

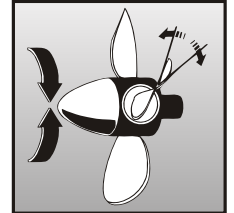
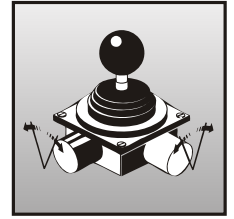
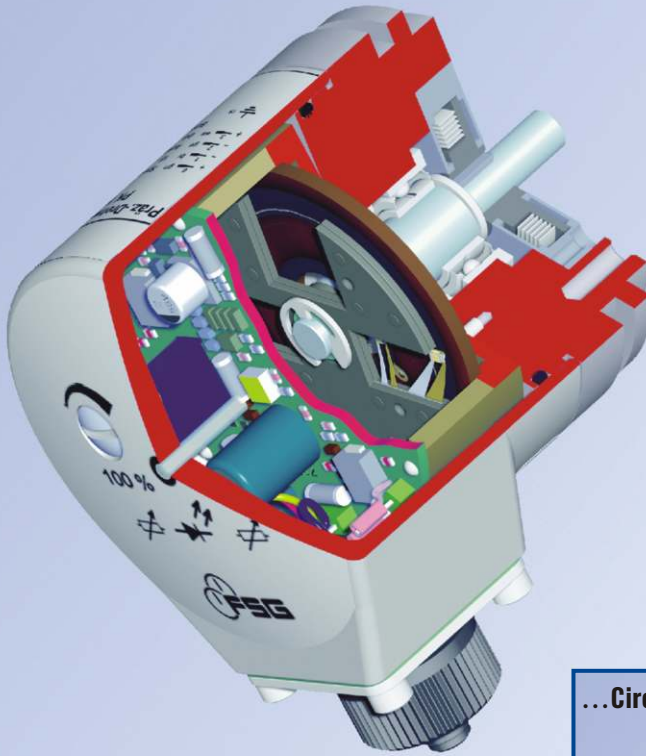
Precision Rotary Potentiometer



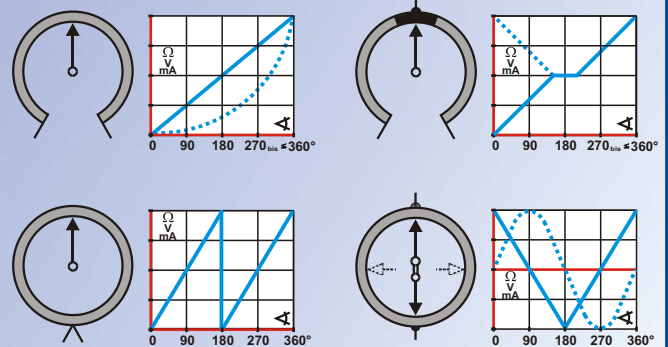
Precision Rotary Potentiometer

with resistance, current or voltage output

... Construction



... Circuits and characteristic curves



Today potentiometric Angular Position Transmitters attain a still more status with regard to the analogue measuring technique as far as high-quality measurement tasks are concerned due to the favourable value for money.

They are mainly used for

- **Power and braking control elements for railway vehicles as well as ship telegraphs**
- **Rudder and propeller systems for ships**
- **Control drives for systems in the field of energy management and chemical industry**
- **Lifting gears and slewing mechanisms of cranes and excavators**
- **Tail vanes for meteorological measurements**
- **As dancer potentiometers for textile and paper machinery**
- **As well as for measurements in the field of mechanical, apparatus and medical engineering**

Potentiometric transmitters have either a high-resolution element of conductive plastic or a high-resolution gold or constantan wire with various resistance and angle values.

They are available in various sizes as single-turn or multiple-turn potentiometers or in a multiple design.

For adjustment of the measuring range almost all series can be provided with short-circuiting tracks, taps and function windings.

