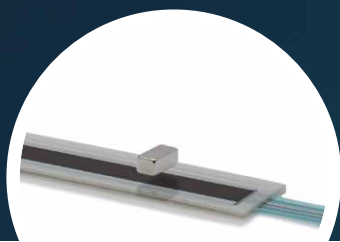
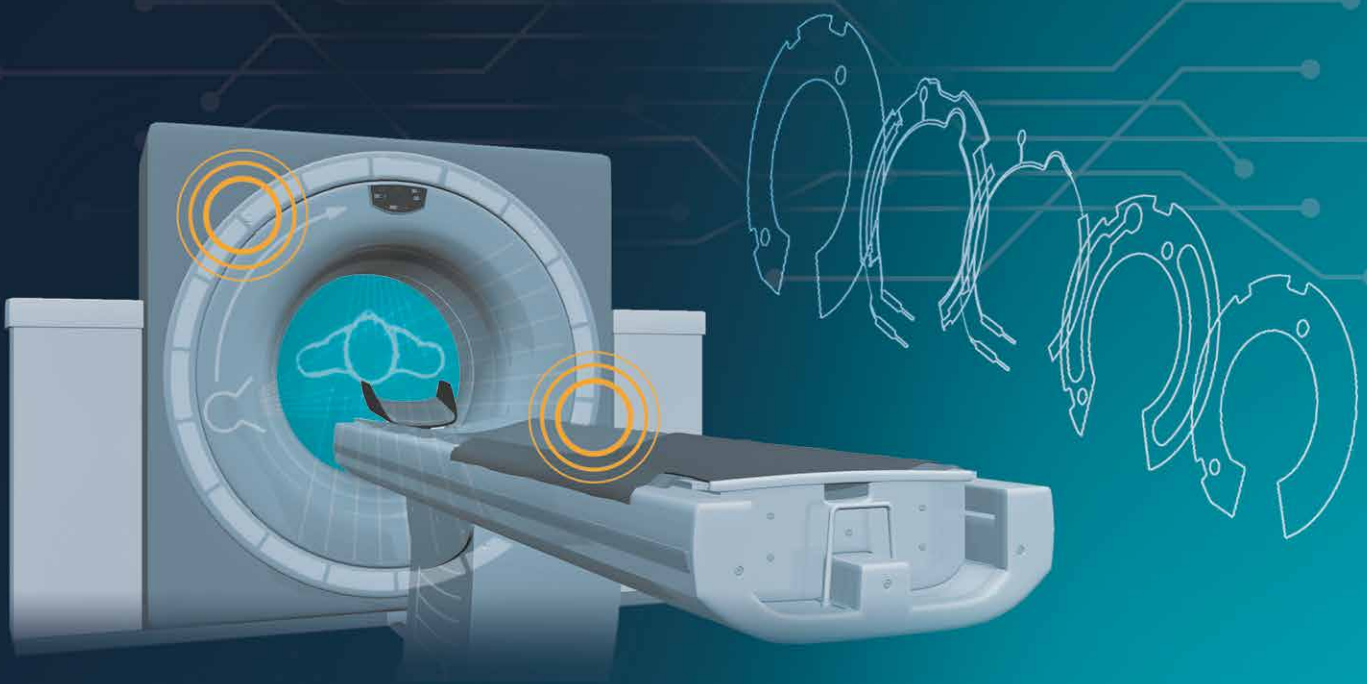


# LINEAR AND ROTARY SENSORS



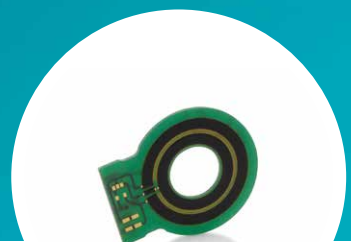
▶ MMP



▶ WPL-OS linear



▶ HWL 60



▶ PE rotary

LEADING IN SENSORS

[metallux.de](http://metallux.de)

# TRUST THE X!

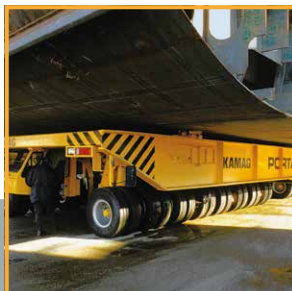


**Rotary and linear sensors for drive- and automation systems, medicine devices, marine or automotive applications.**

To meet your requirements we offer various versions of angular and linear sensors in different technologies. A wide range of electrical stroke lengths or electrical angels as well as mechanical shapes are available. Whether linear, rotary, potentiometric or contactless solutions, with different output signal options, a completed sensor or just the components to be directly integrated in your system, we offer the solution for your benefit.

**ANDREAS OBERASCHER**  
Chairman of the board / CEO

▶ **METALLUX AG** – founded in 1986 and for years now, a leading manufacturer of sensors, membrane sensors, resistors, pressure sensors and industrial joysticks in thick-film technology.



▶ Whether standard or customised solution: Our linear and rotary sensors are used in a wide range of fields, including automotive and medical technology.



POL

Potentiometers  
POL 220, POL 230



POL

Potentiometers  
POL 120, POL 200, POL 200-DA, POL 790



HWL/PGL

Hollow shaft sensors  
HWL 60, PGL 60



WPL

Linear position sensors  
WPL-OS, WPL



PE

Uncased elements/configurable,  
rotary and linear



MTP

MetaPot  
Membrane potentiometers



MTP-LX

MetaPot membrane potentiometers  
with improved linearity



MMP

MetaPot Membrane Potentiometer  
with contact-free magnetic control



POH

Hall sensors  
POH 120, HMS 220



Assembly

Installation instructions for MTP/MMP  
Use of MTP/MMP

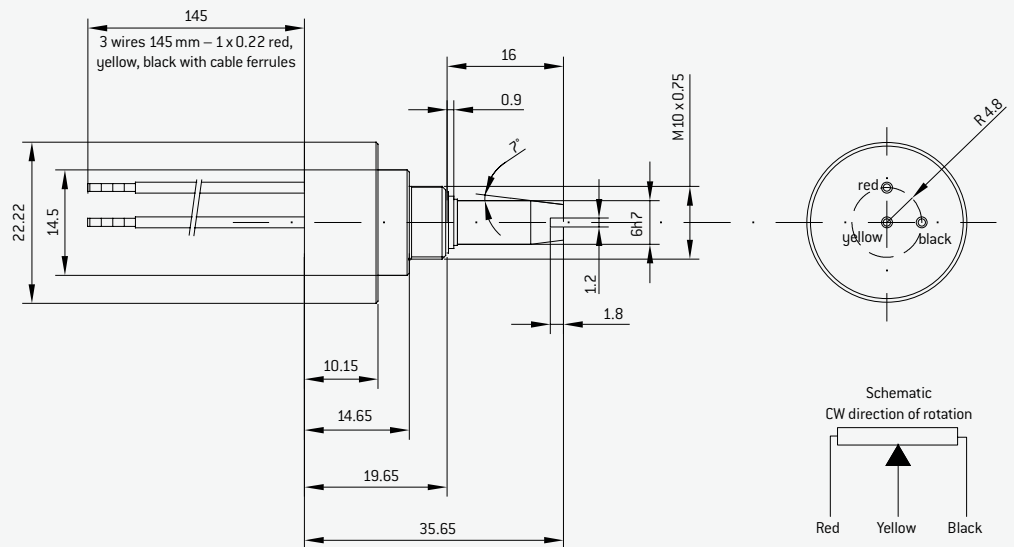


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The Metallux single-turn precision potentiometer POL 220 is housed in robust aluminum housing with slide bearing; the cable or wires of the potentiometer are sealed. The potentiometer shaft is available in diameters of 3 – 6.35 mm. Standard is 6h7. The POL 220 convince with a long lifetime and good linearity.

- Long lifetime
- Good linearity

- Valve controls
- Joysticks
- Steering angle measurement
- Servo systems



## ELECTRICAL SPECIFICATIONS

<b>Resistance range (Rn)</b>	5 kΩ *
<b>Resistance tolerance</b>	± 20 %
<b>Electrical angle</b>	320° *
<b>Independent linearity</b>	± 2 % *
<b>Resolution</b>	Analogue, almost infinite
<b>Maximum wiper current</b>	5 mA in case of malfunction
<b>Typical supply voltage</b>	3 – 30 VDC
<b>Wiper load</b>	> 100 x Rn
<b>Insulation resistance</b>	10 GΩ at 500 VDC
<b>Dielectric strength</b>	1,000 VAC

Mechanical and electrical characteristics are customizable.  
Specifications are subject to change without notice. \* Others on request.

## MECHANICAL SPECIFICATIONS

<b>Lifetime</b>	10 million cycles
<b>Mechanical positioning range</b>	360° continuous rotation
<b>Protection class</b>	IP 65 according to DIN EN 60529
<b>Torque</b>	< 0.3 Ncm
<b>Bearing</b>	Slide bearing

## AMBIENT CONDITIONS

Operating temperature	-25° C – +85° C
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## MATERIAL

<b>Housing</b>	Anodised aluminium
<b>Axis</b>	Stainless steel
<b>Connectors</b>	Cable strand with end sleeves

## SAMPLE ORDER

Part no.	Type series	Resistance range	Elect. measuring range	Elect. connection	Protection class
H060400003	POL 220	5 K	320°	3 x wire	IP 63

# CONDUCTIVE PLASTIC PRECISION POTENTIOMETER POL 230

with ball bearing



The single-turn precision potentiometer with conductive plastic technology and a servo flange features a robust aluminum housing as well as ball bearing to protect it from high mechanical stress. The cable, wire or pin connection is sealed. The axis diameter can be selected from a range of 3 – 6.35 mm. Standard is Ø 3.165 mm. The POL 230 also features a long lifetime and good linearity.

