ENG

MOBILE MACHINES SOLUTIONS

GEFRAN

BEYOND TECHNOLOGY


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IGND
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BEYOND TECHNOLOGY

More than fifty years of experience, an organization 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 and heating 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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PRECISION, DEPENDABILITY AND SAFETY

Gefran offers a complete range of sensors for mobile hydraulic applications, and specifically for the following sectors:

- **aerial platforms**
- **earthmoving**
- **agriculture**

- Complete control of the production process and advanced know-how in application allows Gefran to offer a variety of different technological solutions responding to the specific features of different uses.

Gefran's sensors for mobile hydraulics guarantee:

- absolute **precision** in measurement
- **dependability** in even the most heavy-duty applications
- **total safety** for operators

Ongoing customer assistance, guaranteed by a team of technicians and a sales network dedicated exclusively to products in this line.

	TECHNOLOGY	PRODUCT RANGE		PLUS
LINEAR POSITION	**TWIIST HALL EFFECT** Position transducers	**LSA / LML / LMC**		- High vibration resistance - Robust and reliable - CANopen digital output - IO Link digital output - Single/redundant versions
	MAGNETOSTRICTIVE Position transducers	**RK5 / RK5C**		
	POTENTIOMETRIC Position transducers	**PMI / SLE**		
	POTENTIOMETRIC Draw Wire position transducer	**GSF**		
	HALL EFFECT Draw Wire position transducer	**GSH-S**		
	HALL EFFECT Draw wire position transducer and TILT Inclination with MEMS Technology	**GSH-A**		
ROTATION	**HALL EFFECT** Rotary sensors	**GRA**		- Single/Redundant versions -E1 approved (ECE-R10) -CANopen/CAN Sae J1939 digital output
		GRN		
		GR3P		
INCLINATION	**MEMS** Tilt sensors	**GIB**		-High precision - Linearized response - Single/redundant versions
		GIG		
		GIT		
PRESSURE	**THICK FILM DEPOSITED ON STAINLESS STEEL DIAPHRAGM** Pressure transducers	**KH / KM**		- Automotive connectors - SIL2, PLd Certification - CANopen/ CANopen Safety/CAN Sae J1939 digital output

AERIAL PLATFORMS

The aerial platforms market requires solutions which are:

- **technologically advanced** and capable of guaranteeing total safety for workers
- **precise** in control of movements
- **dependable** under even the most critical conditions of use

The Gefran range is ideal for setting up this type of machinery, with guaranteed control **of the vehicle's stabilization, rotation and inclination in perfect safety.**

AERIAL PLATFORMS

1	Basket inclination		6	Stabilizer lateral position	
2	Basket load		7	Vehicle axis inclination	
3	Boom length position		8	Fifth-wheel rotation	
4	Boom angle position		9	Hydraulic circuit pressure	
5	Structure load				

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CONSTRUCTION

Applications for earthmoving machinery require solutions which are:

- **dependable** under even the most extreme conditions of use
- **high-performing to** guarantee the utmost safety of the machinery
- **precise in control** of the machine's principal movements

Gefran's range is ideal for all the requirements of this type of machinery, guaranteeing **perfectly safe control of the boom extension, inclination and load on the machine.**

