novotechnik
Siedle Group

# Precision Rotary Sensor potentiometric

## Series IPX 7900

**Special features**

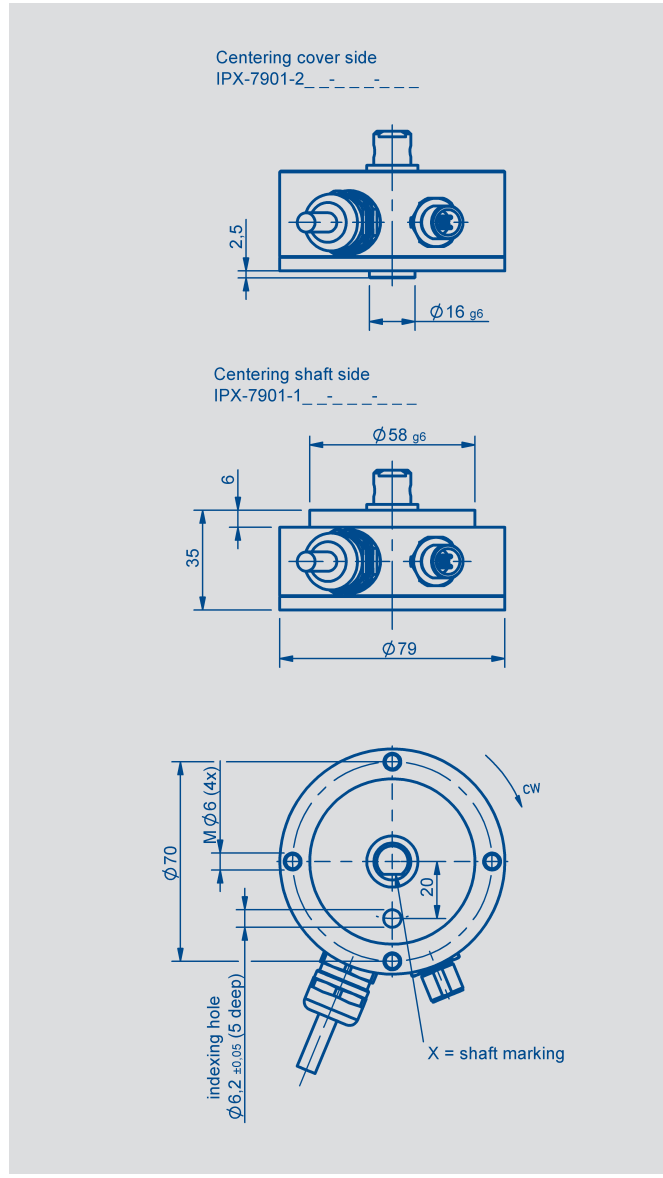
- very durable design for extreme environmental conditions
- absolute potentiometric measuring system
- angle ranges 120°, 200° or 350° in one or two channel versions
- increased corrosion protection by shaft made of stainless steel and anodized aluminium housing; sea water resistant
- very good linearity
- resolution 0.01°
- no mechanical rotation limit
- splash water proof
- high temperature resistant
- high life time, >100 Mio. movements, even under high vibration environments
- full redundant version with 2 separate connections, fulfills SIL3 according to IEC61508

This angle sensor was developed for rough operation under extreme environmental conditions in mobile applications.
Equipped with a conductive plastic resistance element and a long term stable multi-finger wiper, the IPX angle sensor is suitable for durable operation even under challenging conditions.

A durable full metal housing, a continuous stainless steel shaft with double ball bearing with large distance as well as an interlocking top cover protect the wiper from outer force effects.
Hermetic sealing and the accuracy and reliability of the absolute angle measurement are further special features of this sensor. The massive but compact design allows the direct connection of the shaft using a strong lever arm or other couplings.

This sensor's main application is the measurement of the steering angle in electro-hydraulic steering systems.

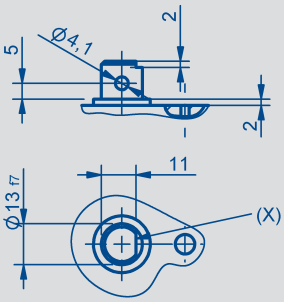
The centering of the housing is provided by a 58g6 mm centering diameter or - if mounted overhead - by a 16g7 mm diameter in the top cover.
A POM shaft can be employed alternatively for enhanced isolation requirements.



