ENG

POSITION TRANSDUCERS

HYPERWAVE
HIGH-PERFORMANCE MAGNETOSTRICTIVE TECHNOLOGY

GEFRAN
BEYOND TECHNOLOGY


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IC2
IGND
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More than fifty years of experience, an organisation with a strong focus on the customer's needs and constant technological innovation have made Gefran a benchmark in the design and production of sensors, systems and components for industrial process automation and control. Expertise, flexibility and process quality are the factors that distinguish Gefran in the production of integrated tools and systems for specific applications in various fields of industry, with consolidated know-how in the plastics, mobile hydraulics, heating and lift sectors. Technology, innovation and versatility represent the catalogue's added value, in addition to the ability to create specific application solutions in association with the world's leading machine manufacturers.

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POSITION TRANSDUCERS

Linear and angular position transducers detect the position of mechanical parts in motion. Real-time position detection makes it possible to reduce machine cycle times and to intercept points for actuation of other servomechanisms in the stroke.
For example by introducing acceleration and deceleration ramps, Gefran has adopted a number of technologies for transduction of position measurement:

- POTENTIOMETRIC of military origin, in which the resistive and collector track are electrically connected by means of contact brushes mounted on the spool.
- MAGNETOSTRICTIVE HYPERWAVE uses the magnetic characteristic and micro-elastic deformation of the primary element to pinpoint the exact position of the cursor.
- HALL EFFECT uses the sinusoidal intersection of magnetic fields to determine the angular or linear position of the TWIIST transducer.
- MEMS technology calculates the angle of inclination in the three axes X, Y, Z with respect to the earth's axis.

HYPERWAVE
HIGH-PERFORMANCE MAGNETOSTRICTIVE TECHNOLOGY

MAGNETOSTRICTIVE
WPG , WRG, WPA

HALL EFFECT TWIIST
LS-A, LM-L, LM-C

POTENTIOMETERS LT, PC

ROTARY GRA, GRN

INCLINOMETERS/TILT GIG, GIT,
DRAW WIRES GSF, GSH

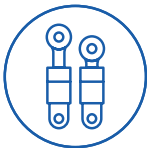
Gefran position transducers are made of robust materials that allow them to be used in most industrial applications, even in particularly adverse conditions.
The body of the position transducers is made of various materials such as anodised aluminium, AISI 316 stainless steel or PBT plastic, which mainly used in the automotive sector, and also resistant to UV rays, saline mist, acids and other aggressive agents.
Gefran position transducers are the result of years of experience and close collaboration with the best European research universities and research centres. Each transducer has been designed and manufactured with features aimed at satisfying the requirements of its particular application.

APPLICATION SECTORS


PLASTIC AND RUBBER INJECTION PRESSES


METALWORKING


MATERIALS HANDLING


HYDRAULIC AND PNEUMATIC CYLINDERS


RENEWABLE ENERGIES


AUTOMOTIVE TESTING MACHINES


MEDICAL SECTOR


GEOTECHNICS


LEVEL CONTROL


FARMING AND EARTHMOVING MACHINERY


RAILWAYS


NAVAL


THERMOFORMING


CALENDERING


EQUIPMENT TEST BENCHES


MARBLE PROCESSING MACHINES


WOODWORKING MACHINES


DIE CASTING

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MAIN FEATURES

- Absolute position measurement: when the system is switched on, the transducer immediately provides the actual position, with no need for mechanical repositioning.
- Lifespan: from 100 million maneuvers of potentiometric transducers to the practically unlimited lifespan of HYPERWAVE MAGNETOSTRICTIVE transducers or HALL EFFECT transducers, thanks to the absence of contact between the transducer and its position reader.
- High resolution of the output signal: from virtually infinite for potentiometers to 0.5 µm for magnetostrictive transducers.
- Easy installation and simple connection to the most common instruments and PLCs.
- Possibility of simultaneously managing up to 16 position readers with the same transducer and providing the displacement speed (WPA-F/WRA-F series magnetostrictive in Profinet and series WPA-E/WRA-E in Ethercat).
- Sensors guaranteed up to 2 years (5 years magnetostrictive models).

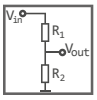
POTENTIOMETERS PZ34, PME, PV1

ANALOGUE AND DIGITAL INFORMATION

Gefran manufactures both transmitters and transducers with the following electrical outputs:

ANALOGUE

- Ratiometric
- Voltage divider 1 to 60Vdc
- 0...20mA, 4...20mA
- 0.5...4.5Vdc, 0...5Vdc, 0...10Vdc



DIGITAL

- **SSI** with 16, 21, 24, 25 bit binary or gray code output data format
  - Position resolution up to 0.5 µm
  - Sampling time 250 msec

- **IO-Link** with digital output format 32 bit position, 16 bit speed, 2 bit SSC
  - 5, 10, 20, 50, 100 µm resolution
  - Sampling time 1 msec
  - Speed data resolution 0.5 mm/sec
  - Setting of 2 cams or shut-off thresholds (Single/Two/Window)

- DPV0 **Profibus** interface on RS485 according to IEC 61158T
  - Position resolution settable via software up to 1 µm
  - Speed resolution up to 0.25 mm/sec
  - Position and speed measurement with up to 4 indipendent cursors
  - Setting of 4/8 cams or shut-off thresholds

- **Profinet** RT (real time) & IRT (Isochronous Real time) interface (ver. 2.3)
  - General or Encoder profile vr. 4.2
  - Position resolution settable via software up to 0.5 µm
  - Speed resolution up to 0.25 mm/sec
  - Position and speed measurement with up to 16 indipendent cursors
  - Number of Work Hours, Maximum and real temperature, active cursor control

- **Ethercat** interface
  - CANopen OVER ETHERCAT (COE) PROTOCOL
  - Position resolution settable via software up to 0.5 µm
  - Position and speed measurement with up to 16 indipendent cursors
  - Number of working hours, maximum and real temperature, cursor active control

- **CANopen** CIA DS301 and DS406 with the following special features
  - Selectable baud rate from 10KBaud to 1MBaud
  - Real-time resolution switching (2 to 40 micron)
  - Position and speed measurement of 1 or 2 indipendent cursors
  - Setting 4/8 cams or shut-off thresholds

- **CAN SAE J1939**
  - 14 bit digital resolution

STROKES FROM 10mm A 12500mm

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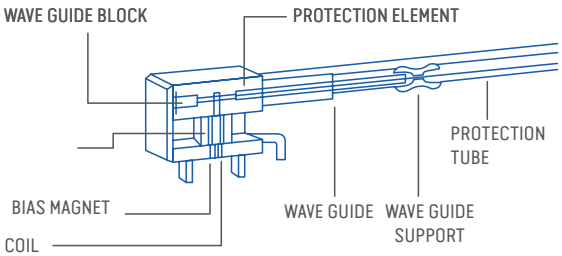
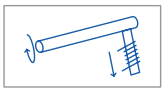
MAGNETOSTRICTIVE TECHNOLOGY

The evolution of the rectilinear potentiometric transducer is represented by magnetostrictive position transmitters in which there is no contact between the transducer and its cursor.
The measuring element consists of a special alloy tube flanked by a copper conductor.
The measurement process takes place through the interaction of mechanical waves and electromagnetic fields. Tipically, every millisecond, a 3 Ampere pulse of current of 3 microseconds is sent along the tube, thanks to the sensor's electronics; the interaction between the current pulse and the magnetic field generated by the position magnet creates a torsion that spreads across the magnetostrictive guide wire in the form of a torsional mechanical wave. By measuring the time between sending the electrical excitation signal and detecting the sonic wave on the magnetostrictive return wire, the exact position of the magnet can be calculated down to the nearest micron.

The sonic wave travels over the magnetostrictive element at approximately 2850 metres/second and the position information is updated an average of 1000 times in one second.
Thanks to this technology there is no direct contact between the moving parts and therefore no wear on the transducer.



HYPERWAVE
HIGH-PERFORMANCE MAGNETOSTRICTIVE TECHNOLOGY

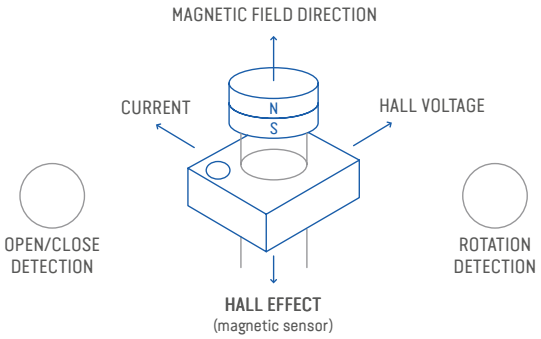


15x amplified magnetostrictive signal

HALL EFFECT TECHNOLOGY

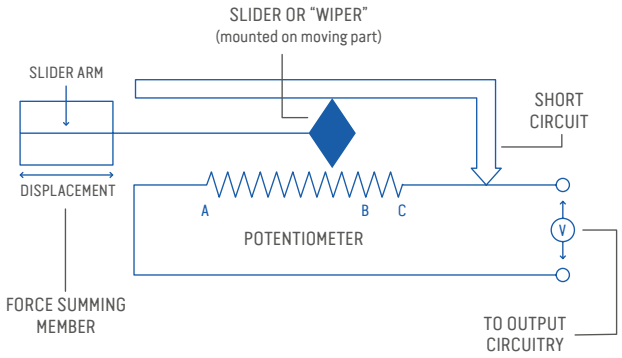
A Hall effect sensor is a transducer that varies its output voltage in response to a magnetic field. Hall effect devices are used as proximity and positioning sensors. This is a more reliable and durable solution to a mechanical switch, as there are no problems with the wear. The Hall effect refers to the voltage that can be measured across a conductor (or semiconductor) when an electric current flowing through it is affected by a magnetic field. Under these conditions a transverse voltage is generated perpendicularly to the applied current, due to the balanceing of the Lorentz and electrical forces. Small size of the integrated package reduces system space and the associated mechanical complexity of implementation.

The Hall effect sensor detects the magnetic field and produces an analogue or digital signal, which is converted into a standard signal, depending on the requirements of the electronic system.
Creation of a voltage (VH) across a conductor carrying a current and subjected to a magnetic field is known as the Hall effect, after the American physicist Edwin Hall, who discovered it in 1879.



POTENTIOMETRIC TECHNOLOGY

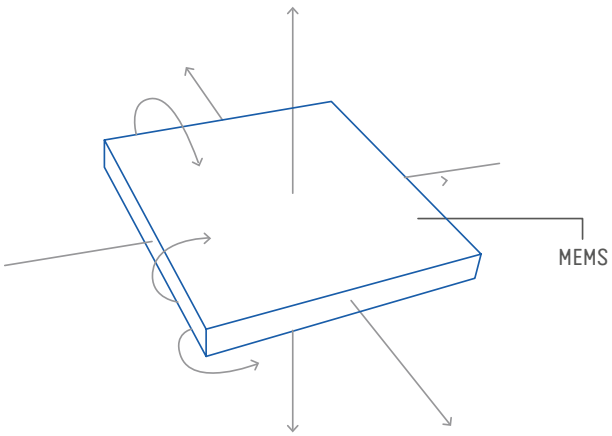
The key element in potentiometric transducer consists of two linear tracks, both of which are the same length as the maximum displacement to be measured and made of a conductive material. A movable cursor with two connected sliding contacts (brushes) acts as a bridge between the two tracks, and measures the potential difference between the first, resistive track and the second, conductive track.



The cursor may be external to the device, and therefore connectable as long as directly to the moving object, whose displacement is to be measured, or it may be internal: a rod, or stem, is used as the actuator of the external movement on the potentiometer cursor. To ensure a high degree of measurement accuracy, it is essential to ensure high quality of the resistive track. Only in this way will the position of the contact on the track correspond to an accurate and repeatable voltage output value. Gefran manufactures all the resistive tracks of its potentiometric transducers in-house, and is therefore able to guarantee measurement reliability and precision.
The relative simplicity of this type of technology allows it to be used in models with a small footprint. Gefran potentiometers do not require any control logic and are therefore quick and easy to install.