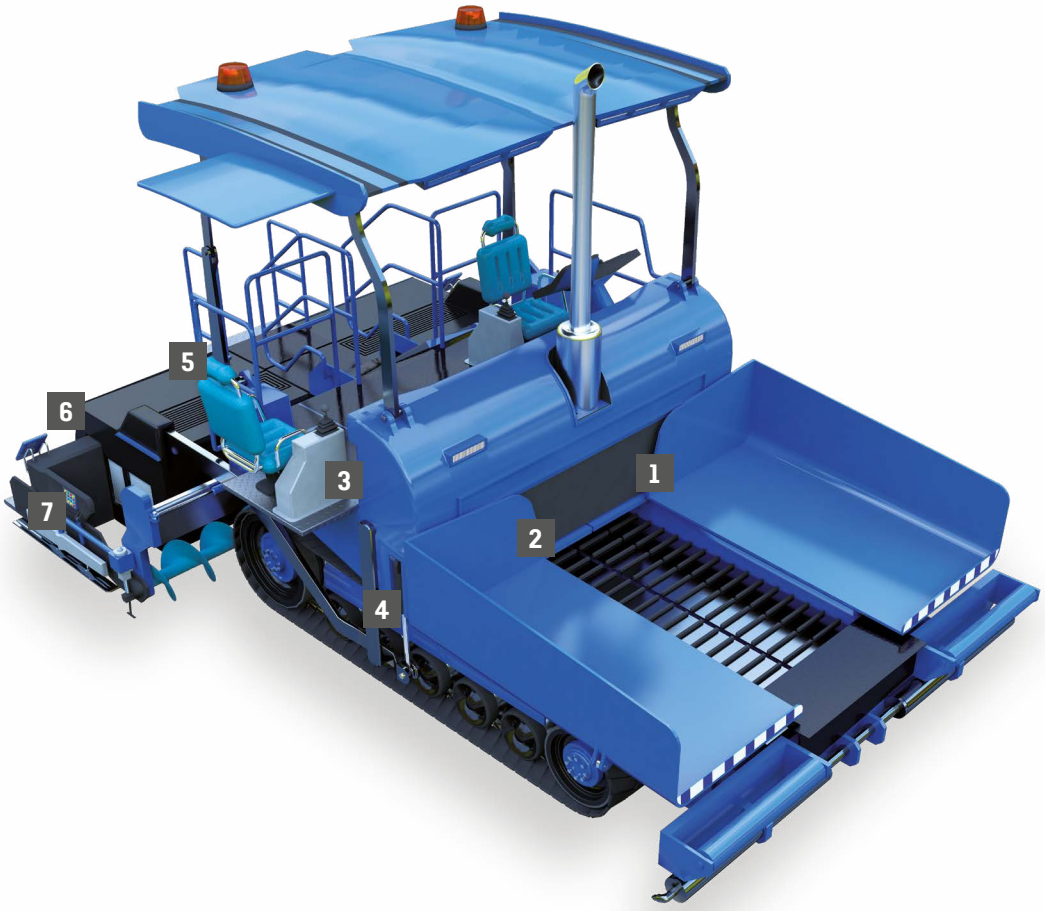
CONSTRUCTION - EXCAVATORS

1	Boom angle position		6	Hydraulic circuit pressure	
2	Boom angle position		7	Stabilizer lateral position	
3	Boom angle position		8	Fifth-wheel rotation	
4	Third arm inclination		9	Vehicle axis inclination	
5	Boom angle position				

CONSTRUCTION - PARVES

1	Bitumen conveyor worm screw height	
2	Bitumen conveyor worm screw height	
3	Hydraulic circuit pressure	
4	Screed unit height asphalt thickness	

5	Screed unit tilt	
6	Bitumen pressure	
7	Right and left bitumen distribution arms lenght detection	



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AGRICULTURE

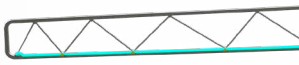
Applications for the agricultural industry require solutions that :

- are **robust to various** environmental conditions
- provide **repeatable and precise** performances every time
- are **reliable** in extremely demanding field conditions
- enhance **safety** of the agricultural vehicle and operator

The Gefran range is ideal for all the requirements of this type of machinery, guaranteeing perfectly safe **control of the steering, inclination and acceleration of the machine.**

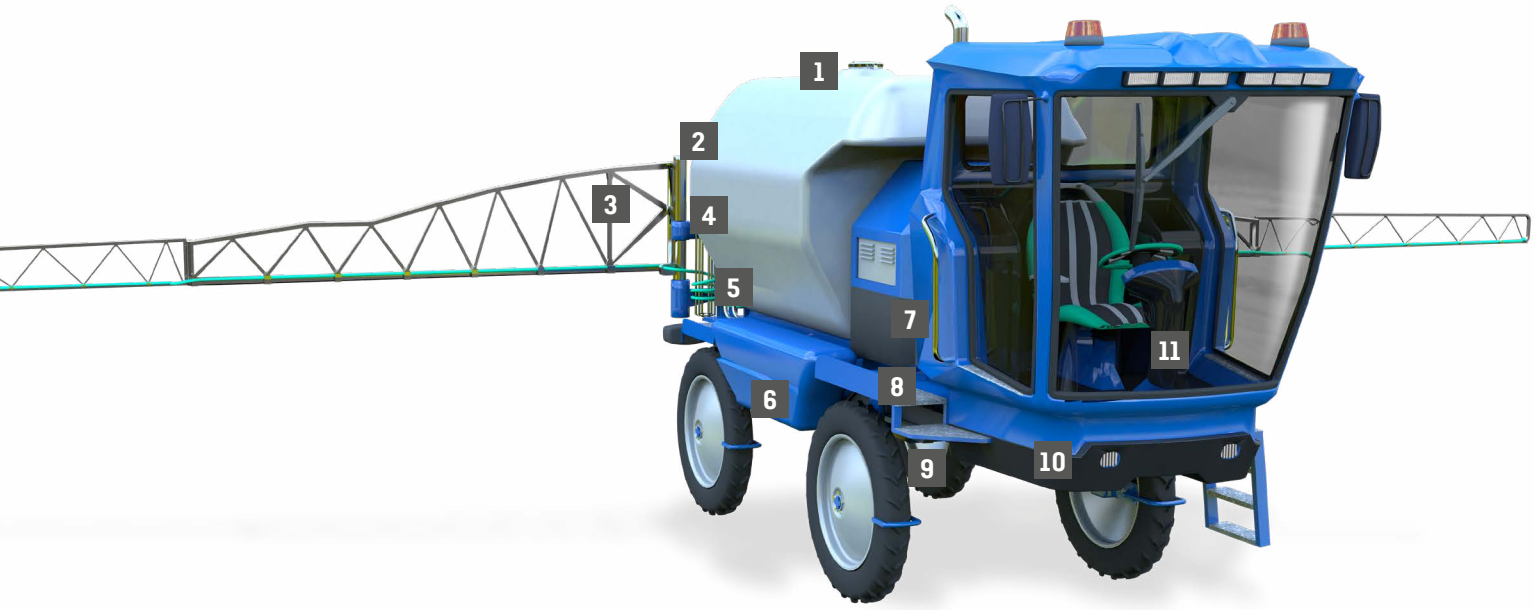
AGRICULTURE - TRACTOR

1	Throttle pedal angle		4	Vehicle cabin positioning	
2	Tow inclination		5	Steering control	
3	Hydraulic circuit pressure		6	Vehicle axis inclination	



AGRICULTURE - SPRAYER

1	Tank level measurement		7	Hydraulic Circuit Pressure	
2	Control of wings opening and closing		8	Vehicle height adjustment according to height of plant type	
3	Water sprayer pressure control		9	Independent front steering control feedback	
4	Height adjustment of spray wings according to the height of the plants type's		10	Wheels Distance DX & SX for adjustment between rows	
5	Vehicle height adjustment according to height of plant type		11	Operator's cabin confort and distribution wings inclination adjustment, on hilly terrain	
6	Independent rear steering control feedback				



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AGRICULTURE - COMBINE HARVESTER

1	Compacting size position		5	Detection of cutting head position in relation to the ground	
2	Independent rear steering control feedback		6	Hydraulic Circuit Pressure	
3	Independent front steering control feedback		7	Cutting and harvesting blades height	
4	Operator's cabin inclination confort adjustment, on hilly terrain				

PRESSURE TRANSDUCERS

PRESSURE TRANSDUCERS - TECHNOLOGY

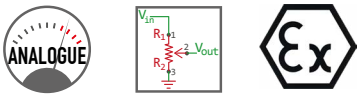
Gefran uses one of the most widespread and proven existing measurement principles, the so-called "Wheatstone Bridge". According to this principle's basis, a number of different technologies may be applied to design the sensitive element. For example, Gefran has chosen the thick film technology on the KH, KHC, KM and KMC models.