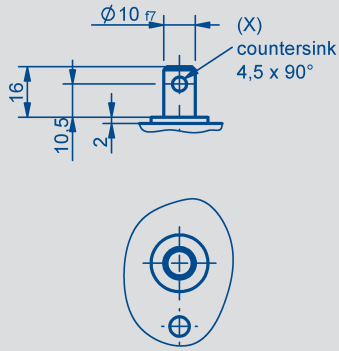

| Description | |
|---|---|
| Housing | anodized aluminium; salt spray resistant |
| Shaft | stainless steel (1.4305) |
| Bearing | double ball bearings with large distance |
| Resistance element | conductive plastic |
| Wiper | precious metal multifinger wiper |
| Electrical connections | cable output with PG screw<br>M12 plug |

## Shaft versions

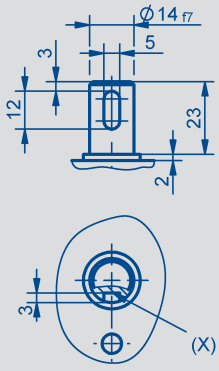
IPX-7901-_ 01-_ _ _-_ _ _ /
IPX-7901-_ 02-_ _ _-_ _ _



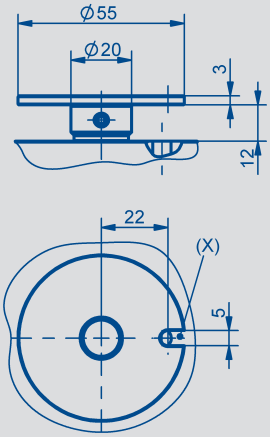

IPX-7901-_ 03-_ _ _-_ _ _




IPX-7901-_ 05-_ _ _-_ _ _

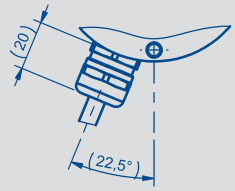



IPX-7901-_ 07-_ _ _-_ _ _

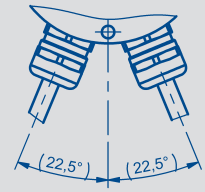



## Versions of electrical connections

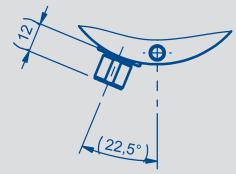
IPX-7901-_ _ _-_ _ _-202



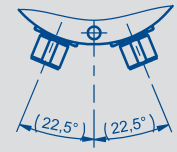

IPX-7901-_ _ _-_ _ _-402



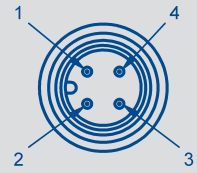

IPX-7901-_ _ _-_ _ _-101

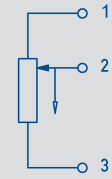



IPX-7901-_ _ _-_ _ _-103




Connector pin assignment
Pin #4 not connected!




Schematic of connection

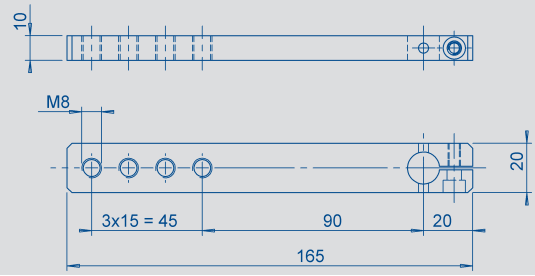
**Connector pin assignment**

| Signal | Connector output not redundant Pin-No. | Connector output redundant Pin-No. | Cable output not redundant Wire marking | Cable output redundant Wire marking |
|---|---|---|---|---|
| Connection 1/1 | S1/ 1 | S1/ 1 | K1/ "1" | K1/ "1" |
| Connection 1/2 | S1/ 2 | S1/ 2 | K1/ GN/YE | K1/ GN/YE |
| Connection 1/3 | S1/ 3 | S1/ 3 | K1/ "2" | K1/ "2" |
| Connection 2/1 | - | S2/ 1 | - | K2/ "1" |
| Connection 2/2 | - | S2/ 2 | - | K2/ GN/YE |
| Connection 2/3 | - | S2/ 3 | - | K2/ "2" |

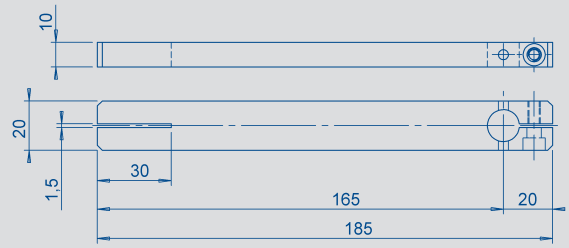
S1 = connector No. 1, S2 = connector No. 2, K1 = cable output No. 1, K2 = cable output No. 2