MEMS TECHNOLOGY

MEMS stands for Micro Electro-Mechanical Systems and is one of the most promising technologies of the 21st century, revolutionising the design paradigms of electronic and computer systems. As a result of this technology, it has been possible to bring electromechanical functions that could previously only be implemented with electrotechnical technologies down to the nanometric level, thus reducing consumption. Sensors were the first practical application of Mems technology. A perfect example of the application of this technology is the inclinometer for controlling angular orientation on the X/Y and Z axes with respect to the earth's axis.



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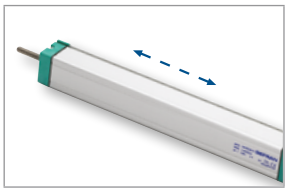
TRANSDUCER SELECTION GUIDE

LENGTH OR ANGLE TO BE MEASURED

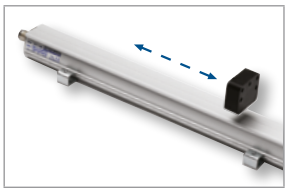
Gefran transducers can be used to detect linear displacements on strokes from a minimum of 10 mm to a maximum of 8300 mm, or angular measurements ranging from +10° to +-180°.
It should always be kept in mind that two strokes are normally specified:

- mechanical stroke: This is the effective translation that the transducer cursor can make;
- useful electrical stroke: this is the part of the mechanical stroke in which the linearity of the transducer is guaranteed.

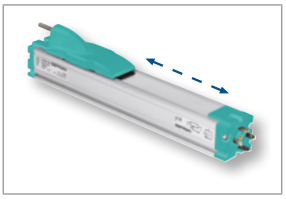
This means that when studying the application, it is necessary to choose a transducer with a useful electrical stroke equal to or greater than the maximum movement of the moving part.



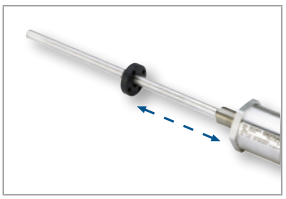
LT



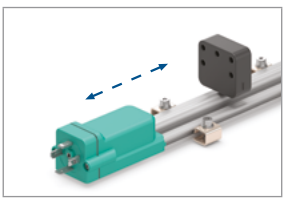
WPA



PK



WRA



WPG

TYPES OF POSITION DETECTION

In order to make it possible to detect the movement of an object, the transducer is structured with a moving part, which is normally attached to the object itself.
This moving part is usually of two types:

- rod: this is the classic system used by potentiometers and consists of a rod that retracts into the body of the transducer, reporting the movement to the sensor's internal parts;
- cursor: this is a more compact solution using a cursor that becomes an integral part of the moving part to be detected.

It is available on some potentiometers (PK, PME and PMI series) as well as on most magnetostrictives. (WPG, WRG, WPP, WRP, WPA, WRA...)
Note that the cursor may be guided (slide or ring) or completely free in relation to the transducer (floating magnetic cursor).

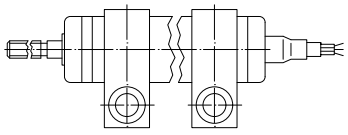
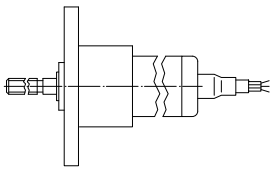
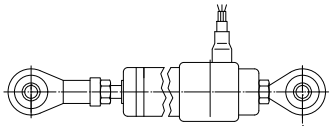
GEFRAN TRANSDUCERS AND INSTRUMENTS:
THE WINNING COMBINATION

Gefran instrumentation and position transducers are the best solution for detecting the position of moving mechanical parts.
Gefran instruments are designed with user-configurable digital inputs in mV/V, voltage and current.

ANCHORAGE SYSTEM

The transducer can be mounted using three types of support:

- brackets: this is the most traditional method; it requires a free surface on which to install the transducer and involves use of two or more brackets, depending on the length of the sensor;
- flanges: ideal in applications where the stem must pass through a borehole and the transducer must be fixed to the walls of the borehole; in this case, care must be taken with the conditions of use, especially in the case of high strokes;
- self-aligning joints: used to fasten the ends of the transducer directly to the moving parts; this eliminates other fastening points and allows offset movements to be detected; this system is not intended for excessively long strokes.

			
	BRACKETS	FLANGE	SELF-ALIGNING JOINTS
MAGNETOSTRICTIVE	WPG-A	WRG-A	RK-XL319
	WPP-A	WRP-A	
	WPP-S	WRP-S	
	WPA-A	WRA-A	
	WPA-S	WRA-S	
	WPL-A	WRA-F	
	WPA-F	WRA-E	
	WPA-E	IK4-P	
	MK4-P	RK2	
		RK4	
		RK5-A	
		RK5-C	
POTENTIOMETERS	LT/LT67	IC	PC/PC67
	PZ12	PZ12	PZ12
	PZ34/PZ67	PZ34/PZ67	PZ34/PZ67
	PK	PMI12	PMA12
	PA1	PMI-SL/PMI-SLE	
	PY1	GSF	
	PY2		
	PY3		
	PZ12		
	PME12		
	PS09		
	PS11		
	PS20		
	PR65		
HALL EFFECT		GSH	LS-A
		GRA	LM-L
		GRN	LM-C
INCLINOMETERS		GIB	
		GIG / GIG RELAY	
		GIT	

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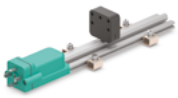
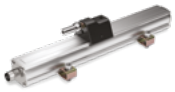
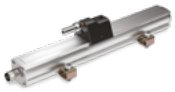
MAGNETOSTRICTIVE POSITION TRANSDUCERS

MAIN TECHNICAL CHARACTERISTICS







MODEL	WPG-A	WPP-A	WPP-S	WPA-A
USEFUL ELECTRICAL STROKE	50…1500 mm	50…2500 mm	50…2500 mm	50…4000 mm
INDEPENDENT LINEARITY	±0.02%	± 0.02%… ± 0.04%	±0.02%	± 0.01%… ± 0.04%
RESOLUTION	infinite (limited only by output noise)	16 bit (Max. noise 5 mVpp)	20 µm - 40 µm	16 bit (Max. noise 5 mVpp)
REPEATABILITY	≤ 0.01 mm	< 0.01 mm	< 0.02 mm	< 0.01 mm
SAMPLING TIME	1 ms to 3 ms (depending on stroke)	0.5 ms to 2 ms (depending on stroke)	0.5 ms to 4 ms (depending on stroke)	0.5 ms to 3 ms (depending on stroke)
PROPERTIES OF MEASUREMENT PRINCIPLE	Magnetostrictive ultrasonic time measurement (system without physical contact)	Magnetostrictive ultrasonic time measurement (system without physical contact)	Magnetostrictive ultrasonic time measurement (system without physical contact)	Magnetostrictive ultrasonic time measurement (system without physical contact)
OPERATING TEMPERATURE	-20…+75°C	- 30…+75°C	- 30…+90°C	- 30…+85°C
STORAGE TEMPERATURE	-40…+100°C	-40…+100°C	-40…+100°C	-40…+100°C
POSITION READER SHIFT SPEED	≤ 10 m/s	≤ 10 m/s	≤ 10 m/s	≤ 10 m/s
SLIDING CURSOR SHIFT FORCE	≤ 1N	≤ 1N	≤ 1N	≤ 1N
LIFESPAN	Theoretically unlimited	Theoretically unlimited	Theoretically unlimited	Theoretically unlimited
TRANSDUCER BODY CONSTRUCTION MATERIAL	Anodised aluminium nylon 66 gf 40	Anodised aluminium Nickel-plated zamak	Anodised aluminium Nickel-plated zamak	Anodised aluminium Nickel-plated zamak
POSITION READER CONSTRUCTION MATERIAL	Magnetic cursor nylon 66 gf 40 floating sliding cursor	Magnetic cursor nylon 66 gf 40 floating sliding cursor	Magnetic cursor nylon 66 gf 40 floating sliding cursor	Magnetic cursor nylon 66 gf 40 floating sliding cursor
ELECTRICAL CONNECTIONS	**WPG-A-M** Conn. 4 poles EN175301-803A **WPG-A-A** Conn. 5 poles M12	**WPP-A-A** Conn. 5 poles M12 M. **WPP-A-B** Conn. 6 poles M16 M. **WPP-A-C** Conn. 8 poles M16 M. **WPP-A-H** Conn. 8 poles M12 M. **WPP-A-F** 6-wire PVC cable 1 m.	**WPP-S-B** Conn. 6 poles M16 M. **WPP-S-C** Conn. 8 poles M16 M. **WPP-S-D** Conn. 7 poles M16 M. **WPP-S-H** Conn. 8 poles M12 M. **WPP-S-F** 6-wire PVC cable 1 m. **WPP-S-R** 7-wire PUR cable 1 m.	**WPA-A-A** Conn. 5 poles M12 M. **WPA-A-B** Conn. 6 poles M16 M. **WPA-A-C** Conn. 8 poles M16 M. **WPA-A-H** Conn. 8 poles M12 M. **WPA-A-F** 6-wire PVC cable 1 m. **WPA-A-R** 7-wire PUR cable 1 m.
OUTPUT SIGNALS	Analogue 1 cursor position	Analogue 2 position and speed cursors	SSI 1 position cursor	Analogue 2 position and speed cursors
	0-10Vdc/10-0Vdc 0,1-10,1Vdc/10,1-0,1Vdc 0-20mA/20-0mA 4-20mA/20-4mA	0-10Vdc/10-0Vdc 0-5Vdc/5-0Vdc 0-20mA/20-0mA 4-20mA/20-4mA	24 bit (Bin./Gray) 25 bit (Bin./Gray) 21+1 bit (Bin./Gray) (FM357)	0-10Vdc/10-0Vdc 0-5Vdc/5-0Vdc 0-20mA/20-0mA 4-20mA/20-4mA
PROTECTION RATING	IP67	IP67	IP67	IP67
MECHANICS AND ANCHORAGE	Mechanical drive with joint for taking up play or with floating magnet cursor. Brackets with variable centre-to-centre distance	Mechanical drive with joint for taking up play or with floating magnet cursor. Brackets with variable centre-to-centre distance	Mechanical drive with joint for taking up play or with floating magnet cursor. Brackets with variable centre-to-centre distance	Mechanical drive with joint for taking up play or with floating magnet cursor. Brackets with variable centre-to-centre distance
HOUSING SIZE/LENGTH	204 … 1654 mm	204 … 2654 mm	204 … 2654 mm	204….4154 mm
	ANALOGUE	ANALOGUE	SSI	ANALOGUE c UL us LISTED