THICK FILM ON STEEL TECHNOLOGY

Using the "screen printing process" technique, the insulating layers (dielectric), the conductive layer (cermet) and the resistive layer are deposited on the steel membrane to create the "Wheatstone bridge". The thickness of the membrane determines the measuring range where the multi-stage heat treatment from 200°C to 900°C makes the sensor extremely robust and reliable.

ANALOGUE

- Ratiometric
- 4...20mA
- 0,5...4,5Vdc, 0...5Vdc, 0...10Vdc



DIGITAL

- CANopen CiA DP 3.01 rel.4.0 and DS406 with the following special features
  - Selectable baud rate from 10KBaud to 1MBaud
- CAN SAE J1939 multi-PDU approach (CiA 602-2)
  - 14 bit digital resolution

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PRESSURE TRANSDUCERS - RANGE

MODEL	KH	KHC	KM	KMC
MEASUREMENT RANGES	0...4 to 0...1000 bar (0...60 to 0...15000 psi)	0...4 to 0...1000 bar (0...60 to 0...15000 psi)	0...4 to 0...1000 bar (0...60 to 0...15000 psi)	0...4 to 0...1000 bar (0...60 to 0...15000 psi)
ACCURACY	<±0.5% FS	<±0.5% FS	<±0.5% FS	<± 0,5% FS
NON LINEARITY	0,15% FS (typical)	0,15% FS (typical)	0,15% FS (typical)	+- 0,15% FS (typical)
OVERPRESSURE	2x	2x	2x	2x
BURST STRENGTH	4x (>= 400bar: burst pressure 1500bar)	4x (>= 400bar: burst pressure 1500bar)	4x (>= 400bar: burst pressure 1500bar)	4x (>= 400bar: burst pressure 1500bar)
SAMPLING TIME	< 1 msec	< 1 msec	< 1 msec	< 1 msec
MEASURING PRINCIPLE PROPERTIES	Thick film of sensitive element deposited on steel membrane	Thick film of sensitive element deposited on steel membrane	Thick film of sensitive element deposited on steel membrane	Thick film of sensitive element deposited on steel membrane
OPERATING TEMPERATURE (PROCESS) RANGE	-40...+125°C (-40...+257°F)	-40...+125°C (-40...+257°F)	-40...+125°C (-40...+257°F)	-40...+125°C (-40...+257°F)
COMPENSATED TEMPERATURE RANGE	-20...+85°C (-4...+185°F)	-20...+85°C (-4...+185°F)	-20...+85°C (-4...+185°F)	-20...+85°C (-4...+185°F)
ZERO DRIFT IN COMPENSATED FIELD	±0.01% FS/°C typical (±0.02% FS (Full Scale) /°C max.)	±0.01% FS/°C typical (±0.02% FS (Full Scale) /°C max.)	±0.01% FS/°C typical (±0.02% FS (Full Scale) /°C max.)	± 0,01% FS/°C typical (± 0,02% FS/°C max.)
TRANSDUCER BODY CONSTRUCTION MATERIAL	Stainless steel	Stainless steel	Stainless steel	Stainless steel
PARTS IN CONTACT WITH THE PROCESS	Fluids compatible with AISI 430F and 17-4 PH stainless steel	Fluids compatible with AISI 430F and 17-4 PH stainless steel	Fluids compatible with AISI 430F and 17-4 PH stainless steel	Fluids compatible with AISI 430F and 17-4 PH stainless steel
ELECTRICAL CONNECTIONS	4-pin M12x1 connector **(Z)** 3-pin connector - EN 175301-803 **(E)** 3 pole shielded cable (1m) **(F)** 4-pin Deutsch DT04 connector **(G)** 3-pin AMP Superseal 1.5 connector **(S)** 3-pin Metri-Pack 150 connector **(K)** 3-pin Deutsch DT04 connector **(D)**	5-pin M12x1 connector **(A)**	4-pin M12x1 connector **(Z)** 4-pin Deutsch DT04 connector **(G)** 3-pin Deutsch DT04 connector **(D)**	5-pin M12x1 connector **(A)**
OUTPUT SIGNAL	Analogue	Digital	Analogue	Digital
	0...10Vdc*(3 wires) 4...20mA (2 wires) 0.5...4.5 V ratiometric **SIL2 certification not available*	CANopen J1939	0,5...4,5 Vdc (3 wires) **(4)** 0...10 Vdc* (3 wires) **(N)** 4...20mA (2 wires) **(E)** 1...5 Vdc **(P)** **SIL2 certification not available*	CANopen CANopen Safety CAN SAE J1939
MEASUREMENT RANGES	bar: B04U, B06U, B01D, B16U, B02D, B25U, B04D — 4, 6, 10, 16, 20, 25, 40 bar: B06D, B01C, B16D, B02C, B25D, B04C, B06C, B01M — 60, 100, 160, 200, 250, 400, 600, 1000	bar: B04U, B06U, B01D, B16U, B02D, B25U, B04D, B06D — 4, 6, 10, 16, 20, 25, 40, 60 bar: B01C, B16D, B02C, B25D, B04C, B06C, B01M — 100, 160, 200, 250, 400, 600, 1000	bar: B04U, B06U, B01D, B16U, B02D, B25U, B04D, B06D — 4, 6, 10, 16, 20, 25, 40, 60 bar: B01C, B16D, B02C, B25D, B04C, B06C, B01M — 100, 160, 200, 250, 400, 600, 1000	bar: B04U, B06U, B01D, B16U, B02D, B25U — 4, 6, 10, 16, 20, 25 bar: B04D, B06D, B01C, B16D, B02C, B25D, B04C, B06C, B01M — 40, 60, 100, 160, 200, 250, 400, 600, 1000
PROTECTION CLASS IEC 529 (WITH FEMALE CONNECTOR MOUNTED)	IP65/IP67	IP67/IP69K	IP67/IP69K	IP65/IP67
PROCESS CONNECTIONS	G 1/4 gas male (DIN 3852-E) **(E)** 1/4-18 NPT male **(7)**	G 1/4 gas male (DIN 3852-E) **(E)** 1/4-18 NPT male **(7)**	G 1/4 ISO 1179-2 **(E1)** 9/16 UNF SAE J1926-2 **(W3)** R 1/4 ISO 7/1 **(H4)**	G 1/4 ISO 1179-2 **(E1)** 9/16 UNF SAE J1926-2 **(W3)** R 1/4 ISO 7/1 **(H4)**
MAIN APPLICATIONS	- Agricultural vehicles - Railways - Municipalities -Mining -Construction -Mobile hydraulics	- Agricultural vehicles - Municipalities -Mining -Construction -Mobile hydraulics	- Industrial automation - Compressors - Hydraulic power units - Plastic injection presses - Hydraulic presses - Boats/Yachts - Hydraulic systems - Pumps	- Industrial automation - Compressors - Hydraulic power units - Plastic injection presses - Hydraulic presses - Boats/Yachts - Hydraulic systems - Pumps