## FEATURES

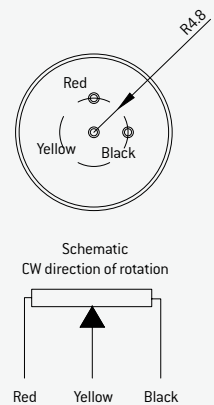
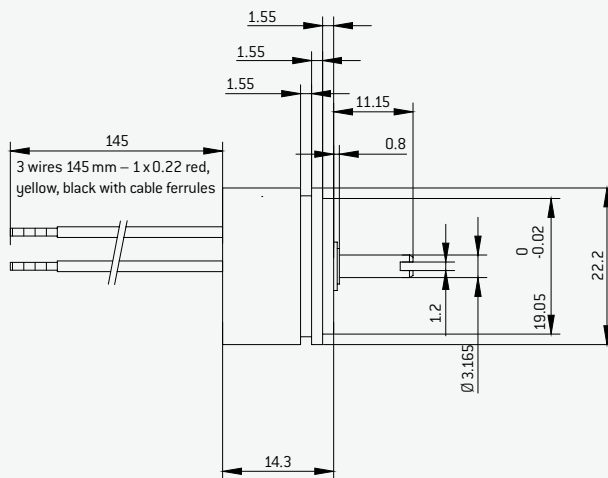
- Long lifetime
- Good linearity

## APPLICATIONS

- High quality measuring systems
- Servo systems
- Drives

## SPECIAL FEATURES:

- 2x ball bearing
- Diameter: 22 mm
- Lifetime: 20 million cycles, redundant versions, special versions possible



## ELECTRICAL SPECIFICATIONS

Resistance range (Rn)	5 kΩ *
Resistance tolerance	± 20 %
Electrical angle	340° *
Independent linearity	± 2 % *
Resolution	Analogue, almost infinite
Maximum wiper current	5 mA in case of malfunction
Typical supply voltage	3 – 30 VDC
Wiper load	> 100 x Rn
Insulation resistance	10 GΩ at 500 VDC
Dielectric strength	1,000 VAC

Mechanical and electrical characteristics are customizable. Specifications are subject to change without notice. \* Others on request.

## MECHANICAL SPECIFICATIONS

Lifetime	20 million cycles
Mechanical positioning range	360° continuous rotation
Protection class	IP 63 according to DIN EN 60529
Torque	< 0.2 Ncm
Bearing	Ball bearing

## AMBIENT CONDITIONS

Operating temperature	-25° C – +85° C
-----------------------	-----------------

## MATERIALS

Housing	Anodised aluminium
Axis	Stainless steel
Connectors	Flex cable with end sleeve

## SAMPLE ORDER

Part no.	Type series	Resistance range	Elect. measuring range	Elect. connection	Protection class
H060423003	POL 230	5 K	340°	3 x wire	IP 63

# CONDUCTIVE PLASTIC POTENTIOMETER POL 120



The Metallux single-turn potentiometer POL 120, with its robust design, is one of the smallest conductive plastic potentiometers (Ø 13 mm) and features a long lifetime, a wire outlet and good linearity. The servo flange makes precision installation possible.

## FEATURES

- Servo flange acc. to international standards
- Long lifetime

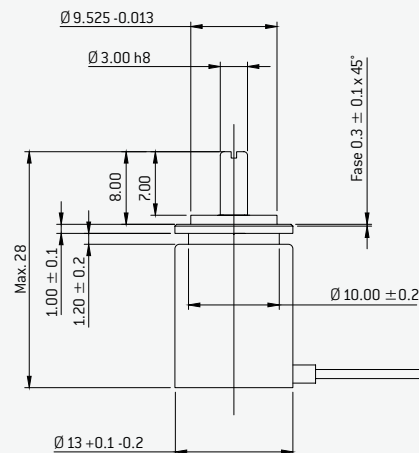
- Good linearity
- Size Ø 13 mm

## APPLICATIONS

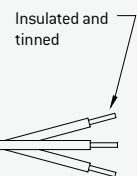
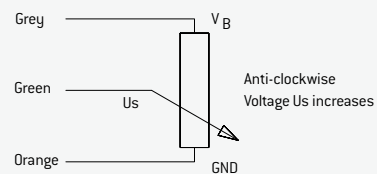
- Valve controls
- Joysticks
- Steering angle measurement
- Servo systems

## SPECIAL FEATURES

- Diameter: 13 mm
- Lifetime: 3 million cycles
- Connection: Cable wires



Potentiometer connector assignments



## ELECTRICAL SPECIFICATIONS

Resistance range (R <sub>n</sub> )	10 kΩ *
Resistance tolerance	± 20 %
Electrical angle	308° *
Independent linearity	± 2.5 %
Resolution	Analogue, almost infinite
Load capacity	0.5 W at 70° C
Maximum wiper current	5 mA in case of malfunction
Typical supply voltage	3 – 30 VDC
Wiper load	> 100 x R <sub>n</sub>
Insulation resistance	10 GΩ at 500 VDC
Dielectric strength	1,000 VAC

Mechanical and electrical characteristics are customizable. Specifications are subject to change without notice. \* Others on request.

## MECHANICAL SPECIFICATIONS

Lifetime	3 million cycles
Mechanical positioning range	Continuous rotation
Protection class	IP 65 according to DIN EN 60529
Torque	< 0.7 Ncm
Bearing	Slide bearing

## AMBIENT CONDITIONS

Operating temperature	-25° C – +85° C
-----------------------	-----------------

## MATERIAL

Housing	Brass (nickel plated)
Axis	Stainless steel
Connectors	Tinned cable wires

## SAMPLE ORDER

Part no.	Type series	Resistance range	Elect. measuring range	Elect. connection	Protection class
E050200016	POL 120	10 K	308°	3 x wire	IP 65

# CONDUCTIVE PLASTIC POTENTIOMETER POL 200



The special features of this single-turn potentiometer include plastic housing with injected metal thread and integrated slide bearing. The materials of axis and bearing are chosen to ensure a long lifetime.

## FEATURES

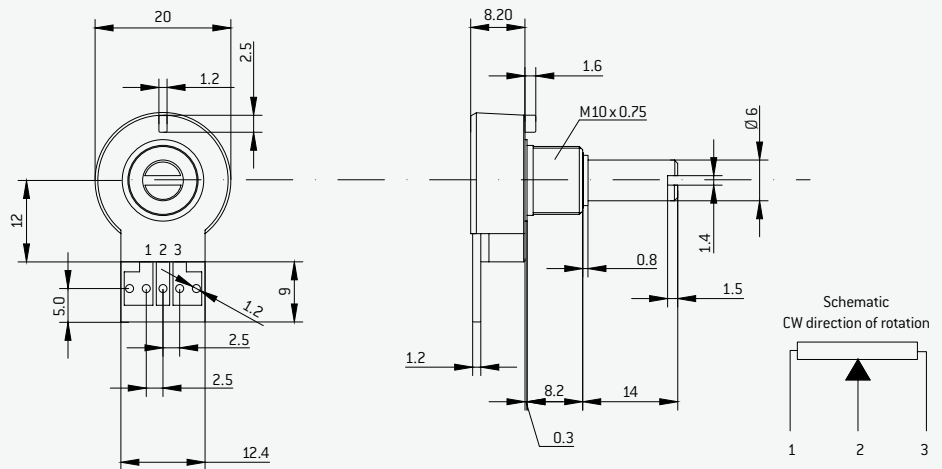
- Long lifetime
- Good linearity

## APPLICATIONS

- Valve controls
- Joysticks

## SPECIAL FEATURES

- Diameter: 20 mm
- Lifetime: 1 million cycles



## ELECTRICAL SPECIFICATIONS

<b>Resistance range (Rn)</b>	10 kΩ *
<b>Resistance tolerance</b>	± 20 %
<b>Electrical angle</b>	320° *
<b>Independent linearity</b>	± 2 % *
<b>Resolution</b>	Analogue, almost infinite
<b>Maximum wiper current</b>	5 mA in case of malfunction
<b>Typical supply voltage</b>	3 – 30 VDC
<b>Wiper load</b>	> 100 x Rn
<b>Insulation resistance</b>	10 GΩ at 500 VDC
<b>Dielectric strength</b>	1,000 VAC

Mechanical and electrical characteristics are customizable. Specifications are subject to change without notice. \* Others on request.