WPA-S	WPL-A	MK4-P	WPA-F	WPA-E
50…4000 mm	50…4000 mm	50…4000 mm	50…4000 mm	50…4000 mm
± 0.01%…± 0.02%	± 0.01%… ± 0.02%	± 0.01%… ± 0.02%	± 0,01% … ± 0,02%	± 0,01% … ± 0,02%
0.5 µm - 40 µm	5, 10, 20, 50, 100 µm	1 µm	0,5 µm	0,5 µm
< 0.01 mm	< 0.01 mm	< 0.01 mm	< 0.01 mm	< 0.01 mm
0.5 ms to 4 ms (depending on stroke)	0.5 ms to 4 ms (depending on stroke)	1 ms to 4 ms (depending on stroke)	0,5ms to 3ms (depending on stroke)	0,5ms to 3ms (depending on stroke)
Magnetostrictive ultrasonic time measurement (system without physical contact)	Magnetostrictive ultrasonic time measurement (system without physical contact)	Magnetostrictive ultrasonic time measurement (system without physical contact)	Magnetostrictive ultrasonic time measurement (system without physical contact)	Magnetostrictive ultrasonic time measurement (system without physical contact)
- 30…+90°C	- 30…+90°C	- 40…+85°C	- 40…+85°C	- 40…+85°C
-40…+100°C	-40…+100°C	-40…+100°C	-40…+100°C	-40…+100°C
≤ 10 m/s	≤ 10 m/s	≤ 10 m/s	≤ 10 m/s	≤ 10 m/s
≤ 1N	≤ 1N	≤ 1N	≤ 1N	≤ 1N
Theoretically unlimited	Theoretically unlimited	Theoretically unlimited	Theoretically unlimited	Theoretically unlimited
Anodised aluminium Nickel-plated zamak	Anodised aluminium Nickel-plated zamak	Anodised aluminium Nickel-plated zamak	Anodised aluminium Nickel-plated zamak	Anodised aluminium Nickel-plated zamak
Magnetic cursor nylon 66 gf 40 floating sliding cursor	Magnetic cursor nylon 66 gf 40 floating sliding cursor	Magnetic cursor nylon 66 gf 40 floating sliding cursor	Magnetic cursor nylon 66 gf 40 floating sliding cursor	Magnetic cursor nylon 66 gf 40 floating sliding cursor
WPA-S-B Conn. 6 poles M16 M. **WPA-S-C** Conn. 8 poles M16 M. **WPA-S-D** Conn. 7 poles M16 M. **WPA-S-H** Conn. 8 poles M12 M. **WPA-S-F** 6-wire PVC cable 1 m. **WPA-S-R** 7-wire PUR cable 1 m.	**WPL-A-A** Conn. 5 poles M12 M.	**MK4P-W** Conn. 5-poles M12 F. **MK4P-W** Conn. 4 poles M8 M. **MK4P-W** Conn. 5 poles M12 M.	**WPA-F** Conn. 5-poles M12 F. (cod. D) **WPA-F** Conn. 4-poles M8 M. (cod. A) **WPA-F** Conn. 5-poles M12 M. (cod. D)	**WPA-E** Conn. 5-poles M12 F. (cod. D) **WPA-E** Conn. 4-poles M8 M. (cod. A) **WPA-E** Conn. 5-poles M12 M. (cod. D)
SSI 1 position cursor	IO Link 1 position and speed, cursor SSC	PROFIBUS 4 position and speed cursors , 4 digital cams	PROFINET 16 position and speed cursors (General Profile) 1 position and speed cursors (Encoder Profile)	ETHERCAT 16 position and speed cursors
24 bit (Bin./Gray) 25 bit (Bin./Gray) 21+1 bit (Bin./Gray) (FM357)	24 bit (Bin./Gray) 25 bit (Bin./Gray) 21+1 bit (Bin./Gray) (FM357)	DPV0 Profibus interface on RS485 according to IEC 61158	IO Profinet interface RT & RTI protocol General Profile Encoder Vr. 4.2 Profile	CANopen OVER ETHERCAT (COE) PROTOCOL
IP67	IP67	IP67	IP67	IP67
Mechanical drive with joint for taking up play or with floating magnet cursor Brackets with variable centre-to-centre distance	Mechanical drive with joint for taking up play or with floating magnet cursor Brackets with variable centre-to-centre distance	Mechanical drive with joint for taking up play or with floating magnet cursor Brackets with variable centre-to-centre distance	Mechanical drive with joint for taking up play or with floating magnet cursor Brackets with variable centre-to-centre distance	Mechanical drive with joint for taking up play or with floating magnet cursor Brackets with variable centre-to-centre distance
204 … 4154 mm	204 … 4154 mm	232 … 4182 mm	235 … 4185 mm	235 … 4185 mm
SSI c UL us LISTED	IO-Link c UL us LISTED	PROFIBUS	PROFINET	EtherCAT

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CURSORS - POSITION READERS

WPG SERIES

PCUR220

PCUR221

PCUR222

PCUR202

WPP / WPA SERIES

PCUR210

PCUR211

PCUR212

PCUR202

MK4 SERIES

PCUR035

PCUR036

PCUR037

PCUR039

ANCHORAGE BRACKETS

WPG SERIES

PKIT590 int. 42.5mm
PKIT591 int. 50mm

WPP / WPA / MK4 SERIES

PKIT090 int. 42.5mm
PKIT091 int. 50mm

MAGNETOSTRICTIVE TRANSDUCER
CONNECTORS WITH ALUMINIUM PROFILE

			WPG-A	WPP-A	WPP-S	WPA-A	WPL-A	WPA-S	MK4-P	WPA-F	WPA-E
CON069	4 PIN EV	IP67	X								
CON006	4 PIN EV	IP65	X								
CON031	5 PIN M12	IP67	X	X		X	X			X	X
CON041	5 PIN M12 90°	IP67	X	X		X	X			X	X
CON035	8 PIN M12	IP67		X	X	X		X			
CON042	8 PIN M12 90°	IP67		X	X	X		X			
CON117	8 PIN M12 90° (UL)	IP67		X	X	X		X			
CON021	6 PIN M16	IP40		X	X	X		X			
CON022	6 PIN M16	IP67		X	X	X		X			
CON118	6 PIN M16 (UL)	IP67		X	X	X		X			
CON023	6 PIN M16 90°	IP67		X	X	X		X			
CON026	7/8 PIN M16	IP40		X	X	X		X			
CON027	7/8 PIN M16	IP67		X	X	X		X			
CON028	7/8 PIN M16 90°	IP67		X	X	X		X			
CAV011	M12 5 PIN CABLE 2M.	IP67	X	X		X				X	X
CAV021	M12 5 PIN 90° CABLE 2M.	IP67	X	X		X				X	X
CAV002	M12 8 PIN CABLE 2M.	IP67		X	X	X		X			
CAV005	M12 8 PIN 90° CABLE 2M.	IP67		X	X	X		X			
CON380	5 PIN M12 M.	IP67							X		
CON390	5 PIN M12 F.	IP67							X		
CON089	4 PIN M12 M. COD. D	IP67								X	X
PCAV700	M8 4 PIN CABLE 3M.	IP67							X		
PCAV702	M8 F. 5 PIN CABLE 3M.	IP67							X		
PCAV703	M8 M. 5 PIN CABLE 3M.	IP67							X		
CAV501	2 (M/F) M12 5 PIN CABLE 2M.	IP67					X				
CAV502	2 (M/F) M12 5 PIN CABLE 5M.	IP67					X				
CAV503	2 (M/F) M12 5 PIN CABLE 10M.	IP67					X				

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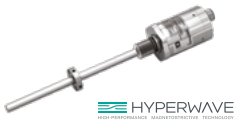
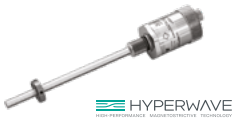
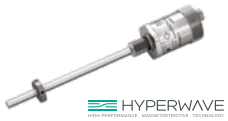
MAGNETOSTRICTIVE POSITION TRANSDUCERS

MAIN TECHNICAL CHARACTERISTICS



MODEL	WRG-A	WRP-A	WRP-S
USEFUL ELECTRICAL STROKE	50…1500 mm	50…2500 mm	50…2500 mm
INDEPENDENT LINEARITY	± 0.04%	± 0.02%… ± 0.04%	≤ ± 0.02%
RESOLUTION	infinite (limited only by output noise)	16 bit (Max. noise 5 mVpp)	20 µm - 40 µm
REPEATABILITY	< 0.02 mm	< 0.01 mm	< 0.01 mm
SAMPLING TIME	1 ms to 1.5 ms *(depending on stroke)*	0.5 ms to 2 ms *(depending on stroke)*	0.5 ms to 4 ms *(depending on stroke)*
PROPERTIES OF MEASUREMENT PRINCIPLE	Magnetostrictive ultrasonic time measurement *(system without physical contact)*	Magnetostrictive ultrasonic time measurement *(system without physical contact)*	Magnetostrictive ultrasonic time measurement *(system without physical contact)*
OPERATING TEMPERATURE	-20…+75°C	- 30…+75°C	- 30…+90°C
STORAGE TEMPERATURE	-40…+100°C	-40…+100°C	-40…+100°C
POSITION READER SHIFT SPEED	≤ 10 m/s	≤ 10 m/s	≤ 10 m/s
SLIDING CURSOR SHIFT FORCE	≤ 1N	≤ 1N	≤ 1N
LIFESPAN	Theoretically unlimited	Theoretically unlimited	Theoretically unlimited
TRANSDUCER BODY CONSTRUCTION MATERIAL	Stainless steel 316 Anodised aluminium	Stainless steel 316 Anodised aluminium	Stainless steel 316 Anodised aluminium
POSITION READER CONSTRUCTION MATERIAL	Floating Magnet Slider - Plastoferrite	Floating Magnet Slider - Plastoferrite	Floating Magnet Slider - Plastoferrite
ELECTRICAL CONNECTIONS	**WRG-A-M** Conn. 4 poles EN175301-803A **WRG-A-A** Conn. 5 poles M12	**WRP-A-A** Conn. 5 poles M12 M. **WRP-A-B** Conn. 6 poles M16 M. **WRP-A-C** Conn. 8 poles M16 M. **WRP-A-H** Conn. 8 poles M12 M. **WRP-A-F** 6-wire PVC cable 1 m.	**WRP-S-B** Conn. 6 poles M16 M. **WRP-S-C** Conn. 8 poles M16 M. **WRP-S-D** Conn. 7 poles M16 M. **WRP-S-H** Conn. 8 poles M12 M. **WRP-S-F** 6-wire PVC cable 1 m. **WRP-S-R** 7-wire PUR cable 1 m.
OUTPUT SIGNALS	Analogue 1 position cursor	Analogue 2 position cursors	SSI 1 position cursor
	0-10Vdc/10-0Vdc 0.1-10.1Vdc/10.1-0.1Vdc 0-20mA/20-0mA 4-20mA/20-4mA	0-10Vdc/10-0Vdc 0-5Vdc/5-0Vdc 0-20mA/20-0mA 4-20mA/20-4mA	24 bit (Bin./Gray) 25 bit (Bin./Gray) 21+1 bit (Bin./Gray) (FM357)
PROTECTION RATING	IP67	IP67	IP67
MECHANICS AND ANCHORAGE	Mechanical anchorage with external threaded flange M18x1.5 (standard) **(M)** 3/4" - 16UNF **(F)**	Mechanical anchorage with external threaded flange M18x1.5 (standard) **(M)** 3/4" - 16UNF **(F)**	Mechanical anchorage with external threaded flange M18x1.5 (standard) **(M)** 3/4" - 16UNF **(F)**
HOUSING SIZE/LENGTH	228 … 1683 mm	228 … 2683 mm	228 … 2683 mm
	ANALOGUE	ANALOGUE	SSI