PRESSURE TRANSDUCERS - CONNECTORS

CON069 4 PIN EV
IP67

CON031 5 PIN M12 (UL)
IP67

CON041 5 PIN M12 90° (UL)
IP67

CAV220 CABLE M12 5 PIN 2M.
IP67

CAV222 CABLE M12 5 PIN 5M.
IP67

CON293 M12 X 1
IP67

			KH	KHC	KM	KMC
CON031	M12 5-POLE FEMALE CONNECTOR	IP67		X		X
CON041	M12 5-POLE FEMALE CONNECTOR; 90°	IP67		X		X
CON045	FEM. CONN. 3 POLE + EARTH FEMALE CONN. (EN 175301-803A); H=28; CULUS 40..+65°C	IP65				
CON064	3-POLE + EARTH FEMALE CONNECTOR (EN 175301-803A); CULUS -40..+65°C (KH/KS SERIES)	IP65	X		X	
CON087	4 POLE M12 X 1 FEMALE CONNECTOR; CULUS -25...+90°C	IP67				
CON293	4-POLE M12 X 1 FEMALE CONNECTOR	IP67	X		X	
CAV220	M12 X 1 FEMALE CONNECTOR WITH 2 M. OF CABLE	IP67	X		X	
CAV222	M12 X 1 FEMALE CONNECTOR WITH 5 M. OF CABLE	IP67	X		X	

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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 servo-mechanisms 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 position.
- MEMS technology calculates the angle of inclination in the three axes X, Y, Z with respect to the earth's axis.

ROTARY
GRA, GRN, GR3P

INCLINOMETERS
GIB, GIG, GIT

MAGNETOSTRICTIVE
RK5, RKXL319

POTENTIOMETERS
PC67, PMI, PMI SLIM

HALL EFFECT
LSA, LML, LMC

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.

POSITION TRANSDUCERS - 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 MAGNETOSTRUCTIVE 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 micron for magnetostrictive transducers.
- Easy installation and simple connection to the most common instruments and PLCs.
- TWIIST possibility to have a multivariable transducer (position, tilt, acceleration, temperature…). Firmware upgradable via BOOT LOADER and customizable, all from remote.
- Sensors guaranteed up to 2 years

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POSITION TRANSDUCERS - RANGE

MODEL	TECHNOLOGY	STROKE LENGHT	LINEARITY	RESOLUTION	OUTPUTS	CERTIFICATIONS
RK5-A	MAGNETOSTRICTIVE	50..2500	± 0.04%	Infinite	Analogue	
RK5-C		50..2500	± 0.04%		CANopen	
RK2 XL319		50..1000	± 0.02%		Analogue	
PC67	POTENTIOMETER	50..750	± 0.05%	Infinite	Potentiometric Voltage Divider	Atex (XI339)
IC		100..550	± 0.1%			
PMA12		50..1000	± 0.2% - ± 0.05%			
PMI12		50..1000	± 0.2% - ± 0.05%			
PMI-SL/SLE		50..1000	± 0.2% - ± 0.05%			
GSF		1800..8300	± 0.25% - ± 0.5%	Infinite 12bit - 14/16bit	Potentiometric, Analogue, CANopen, CANSae1939	
GSH-S	HALL EFFECT	1800..12500	± 0.5%			
GSH-A	POSITION: HALL EFFECT TILT: MEMS	1800..8300	± 0.5%			
LSA	TWIIST HALL EFFECT	50..900	± 0.15%	12bit	Analogue	
LML		100..900		14bit	IO-Link	
LMC					CANopen	
GRA	HALL EFFECT	± 15°- ±180°	±0,5%F.S.	12 bit (Analogue output); 4096 divisions 14 bit divisions (CAN output); 16384 divisions	Analogue, CANopen, SAE1939	E1
GRN						
GR3P				12 bit (Analogue output); 4096 divisions	Analogue	
GIB	MEMS	±10° ±15° ±20° ±30° ±45° ±60° ±85° (dual XY axis) ±180° (single Z axis)	< ± 0,5% FS (±10° to ±60°; ±180°); < ± 0.5% FS (±85°)	0.05° (±10° to ±20°); 0.05°(±30°); 0.1°(±45°); 0.1°(±60°); 0.1°(±85°); 0.1°(±180°) Analogue; 0.05° CANopen	Analogue, CANopen	
GIG			< ±0.5% FS			
GIG RELAY		±10°±15°± 20°± 30°± 45°± 60° (dual XY axis)	< ±0.15% FS	0.01° (from ±10° to ±20°); 0.02°(±30°); 0.03°(±45°); 0.04°(±60°)	Relay	
GIT		+-10° +-15° +-20° +-30° +-45° +-60° (dual XY axis)	< ± 0.15% FS (from ±15° to ± 60°); < ± 0.3% FS (± 85°)	Analogue outputs 0.01° (from ±10° to ±20°); 0.02°(±30°); 0.03°(±45°); 0 .04°(±60°); 0.05°(±85°); 0.1° (±180°). CANopen: 0.01°"	Analogue, CANopen	