Some models are available with incorporated Signal Converter providing current or voltage outputs in configuration of 2, 3 or 4 wires.

To ensure reliability in very dirty atmospheres, oil-filled potentiometers are available.

Moreover, to provide protection for all potentiometers from mechanical damage, dusty and damp industrial atmospheres a series of casings with a degree of protection IP 40 to IP 68 is available which can be equipped with gearing and limit switches.

...Versions and Circuit Variations

...series PW

| | | |
|--|--|--|
| | | |
| | | |
| | | |

Resistance elements as **ring winding** with wire winding on an anodised anchor ring can be provided with any circuit, angle and resistance values.

1. wiper limited by stops
2. wiper rotatable over 360° with reactive winding
3. wiper rotatable over 360° without reactive winding (sawtooth shape)
4. any arrangement of short circuiting tracks
5. any arrangement of tappings
6. 7. 8. special windings with characteristic curve of the linear or sin./cos. type
9. two electrically isolated windings on a winding former, angle $\leq 175^\circ$

...series PW

| | | |
|--|--|--|
| | | |
| | | |

Resistance elements as **straight winding** with wire winding on a coated former of copper wire are used in potentiometers of the multiple-turn or linear type but also in single-turn potentiometers with active angles up to max. 355°.

1. wiper limited by stops
2. wiper rotatable over 360° only for purposes of putting into operation
4. any arrangement of short circuiting tracks
5. any arrangement of tappings

...series PK

| | | |
|--|--|--|
| | | |
| | | |

Resistance elements of **conductive plastic**, imprinted on glass-fiber reinforced support material. The max. active angle amounts to 355°. Smaller angles, tappings and short circuiting tracks on request.

1. wiper limited by stops
2. wiper rotatable over 360°
4. any arrangement of short circuiting tracks
5. any arrangement of tappings
9. two electrically isolated windings on a winding former, angle $\leq 175^\circ$

...series PK/PW...-MU

| | |
|--|-------------------------------|
| | 4 wires galvanically isolated |
| | 3 or 4 wires |
| | 2 wires |

Angular Position Transducers, equipped with resistance elements of wire or plastic with integrated R/I or R/V Converter for a current or voltage signal output, optional with a configuration of 2, 3 or 4 wires.

Also available with galvanic isolation between supply and output signal as far as version with 4 wires is concerned.

All types of transducers are provided with back trimmers matching the output signal within wide limits to the respective angular position.

...Electrical Specifications

| Series | PW 45 | PW 70 ¹⁾ | PW 613 | PW 620 | PW 1023 |
|--------------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| Max. active angle | 360° | 360° | 360° | 360° | 360° |
| Stops at max. | 345° | 350° | 345° | 345° | 345° |
| Resistance on angle limited by stops | min. 25 Ω max. 20 kΩ | min. 50 Ω max. 50 kΩ | min. 25 Ω max. 20 kΩ | min. 25 Ω max. 20 kΩ | min. 25 Ω max. 20 kΩ |
| Resistance tolerance ²⁾ | ± 5 % | ± 5 % | ± 5 % | ± 5 % | ± 5 % |
| Linearity tolerance ²⁾ | ± 0,3 up to 0,2 % | ± 0,2 up to 0,15 % | ± 0,3 up to 0,2 % | ± 0,3 up to 0,2 % | ± 0,3 up to 0,2 % |
| Resolution | 0,5 up to <0,1 % | 0,3 up to <0,1 % | 0,5 up to <0,1 % | 0,5 up to <0,1 % | 0,5 up to <0,1 % |
| Capacity | 2,5 W | 6 W | 2,5 W | 2,5 W | 2,5 W |
| Multiple design | twofold | sixfold | sixfold | sixfold | -- |
| Functional winding | • | • | • | • | • |
| Oilfilling | • | • | • | • | -- |
| Limit swiches | -- | version M... only | • | • | -- |
| Temperature coefficient | 17 ppm | | | | |