WRA-A	WRA-S	IK4-P	WRA-F	WRA-E
50…4000 mm	50…4000 mm	50…4000 mm	50…4000 mm	50…4000 mm
± 0.01%… ± 0.04%	± 0.01%… ± 0.02%	± 0.01%… ± 0.02%	± 0.01% … ± 0.02%	± 0.01% … ± 0.02%
16 bit (Max. noise 5 mVpp)	0.5 µm - 40 µm	1 µm	0.5 µm	0.5 µm
< 0.01 mm	< 0.01 mm	< 0.01 mm	< 0.01 mm	< 0.01 mm
0.5 ms to 3 ms *(depending on stroke)*	0.5 ms to 4 ms *(depending on stroke)*	1 ms to 4 ms *(depending on stroke)*	0,5ms to 3ms *(depending on stroke)*	0,5ms to 3ms *(depending on stroke)*
Magnetostrictive ultrasonic time measurement *(system without physical contact)*	Magnetostrictive ultrasonic time measurement *(system without physical contact)*	Magnetostrictive ultrasonic time measurement *(system without physical contact)*	Magnetostrictive ultrasonic time measurement *(system without physical contact)*	Magnetostrictive ultrasonic time measurement *(system without physical contact)*
- 30…+85°C	- 30…+90°C	- 40…+85°C	- 40…+85°C	- 40…+85°C
-40…+100°C	-40…+100°C	-40…+100°C	-40…+100°C	-40…+100°C
≤ 10 m/s	≤ 10 m/s	≤ 10 m/s	≤ 10 m/s	≤ 10 m/s
≤ 1N	≤ 1N	≤ 1N	≤ 1N	≤ 1N
Theoretically unlimited	Theoretically unlimited	Theoretically unlimited	Theoretically unlimited	Theoretically unlimited
Stainless steel 316 Anodised aluminium	Stainless steel 316 Anodised aluminium	Stainless steel 316 Anodised aluminium	Stainless steel 316 Anodised aluminium	Stainless steel 316 Anodised aluminium
Floating magnet slider - Plastoferrite	Floating magnet slider - Plastoferrite	Floating magnet slider Anodised aluminium	Floating magnet slider Anodised aluminium	Floating magnet slider Anodised aluminium
WRA-A-A Conn. 5 poles M12 M. **WRA-A-B** Conn. 6 poles M16 M. **WRA-A-C** Conn. 8 poles M16 M. **WRA-A-H** Conn. 8 poles M12 M. **WRA-A-F** 6-wire PVC cable 1 m. **WRA-A-R** 7-wire PUR cable 1 m.	**WRA-S-B** Conn. 6 poles M16 M. **WRA-S-C** Conn. 8 poles M16 M. **WRA-S-D** Conn. 7 poles M16 M. **WRA-S-H** Conn. 8 poles M12 M. **WRA-S-F** 6-wire PVC cable 1 M. **WRA-S-R** 7-wire PUR cable 1 m.	**MK4P-W** Conn. 5 poles M12 F. **MK4P-W** Conn. 4 poles M8 M. **MK4P-W** Conn. 5 poles M12 M.	**WRA-F** Conn. 5 poles M12 F. (cod. D) **WRA-F** Conn. 4 poles M8 M. (cod. A) **WRA-F** Conn. 5 poles M12 M. (cod. D)	**WRA-E** Conn. 5 poles M12 F. (cod. D) **WRA-E** Conn. 4 poles M8 M. (cod. A) **WRA-E** Conn. 5 poles M12 M. (cod. D)
Analogue 2 position and speed cursors	SSI 1 position cursor	PROFIBUS 4 position and speed sliders 4 digital cams	PROFINET 16 position and speed cursors (General Profile) 1 position and speed cursors (Encoder Profile)	ETHERCAT 16 position and speed cursors
0-10Vdc/10-0Vdc 0-5Vdc/5-0Vdc 0-20mA/20-0mA 4-20mA/20-4mA	24 bit (Bin./Gray) 25 bit (Bin./Gray) 21+1 bit (Bin./Gray) (FM357)	DPV0 Profibus interface on RS485 according to IEC 61158	IO Profinet interface RT & RTI protocol General Profile Encoder Vr. 4.2 Profile	CANopen OVER ETHERCAT (COE) PROTOCOL
IP67	IP67	IP67	IP67	IP67
Mechanical anchorage with external threaded flange M18x1.5 (standard) **(M)** 3/4" - 16UNF **(F)**	Mechanical anchorage with external threaded flange M18x1.5 (standard) **(M)** 3/4" - 16UNF **(F)**	Mechanical anchorage with external threaded flange M18x1.5 (standard) **(M)** 3/4" - 16UNF **(F)**	Mechanical anchorage with external threaded flange M18x1.5 (standard) **(M)** 3/4" - 16UNF **(F)**	Mechanical anchorage with external threaded flange M18x1.5 (standard) **(M)** 3/4" - 16UNF **(F)**
228 … 4183 mm	228 … 4183 mm	233 … 4188 mm	237 … 4192 mm	237 … 4192 mm
ANALOGUE c UL us LISTED	SSI c UL us LISTED	PROFIBUS	PROFINET	EtherCAT

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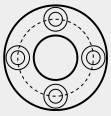
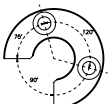
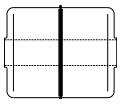
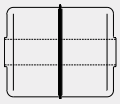
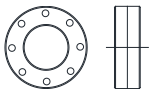
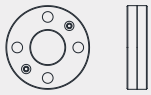
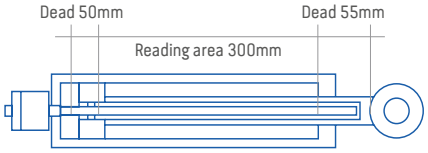
CURSORS
POSITION READERS

		WRG-A	WRP-A	WRP-S	WRA-A	WRA-S	IK4-P	WRA-F	WRA-E	RK2	RK4	RK5-A	RK5-C
	Ø32 x Ø13,5 x H7,9mm.	PCUR095	PCUR095	PCUR095	PCUR095	PCUR095	PCUR610	PCUR095	PCUR095	PCUR022	PCUR022		
	Ø32 x Ø13,5 x H7,9mm.	PCUR096	PCUR096	PCUR096	PCUR096	PCUR096	PCUR023	PCUR096	PCUR096	PCUR023	PCUR023		
	Ø25,4 x Ø13,5 x H7,9mm.	PCUR097	PCUR097	PCUR097	PCUR097	PCUR097	PCUR600	PCUR097	PCUR097	PCUR024	PCUR024		
	Ø44 x Ø12 x H52,4mm. AISI 316	PCUR098	PCUR098	PCUR098	PCUR098	PCUR098	PCUR026	PCUR098	PCUR098	PCUR026	PCUR026		
	Ø42 x Ø15 x H52,4mm. AISI 316						PCUR027			PCUR027	PCUR027		
	Ø25,4 x Ø13,5 x H8mm.											PKIT528	PKIT528
	Ø33 x Ø13,5 x H8mm.											PKIT529	PKIT529
P + M 												PKIT525	PKIT525
P + M + P 												PKIT526	PKIT526
P + M + A 												PKIT527	PKIT527

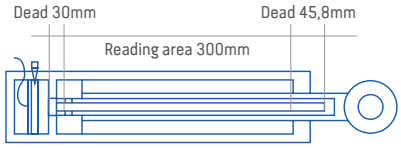
P - Plastic M - Magnet A - AISI 420 stainless steel

GEFRAN'S UNIQUE COMPREHENSIVE **RANGE**



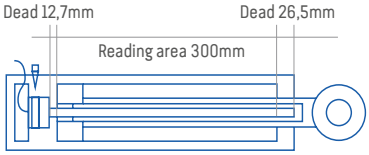
WRG/WRP/WRA Solution 1

CONTACTLESS, REPLACE ALL BRANDS



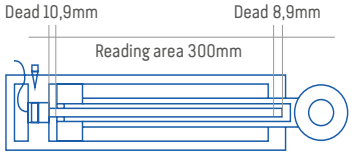
RK5 Solution 2

CONTACTLESS, NO WEAR



PMI-SL Solution 3

COMPACT, ATEX COMPLIANT



IC Solution 4

SUPER COMPACT

PC67 Solution 5

AUTO ALIGNMENT, IP67

GSH Solution 6

SMALL WITH VERY LONG STROKE

Gefran is the only sensor manufacturer in the world to offer such a complete range of solutions for detecting the position of the piston in a hydraulic or pneumatic cylinder.

Some transducers are designed to be fully integrated in the cylinders, while others are partially integrated or totally external. The sensors are designed for different uses: steelmaking, industry, self-propelled vehicles, and for use in potentially explosive areas.

All this to meet the needs of a variety of applications: from sensors fully protected against external agents to easily replaceable sensors, identifying the needs with our customers' engineers.

Gefran is in daily contact with the world's leading cylinder manufacturers, studying the best way to integrate sensors into their projects with them. Gefran assesses correct sensor installation with experienced mechanical engineers.

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MAGNETOSTRICTIVE POSITION TRANSDUCERS

MAIN TECHNICAL CHARACTERISTICS



MODEL	RK2	RK4	RK5-A
USEFUL ELECTRICAL STROKE	50...4000 mm	50.....4000 mm	50...2500 mm
INDEPENDENT LINEARITY	< ± 0.02% F.S. (minimum ± 0.060 mm)	< ± 0.02% F.S. (minimum ± 0.060 mm)	< ±0.04% F.S. (minimum ±0.10 mm)
RESOLUTION	Infinite	Infinite	Infinite
REPEATABILITY	< 0.01 mm	< 0.01 mm	< 0.01 mm
SAMPLING TIME	1 ms to 2 ms *(depending on stroke)*	1 ms to 2 ms *(depending on stroke)*	1 ms to 2 ms *(depending on stroke)*
PROPERTIES OF MEASUREMENT PRINCIPLE	Magnetostrictive ultrasonic time measurement (system without physical contact)	Magnetostrictive ultrasonic time measurement (system without physical contact)	Magnetostrictive ultrasonic time measurement (system without physical contact)
OPERATING TEMPERATURE	- 55...+100°C	- 55...+100°C	- 55...+100°C
STORAGE TEMPERATURE	- 55...+125°C	- 55...+125°C	- 55...+125°C
POSITION READER SHIFT SPEED	≤ 600 rpm	≤ 600 rpm	≤ 600 rpm
SLIDING CURSOR SHIFT FORCE	≤ 0.20 Ncm	≤ 1.8 Ncm	≤ 0.20 Ncm
LIFESPAN	Theoretically unlimited	Theoretically unlimited	Theoretically unlimited
TRANSDUCER BODY CONSTRUCTION MATERIAL	Stainless steel 316	Stainless steel 316	Stainless steel 316
POSITION READER CONSTRUCTION MATERIAL	Magnetic cursor Floating Anodised aluminium	Magnetic cursor Floating Anodised aluminium	Magnetic cursor Floating Anodised aluminium
ELECTRICAL CONNECTIONS	**RK2** PUR 8-wire cable 1 m.	**RK4** Conn. 5 poles M12 M.	**RK5-A** Conn. 5 poles M12 M.
OUTPUT SIGNALS	Analogue 1 position cursor	Analogue 1 position cursor	Analogue 1 position cursor
	0.1-10.1Vdc/10.1-0.1Vdc 0.1-5.1Vdc/5.1-0.1Vdc 4-20mA/20-4mA	0.1-10.1Vdc/10.1-0.1Vdc 0.1-5.1Vdc/5.1-0.1Vdc 0-20mA/20-0mA 4-20mA/20-4mA	0.5-9.5Vdc/9.5-0.5Vdc 0.5-4.5Vdc/4.5-0.5Vdc 0-20mA/20-0mA 4-20mA/20-4mA
PROTECTION RATING	IP67	IP67	IP69K
MECHANICS AND ANCHORAGE	Mechanical anchorage with ø33mm internal flange	Mechanical anchorage with external threaded flange M18x1.5 (standard) **(M)** 3/4" - 16UNF **(F)**	Mechanical anchorage with ø48mm internal flange
HOUSING SIZE/LENGTH	182 ... 4182 mm	190 ... 4190 MM	154.7 ... 2609.7 mm
	ANALOGUE	ANALOGUE	ANALOGUE

MODEL	RK5-C	RK2 XL319
USEFUL ELECTRICAL STROKE	50…2500 mm	50…1000 mm
INDEPENDENT LINEARITY	< ±0.04% F.S. (minimum ± 0.10 mm)	< ± 0.02% F.S. (minimum ± 0.060 mm)
RESOLUTION	Infinite	Infinite
REPEATABILITY	< 0.01 mm	< 0.01 mm
SAMPLING TIME	1 ms to 2 ms *(depending on stroke)*	1 ms to 2 ms *(depending on stroke)*
PROPERTIES OF MEASUREMENT PRINCIPLE	Magnetostrictive ultrasonic time measurement *(system without physical contact)*	Magnetostrictive ultrasonic time measurement *(system without physical contact)*
OPERATING TEMPERATURE	- 55…+100°C	- 55…+100°C
STORAGE TEMPERATURE	- 55…+125°C	- 55…+125°C
POSITION READER SHIFT SPEED	≤ 600 rpm	≤ 600 rpm
SLIDING CURSOR SHIFT FORCE	≤ 0.20 Ncm	≤ 0.20 Ncm
LIFESPAN	Theoretically unlimited	Theoretically unlimited
TRANSDUCER BODY CONSTRUCTION MATERIAL	Stainless steel 316	Stainless steel 316 Anodised aluminium
POSITION READER CONSTRUCTION MATERIAL	Floating Magnet Slider Ferrobore Neodymium	Floating magnet slider Anodised aluminium
ELECTRICAL CONNECTIONS	**RK5-C** Conn. 5 poles M12 M.	**RK2** PUR 8-wire cable 1 m.
OUTPUT SIGNALS	Analogue 1 position cursor	Analogue 1 position cursor
	CANopen DS-301 Interface V4.01 Device Profile	RK2 XL319 0-10Vdc/10-0VdcRK2 XL353 4-20mA/20-4mA
PROTECTION RATING	IP69K	IP67
MECHANICS AND ANCHORAGE	Mechanical anchorage with ø48mm internal flange	Mechanical anchorage and self-aligning drive on two self-aligning ball joints.
HOUSING SIZE/LENGTH	154.7…2609.7 mm	250…1200 mm closed rod 302…2202 mm open rod
	CANopen	ANALOGUE