POSITION TRANSDUCERS- 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 12500 mm, or angular measurements range from ±10° - ±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 implies that during the analysis of the application, it is necessary to choose a transducer with a useful electrical stroke equal to or greater than the maximum displacement done by the moving part.

RK5

GSH-S

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 or TWIIST Hall Effect 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 (PME and PMI series) as well as on most magnetostrictives.

TWIIST

PMI - SL

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ELECTRICAL OUTPUTS

ANALOGUE

- Ratiometric
- Voltage divider 1 to 60 Vdc
- 0…20mA, 4…20mA
- 0,5…4,5Vdc, 0…5Vdc, 0…10Vdc

DIGITAL

- Magnetostrictives CANopen CiA DS3.01 rel.4.0 and DS406 with special features:
  - Real time resolution switching (2 to 40ms)
  - Position and speed measurement of cursor
  - Setting 4/8 cams or shut off thresholds
- TWIIST CANopen CiA DS3.01 , DS302, DS406 encoder profile, DS410 inclinometer profile
- Position, Tilt, Acceleration & Speed configurable PDO
- CAN SAE J1939
- 14 bit digital resolution

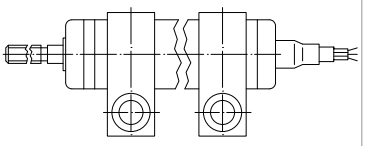
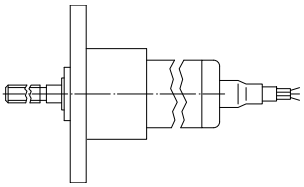
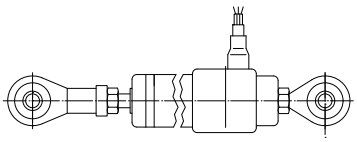
CANopen®

SAE J1939

FIXING 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 morebrackets, 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-ALIGNINGS JOINTS
MAGNETOSTRICTIVES			RK-XL319
		RK5-A	
		RK5-C	
POTENTIOMETERS			PC67
	PZ67	PZ67	
		PMI12	
		PMI-SL/PMI-SLE	
		GSF	
HALL EFFECT		GSH-S/ GSH-A	LSA
		GRA	LML
		GRN	LMC
INCLINOMETERS		GIB	
		GIG / GIG RELAY	
		GIT	

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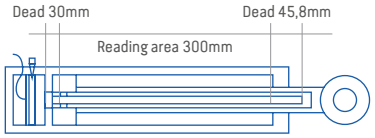
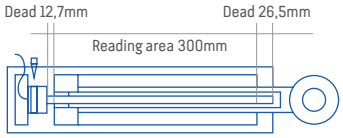
POSITION TRANSDUCERS - HYDRAULIC CYLINDERS



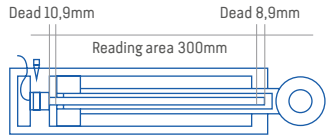
RK5 Solution 1

CONTACTLESS, NO WEAR



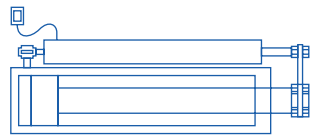
PMI-SL Solution 2

COMPACT, ATEX COMPLIANT



IC Solution 3

SUPER COMPACT

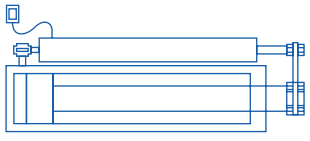


PC67 Solution 4

AUTO ALIGNMENT, IP67

GSH Solution 5

SMALL WITH VERY LONG STROKE



TWIIST Solution 6

AUTO ALIGN-MENT, IP67 POSITION AND TILT

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.

POSITION TRANSDUCERS - IP PROTECTION

	4 1 mm 0	6 0	6 5	6 7	6 8	6 9k
	IP40	IP60	IP65	IP67	IP68	IP69K
MAGNETOSTRICTIVE				RK2 XL319		
						RK5-A
						RK5-C
PTENTIOMETER				PC67	PMI-SL	
				PMI		
				GSF		
HALL EFFECT						TWIIST LSA
						TWIIST LML
						TWIIST LMC
				GRN-F	GRA-D	GRA-A
				GSH-S	GRN-F	GRN-A
						GR3P
INCLINOMETERS				GIB-F		GIB-A
				GIG-M		GIB-F
				GIT-M		GIG-F
						GIT-F

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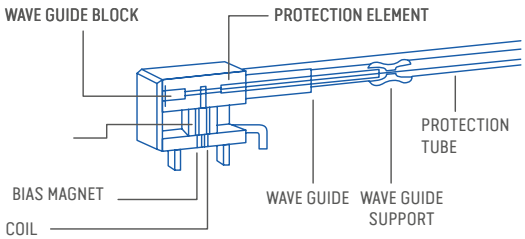
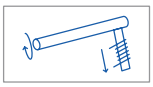
MAGNETOSTRICTIVE TRANSMITTERS