## MECHANICAL SPECIFICATIONS

<b>Lifetime</b>	1 million cycles
<b>Mechanical positioning range</b>	Continuous rotation
<b>Protection class</b>	IP 50 according to DIN EN 60529
<b>Torque</b>	< 0.7 Ncm
<b>Bearing</b>	Slide bearing

## AMBIENT CONDITIONS

<b>Operating temperature</b>	-25° C – +85° C
------------------------------	-----------------

## MATERIAL

<b>Housing</b>	Thermoplastic
<b>Axis</b>	Nickel-plated brass
<b>Connectors</b>	Gold-plated solder pads

## SAMPLE ORDER

Part no.	Type series	Resistance range	Elect. measuring range	Elect. connection	Protection class
H060420000	POL 200	10 K	320°	Solder pad	IP 50

# CONDUCTIVE PLASTIC POTENTIOMETER POL 200-DA

//////////////////// (continuous axis)

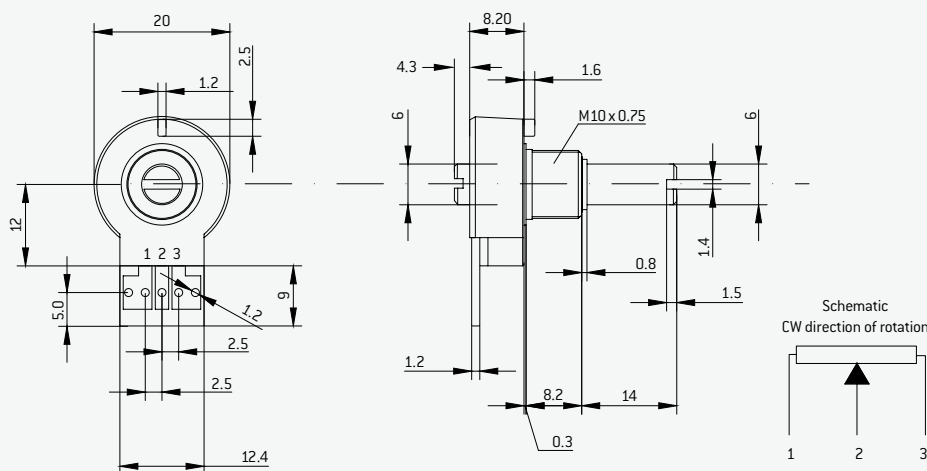


The special features of this single-turn potentiometer include plastic housing with injected metal thread and integrated slide bearing and continuous axis. The materials of axis and bearing are chosen to ensure a long lifetime.

- Long lifetime
- Good linearity

- Valve controls
- Joysticks

- Diameter: 20 mm
- Lifetime: 1 million cycles
- Option: Cable with plug



## ELECTRICAL SPECIFICATIONS

<b>Resistance range (Rn)</b>	10 kΩ *
<b>Resistance tolerance</b>	± 20 %
<b>Electrical angle</b>	320° *
<b>Independent linearity</b>	± 2 % *
<b>Resolution</b>	Analogue, almost infinite
<b>Maximum wiper current</b>	5 mA in case of malfunction
<b>Typical supply voltage</b>	3 – 30 VDC
<b>Wiper load</b>	> 100 x Rn
<b>Insulation resistance</b>	10 GΩ at 500 VDC
<b>Dielectric strength</b>	1,000 VAC

Mechanical and electrical characteristics are customizable.  
Specifications are subject to change without notice. \* Others on request.

## MECHANICAL SPECIFICATIONS

<b>Lifetime</b>	1 million cycles
<b>Mechanical positioning range</b>	Continuous rotation
<b>Protection class</b>	IP 50 according to DIN EN 60529
<b>Torque</b>	< 0.7 Ncm
<b>Bearing</b>	Slide bearing

## AMBIENT CONDITIONS

Operating temperature	-25° C – +85° C
-----------------------	-----------------

## MATERIAL

<b>Housing</b>	Thermoplastic
<b>Axis</b>	Nickel-plated brass
<b>Connectors</b>	Gold-plated solder pads

## SAMPLE ORDER

Type series	Resistance range	Elect. measuring range	Elect. connection	Protection class
POL 200	10 K	320*	Solder pad	IP 50

# CONDUCTIVE PLASTIC POTENTIOMETER POL 790



The Metallux conductive plastic precision potentiometer POL 790 is extremely robust and features excellent linearity, outstanding resolution and repeatability. The POL 790 is also available with plastic housing.

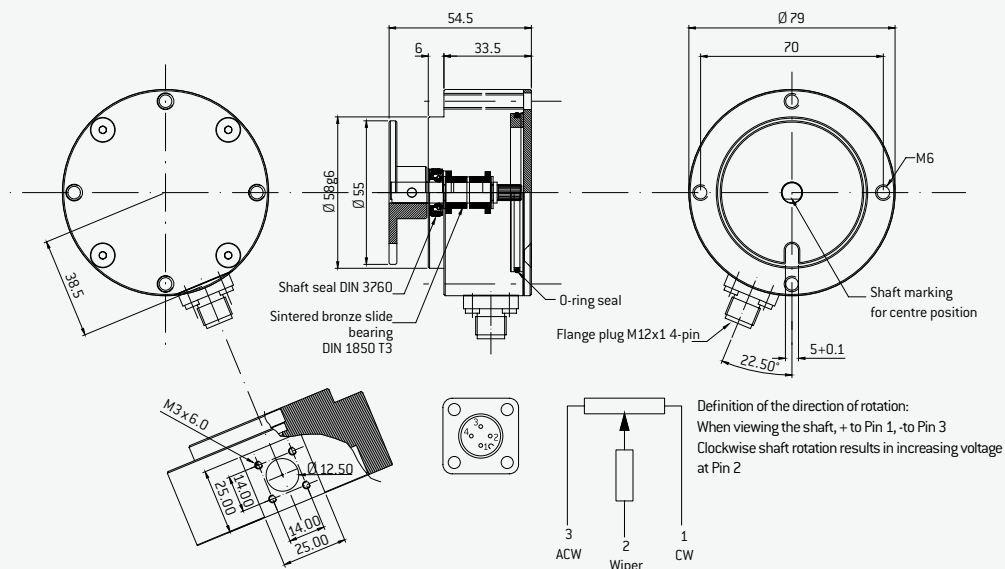
## FEATURES

- Extremely robust
- Extremely good linearity

- Excellent resolution and repeatability

## APPLICATIONS

- Steering angle measurement on special vehicles
- Axis position sensing in robotics
- Servo systems



## ELECTRICAL SPECIFICATIONS

Resistance range [Rn]	5 kΩ *
Resistance tolerance	± 20 %
Electrical angle	350° *
Independent linearity	± 2 % *
Maximum wiper current	5 mA in case of malfunction
Typical supply voltage	3 – 30 VDC
Wiper load	> 100 x Rn
Insulation resistance	10 GΩ at 500 VDC
Dielectric strength	1,000 VAC

Mechanical and electrical characteristics are customizable. Specifications are subject to change without notice. \* Others on request.

## MECHANICAL SPECIFICATIONS

Lifetime	10 million cycles
Mechanical positioning range	360° continuous rotation
Protection class	IP 67 according to DIN EN 60529
Bearing	2 fold sinterbronze friction bearing DIN 1850
Shaft diameter	8 mm

## AMBIENT CONDITIONS

Operating temperature	-25° C – +85° C
-----------------------	-----------------

## MATERIALS

Housing	Anodised aluminium
Axis	Stainless steel
Electrical connectors	Plug connector type M12 x 1, 4-pole

## SAMPLE ORDER

Part no.	Type series	Resistance range	Elect. measuring range	Elect. connection	Protection class
E050200416	POL 790	5 K	350°	Flange connector M12x1	IP 67

# CONDUCTIVE PLASTIC, HOLLOW SHAFT POTENTIOMETER HWL 60



The Metallux hollow shaft potentiometer with conductive plastic technology features a long lifetime, a simple design and customised connectors.

## FEATURES

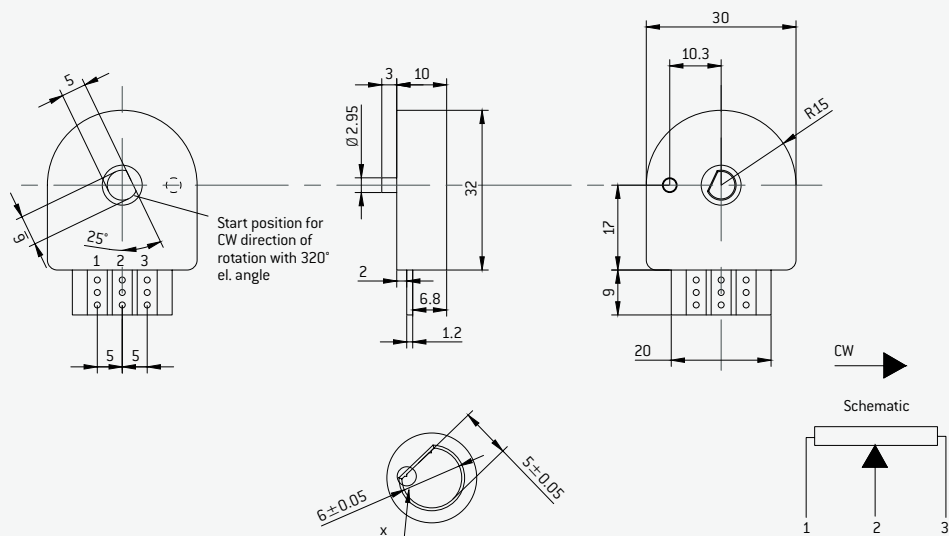
- Customised connectors
- Long lifetime

## APPLICATIONS

- Flap positioning
- Valve controls
- Joysticks
- Steering angle measurement

## SPECIAL FEATURES

- Redundancy possible
- Lifetime: 3 million cycles
- Special versions possible



## ELECTRICAL SPECIFICATIONS

<b>Resistance range (Rn)</b>	10 kΩ *
<b>Resistance tolerance</b>	± 20 %
<b>Electrical angle</b>	320° *
<b>Independent linearity</b>	± 2 % *
<b>Resolution</b>	Almost infinite
<b>Maximum wiper current</b>	5 mA in case of malfunction
<b>Typical supply voltage</b>	3 – 30 VDC
<b>Wiper load</b>	> 100 x Rn
<b>Insulation resistance</b>	10 GΩ at 500 VDC
<b>Dielectric strength</b>	1,000 VAC

Mechanical and electrical characteristics are customizable. Specifications are subject to change without notice. \* Others on request.