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MAGNETOSTRICTIVE TRANSDUCER
CONNECTORS


CON006


CON027


CON035


CON069


CON002


CON021


CON022


CON023


CON026


CON028


CON031


CON041


CON042


CON117 (UL)


CON118


CON380


CON390


CAV002


CAV005


CAV011


CAV021


PCAV700


PCAV702


PCAV703


CON079

			WRG-A	WRP-A	WRP-S	WRA-A	WRA-S	IK4-P	WRA-F	WRA-E	RK4	RK5-A	RK5-C
CON069	4 PIN EV	IP67	X										
CON006	4 PIN EV	IP65	X										
CON031	5 PIN M12 (UL)	IP67	X	X		X			X	X	X	X	X
CON041	5 PIN M12 90° (UL)	IP67	X	X		X			X	X	X	X	X
CON035	8 PIN M12 (UL)	IP67		X	X	X	X						
CON042	8 PIN M12 90°	IP67		X	X	X	X						
CON117	8 PIN M12 90° (UL)	IP67		X	X	X	X						
CON021	6 PIN M16	IP40		X	X	X	X						
CON022	6 PIN M16	IP67		X	X	X	X						
CON118	6 PIN M16 (UL)	IP67		X	X	X	X						
CON023	6 PIN M16 90°	IP67		X	X	X	X						
CON026	7/8 PIN M16	IP40		X	X	X	X						
CON027	7/8 PIN M16	IP67		X	X	X	X						
CON028	7/8 PIN M16 90°	IP67		X	X	X	X						
CAV011	M12 5 PIN CABLE 2M.	IP67	X	X		X			X	X	X	X	X
CAV021	M12 5 PIN 90° CABLE 2M.	IP67	X	X		X			X	X	X	X	X
CAV002	M12 8 PIN CABLE 2M.	IP67		X	X	X	X						
CAV005	M12 8 PIN 90° CABLE 2M.	IP67		X	X	X	X						
CON380	5 PIN M12 M. PROFIBUS	IP67						X					
CON390	5 PIN M12 F. PROFIBUS	IP67						X					
CON089	4PIN M12 M. COD. D	IP67							X	X			
PCAV700	M8 4 PIN CABLE 3M.	IP67						X					
PCAV702	M8 F. 5 PIN CABLE 3M.	IP67						X					
PCAV703	M8 M. 5 PIN CABLE 3M.	IP67						X					

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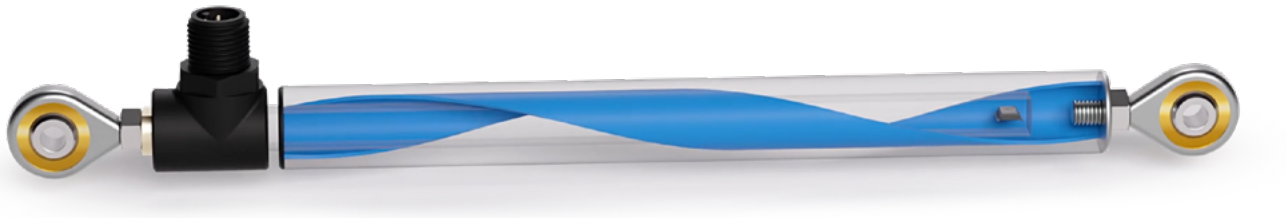
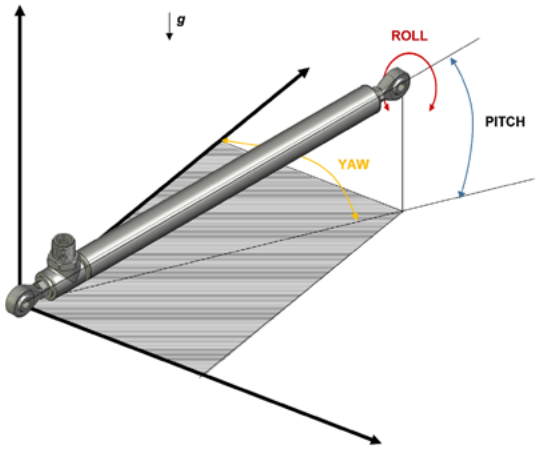
HALL-EFFECT 3-DIMENSIONAL TWIST TRANSDUCERS

TWIIST HALL EFFECT TRANSDUCERS - TECHNOLOGY

The primary element of the TWIIST technology is a 3D Hall effect microchip mounted on a circuit board and coupled with a helical magnetic field.



The primary element installed at the end of the inner support rod is free to move linearly into the magnetic helix. From the variation of the field angle of the magnetic helix along the cylindrical housing, the position of the Hall microchip (located inside the transducer) is determined, and thus the displacement measurement.



POSITION

ACCELEROMETER & GYROSCOPE

TEMPERATURE

TWIST

These three sensors combined provide this set of infomation:


Real-time
absolute position


Real-time &
max speed


Real-time
acceleratio


Tilt angle
X, Y, Z


Real-time & Max
sensor
temperature


Working
time

Km cursor
travel

MULTIVARIABLE TRANSDUCER:

This position transducer represents a new concept of sensing; the same electronic circuit includes several sensors (position, tilt and temperature for example), the firmware processes simultaneously data from the sensors and the fieldbus interface transmits the measurement values according to use-specified data rates.

FIRMWARE UPGRADE:

In addition, the sensor is equipped with a Boot Loader, which can update the sensor directly in the field via Can Open or IO-Link BUSes remotely


Firmware
update


Personalized
firmware

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TWIIST HALL EFFECT TRANSDUCERS

MAIN TECHNICAL CHARACTERISTICS



MODEL	LSA	LML	LMC
USEFUL ELECTRICAL STROKE	50…900 mm	100…900 mm	100…900 mm
INDEPENDENT LINEARITY	±0.15%	±0.15%	±0.15%
RESOLUTION	typical 12 bit	typical 14 bit	typical 14 bit
REPEATABILITY	typical < 0.1% FS	typical < 0.05% FS	typical < 0.05% FS
SAMPLING TIME	typical 300 µs	typical 1 ms	typical 1 ms
PROPERTIES OF MEASUREMENT PRINCIPLE	Hall effect (system without physical contact)	Hall effect (system without physical contact)	Hall effect (system without physical contact)
OPERATING TEMPERATURE	-40…+85°C	-40…+85°C	-40…+85°C
POSITION READER SHIFT SPEED	≤ 5 m/s	≤ 5 m/s	≤ 5 m/s
LIFESPAN	Theoretically unlimited	Theoretically unlimited	Theoretically unlimited
TRANSDUCER BODY CONSTRUCTION MATERIAL	AISI444 stainless steel, brass, anodized aluminum, PA12	AISI444 stainless steel, brass, anodized aluminum, PA12	AISI444 stainless steel, brass, anodized aluminum, PA12
ELECTRICAL CONNECTIONS	**LSA/Z** Conn. 4 p oles M12 **LSA/A** Conn. 5 p oles M12 **LSA/H** Conn. 8 p oles M12 (only for ratiometric output)	Conn 5 poles M12	Conn 5 poles M12
OUTPUT SIGNALS	Analogue (full redundant only for ratiometric output)	Position Tilt X, Y, Z Acceleration X, Y, Z Speed Temperature	Position Tilt X, Y, Z Acceleration X, Y, Z Speed Temperature
	0-10Vdc/10-0Vdc 0…10Vdc/10…0Vdc (supply 10…18Vdc) 4-20mA/20-4mA 10…90%/90…10% Vsupply (ratiometric)	IO Link Device profile vr . 1.1.2 General smart Sensors COM3	DS-301 CANopen application layer and communication profile Vr 4.2.0 DS-302 Additional application layer functions Vr 4 1.0 DS 406 Device profile for encoders Vr 4.1.0 DS 410 Device profile for inclinometers (class C2) Vr 2.0.0
PROTECTION RATING	IP67	IP67	IP67
MECHANICS AND ANCHORAGE	**LSA/A** Self aligning swivel ball joints **LSA/B** Self aligning ball joints **LSA** Screw fixing	**LML/A** Self aligning swivel ball joints **LML/B** Self aligning ball joints **LML** Screw fixing	**LMC/A** Self aligning swivel ball joints **LMC/B** Self aligning ball joints **LMC** Screw fixing
HOUSING SIZE/LENGTH	134 … 984 mm	184 … 984 mm	184 … 984 mm
	ANALOGUE REDUNDANT	IO-Link REDUNDANT	CANopen REDUNDANT

ACCESSORIES, CONNECTORS AND CABLES FOR TWIIST HALL EFFECT TRANSDUCERS

CONFIGURATION OPTION			
PKIT 1567	BALL JOINTS		A
PKIT 1565	AXIAL JOINTS		B
PKIT 1566	SS AXIAL JOINTS (AISI316)	STAINLESS STEEL	C
PKIT 1568	SS BALL JOINTS (AISI316)	STAINLESS STEEL	D

PKIT 1567- PKIT 1568

PKIT 1567- PKIT 1566

			LSA	LML	LMC
CON031	5 PIN M12	IP67	X	X	X
CON041	5 PIN M12 90°	IP67	X	X	X
CON035	8 PIN M12	IP67	X	X	
CON042	8 PIN M12 90°	IP67	X	X	
CAV501	2 (M/F) M12 5 PIN CABLE 2M.	IP67		X	
CAV502	2 (M/F) M12 5 PIN CABLE 5M.	IP67		X	
CAV503	2 (M/F) M12 5 PIN CABLE 10M.	IP67		X	

CON031

CON035

CON041

CON042

CAV501

CAV502

CAV503

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POTENTIOMETRIC POSITION TRANSDUCERS

MAIN TECHNICAL CHARACTERISTICS



MODEL	LT /LT67	PC / PC67	PK
USEFUL ELECTRICAL STROKE	50…900 mm	50…750 mm	100…2000 mm
INDEPENDENT LINEARITY	±0.05%	±0.05%	±0.05%
RESOLUTION	Infinite	Infinite	Infinite
REPEATABILITY	< 0.01 mm	< 0.01 mm	< 0.01 mm
RESISTANCE	5KOhm / 50…600 10KOhm / 750…900	5KOhm / 50…600	5KOhm / 100…300 10KOhm / 400…1000 20KOhm / 1250…2000
OPERATING TEMPERATURE	-30…+100°C	-30…+100°C	-30…+100°C
STORAGE TEMPERATURE	-50…+120°C	-50…+120°C	-50…+120°C
SHIFT SPEED	**LT** ≤ 10 m/s **LT67** ≤ 3 m/s max ≤ 5 m/s	**PC** ≤ 5 m/s, **PC67** ≤ 3m/s max ≤ 5m/s	≤ 10 m/s
SHIFT FORCE	**LT-S** ≤ 3,5N (IP60) **LT-P** ≤ 10N (IP65) **LT67** ≤ 20N (IP67)	**PC** ≤ 15N **PC67** ≤ 30N	≤ 1.2N
LIFESPAN	> 100 x 10^6 manoeuvres	> 100 x 10^6 manoeuvres	> 100 x 10^6 manoeuvres
TRANSDUCER BODY CONSTRUCTION MATERIAL	Anodised aluminium Nylon 66 GF 40	Anodised aluminium Nylon 66 GF 40	Anodised aluminium Nylon 66 GF 40
DRIVE SHAFT CONSTRUCTION MATERIAL	Stainless steel AISI 303	Stainless steel AISI 303	Nylon Cursor 66 GF 40 Latilub 73/13
PROTECTION RATING	LT/S IP60 LT/P IP6 LT67 IP67	**PC** IP65 **PC67** IP67	IP40
MECHANICS AND ANCHORAGE	Mechanical drive with M6 threaded shaft, anchorage brackets with variable centre-to- centre distance	Mechanical anchorage and self-aligning drive on two self-aligning ball joints	Mechanical drive with joint for taking up play, M5 thread anchorage brackets with variable centre-to-centre distance
DIMENSIONS / HOUSING LENGTH	112…977 mm	185…898 mm	253…2171 mm
	RoHS✓ VR. XL339	RoHS✓ VR. XL339	RoHS✓ VR. XL339