¹⁾ also available with integrated slipping clutch ²⁾ constricted resistance and linearity tolerances possible

| Series | PW 609/611 | PW 613/620 | PW 0045 | PW 55 | PW45W3/W10 ³⁾ | |
|--------------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------------------|-------------------------|
| Max. active angle | 340° | 345° | 280°..345° | 345° | W3 | 1080° |
| Stops at max. | 340° | 345° | 280°..345° | 345° | W10 | 3600° |
| | | | | | W3 | 1080° |
| Resistance on angle limited by stops | min. 25 Ω max. 20 kΩ | min. 25 Ω max. 50 kΩ | min. 25 Ω max. 50 kΩ | min. 25 Ω max. 50 kΩ | min. 25 Ω max. 50 kΩ | min. 25 Ω max. 50 kΩ |
| | | | | | | |
| Resistance tolerance | ± 5 % | ± 5 % | ± 5 % | ± 5 % | ± 5 % | |
| Linearity tolerance | ± 0,5 % | ± 0,2 % | ± 0,5 % | ± 0,5 % | ± 0,1 % | |
| Resolution | ± 0,5 % | ± 0,2 % | ± 0,2 % | ± 0,2 % | 0,1 up to 0,01 % | |
| Capacity | 0,5 W | 1 W | 1,5 W | 1,5 W | 2 W | |
| Multiple design | threefold | sixfold | -- | stackable | -- | |
| Temperature coefficient | 17 ppm | | | | | |

³⁾ PW45W3 and PW45W10 are multi-turn potentiometers for 3 or 10 turns

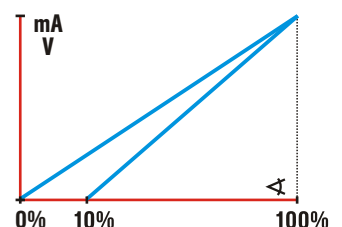
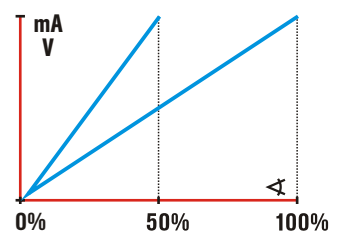
| Series | PK 609 | PK 611 | PK 613 | PK 620 | PK 1023 |
|-----------------------------------|--------------|--------------|--------------|--------------|----------------------|
| Max. active angle | ± 2° 340° | 347° | 352° | 355° | 355° |
| Stops at max. | ± 2° 340° | 345° | 345° | 345° | not limited by stops |
| Resistance | 1, 2 or 5 kΩ | 1, 2 or 5 kΩ | 1, 2 or 5 kΩ | 1, 2 or 5 kΩ | 1, 2 or 5 kΩ |
| Resistance tolerance | ± 20 % | ± 20 % | ± 10 % | ± 10 % | ± 10 % |
| Linearity tolerance ⁴⁾ | ± 0,5 % | ± 0,5 % | ± 0,2 % | ± 0,1 % | ± 0,1 % |
| Resolution | ∞ | ∞ | ∞ | ∞ | ∞ |
| Capacity | 0,5 W | 0,5 W | 1 W | 1 W | 1 W |
| Multiple design | threefold | threefold | sixfold | sixfold | twofold |
| Temperature coefficient | 200 ppm | | | | |

⁴⁾ favourably priced version with ± 1 - 2 % available

| Series | PW/PK613-MU | PW/PK620-MU | PW/PK1023-MU |
|-------------------------------|--|--------------------------|--------------|
| Voltage output | -- | 0-10 and 2-10 V respec. | |
| Load resistance | | ≥ 500Ω | |
| Current output | | 0-20 and 4-20 mA respec. | |
| Load resistance | | ≤ 600Ω | |
| Supply voltage | | 18-33 V DC | |
| Current consumption | | approx. 80 mA | |
| 4 wires galvanically isolated | -- | • | • |
| 2, 3 or 4 wires | • | • | • |
| Temperature coefficient | max. 1 ‰ / 10K, typically: 0,5 ‰ / 10K | | |
| Linearity | ± 0,2 % | ± 0,1 % | ± 0,1 % |