## MECHANICAL SPECIFICATIONS

<b>Lifetime</b>	3 million cycles
<b>Mechanical positioning range</b>	Continuous rotation
<b>Protection class</b>	IP 50 according to DIN EN 60529
<b>Torque</b>	< 0.7 Ncm
<b>Bearing</b>	Floating
<b>Geometry of the bore</b>	D-profile, Ø 6, form-locking

## AMBIENT CONDITIONS

<b>Operating temperature</b>	-25° C – +85° C
------------------------------	-----------------

## MATERIAL

<b>Housing</b>	Thermoplastic
<b>Connectors</b>	Gold-plated solder pads

## SAMPLE ORDER

Part no.	Type series	Resistance range	Elect. measuring range	Elect. connection	Protection class
H060360013	HWL 60	10 K	320°	Solder pads	IP 50

# CONDUCTIVE PLASTIC HOLLOW SHAFT SENSOR PGL 60



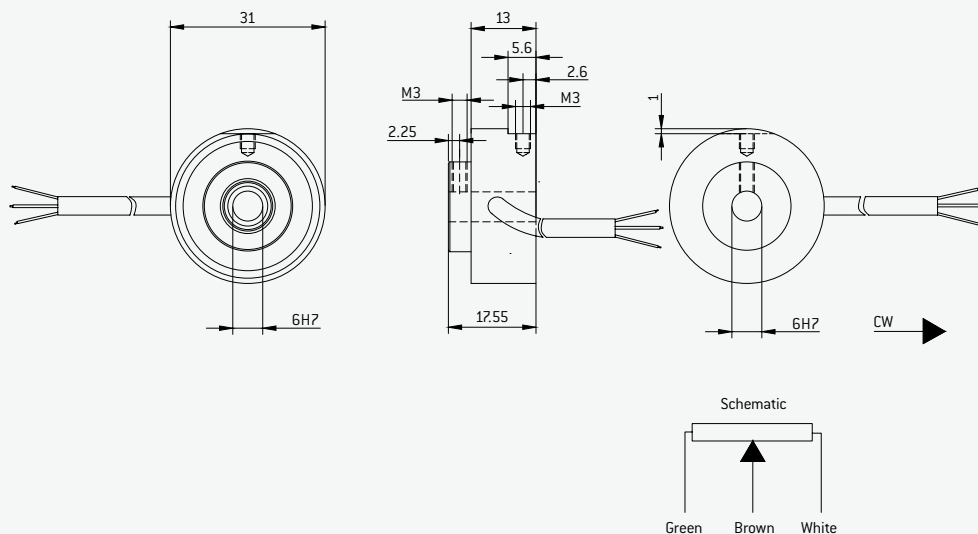
Extremely robust, with good linearity, excellent resolution and repeatability: These are the defining characteristics of the Metallux conductive plastic hollow shaft precision potentiometer PGL 60.

## FEATURES

- Hollow shaft
- Extremely robust
- Extremely good linearity
- Excellent resolution and repeatability
- Ball bearing

## APPLICATIONS

- Steering angle measurement on special vehicles
- Axis position sensing in robotics
- Servo systems



## ELECTRICAL SPECIFICATIONS

<b>Resistance range (R<sub>n</sub>)</b>	10 kΩ *
<b>Resistance tolerance</b>	± 20 %
<b>Electrical angle</b>	320° *
<b>Independent linearity</b>	± 2 %
<b>Resolution</b>	Analogue, almost infinite
<b>Maximum wiper current</b>	5 mA in case of malfunction
<b>Typical supply voltage</b>	3 – 30 VDC
<b>Wiper load</b>	> 100 x R <sub>n</sub>
<b>Insulation resistance</b>	10 GΩ at 500 VDC
<b>Dielectric strength</b>	1,000 VAC

Mechanical and electrical characteristics are customizable.  
Specifications are subject to change without notice. \* Others on request.

## MECHANICAL SPECIFICATIONS

<b>Lifetime</b>	25 million cycles
<b>Mechanical positioning range</b>	360° continuous rotation
<b>Protection class</b>	IP 63 according to DIN EN 60529
<b>Bearing</b>	Ball bearing

## AMBIENT CONDITIONS

<b>Operating temperature</b>	-25° C – +85° C
------------------------------	-----------------

## MATERIAL

<b>Housing</b>	Anodised aluminium
<b>Electrical connectors</b>	Cable 1 m stripped and tinned

## SAMPLE ORDER

Part no.	Type series	Resistance range	Elect. measuring range	Elect. connection	Protection class
H060502320	PGL 60	10 K	320° *	Cable connection	IP 63

# POTENTIOMETRIC CONDUCTIVE PLASTIC LINEAR POSITION SENSOR

## WPL-OS (without push rod)



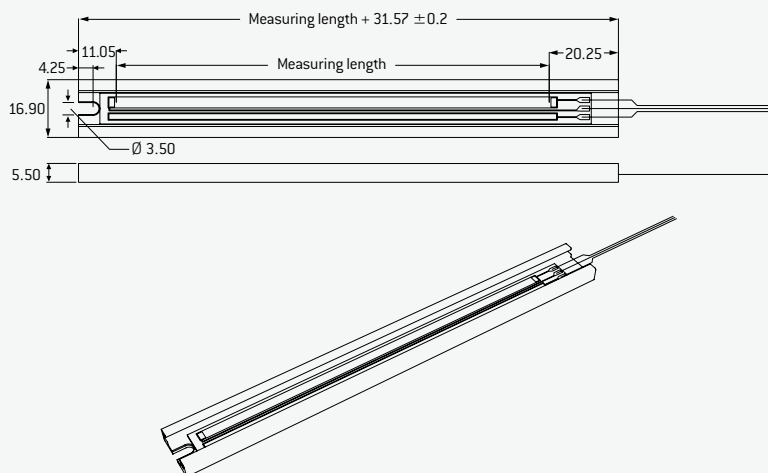
Our Metallux linear position sensor WPL-OS without push rod and using conductive plastic technology offers a wide range of integration possibilities as well as an easy installation. The electrical measuring range runs from 30 mm to 300 mm depending on requirements. With linearisation, it is possible to achieve a linearity of up to  $\pm 0.25\%$ .

### FEATURES

- Wide range of possibilities for integration
- Easy installation

### APPLICATIONS

- Medical technology
- Cylinder stroke measurement
- Flap control
- Valve control



### ELEKTRISCHE DATEN

<b>Resistance range (Rn)</b>	5 k $\Omega$ /100mm *
<b>Resistance tolerance</b>	$\pm 20\%$
<b>Electrical stroke</b>	30 – 300mm *
<b>Independent linearity</b>	$\pm 2\%$ untrimmed $\pm 0.25\%$ trimmed (Option) *
<b>Resolution</b>	Analogue, almost infinite
<b>Maximum wiper current</b>	5 mA in case of malfunction
<b>Typical supply voltage</b>	3 – 30 VDC
<b>Wiper load</b>	> 100 x Rn
<b>Insulation resistance</b>	10 G $\Omega$ at 500 VDC
<b>Dielectric strength</b>	700 VAC

### MECHANICAL SPECIFICATIONS

**Lifetime** 10 million cycles

### AMBIENT CONDITIONS

**Operating temperature** -25° C – 85° C

### MATERIALS

**Guidance** Anodised aluminium

**Connectors** Flat litz wire (3x) \*

Mechanical and electrical characteristics are customizable. Specifications are subject to change without notice. \* Others on request.

### SAMPLE ORDER

Part no.	Type series	Resistance range	Elect. measuring range	Elect. connection
E050245727	WPL-OS	5 K	105 mm	3 x wire

# POTENTIOMETRIC CONDUCTIVE PLASTIC LINEAR POSITION SENSOR WPL



As an absolute linear position sensor with robust design and a 3 or 4 mm push rod, the Metallux linear position sensor features conductive plastic technology, a long lifetime and easy installation. The mechanical coupling is by threaded connectors. The measuring range is from 25 mm to 300 mm. Customised versions according to customer specific requirements can be offered.

## FEATURES

- Long lifetime
- Easy mounting

## APPLICATIONS

- Displacement probes
- Cylinder stroke measurement
- Foot pedal position
- Valve control



## ELECTRICAL SPECIFICATIONS

<b>Resistance range (Rn)</b>	1 k $\Omega$ /10 mm *
<b>Resistance tolerance</b>	$\pm$ 20 %
<b>Electrical stroke</b>	25 – 300 mm *
<b>Independent linearity</b>	$\pm$ 2 %
<b>Resolution</b>	Analogue, almost infinite
<b>Maximum wiper current</b>	5 mA in case of malfunction
<b>Typical supply voltage</b>	3 – 30 VDC
<b>Wiper load</b>	> 100 x Rn
<b>Insulation resistance</b>	10 G $\Omega$ at 500 VDC
<b>Dielectric strength</b>	700 VAC

Mechanical and electrical characteristics are customizable.  
Specifications are subject to change without notice. \* Others on request.