MODEL	PA1	PV1	PV2	PV3
USEFUL ELECTRICAL STROKE	25…150 mm	25…150 mm	10…150 mm	25…150 mm
INDEPENDENT LINEARITY	± 0.2%/25 ± 0.1%/50…100 ± 0.05%/125…150	± 0.2%/25 ± 0.1%/50…100 ± 0.05%/125…150	± 0.3%/10 ± 0.2%/25 ± 0.1%/50	± 0.2%/25 ± 0.1%/50
RESOLUTION	Infinite	Infinite	Infinite	Infinite
REPEATABILITY	< 0.01 mm	< 0.01 mm	< 0.01 mm	< 0.01 mm
RESISTANCE	1KOhm / 25 5KOhm / 50…150	1KOhm / 25 5KOhm / 50…150	1KOhm / 10…25 mm 5KOhm / 50…150 mm	1KOhm / 25 mm 5KOhm / 50…150 mm
OPERATING TEMPERATURE	-30…+100°C	-30…+100°C	-30…+100°C	-30…+100°C
STORAGE TEMPERATURE	-50…+120°C	-50…+120°C	-50…+120°C	-50…+120°C
SHIFT SPEED	≤ 5 m/s	≤ 10 m/s	≤ 10 m/s	≤ 10 m/s
SHIFT FORCE	≤ 1.2N	≤ 0.3N	≤ 0.4N	≤ 0.4N
LIFESPAN	> 100 x 10^6 manoeuvres	> 100 x 10^6 manoeuvres	> 100 x 10^6 manoeuvres	> 100 x 10^6 manoeuvres
TRANSDUCER BODY CONSTRUCTION MATERIAL	Anodised aluminium Nylon 66 GF 40	Anodised aluminium Nylon 66 GF 40	Anodised aluminium Nylon 66 GF 40	Anodised aluminium Nylon 66 GF 40
DRIVE SHAFT CONSTRUCTION MATERIAL	AISI 303 stainless steel	AISI 303 stainless steel	AISI 303 stainless steel	AISI 303 stainless steel
PROTECTION RATING	IP40	IP40	IP40	IP40
MECHANICS AND ANCHORAGE	Mechanical drive with joint for taking up play, M4 thread, anchorage brackets with variable centre-to-centre distance	Probe shaft with joint for taking up play, M4 thread, anchorage brackets with variable centre-to- centre distance	Probe shaft with double support and return spring. Ball point. Anchorage brackets with variable centre-to-centre distance	Probe shaft with double support and return spring. Locked against rotation. Ball bearing tip. Anchorage brackets with variable centre-to-centre distance
DIMENSIONS / HOUSING LENGTH	74.5…199.5 mm	63…188 MM	48…188 mm	63…188 mm
	RoHS✓ VR. XL339	RoHS✓ VR. XL339	RoHS✓ VR. XL339	RoHS✓ VR. XL339

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POTENTIOMETRIC POSITION TRANSDUCERS

MAIN TECHNICAL CHARACTERISTICS




MODEL	PZ12	PZ34/PZ67	IC	PME12
USEFUL ELECTRICAL STROKE	25…150 mm	25…250 mm	100…550 mm	50…1000 mm
INDEPENDENT LINEARITY	± 0.2%/25 ± 0.1% / 50…10 ± 0.05% / 125…150	± 0.2%/25 ± 0.1% / 50…100 ± 0.05% / 125…250	±0.1%	± 0.1% / 50…100mm ± 0.05% / 150…1000mm
RESOLUTION	Infinite	Infinite	Infinite	Infinite
REPEATABILITY	< 0.01 mm	< 0.01 mm	< 0.01 mm	≤ 0.08 mm
RESISTANCE	1KOhm / 25 2KOhm / 50mm 3KOhm / 75 4KOhm / 100mm 5KOhm / 125 6KOhm / 150mm	1KOhm / 25 2KOhm / 50mm 3KOhm / 75 4KOhm / 100mm 5KOhm / 125 6KOhm / 150mm 8KOhm / 200 10KOhm / 250mm	10KOhm	5KOhm / 50…300 10KOhm / 350…600 20KOhm / 650…1000
OPERATING TEMPERATURE	-30…+100°C	-30…+100°C	-30…+100°C	-30…+100°C
STORAGE TEMPERATURE	-50…+120°C	-50…+120°C	-50…+120°C	-50…+120°C
SHIFT SPEED	≤ 10 m/s	≤ 10 m/s	≤ 1.5 m/s	≤ 10 m/s
SHIFT FORCE	≤ 0.5N	≤ 0.5N	≤ 1 N	≤ 0.5N
LIFESPAN	> 100 x 10^6 manoeuvres	> 100 x 10^6 manoeuvres	> 100 x 10^6 manoeuvres	> 100 x 10^6 manoeuvres
TRANSDUCER BODY CONSTRUCTION MATERIAL	Anodised aluminium Nylon 66 GF 40	PZ34: Anodised aluminium Nylon 66 GF 40 PZ67: Steel C45, chrome-plated 20mm	Rod: Anodised aluminium	Anodised aluminium 12.7 mm diameter rod, Nylon 66 GF 40 cursor
DRIVE SHAFT CONSTRUCTION MATERIAL	AISI 303 stainless steel	AISI 303 stainless steel	Flange: AISI 303 stainless steel	Nylon 66 GF 40
ELECTRICAL CONNECTIONS	Shielded cable 3-pole 3x0.25-1 m	Shielded cable 3-pole 3x0.25-1 m	**ICC** conn. 5-pole **ICF** 3 wires - 200 mm	**PME12C** conn. 3-pole **PME12F** 3-pole cable x0.25 - 1m
PROTECTION RATING	IP60	**PZ34** IP60 **PZ67** IP67		IP67
MECHANICS AND ANCHORAGE	**PZ12-S** Mechanical with brackets **PZ12-A** Self-aligning joints **PZ12-F** flange	**PZ34-S** Mechanical with brackets **PZ34-A** Self-aligning joints **PZ34-F** flange **PZ67** Self-aligning joints	Mechanical anchorage with internal or external flange	Mechanical with brackets
DIMENSIONS / HOUSING LENGTH	74.5…199.5 mm	83.5 … 308.5 mm	max. 123.5…573.5 mm	55…1065 mm
	RoHS✓ VR. XL339	RoHS✓ VR. XL339	RoHS✓ VR. XL339	RoHS✓ VR. XL339

MODEL	PMA12	PMI12	PMI-SL/PMI-SLE
USEFUL ELECTRICAL STROKE	50…1000 mm	50…1000 mm	50…1000 mm
INDEPENDENT LINEARITY	± 0.1% / 50…100mm ± 0.05% / 150…1000mm	± 0.1% / 50…100mm ± 0.05% / 150…1000mm	± 0.1% / 50…100mm ± 0.05% / 150…1000mm
RESOLUTION	Infinite	Infinite	Infinite
REPEATABILITY	≤ 0.08 mm	≤ 0.08 mm	≤ 0.08 mm
RESISTANCE	5KOhm / 50…300 10KOhm / 350…600 20KOhm / 650…1000	5KOhm / 50…300 10KOhm / 350…600 20KOhm / 650…1000	5KOhm / 50…300 10KOhm / 350…600 20KOhm / 650…1000
OPERATING TEMPERATURE	-30…+100°C	-30…+100°C	-30…+100°C
STORAGE TEMPERATURE	-50…+120°C	-50…+120°C	-50…+120°C
SHIFT SPEED	≤ 10 m/s	≤ 10 m/s	≤ 10 m/s
SHIFT FORCE	≤ 0.5N	≤ 0.5N	≤ 0.5N
LIFESPAN	> 100 x 10^6 manoeuvres	> 100 x 10^6 manoeuvres	> 100 x 10^6 manoeuvres
TRANSDUCER BODY CONSTRUCTION MATERIAL	Anodised aluminium Nylon 66 GF 40	Stainless steel rod diameter 16 mm	Stainless steel rod diameter 12.7 mm
DRIVE SHAFT CONSTRUCTION MATERIAL	Nylon 66 GF 40	Nylon 66 GF 40	Nylon 66 GF 40
ELECTRICAL CONNECTIONS	3-pole cable x0.25 - 1m	3-pole cable x0.25 - 1m	**PMI-SL** voltage divider potentiometer output, 3-pole cable x0.25 - 1m **PMI-SLE** 4…20mA output, 3-pole cable x0.25 - 1m
PROTECTION RATING	IP67	IP68	IP68
MECHANICS AND ANCHORAGE	Self-aligning joints	Mechanical anchorage with internal or external flange	Mechanical anchorage with internal or external flange
DIMENSIONS / HOUSING LENGTH	205…1155 mm	55…1097 mm	55…1100 mm
	RoHS✓ VR. XL339	RoHS✓ VR. XL339	RoHS✓ ANALOGUE PMI-SL VR. XL339

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POTENTIOMETRIC ROTARY POSITION TRANSDUCERS

MAIN TECHNICAL CHARACTERISTICS




MODEL	PS09	PS11	PS20	PR65
USEFUL ELECTRICAL STROKE	340° ± 4°	345° ± 4°	350° ± 4°	345° ± 4°
INDEPENDENT LINEARITY	±1... ± 0.05%	±1... ± 0.05%	±1... ± 0.05%	±1... ± 0.05%
RESOLUTION	Infinite	Infinite	Infinite	Infinite
TOTAL RESISTANCE (+-20%)	1 / 4.7 / 10KOhm	2 / 4.7 / 10KOhm	3 / 4.7 / 10KOhm	4 / 4.7 / 10KOhm
OPERATING TEMPERATURE	- 55...+100°C	- 55...+100°C	- 55...+100°C	- 55...+100°C
STORAGE TEMPERATURE	- 55...+125°C	- 55...+125°C	- 55...+125°C	- 55...+125°C
SPEED OF ROTATION	≤ 600 rpm	≤ 600 rpm	≤ 600 rpm	≤ 600 rpm
SHAFT TORQUE	≤ 0.20 Ncm	≤ 0.20 Ncm	≤ 0.20 Ncm	≤ 1.8 Ncm
LIFESPAN	> 100 x 10^6 manoeuvres	> 100 x 10^6 manoeuvres	> 100 x 10^6 manoeuvres	> 100 x 10^6 manoeuvres
TRANSDUCER BODY CONSTRUCTION MATERIAL	DAP	DAP	DAP	Nylon 66 GF 30
DRIVE SHAFT CONSTRUCTION MATERIAL	Stainless steel AISI 303	Stainless steel AISI 303	Stainless steel AISI 303	Stainless steel AISI 303
ELECTRICAL CONNECTIONS	Welded turrets	Welded turrets	Welded turrets	Welded turrets
PROTECTION RATING	IP40	IP40	IP40	IP65
MECHANICS AND ANCHORAGE	Servo mounting (flange)	Servo mounting (flange)	Servo mounting (flange)	5-pole connector
DIMENSIONS	External diameter 22,25mm External diameter 3,175mm	External diameter 27,05mm External diameter 3,175mm	External diameter 50,80mm External diameter 6,35mm	External diameter 55 mm External diameter 6 mm
	 RoHS✓	 RoHS✓	 RoHS✓	 RoHS✓

CONNECTORS AND ACCESSORIES FOR POTENTIOMETRIC TRANSDUCERS


CAV010


CON006


CON002


CON008


CON011


CON012


CON013


CON050


CON293


CON300


PKIT015

SIGNAL CONDITIONERS FOR POTENTIOMETRIC TRANSDUCERS

PCIR-101

0...10Vdc output

PCIR-102

4...20mA output

- Interface module integrated in female connector;
- standard output 0...10Vdc (PCIR 101);
- standard output 4...20mA (PCIR 102);
- high linearity (0.01% F.S.O);
- reduced thermal deviation of Zero and Span;
- adjustable Zero and Span;