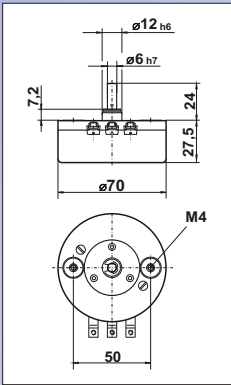
| General data | |
|-------------------------|--|
| Temperature coefficient | -30 up to +70 °C |
| Testing voltage | 550 V, 50 Hz, 1 min. |
| EMC test according to | DIN 50 081-1 Generic Emission Standard DIN 50 082-2 Generic Immunity Standard |

zero point and steepness to be matched via trimmer

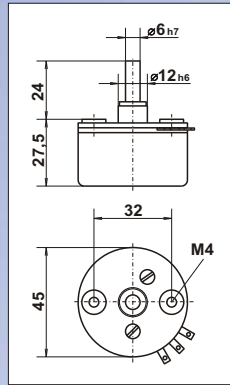


...Models

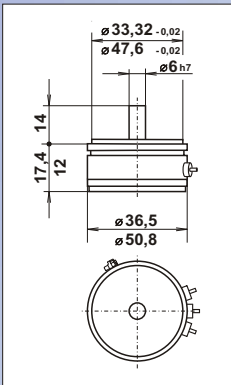
PW70



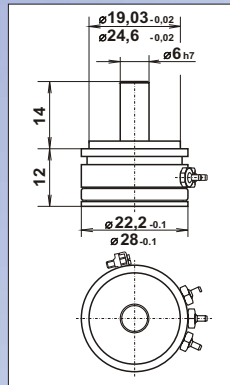
PW45



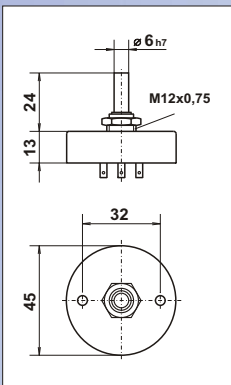
PK/PW613/620



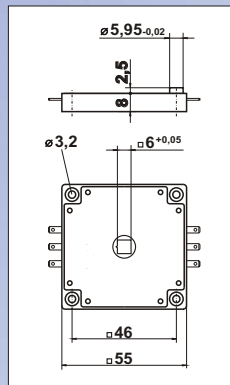
PK/PW609/611



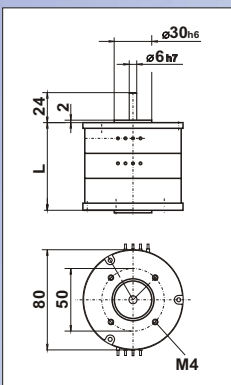
PW0045



PW55

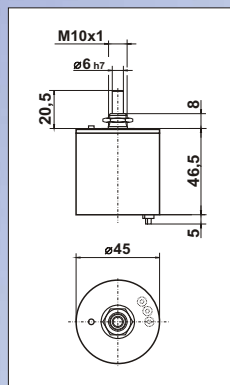


PW70M...



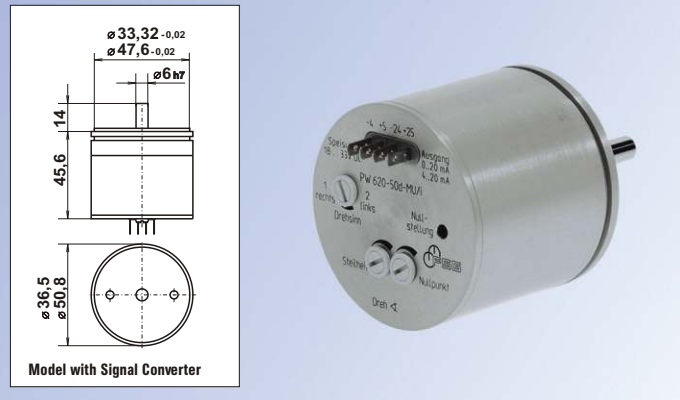
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|----------|----|-----|------|-----|-----|-----|
| L | 50 | 70 | 90 | 110 | 130 | 150 |
| | MI | MII | MIII | MIV | MV | MVI |