MAGNETOSTRICTIVE TRANSMITTERS - 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 electromagnetic fields. The sensor electronics send a 3 Ampere current pulse down the tube for a duration of 3 microseconds; 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 exactposition 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

MAGNETOSTRICTIVE TRANSMITTERS - RANGE

MODEL	RK5-A	RK5-C	RK2 XL319
USEFUL ELECTRICAL STROKE	50…2500 mm	50…2500 mm	50…1000 mm
INDEPENDENT LINEARITY	< ±0.04% F.S. (minimum ±0.10 mm)	< ±0.04% F.S. (minimum ± 0.10 mm)	< ± 0.02% F.S. (minimum ± 0.060 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
MAXIMUM DISPLACEMENT SPEED OF THE POSITION CURSOR	≤ 10 m/s	≤ 10 m/s	≤ 10 m/s
CURSOR SLIDING FORCE	≤ 0.20 Ncm	≤ 0.20 Ncm	≤ 0.20 Ncm
LIFESPAN	Theoretically unlimited	Theoretically unlimited	Theoretically unlimited
TRANSDUCER BODY CONSTRUCTION MATERIAL	Stainless steel 316	Stainless steel 316	Stainless steel 316 Anodised aluminium
POSITION READER CONSTRUCTION MATERIAL	Magnetic cursor Floating Anodised aluminium	Floating Magnet Slider Ferrobore Neodymium	Floating magnet slider Anodised aluminium
ELECTRICAL CONNECTIONS	**RK5-A** Conn. 5 poles M12 M.	**RK5-C** Conn. 5 poles M12 M.	**RK2** PUR 8-wire cable 1 m.
OUTPUT SIGNALS	Analogue 1 position cursor	Analogue 1 position cursor	Analogue 1 position cursor
	0.5-9.5Vdc/9.5-0.5Vdc 0.5-4.5Vdc/4.5-0.5Vdc 0-20mA/20-0mA 4-20mA/20-4mA	CANopen DS-301 Interface V4.01 Device Profile	"RK2 XL319 0-10Vdc/10-0Vdc RK2 XL353 4-20mA/20-4mA"
PROTECTION RATING	IP69K	IP69K	IP67
MECHANICS AND ANCHORAGE	Mechanical anchorage with ø48mm internal flange	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	154.7… 2609.7 mm	250…1200 mm closed rod 302…2202 mm open rod
	ANALOGUE	CANopen	ANALOGUE

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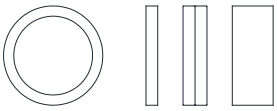
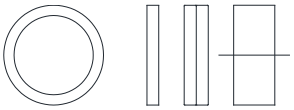
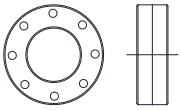
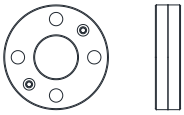
MAGNETOSTRICTIVE TRANSMITTERS - CURSORS

			RK5-A	RK5-C
		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

MAGNETOSTRICTIVE TRANSMITTERS - CONNECTORS

CON031

CON041

CAV011

CAV021

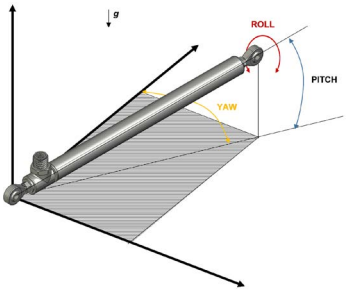
			RK5-A	RK5-C
CON031	5 PIN M12 (UL)	IP67	X	X
CON041	5 PIN M12 90° (UL)	IP67	X	X
CAV011	M12 5 PIN CABLE 2M	IP67	X	X
CAV021	M12 5 PIN 90° CABLE 2M.	IP67	X	X

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 inside the magnetic helix. From the change in the field angle of the magnetic helix along the cylindrical housing, the position of the Hall microchip (located inside the transducer) is detected and thus the displacement measurement.



POSItion

ACCELLEROMETER AND GYROSCOPE

TEMPERATURE

The combination of these three sensors provides this set of information:

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 update

Customized firmware

FIRMWARE UPGRADE:

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

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TWIIST HALL EFFECT TRANSDUCERS - RANGE



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
SLIDING CURSOR SHIFT FORCE	≤ 1N	≤ 1N	≤ 1N
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	IP69K	IP69K	IP69K
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

TWIIST HALL EFFECT TRANSDUCERS - ACCESSORIES

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

TWIIST HALL EFFECT TRANSDUCERS - CONNECTORS AND CABLES

			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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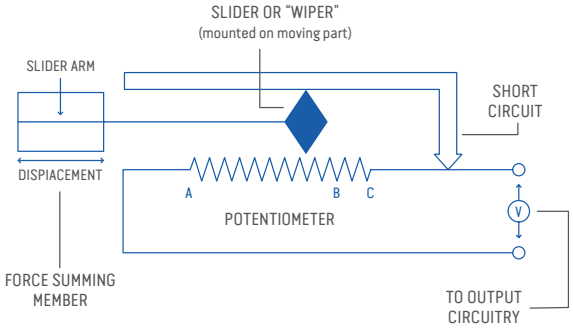
POTENTIOMETRIC TRANSDUCERS

POTENTIOMETRIC TRANSDUCERS - 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.