PCIR-A

0...10Vdc output

- high input impedance (> 100 MOhm);
- standard output 0...10Vdc;
- linearity error (0.02% F.S.O);
- simultaneous processing of two transducers;
- reduced temperature deviation (0.01% F.O.S. / °C);
- ready for DIN EN50035 and EN50022 mounting;
- MOR031 female connector;

			LT	PC	PC67	PK	PA1	PV1	PV2	PV3	PME	IC
CON002	3 PIN	IP40	X	X								
CON006	4 PIN	IP65	X			X						
CON008	4 PIN	IP65		X								
CON011	5 PIN	IP40	X	X		X	X	X	X	X		
CON011	5 PIN	IP67	X	X		X	X	X	X	X		
CON011	5 PIN 90°	IP67	X	X		X	X	X	X	X		
CON293	4 PIN M12	IP67			X							
CON050	4 PIN M12 90°	IP67			X							
CAV010	3 PIN	IP67									X	
CON300	6 PIN	IP66										X

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POSITION TRANSDUCERS

MAIN TECHNICAL CHARACTERISTICS

				
MODEL	GRA	GRN	GIB	GIG
USEFUL ELECTRICAL STROKE	±15°-360° (15° step in analogue versions)	±15°-360° (15° step in analogue versions)	±10° ±15° ±20° ±30° ±45° ±60° ±85° (dual XY axis) ±180° (single Z axis)	±10° ±15° ±20° ±30° ±45° ±60° ±85° (dual XY axis) ±180° (single Z axis)
UNIT OF MEASUREMENT	Angular Degrees	Angular Degrees	Angular Degrees	Angular Degrees
INDEPENDENT LINEARITY	±0.5%FS.	±0.5%FS.	< ± 0.5% FS (±10° to ±60°; ±180°); < ± 0.5% FS (±85°)	< ± 0.5% FS
RESOLUTION	12 bit (analogue output); 4096 14 bit divisions (CAN output); 16384 divisions	12 bit (analogue output); 4096 14 bit divisions (CAN output); 16384 divisions	0.05° (±10° to ±20°); 0.05°(±30°); 0.1°(±45°); 0.1°(±60°); 0.1°(±85°); 0.1° (±180°) analogue; 0.05° for CANopen version	0.05° (±10° to ±20°); 0.05°(±30°); 0.1°(±45°); 0.1°(±60°); 0.1°(±85°); 0.1° (±180°) analogue; 0.05° for CANopen version
SAMPLING TIME	4 msec	4 msec	67 msec	67 msec
PROPERTIES OF MEASUREMENT PRINCIPLE	Hall effect	Hall effect	MEMS technology (Micro-Electro-Mechanical Systems)	MEMS technology (Micro-Electro-Mechanical Systems)
OPERATING TEMPERATURE	-40...+85°C	-40...+85°C	-40...+85°C	-40...+85°C
STORAGE TEMPERATURE	-40...+85°C	-40...+85°C	-40...+85°C	-40...+85°C
LIFESPAN	35 Mil. operations (stroke ±75°)	Theoretically unlimited	Theoretically unlimited	Theoretically unlimited
TRANSDUCER BODY CONSTRUCTION MATERIAL	Transducer: PBT (polybutylene terephthalate)	Transducer: PBT (polybutylene terephthalate)	Transducer: PBT (polybutylene terephthalate)	Transducer: PBT (polybutylene terephthalate)
POSITION READER CONSTRUCTION MATERIAL		Floating Magnetic Cursors 316 L Stainless Steel SmCo Samarium Cobalt		
OUTPUT SIGNALS	Ratiometric, Analogue, CANopen, CAN SAE J1939	Ratiometric, Analogue, CANopen, CAN SAE J1939	Ratiometric, Analogue, CANopen	Ratiometric, Analogue, CANopen
	0.5-4.5Vdc/4.5-0.5Vdc 0-10Vdc/10-0Vdc 4-20mA/20-4mA CANopen, CAN SAE J1939	0.5-4.5Vdc/4.5-0.5Vdc 0-10Vdc/10-0Vdc 4-20mA/20-4mA CANopen, CAN SAE J1939	0.5-4.5Vdc/4.5-0.5Vdc 0-10Vdc/10-0Vdc 4-20mA/20-4mA CANopen	0.5-4.5Vdc/4.5-0.5Vdc 0-10Vdc/10-0Vdc 4-20mA/20-4mA CANopen
OUTPUT TYPE	Single / Redundant	Single / Redundant	Single	Single / Redundant
PROTECTION RATING	Output conn. AMP (IP X9K) Output cable(IP 68)	Output conn. AMP (IP X9K) Output cable (IP 68) Output cable +Conn. M12 - 67	Output conn. M12 (IP67) Output cable (IP X9K)	Output conn. M12 (IP67) Output cable (IP X9K)
MECHANICS AND ANCHORAGE	Angular movement detection shaft integral with transducer body 2 anchorage holes	3 anchorage holes	3 anchorage holes	3 anchorage holes
HOUSING SIZE/LENGTH	54.9 x 30.8 x H27.5+13.6 Shaft mm.	65.4 x 43.8 x H 14.2 mm	65.4 x 43.8 x H 14.2 mm	84 x 70 x H37.9 mm.
	ANALOGUE CANopen E1 REDUNDANT SAE J1939	ANALOGUE CANopen E1 REDUNDANT SAE J1939	ANALOGUE CANopen	ANALOGUE CANopen REDUNDANT





MODEL	GIG RELAY	GIT	GSF	GSH-S	GSH-A
USEFUL ELECTRICAL STROKE	±10°±15°± 20°± 30°± 45°± 60° (dual XY axis)	±10° ±15° ± 20° ± 30° ± 45° ± 60° (dual XY axis)	1800-2300-3300-4300-4800-5300-6300-7300-8300	1800-2300-3300-4300-4800-5300- 6300-7300-8300-10000-12500	POSITION: 1800-2300-3300-4300-4800-5300-6300-7300-8300 TILT:±180° (single Z axis)
UNIT OF MEASUREMENT:	Angular Degrees	Angular Degrees	mm	mm	mm / Angular Degrees
INDEPENDENT LINEARITY	< ± 0.15% FS	< ± 0.15% FS (±15° to ± 60°; ±180°); < ± 0.3% FS (± 85°)	± 0.25% FS (1800mm to 4300mm) ± 0.5% FS (4800mm to 8300mm)	±0.5 %F.S.	POSITION: ±0,5%F.S. TILT: < ± 0,5% FS
RESOLUTION	0.01°(±10° TO ±20°); 0.02°(±30°); 0.03°(±45°); 0.04°(±60°)	Analogue outputs 0.01° (±10° to ±20°); 0.02°(±30°); 0.03°(±45°); 0.04°(±60°); 0.05°(±85°); 0.1° (±180°). CANopen output: 0.01°)	Infinite for potentiometer output analogue outputs 0.5..4.5V, 0..10V, 4..20mA 12 bit; CANopen 14/16 bit output	Analogue outputs 0.5..4.5V, 0..10V, 4..20mA 12 bit; CANopen 14/16 bit output	POSITION: 14 bit (uscita CAN); 16384 divisioni TILT:0.1° (±180°)
SAMPLING TIME	67 msec	67 msec	17 msec	17 msec	POSITION: 67msec. TILT:10 msec.
PROPERTIES OF MEASUREMENT PRINCIPLE	MEMS technology (Micro-Electro-Mechanical Systems)	MEMS technology (Micro-Electro-Mechanical Systems)	Potentiometer	Hall effect	POSITION: Hall effect TILT:MEMS technology (Micro-Electro-Mechanical Systems)
OPERATING TEMPERATURE	-40...+85°C	-40...+85°C	-40...+85°C	-40...+85°C	-40...+85°C
STORAGE TEMPERATURE	-40...+85°C	-40...+85°C	-40...+85°C	-40...+65°C	-40...+65°C
LIFESPAN	Theoretically unlimited	Theoretically unlimited	250,000 cycles (strokes up to 5300mm) otherwise 2,000 km travelled; @ typical speed 1m/s, typical acceleration 1g	500,000 cycles @ typical speed 1m/s, typical acceleration 0.5g 250,000 cycles @ typical speed 2m/s, typical acceleration 1g	POSITION: 500,000 cycles @ typical speed 1m/s, typical acceleration 0.5g 250,000 cycles @ typical speed 2m/s, typical acceleration 1g TILT: Theoretically unlimited
TRANSDUCER BODY CONSTRUCTION MATERIAL	Transducer: PBT (polybutylene terephthalate)	Transducer: PBT (polybutylene terephthalate)	Transducer: PBT Cable: AISI316 stainless steel coated with nylon Ø 0.85mm	Transducer: PBT Cable: AISI316 stainless steel coated with nylon Ø 0.85mm	Transducer: PBT Cable: AISI316 stainless steel coated with nylon Ø 0.85mm
POSITION READER CONSTRUCTION MATERIAL	-	-	-	-	-
OUTPUT SIGNALS	Relay output	Ratiometric, Analogue, CANopen	Potentiometric, Analogue, CANopen	Analogue, CANopen	CANopen output 14/16 bit
	Relay Output 1 (N.C. / N.O.) Relay Output 2 (N.C. / N.O.)	0.5-4.5Vdc/4.5-0.5Vdc 0-10Vdc/10-0Vdc 4-20mA/20-4mA CANopen	CANopen DS-301 Interface V4.01 Device Profile	DPV0 Profibus interface on RS485 according to IEC 61158	CANopen DS-301 Interface V4.01 Device Profile
OUTPUT TYPE	Single	Single / Redundant	Single / Redundant	Single / Redundant / Semi-redundant	Single / Redundant / Semi-redundant
PROTECTION RATING	Output conn. M12 (IP67) Output cable (IP X9K)	Output conn. M12 (IP67) Output cable (IP X9K)	IP67	IP67	IP67
MECHANICS AND ANCHORAGE	3 anchorage holes	4 anchorage holes	Mechanical wire drive with spring return	Mechanical wire drive with spring return	Mechanical wire drive with spring return
HOUSING SIZE/LENGTH	84 x 70 x H37.9 mm.	66 x 90 x H35.5 mm.	107.5 x 107.5 x H80.5 mm.	107,5 x 107,5 x H65 mm. (1800...6300 mm.) 107,5 x 107,5 x H68 mm. (7300...8300 mm.) 125 x 125 x H91,8 mm. (10000...12500 mm.)	107,5 x 107,5 x H87 mm. (1800...8300 mm.)
	REDUNDANT	ANALOGUE CANopen REDUNDANT	ANALOGUE CANopen REDUNDANT	ANALOGUE CANopen REDUNDANT	ANALOGUE CANopen REDUNDANT

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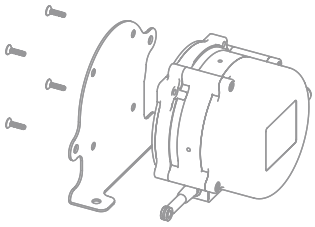
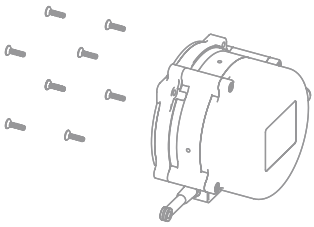
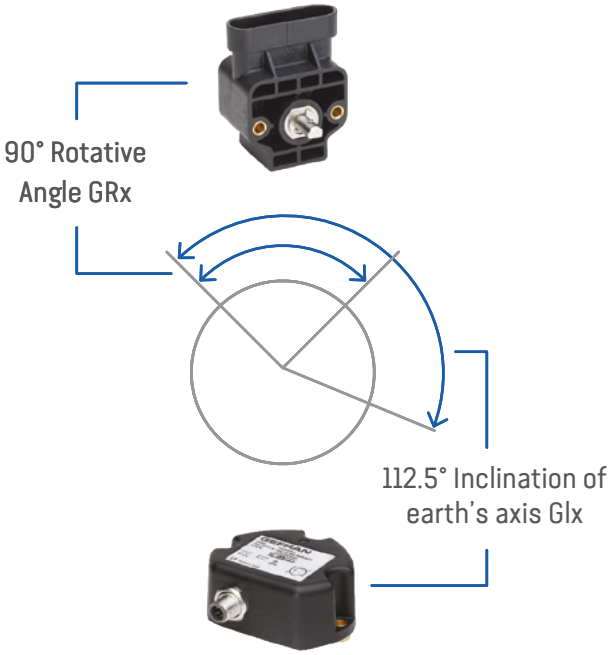
ACCESSORIES