PW45W10

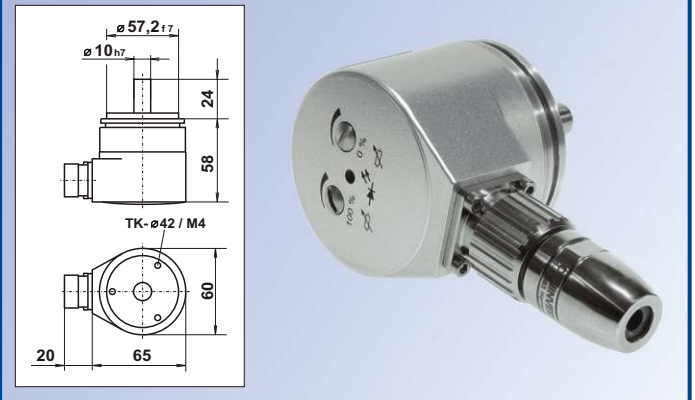


...Models

PW/PK613-MU/620-MU



PW/PK1023



... mechanical characteristics of FSG models

| Series | PW 0045 | PW 45 PW 70 | PW 55 | PW45W3 PW45W10 |
|-----------------------------------|------------------------------------|--|--------------------------|-------------------------------|
| Casing material | thermoplastic | PW45 thermoplastic PW70 thermoset | thermoplastic | brass coated thermoplastic |
| Shaft bearing | sintered bearing | ball - or sintered bearing | plastic friction bearing | sintered bearing |
| Shaft material | stainless steel | | | |
| Connection | solder-type terminals | solder-type terminals or screw connection | plug Faston | solder-type terminals |
| IP code of casing | IP 30 | | | |
| Torque (single version only) | PW 0045m 0,5 Ncm PW 0045h 5 Ncm | PW45 0,3 or 3 Ncm PW70 0,5 Ncm | 0,2 Ncm | 0,5 Ncm |
| Torque (oilfilling) | -- | 1 Ncm | -- | -- |
| Weight for single version only | 70 g | PW45 70 g PW 70 140 g | 50 g | PW45W3 100 g PW45W10 150 g |
| Fastening | central thread | threaded hole | through hole | central thread |

... mechanical characteristics of servo mount models

| Series | PW/PK 609 | PW/PK 611 | PW/PK 613 | PW/PK 620 | PW/PK 1023 |
|--------------------------------|---|-----------|-----------|-----------|------------------------|
| Casing material | Alu, black anodised | | | | Alu, cover coated |
| Shaft bearing | ball or sintered bearing | | | | ball bearing |
| Shaft material | stainless steel | | | | |
| Connection | Faston- or stranded wires | | | | plug or cable |
| IP code of casing | IP 30 | | | | IP 65 |
| Torque | 0,03 Ncm | 0,04 Ncm | 0,05 Ncm | 0,05 Ncm | 2,5 Ncm |
| Torque (oilfilling) | -- | -- | 1,0 Ncm | 1,0 Ncm | -- |
| Weight for single version only | 15 g | 20 g | 40 g | 70 g | 370 g |
| Weight with transducer | -- | -- | 65 g | 120 g | 400 g |
| Fastening | clamp or central thread or threaded holes | | | | clamp or threaded hole |

General data

| | |
|-------------------------|--|
| Resistance to vibration | 5 - 200 Hz, 10 g |
| Shock resistance | 50 g, 6 ms |
| Lifetime | high life by using a patented helical wiper 10 - 100 Mio. |

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