POTENTIOMETRIC TRANSDUCERS - RANGE

				
MODEL	PC / PC67	IC	PMI12	PMI-SL/PMI-SLE
USEFUL ELECTRICAL STROKE	50…750 mm	100…550 mm	50…1000 mm	50…1000 mm
INDEPENDENT LINEARITY	±0.05%	±0.1%	± 0.1% / 50…100mm ± 0.05% / 150…1000mm	± 0.1% / 50…100mm ± 0.05% / 150…1000mm
RESOLUTION	Infinite	Infinite	Infinite	Infinite
REPEATABILITY	< 0.01 mm	< 0.01 mm	≤ 0.08 mm	≤ 0.08 mm
RESISTANCE	5KOhm / 50…600	10KOhm	"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	-30…+100°C
STORAGE TEMPERATURE	-50…+120°C	-50…+120°C	-50…+120°C	-50…+120°C
SHIFT SPEED	**PC** ≤ 5 m/s, **PC67** ≤ 3m/s max ≤ 5m/s	≤ 1.5 m/s	≤ 10 m/s	≤ 10 m/s
SHIFT FORCE	**PC** ≤ 15N **PC67** ≤ 30N	≤ 1 N	≤ 0.5N	≤ 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	Rod: Anodised aluminium	Stainless steel rod diameter 16 mm	Stainless steel rod diameter 12.7 mm
DRIVE SHAFT CONSTRUCTION MATERIAL	Stainless steel AISI 303	Flange: AISI 303 stainless steel	Nylon 66 GF 40	Nylon 66 GF 40
ELECTRICAL CONNECTIONS	**PCM 4**-pole connector output DIN43650 ISO4400 **PCF 3**-pole PVC cable output 3x0,25 1m	**ICC** conn. 5-pole **ICF** 3 wires - 200 mm	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	**PC** IP65 **PC67** IP67		IP68	IP68
MECHANICS AND ANCHORAGE	Mechanical anchorage and self-aligning drive on two self-aligning ball joints	Mechanical anchorage with internal or external flange	Mechanical anchorage with internal or external flange	Mechanical anchorage with internal or external flange
DIMENSIONS / HOUSING LENGTH	185…898 mm	max. 123.5…573.5 mm	55…1097 mm	55…1100 mm
	RoHS✓ VR. XL339	RoHS✓ VR. XL339	RoHS✓ VR. XL339	RoHS✓ PMI-SL VR. XL339

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POTENTIOMETRIC TRANSDUCERS - CONNECTORS AND ACCESSORIES

CON050

CON293

CON300

			PC67	IC
CON293	4 PIN M12	IP67	X	
CON050	4 PIN M12 90°	IP67	X	
CON300	6 PIN	IP66		X

POTENTIOMETRIC TRANSDUCERS - SIGNAL CONDITIONERS

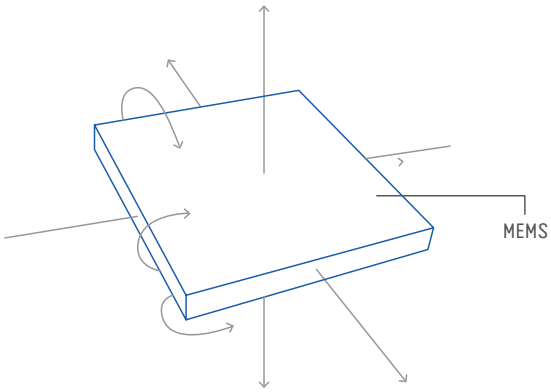
PCIR-A

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;

POSITION TRANSDUCERS WITH MEMS TECHNOLOGY

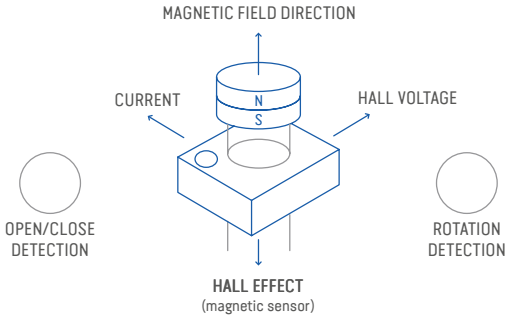
MEMS stands for Micro Electro-Mechanical Systems and is one of the most promising technologies of the 21st century, revolutionising the design paradigms of electronic and computer systems. As a result of this technology, it has been possible to bring electromechanical functions that could previously 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.



POSITION TECHNOLOGY: HALL EFFECT

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.



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ROTATIVES, INCLINOMETERS/ TILT, DRAW WIRES TRANSDUCERS

ROTATIVES, INCLINOMETERS/TILT, DRAW WIRES TRANSDUCERS

MODEL	GRA	GRN	GIB	GIG	GR3P
USEFUL ELECTRICAL STROKE	±15° - ±180° (15° step in analogue versions)	±15° - ±180° (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)	±15° - ±180° (15° step in analogue versions)
UNIT OF MEASUREMENT	Angular Degrees	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	±0,5%F.S.
RESOLUTION	12 bit (analogue output); 4096 divisions 14 bit (CAN output) 16384 divisions	112 bit (analogue output); 4096 divisions 14 bit (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	12 bit (analogue output); 4096 divisions
SAMPLING TIME	4 msec	4 msec	67 msec	67 msec	4 msec.
PROPERTIES OF MEASUREMENT PRINCIPLE	Hall effect	Hall effect	MEMS technology (Micro-Electro-Mechanical Systems)	MEMS technology (Micro-Electro-Mechanical Systems)	Hall effect
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...+85°C	-40...+85°C
LIFESPAN	35 Mil. operations (stroke ±75°)	Theoretically unlimited	Theoretically unlimited	Theoretically unlimited	35 Mil. operations (stroke ±75°)
TRANSDUCER BODY CONSTRUCTION MATERIAL	Transducer: PBT (polybutylene terephthalate)	Transducer: PBT (polybutylene terephthalate)	Transducer: PBT (polybutyle-ne terephthalate)	Transducer: PBT (polybutyle-ne terephthalate)	Transducer: PAA (poliacrillamide)
POSITION READER CONSTRUCTION MATERIAL		Floating Magnetic Cursors 316 L Stainless Steel SmCo Samarium Cobalt			-
OUTPUT SIGNALS	Ratiometric, Analogue, CANo-pen, CAN SAE J1939	Ratiometric, Analogue, CANo-pen, CAN SAE J1939	Ratiometric, Analogue, CANopen	Ratiometric, Analogue, CANopen	Ratiometric, Analogue
	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	0,5-4,5Vdc/4,5-0,5Vdc 0-10Vdc/10-0Vdc 4-20mA/20-4mA
OUTPUT TYPE	Single / Redundant	Single / Redundant	Single	Single / Redundant	Single
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)	Output conn. AMP (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	Angular motion detec-tion shaft integrated with transducer body, 2 holes or 2 fixing slots.
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.	Various models, please consult the technical data sheet.
	ANALOGUE CANopen E1 REDUNDANT SAE J1939	ANALOGUE CANopen E1 REDUNDANT SAE J1939	ANALOGUE CANopen	ANALOGUE REDUNDANT CANopen	ANALOGUE REDUNDANT