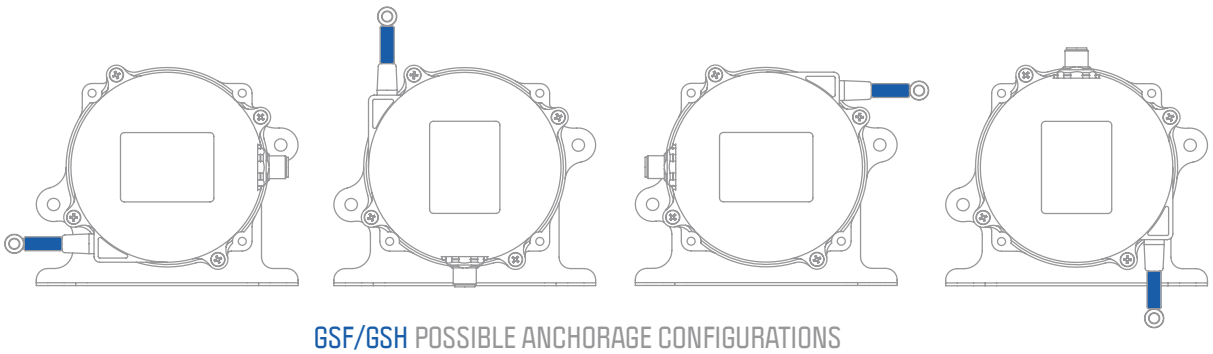


FLANGE MODEL A - FLA033



FLANGE MODEL B - FLA034





GSF/GSH POSSIBLE ANCHORAGE CONFIGURATIONS

ROTATIVES, INCLINOMETERS/TILT, DRAW WIRES
TRANSDUCERS CONNECTORS

CAV002

CAV005

CAV011

CAV021

CAV035

CON031

CON041

CON050

CON293

PCON010

PCON013

			GRA	GRN	GIB	GIG	GIG-RELAY	GIT	GSF	GSH-S	GSH-A
CON293	4 PIN M12	IP67							X	X	
CON050	4 PIN M12 90°	IP67							X	X	
CON031	5 PIN M12 (UL)	IP67			X					X	X
CON041	5 PIN M12 90° (UL)	IP67			X					X	X
CON035	8 PIN M12 (UL)	IP67				X	X	X	X	X	X
CON042	8 PIN M12 90°	IP67				X	X	X	X	X	X
CON117	8 PIN M12 90° (UL)	IP67				X	X	X	X	X	X
CON011	M12 5 PIN CABLE 2M.	IP67			X					X	X
CON021	M12 5 PIN 90° CABLE 2M.	IP67			X					X	X
CAV002	M12 8 PIN CABLE 2M.	IP67				X	X	X	X	X	X
CAV005	M12 8 PIN 90° CABLE 2M.	IP67				X	X	X	X	X	X
PCON010	PUR 2M CABLE + CONN. 6 PIN DEUTSCH	IP67	X								
PCON013	PUR 2M CABLE + CONN. 6 PIN AMP	IPX9K	X	X	X						

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WIDE RANGE OF PRODUCTS
ONE FOR EACH APPLICATION

MODEL	TECHNOLOGY	RUN	LINEARITY	RESOLUTION	OUTPUTS	CERTIFICATIONS
WPG-A	MAGNETOSTRICTIVE	50..1500	± 0.02%	Infinite	Analogue	
WPP-A		50..2500	± 0.02% - ± 0.04%	16 bit		
WPP-S			± 0.02%	20 – 40 µm	SSI	
WPA-A		50..4000	± 0.01% - ± 0.04%	16 Bit	Analogue	cULus
WPA-S			± 0.01% - ± 0.02%	0,5 – 40 µm	SSI	cULus
WPL-A				5 – 100 µm	IO-Link	cULus
MK4-P			± 0.01% - ± 0.02%	1 µm	Profibus	
WPA-F				0,5 - 40 µm	Profinet	
WPA-E					Ethercat	
WRG-A		50..1500	± 0.02%	Infinite	Analogue	
WRP-A		50..2500	± 0.02% - ± 0.04%	16 bit		
WRP-S			± 0.02%	20 – 40 µm	SSI	
WRA-A		50..4000	± 0.01% - ± 0.04%	16 bit	Analogue	cULus
WRA-S			± 0.01% - ± 0.02%	0,5 – 40 µm	SSI	cULus
IK4-P			± 0.01% - ± 0.02%	1 µm	Profibus	
WRA-F				0,5 - 40 µm	Profinet	
WRA-E					Ethercat	
RK2			± 0.02%	Infinite	Analogue	
RK4						
RK5-A		50..2500	± 0.04%			
RK5-C					CANopen	
RK2 XL319		50..1000	± 0.02%		Analogue	
LS-A	HALL	50....900	± 0.015%	Infinite	Analogue	
LM-L		100...900			IO-Link	
LM-C					CANopen	
LT/LT67	POTENTIOMETER	50..900	± 0.05%	Infinite	Potentiometric Voltage divider	Atex (XI339)
PC/PC67		50..750				
PK		100..2000				
PA1		25..150	± 0.2% - ± 0.05%			
PV1		25..150				
PV2		10..250	± 0.3% - ± 0.1%			
PV3		25..150				
PZ12			± 0.2% - ± 0.05%			
PZ34/PZ67						
IC		100..550	± 0.1%			
PME12		50..1000	± 0.1% - ± 0.05%			
PMA12			± 0.2% - ± 0.05%			
PMI12						
PMI-SL/SLE						
GSF	POTENTIOMETER	1800..8300	± 0.25% - ± 0.5%	Infinite 12bit - 14/16bit	Potentiometric, Analogue, CANopen, CAN SAEJ1939	
GSH-S	HALL EFFECT	1800...12500	± 0.5%	Infinite 12bit - 14/16bit	Potentiometric, Analogue, CANopen, CAN SAE J1939	
GSH-A	POSITION: HALL EFFECT TILT: MEMS	1800..8300	± 0.5%	Infinite 12bit - 14/16bit	Potentiometric, Analogue, CANopen, CAN SAE J1939	
GRA	HALL EFFECT	± 15°-360° (15° step for analogue versions)	±0,5%F.S.	12 bit (Analogue): 4096 divisions - 14 bit (CAN Output): 16384 divisions	Ratiometric, Analogue, CANopen, CAN SAE J1939	E1
GRN						
GIB	MEMS (Micro-Electro-Mechanical Systems)	±10° ±15° ±20° ±30° ±45° ±60° ±85° (double axis XY) ±180° (single axis Z)	±0,5%F.S.	Analogue from 0.05° (±10° to ±30°); to 0.1°(±45 to ±180°); 0.05° CANopen for Analogue version	Ratiometric, Analogue, CANopen	
GIG						
GIT			< ± 0.15% FS (from ±15° to ± 60°; ±180°); < ± 0.3% FS (± 85°)	Analogue: from 0.01° (±10°); to 0.1° (±180°). CANopen: 0.01°		

ENVIRONMENTAL PROTECTION OF POSITION TRANSDUCERS

	4 1 mm	6	6	6	6	6
	0	0	5	7	8	9k
	IP40	IP60	IP65	IP67	IP68	IP69K
MAGNETOSTRICTIVE				WPG-A / WRG-A		
				WPP-A / WRP-A		
				WPP-S / WRP-S		
				WPA-A / WRA-A		
				WPA-S / WRA-S		
				WPL-A / IK4P		
				MK4P / WRA-F		
				WPA-F / WRA-E		
				WPA-E / RK2		
				RK2 XL319 / RK4		
						RK5-A
						RK5-C
POTENTIOMETERS	PK	LT	LT	LT67	PMI12	
	PA1	PZ12	PC	PC67	PMI-SL	
	PY1	PZ34	PR65	PZ67	PMI-SLE	
	PY2			PME		
	PY3			PMI		
	PS09			GSF		
	PS11					
	PS20					
HALL EFFECT				GRN-F	GRA-D	GRA-A
				GSH-S	GRN-F	GRN-A
				GSH-A		
TWIST				LS-A		
				LM-L		
				LM-C		
INCLINOMETERS				GIB-F		GIB-A
				GIG-M		GIB-F
				GIT-M		GIG-F
						GIT-F

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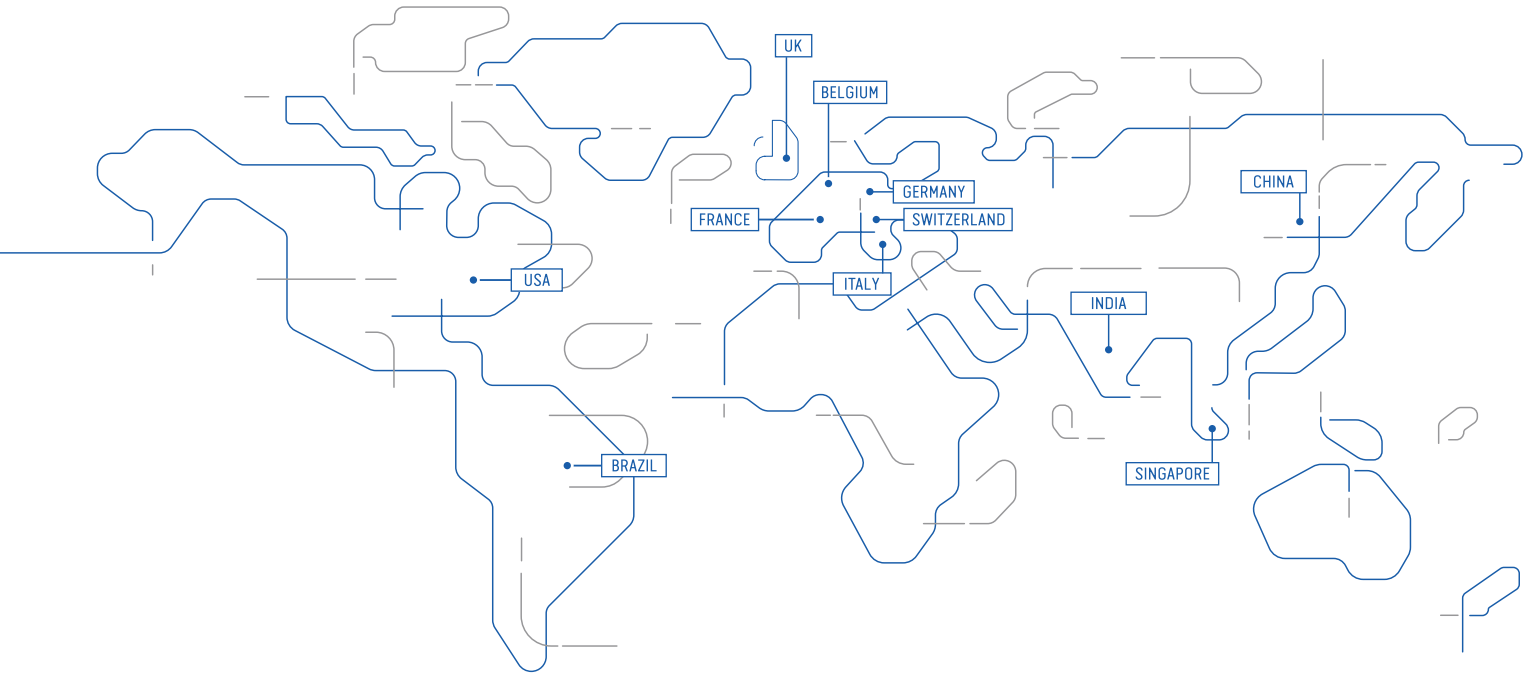

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