| | | | | |
|---|---|---|---|---|
| **Electrical Data** | | | | |
| Electrical range | 120 ±2 | 200 ±2 | 350 ±2 | ° |
| Nominal resistance | 2 | 2 | 5 | kΩ |
| Resistance tolerance | ± 15 | | | % |
| Repeatability | 0.002 (0.007°) | | | % |
| Temperature coefficient of the output to applied voltage ratio | typ. 10 | | | ppm/K |
| Independent linearity | ≤ ±0,2 | ≤ ±0,1 | ≤ ±0,1 | % |
| Max. permissible applied voltage | 42 | | | V |
| Recommended operating wiper current | ≤ 10 | | | µA |
| Max. wiper current in case of malfunction | 10 | | | mA |
| Insulation resistance (500 VDC, 1 bar, 2 s) | > 100 | | | MΩ |
| Dielectric strength (50 Hz, 2 s, 1 bar, 500 VAC) | ≤ 1000<br>with POM-shaft ≤ 3000 | | | V RMS<br>V RMS |
| **Mechanical Data** | | | | |
| Dimensions | see drawings | | | |
| Mounting | 4 screws M6 or M5 (depends on mounting style) | | | |
| Mechanical travel | 360 continous | | | ° |
| Permitted shaft load (static or dynamic force) | 300 (axial), 400 (radial) | | | N |
| Torque max. | 4 | | | Ncm |
| Maximum operational speed | 50 | | | $min^{-1}$ |
| Weight approx. | 0,5 | | | kg |
| **Environmental Data** | | | | |
| Temperature range Operation and storage temperature | -40 ...+120 (M12 plug)<br>-40...+100 (cable output) | | | °C<br>°C |
| Vibration | 5...2000<br>$A_{max}$ = 0,75<br>$a_{max}$ = 5 | | | Hz<br>mm<br>g |
| Shock | 50<br>11 | | | g<br>ms |
| Life time | > 100 x $10^6$ | | | movem. |
| Protection class | IP 69k (with PG connection)<br>IP 67 (M12 plug with fastened connector) | | | |

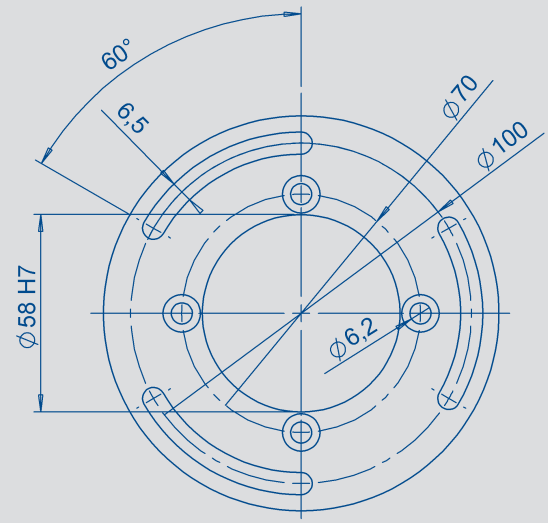
## Z-IPX-01 lever arm 165 x 20 mm




## Z-IPX-11 lever arm 185 x 20 mm




## Z-IPX-M31 mounting plate for IPX7900 sensor



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## Ordering specifications

| I | P | X | 7 | 9 | 0 | 1 | 1 | 0 | 1 | 1 | 2 | 0 | 1 | 0 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Product family**
IPX

**Product series**
79: Ø 79 x 35mm

**Housing material**
01: Aluminium anodized

**Housing centering**
1: Centering collar on shaft side
2: Centering collar on top cover side

**Shaft**
01: Steel D13x12 mm with cross hole D4.1 mm
02: POM D13x12mm with cross hole D4.1 mm
03: Steel D10x16mm with countersink D4.5 x 90°
05: Steel D14x25 mm with longitudinal slot and spring D4.1 mm
07: Steel D13x12 mm with cross hole D4.1 mm, with mounted disc Ø 55 mm for driving pin

**Electrical range**
120: 120°
200: 200°
350: 350°

**Electr. type and connections**
101: not redundant, 1 x plug M12, 3-pin
103: fully redundant, 2 x plug M12 3-pin
202: not redundant, 1 x cable type “1”, 2 m, 3-wire shielded
402: fully redundant, 2 x cable type “1”, 2 m, 3-wire shielded

Cable type “1” Ölflex-FD 855 CP 100 CY (PUR)

### Important

All the values given in this data sheet for linearity, lifetime and temperature coefficient in the voltage dividing mode are quoted for the device operating with the wiper voltage driving on operational amplifier working as a voltage follower, where virtually no load is applied to the wiper ($I_e \leq 10$ µA).

### Accessories

- Lever arm 165 x 20 mm, Z-IPX-01, Art.No. 056501
- Lever arm 185 x 20 mm, Z-IPX-11, Art.No. 056502
- Disc Ø 55 mm (mounted ex works, ordering code IPX-7901- _07-___-___) Z-IPX-M21, Art.No. 056503
- Mounting plate Z-IPX-31, Art.No. 056504