## MECHANICAL SPECIFICATIONS

<b>Lifetime</b>	5 million cycles
<b>Protection class</b>	IP 63 according to DIN EN 60529
<b>Adjustable force</b>	2 – 8 N spring force < 0.5 N without spring

## AMBIENT CONDITIONS

<b>Operating temperature</b>	-25° C – +65° C
------------------------------	-----------------

## MATERIALS

<b>Housing</b>	Aluminium
<b>Push rod</b>	Stainless steel
<b>1 m connectors</b>	Flexible cable 3 x 0.14 mm <sup>2</sup>

## CUSTOMIZED ORDER

See table on page WPL [2]

# POTENTIOMETRIC CONDUCTIVE PLASTIC LINEAR POSITION SENSOR

## WPL (2)



The potentiometric conductive plastic position sensor WPL is available in different designs. Customized modifications can be realized at any time.

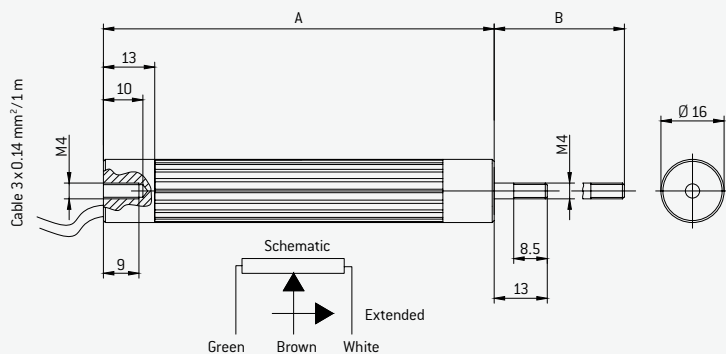
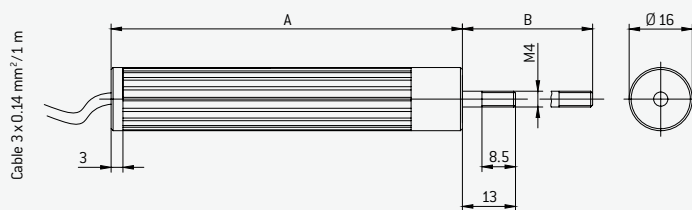
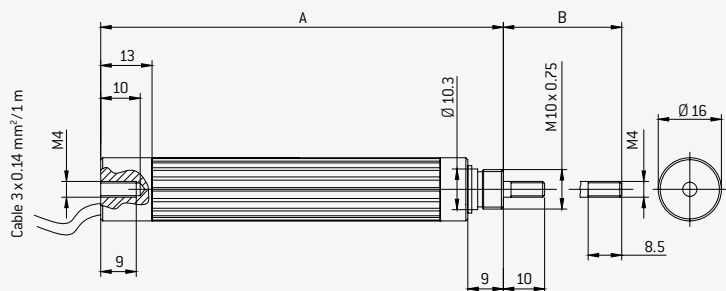
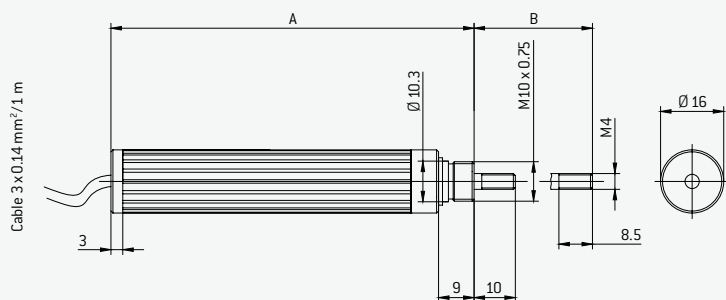
On request available with return spring for all versions.

WPL-LH-SEZ-XXX							
	25	50	75	100	150	250	300
El. stroke [mm]	25	50	75	100	150	250	300
Mech. stroke [mm]	26	51	76	101	151	251	301
Dim. A [mm]	67	92	117	142	192	292	342
Dim. B [mm]	36	61	86	111	161	261	311
Resistance ± 20 % (kOhm)	10	10	10	10	10	17	21

WPL-LH-SGZ-XXX							
	25	50	75	100	150	250	300
El. stroke [mm]	25	50	75	100	150	250	300
Mech. stroke [mm]	26	51	76	101	151	251	301
Dim. A [mm]	77	102	127	152	202	302	352
Dim. B [mm]	36	61	86	111	161	261	311
Resistance ± 20 % (kOhm)	10	10	10	10	10	17	21

WPL-LH-SE-XXX							
	25	50	75	100	150	250	300
El. stroke [mm]	25	50	75	100	150	250	300
Mech. stroke [mm]	26	51	76	101	151	251	301
Dim. A [mm]	64	89	114	139	189	289	339
Dim. B [mm]	39	64	89	114	164	264	314
Resistance ± 20 % (kOhm)	10	10	10	10	10	17	21

WPL-LH-SG-XXX							
	25	50	75	100	150	250	300
El. stroke [mm]	25	50	75	100	150	250	300
Mech. stroke [mm]	26	51	76	101	151	251	301
Dim. A [mm]	74	99	124	149	199	299	349
Dim. B [mm]	39	64	89	114	164	264	314
Resistance ± 20 % (kOhm)	10	10	10	10	10	17	21



# POTENTIOMETER ELEMENT FOR ROTARY POSITION SENSING



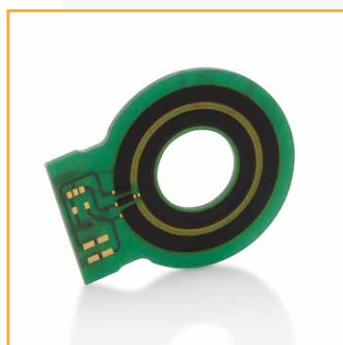
These Metallux potentiometer elements for rotary position sensing feature customised designs, efficient integration in existing installation spaces and a long lifetime. Linearisation with accuracy of up to  $\pm 0.25\%$  is possible.

## FEATURES

- Customised designs
- Different substrate materials available

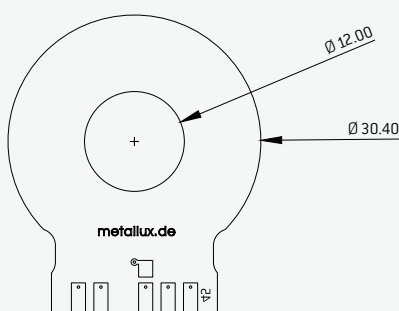
## APPLICATIONS

- Rotary position sensing
- Automotive
- Industrial applications
- Aerospace

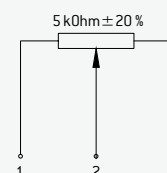
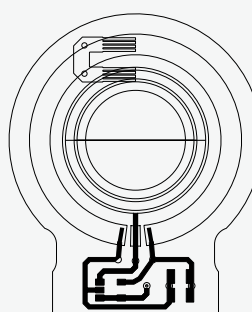


\*\* showcase sample

View of the front



View of the back



## ELECTRICAL SPECIFICATIONS

Resistance range (Rn)	5 kΩ *
Resistance tolerance	$\pm 20\%$
Electrical angle	0° – 355° *
Independent linearity	$\pm 2\%$ *, $\pm 0.25\%$ optional
Resolution	Analogue, almost infinite
Maximum wiper current	5 mA in case of malfunction
Typical supply voltage	3 – 30 VDC
Wiper load	> 100 x Rn

## MECHANICAL SPECIFICATIONS

Lifetime	Up to 50 million cycles
Wiper	Metallux PC Board system with bimetal wiper

## AMBIENT CONDITIONS

Operating temperature	-40° C – +125° on FR4-carrier
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## MATERIALS

Substrates	FR4, FR5, Polymer, Ceramic, Polyimid
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Mechanical and electrical characteristics are customizable. Specifications are subject to change without notice. \* Others on request.

## SAMPLE ORDER

Part no.	Type series	Elect. measuring range	Elect. connection
E040200216	Potentiometer element, rotary	350°	Solder pads, cable optional
H903560002	Slider 2		

# POTENTIOMETER ELEMENT FOR LINEAR POSITION SENSING



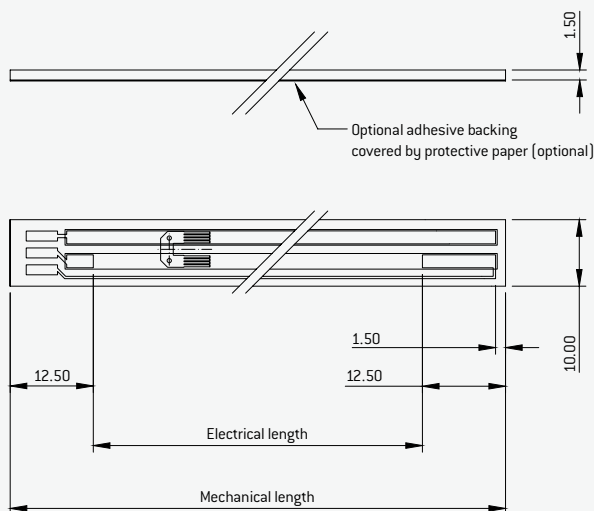
Our Metallux potentiometer elements are ideal for position sensing. We custom manufacture these elements according to the customer's specific requirements. They are also easy to integrate into existing installation spaces and feature an extremely long lifetime. Linearisation with accuracy of up to  $\pm 0.25\%$  is possible.

