | 2 x ball-head screws 740 413-31 | 9XB 732 588-207 |
| | | 78.2 mm ± 0.3 | 2 x ball-head screws 740 413-31 | 9XB 732 588-197 |
|  |  | 70 mm ± 0.3 | 2 x ball-head screws 740 413-31 | 9XX 736 603-107 |
|  |  | 29.5 mm ± 0.6 (total) 14 mm ± 0.3 (Screw) | M6 thread | 9NS 740 413-317 |