## FEATURES

- Customised designs
- Different substrate materials available

## APPLICATIONS

- Rotary position sensing
- Automotive
- Industrial applications
- Aerospace



## ELECTRICAL SPECIFICATIONS

<b>Resistance range (R<sub>n</sub>)</b>	5 kΩ * / 10 kΩ *
<b>Resistance tolerance</b>	± 20 %
<b>Electrical positioning range</b>	20 – 500 mm
<b>Independent linearity</b>	± 2 % untrimmed ± 0.25 % trimmed (Option)
<b>Resolution</b>	Analogue, almost infinite
<b>Maximum wiper current</b>	5 mA in case of malfunction
<b>Typical supply voltage</b>	3 – 30 VDC
<b>Wiper load</b>	> 100 x R <sub>n</sub>

## MECHANICAL SPECIFICATIONS

<b>Lifetime</b>	Up to 50 million cycles
<b>Wiper</b>	Metallux PC Board system with bimetal wiper

## AMBIENT CONDITIONS

FR4, polymer, ceramic	-40° C – +125° C on FR4-carrier
-----------------------	---------------------------------

## MATERIAL

<b>Substrates</b>	FR4, FR5, Polymer, Ceramic, Polyimid
-------------------	--------------------------------------

Mechanical and electrical characteristics are customizable. Specifications are subject to change without notice. \* Others on request.

## SAMPLE ORDER

Part no.	Type series	Resistance range	Elect. measuring range	Elect. connection
E040200100	Potentiometer element, linear	10 kΩ	100 mm	Solder pads
H903560002	Slider 2			

# METAPOT LINEAR MEMBRANE SENSOR MTP-L



The linear membrane sensors are well suited for precision position sensing applications in a variety of industries. The MTP-L membrane sensors are non-wearing, easy to install and offer wide possibilities for integration, as well as an IP65 protection class.

## FEATURES

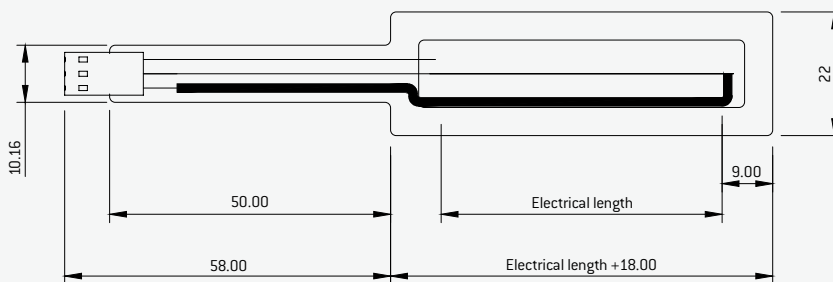
- Wide range of possibilities for integration
- Simple mounting

## FEATURES

- Electrical measuring range of 30 – 500 mm
- Very flat

## APPLICATIONS

- Medical technology
- Cylinder stroke measurement
- Flap control
- Valve control
- Accu driven devices



Spring loaded pin (optional)

Adhesive covered by protective paper (optional)

## ELECTRICAL SPECIFICATIONS

<b>Resistance range (Rn)</b>	2.5 k $\Omega$ /100 mm distance
<b>Resistance tolerance</b>	$\pm 30\%$
<b>Electrical distance</b>	30 – 500 mm
<b>Independent linearity</b>	$\pm 2\%$ **
<b>Resolution</b>	< 0.05 mm **
<b>Maximum wiper current</b>	5 mA in case of malfunction
<b>Typical supply voltage</b>	3 – 30 VDC
<b>Wiper load</b>	> 100 x Rn
<b>Spring loaded pin</b>	Mechanical wiper pin as M6 threaded part with spring-loaded ball

Mechanical and electrical characteristics are customizable. Specifications are subject to change without notice. \* Others on request. \*\* Specifications may deviate according to temperature and installation conditions.

## MECHANICAL SPECIFICATIONS

<b>Lifetime</b>	> 5 million cycles **
<b>Travel speed</b>	0.1 m/sec. **
<b>Max. sensor thickness</b>	0.5 mm
<b>Actuation force</b>	1 – 3 N **
<b>Wiper</b>	See mounting recommendation for MTP

## AMBIENT CONDITIONS

<b>Operating temperature</b>	-25° C – +85° C **
<b>Protection class</b>	IP 65 according to DIN EN 60529, electrical connection and plug excluded

## MATERIALS

<b>Substrates</b>	PET polyester film, FR4
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## ELECTRICAL CONNECTION

Female crimp contacts, Crimpflex solder pads\* (Poka Yoke)

## SAMPLE ORDER

Part no.	Type series	Resistance range	Elect. measuring range	Elect. connection
E080200099	MTP	2.5 K	100 mm	Female crimp contacts
H959000000	Spring loaded pin			

# METAPOT ROTARY MEMBRANE SENSOR MTP-R



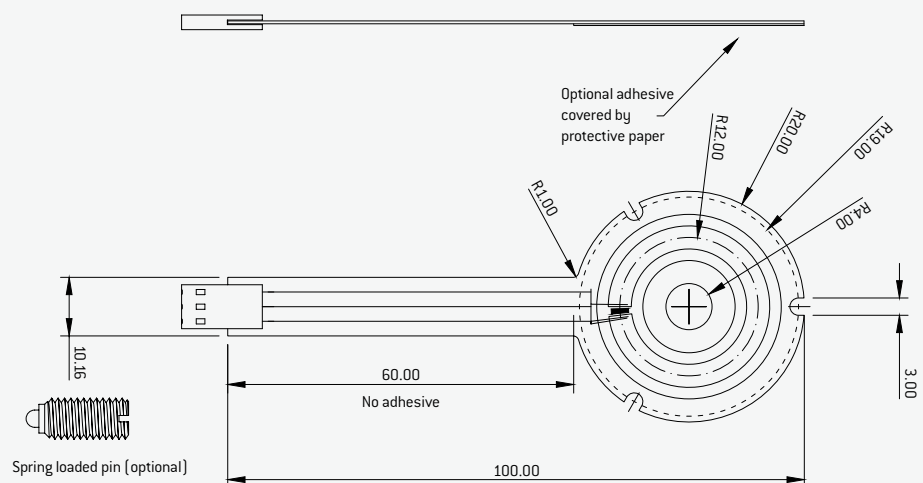
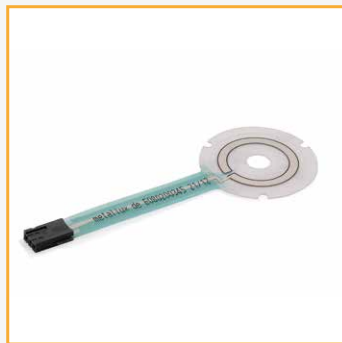
MetaPot membrane sensors are flat, non-wearing and with an IP65 protection class, offer a favourably priced alternative to other sensor systems. The rotary membrane sensors are ideal for use in precision positioning applications in many applications.

## FEATURES

- Extremely flat
- IP 65
- Optional: Adhesive backing
- Long lifetime

## APPLICATIONS

- Rotary position sensing
- Servo systems
- Industrial applications
- Automotive
- Accu driven devices



## ELECTRICAL SPECIFICATIONS

<b>Resistance range (Rn)</b>	2.5 k $\Omega$ /25 mm perimeter
<b>Resistance tolerance</b>	$\pm 30\%$
<b>Electrical angle</b>	25° – 345°
<b>Independent linearity</b>	$\pm 2\%$ **
<b>Resolution</b>	< 0.05 mm perimeter **
<b>Maximum wiper current</b>	5 mA in case of malfunction
<b>Typical supply voltage</b>	3 – 30 VDC
<b>Wiper load</b>	> 100 x Rn
<b>Spring loaded pin</b>	Mechanical wiper pin as M6 threaded part with spring-loaded ball

Mechanical and electrical characteristics are customizable. Specifications are subject to change without notice. \* Others on request. \*\* Specifications may deviate according to temperature and installation conditions.

## MECHANICAL SPECIFICATIONS

<b>Lifetime</b>	> 5 million cycles **
<b>Max. travel speed</b>	0.1 m/sec. **
<b>Sensor thickness</b>	0.5 mm
<b>Actuation force</b>	1 – 3 N **
<b>Wiper</b>	See mounting recommendation for MTP

## AMBIENT CONDITIONS

<b>Operating temperature</b>	-25° C – +85° C **
<b>Protection class</b>	IP65 according to DIN EN 60529, electrical connection and plug excluded

## MATERIALS

<b>Substrates</b>	PET polyester film, FR4
<b>Electrical connectors</b>	Female crimp contacts, Crimpflex solder tabs * (Poka Yoke)

## SAMPLE ORDER

Part no.	Type series	Resistance range	Elect. measuring range	Elect. connection
E080200345	MTP-R	2.5 K	345° *	Female crimp contacts
H959000000	Spring loaded pin			

# MEMBRANE SENSOR MTP-LX



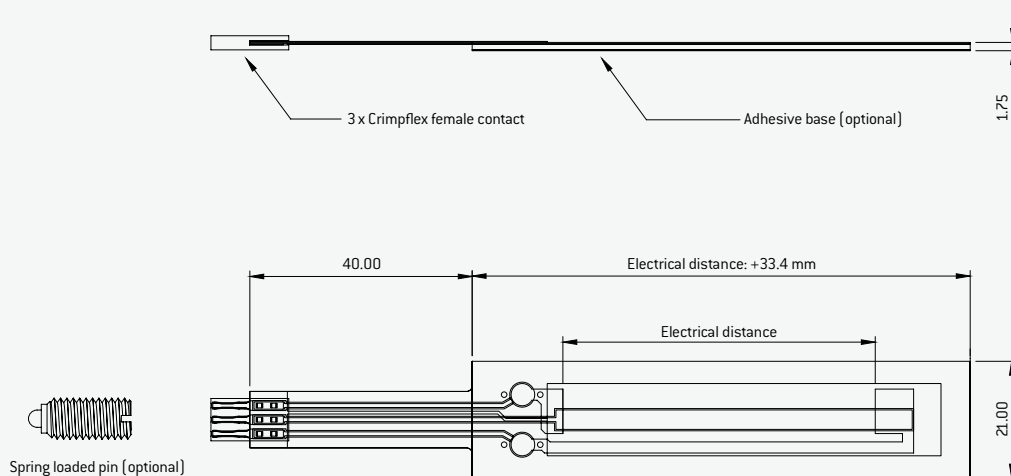
Together with the long lifetime, special features of the Metallux MTP-LX membrane sensors include excellent linearity of up to  $< \pm 0.3\%$  and temperature resistance up to  $105^\circ\text{C}$ . They are very robust, feature a flat shape and also offer resistance to dust, soiling and liquids.

## FEATURES

- Protection class IP 67
- Resistant to dust, soiling and liquids

## APPLICATIONS

- Mirror systems
- Adjustment systems in car and truck seats
- Controls for car windows and roofs
- Medical technology
- Solar panel positioning
- Robotic systems
- Accu driven devices



## ELECTRICAL SPECIFICATIONS

**Resistance range (Rn)** 4 k $\Omega$ /100 mm distance \*

**Independent linearity** Up to  $< \pm 0.3\%$  \*\*

## MECHANICAL SPECIFICATIONS

**Electrical distance** 50 – 500 mm in gradation of 50 mm

**Element length** 90 – 550 mm

**Spring loaded pin (accessories)** Mechanical wiper pin as M6 threaded part with spring-loaded ball

**Spring loaded pin contact force**  $2 \pm 1\text{ N}$  \*

**Typical supply voltage** 5 VDC

Mechanical and electrical characteristics are customizable. Specifications are subject to change without notice. \* Others on request. \*\* Specifications may deviate according to temperature and installation conditions.

## OPERATIONAL CONDITIONS

**Temperature range** Standard:  $-25^\circ\text{C} - +105^\circ\text{C}$ ,  $-40^\circ\text{C} - +125^\circ\text{C}$  with limited performance specifications

**Operational humidity** 0 – 95 % R.H.

**Vibration acc. to DIN IEC 68T2-6** 5 – 2,000 Hz

**Shock acc. to DIN IEC 68T2-27** 50 g, 11 ms

**Lifetime**  $25 \times 10^6$  cycles

**Travel speed** 1.0 m/sec.

**Protection class acc. to DIN EN 60529** IP 67 according to DIN EN 60529, electrical connection and plug excluded

**Options for fastening** Optional adhesive film on back

## ELECTRICAL CONNECTION

Female crimp contacts, Crimpflex solder pads \* (Poka Yoke)

## SAMPLE ORDER

Part no.	Type series	Resistance range	Elect. measuring range	Elect. connection
E080400100	MTP-LX	4 k $\Omega$ *	100 mm	Female crimp contacts
H959000000	Spring loaded pin			

# CONTACTLESS LINEAR MEMBRANE SENSOR MMP



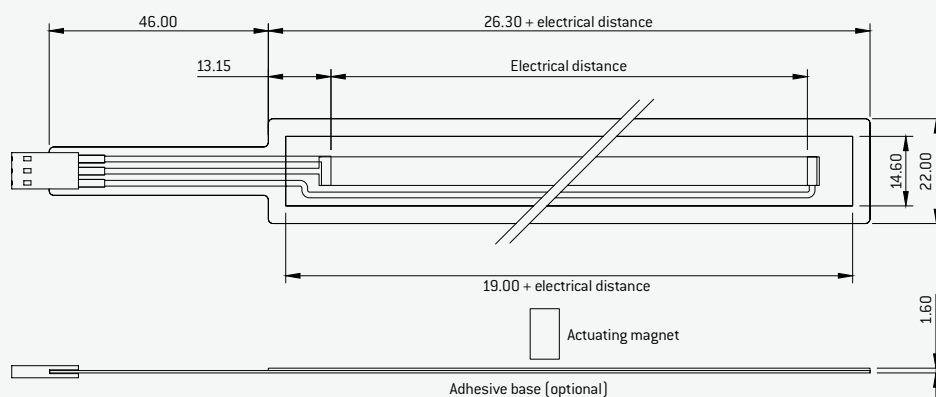
The technology of the MMP series is based on the MTP series. The linear, contactless Metallux membrane sensors can be used for position sensing in a wide range of applications. The contactless measurement is performed by means of a layer of metal foil integrated in the sensor and a magnet positioned at a set distance from the sensor.

## FEATURES

- Contactless magnetic coupling
- Flat design
- IP 65, electrical connection and plug excluded
- Long lifetime

## APPLICATIONS

- Linear position sensing, for instance in cylinders
- Servo systems
- Industrial applications



## ELECTRICAL SPECIFICATIONS

<b>Resistance range (Rn)</b>	2.5 kΩ/100 mm distance
<b>Resistance tolerance</b>	± 30 %
<b>Electrical distance</b>	50 – 500 mm
<b>Independent linearity</b>	± 2 % **
<b>Resolution</b>	< 0.1mm **
<b>Load resistance</b>	> 100* Rn
<b>Max. load current in case of fault</b>	5 mA
<b>Typical supply voltage</b>	5 VDC

Mechanical and electrical characteristics are customizable. Specifications are subject to change without notice. \* Others on request. \*\* Specifications may deviate according to temperature and installation conditions.

## MECHANICAL SPECIFICATIONS

<b>Lifetime</b>	50 million cycles
<b>Travel speed</b>	≤ 3 m/sec. *
<b>Cable connection</b>	L: 46 mm; W: 10.16 mm
<b>Max. measuring distance from magnet to sensor</b>	2 mm
<b>Type of mount</b>	Adhesive film

## AMBIENT CONDITIONS

<b>Operating temperature</b>	-10° C – +70° C **
<b>Protection class</b>	IP 65 according to DIN EN 60529, electrical connection and plug excluded

## MATERIALS

<b>Substrates</b>	PET, PEEK, FR4
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## ELECTRICAL CONNECTION

Female crimp contacts, Crimpflex solder pads\* (Poka Yoke)

## SAMPLE ORDER

Part no.	Type series	Resistance range	Elect. measuring range	Elect. connection
E090100100	MMP	2.5 K	100 mm	Female crimp contacts
H907040001	Block magnet 10 x 5 x 4 mm, 80° C			
H907040004	Block magnet 10 x 5 x 4 mm, 150° C			

# HALL POTENTIOMETER POH 120 "CONTACTLESS"



The POH 120 is small and robust and features a freely programmable rotary angle. The measurement principle is via Hall effect as absolute measuring rotary sensor even after blackout. The POH series is available with a decoupled axis or integrated axis.

## FEATURES

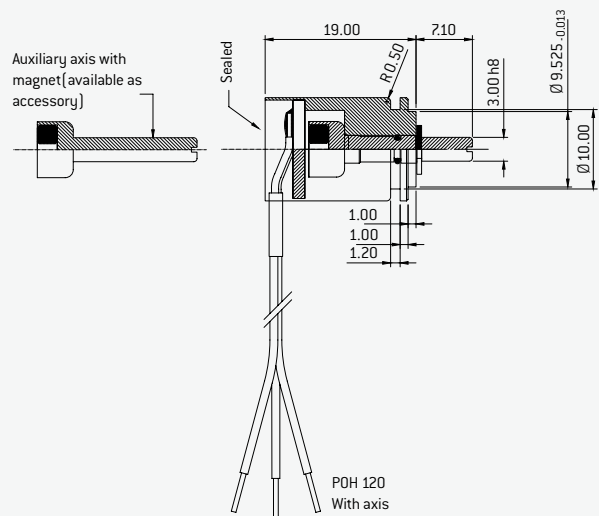
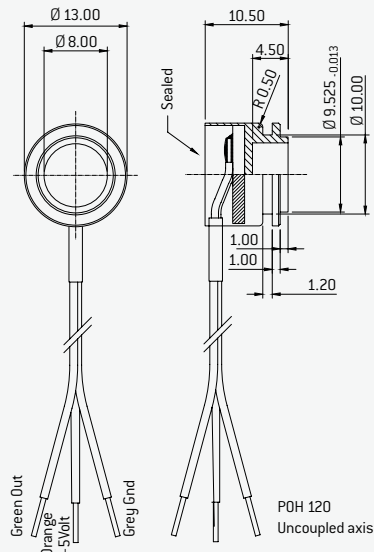
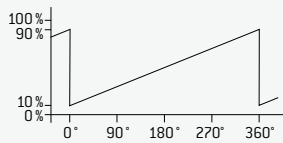
- Long lifetime
- Size Ø 13 mm

## APPLICATIONS

- Valve controls
- Joysticks
- Steering angle measurement
- Servo systems

## SPECIAL FEATURES

- Hall sensor
- Compensation for play and tolerance by decoupled axis possible
- contactless
- Freely programmable angles possible
- Load free drive when axis is uncoupled



## ELECTRICAL SPECIFICATIONS

Measuring range	0 – 360° programmable
Independent linearity	± 0.5 %
Resolution	12 bit < 0.1°
Supply voltage (Vs)	5 (± 10 %) VDC
Output signal	10 % – 90 % of Vs
Current consumption without load (typical)	8.5 mA
Min. ohmic load at output	10 kOhm
Max. capacitive load at output	10 nF
Max. load current at output	11 mA
Electrical connection	Tinned cable wires
Operating temperature	-40° C – +85° C *

## MECHANICAL SPECIFICATIONS

Mechanical positioning range	360° continuous rotation
Bearing	Slide bearing/ uncoupled load free
Min. lifetime (mechanical)	200 million cycles
Protection class	IP 65 with axis/ IP 67 uncoupled load free (according to DIN EN 60529)

## MATERIALS

Housing material	Stainless steel
Axis material	Brass (nickel plated)

## AMBIENT CONDITIONS

Operating temperature	-40° C – +85° C *
-----------------------	-------------------

Mechanical and electrical characteristics are customizable. Specifications are subject to change without notice. \* Others on request.

## SAMPLE ORDER

	Part no.	Type series	Elect. measuring range	Elect. connection
POH 120 with axis	E050200120	POH	360°	Wire connection
POH 120 with uncoupled axis	E050200121	POH	360°	Wire connection

# CONTACTLESS ROTARY SENSOR HMS 220



These contactless, absolute measuring rotary sensors based on the Hall effect are designed with robust housings. The Metallux series of rotary sensors HMS 220 features a long lifetime, excellent linearity and a robust design.

## FEATURES

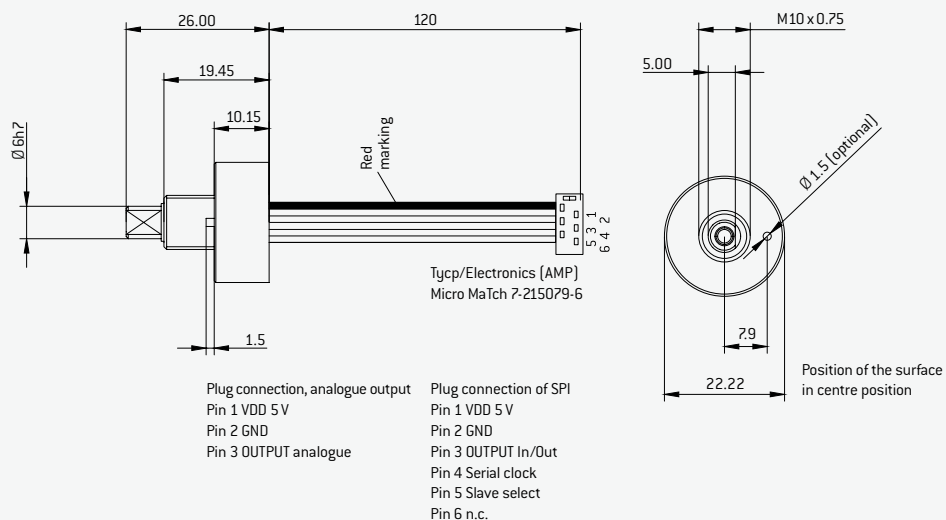
- Long lifetime
- Good linearity
- Robust design

## APPLICATIONS

- Joysticks
- Valve controls
- Steering angle measurement
- Servo systems

## SPECIAL FEATURES

- Hall sensor
- Freely programmable angles possible
- Absolute measuring rotary sensors even after blackout



## ELECTRICAL SPECIFICATIONS

Measuring range	0 – 360°, programmable
Independent linearity	± 0.5 %
Resolution	12 bit < 0.1°
Supply voltage (Vs)	5 (± 10 %) VDC
Output signal	10 % – 90 % of Vs *
Current consumption without load [typical]	18 mA
Min. ohmic load at output	10 kOhm
Max. capacitive load at output	10 nF
Electrical connection	Tinned cable wires

Mechanical and electrical characteristics are customizable.  
Specifications are subject to change without notice. \* Others on request.

## MECHANICAL SPECIFICATIONS

Mechanical positioning range	Continuous rotation
Bearing	Double ball bearing
Min. lifetime (mechanical)	200 million cycles

## MATERIALS

Housing material	Anodised aluminium
Axis material	Stainless steel

## AMBIENT CONDITIONS

Operating temperature	-40° C – +85° C *
-----------------------	-------------------

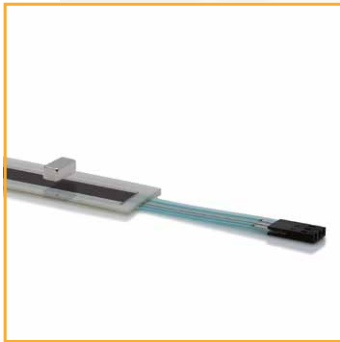
## SAMPLE ORDER

Part no.	Type series	Elect. measuring range	Elect. connection
H061500286	HMS	360°	Wire connection

# ASSEMBLY: CONTACT-FREE MEMBRANE SENSORS AND MAGNET



Proper installation of our products is important for ensuring reliable operation and a long lifetime. Please note the installation criteria listed below.

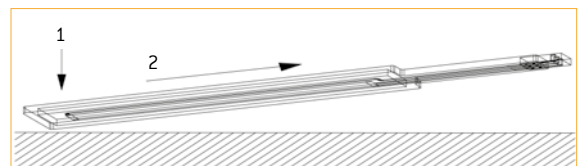


## PREPARING THE SURFACE

- The surface on which the membrane sensor is to be mounted has to be free of moisture, oil, grease and dust.  
Avoid change in temperature between the membrane sensor and the supporting surface.
- In addition, the surface should be flat in order to ensure faultless mounting and operation of the membrane sensor.
- Depending on the material of the supporting surface, isopropanol or butanone may be used as a cleaning agent.

## MOUNTING THE MEMBRANE SENSOR

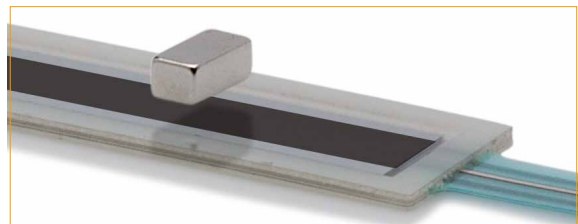
- Remove the protection paper from the adhesive film and place the membrane sensor at the desired position. Take care not to warp the sensor (bending or twisting).
- Gently press on one side of the membrane sensor (see point 1 in the drawing).
- Applying even pressure, move across the membrane sensor from the point of application until the sensor lies flush against the surface, without air bubbles (see point 2 in the drawing).



## MOUNTING THE MAGNET FOR CONTACTLESS MEMBRANE SENSORS

**In order to ensure proper actuation of the MMP, the magnet has to be mounted as follows:**

- In order for the measuring signal to be optimal and faultless, the magnet needs to be centred above the MMP.
- The magnet should be positioned at a distance of  $< 2.0 \text{ mm}$  from the surface of the MMP.
- The magnet should be securely, permanently fixed in place. The magnet can be glued on or sealed in.



# MOUNTING RECOMMENDATION FOR MTP



Selecting the correct type of actuation and the correct materials is essential for ensuring the operational reliability of our MetaPot membrane sensors. Below, you will find the most important information for mounting. Our development team will be happy to assist you with your application.



## PREPARING THE SURFACE

- The surface on which the membrane sensor is to be mounted has to be free of moisture, oil, grease and dust.  
Avoid change in temperature between the membrane sensor and the supporting surface.
- In addition, the surface should be flat in order to ensure faultless mounting and operation of the membrane sensor.
- Depending on the material of the supporting surface, isopropanol or butanone may be used as a cleaning agent.

MATERIALS	BALL	SPRING FORCE
POM/Stainless steel	R 8 – 10 mm	0.5 N – 5 N *

\* **Contact force:** The contact force is the force required in order to establish the first electrical contact.  
**Optimal spring force:** = 1.5 x contact force

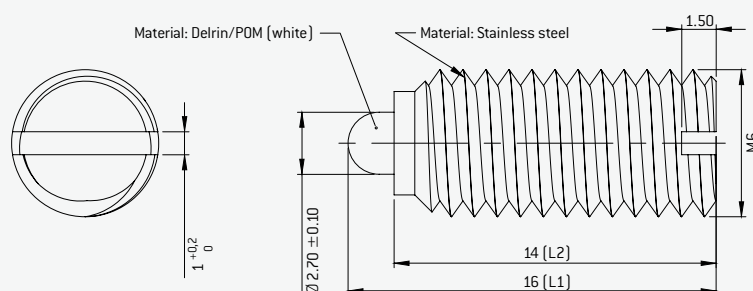
## EXAMPLE:

<b>Contact force</b>	0.4 N
<b>Max. contact force</b>	5 N

## FACTORS THAT INFLUENCE THE SPRING FORCE:

- Active measuring width
- Film material
- Travel speed

## STANDARD OPERATION SPRING LOADED PIN FOR MTP/MTP-LX ARTICLE NO. H959000000



[www.metallux.de](http://www.metallux.de)

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System Certification  
to ISO 9001:2015