MODEL	GIT	GSF	GSH-S	GSH-A
USEFUL ELECTRICAL STROKE	±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	mm	mm	mm / Angular Degrees
INDEPENDENT LINEARITY	< ± 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	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	17 msec	17 msec	POSITION: 67msec. TILT:10 msec.
PROPERTIES OF MEASUREMENT PRINCIPLE	"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
STORAGE TEMPERATURE	-40...+85°C	-40...+85°C	-40...+65°C	-40...+65°C
LIFESPAN	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 - 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	Ratiometric, Analogue, CANopen	Potentiometric, Analogue, CANopen	Analogue 0.5..4.5V, 0..10V, 4..20mA 12 bit; CANopen output 14/16 bit	CANopen output 14/16 bit
	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	CANopen DS-301 Interface V4.01 Device Profile	CANopen DS-301 Interface V4.01 Device Profile
OUTPUT TYPE	Single / Redundant	Single / Redundant	Single / Redundant / Semi-redundant	Single / Redundant / Semi-redundant
PROTECTION RATING	Output conn. M12 (IP67) Output cable (IP X9K)	IP67	IP67	IP67
MECHANICS AND ANCHORAGE	4 anchorage holes	Mechanical wire drive with spring return	Mechanical wire drive with spring return	Mechanical wire drive with spring return
HOUSING SIZE/LENGTH	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.)
	ANALOGUE REDUNDANT CANopen	ANALOGUE REDUNDANT CANopen	ANALOGUE REDUNDANT CANopen	ANALOGUE REDUNDANT CANopen

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ROTATIVES, INCLINOMETERS/TILT, DRAW WIRES TRANSDUCERS - CONNECTORS

CAV002

CAV005

CAV011

CAV021

CAV035

CON031

CON041

CON050

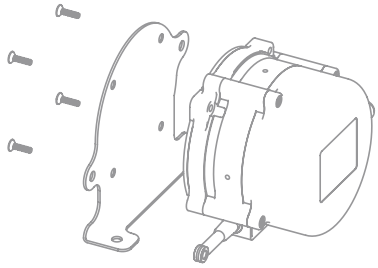
CON293

PCON010

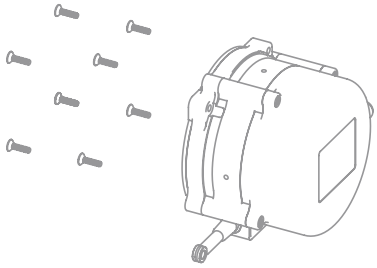
PCON013

			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 PINM12 (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	CAVO DA M12 5 PIN 2M.	IP67			X					X	X
CON021	CAVO DA M12 5 PIN 90° 2M.	IP67			X					X	X
CAV002	CAVO DA M12 8 PIN 2M.	IP67				X	X	X	X	X	X
CAV005	CAVO DA M12 5 PIN 90° 2M.	IP67				X	X	X	X	X	X
PCON010	CAVO PUR 2M + 6 PIN DEUTSCH	IP67	X								
PCON013	CAVO PUR 2M +. 6 PIN AMP	IPX9K	X	X	X						

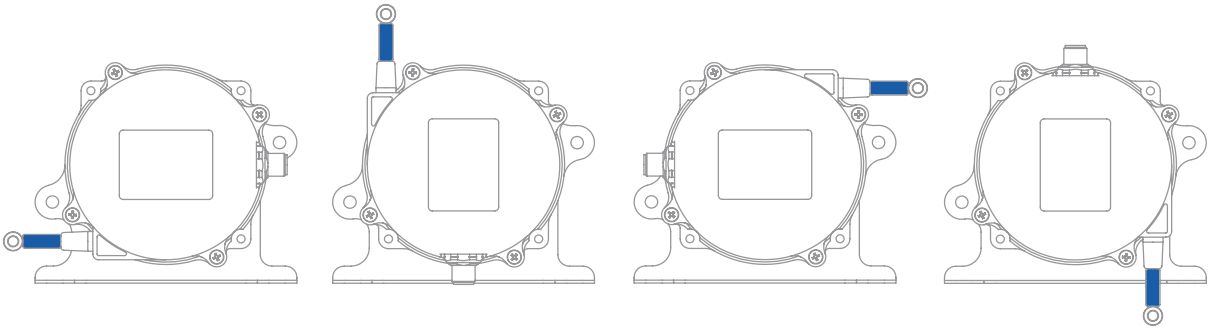
DRAW WIRE TRANSDUCERS - ACCESSORIES



FLANGE MODEL A - FLA033

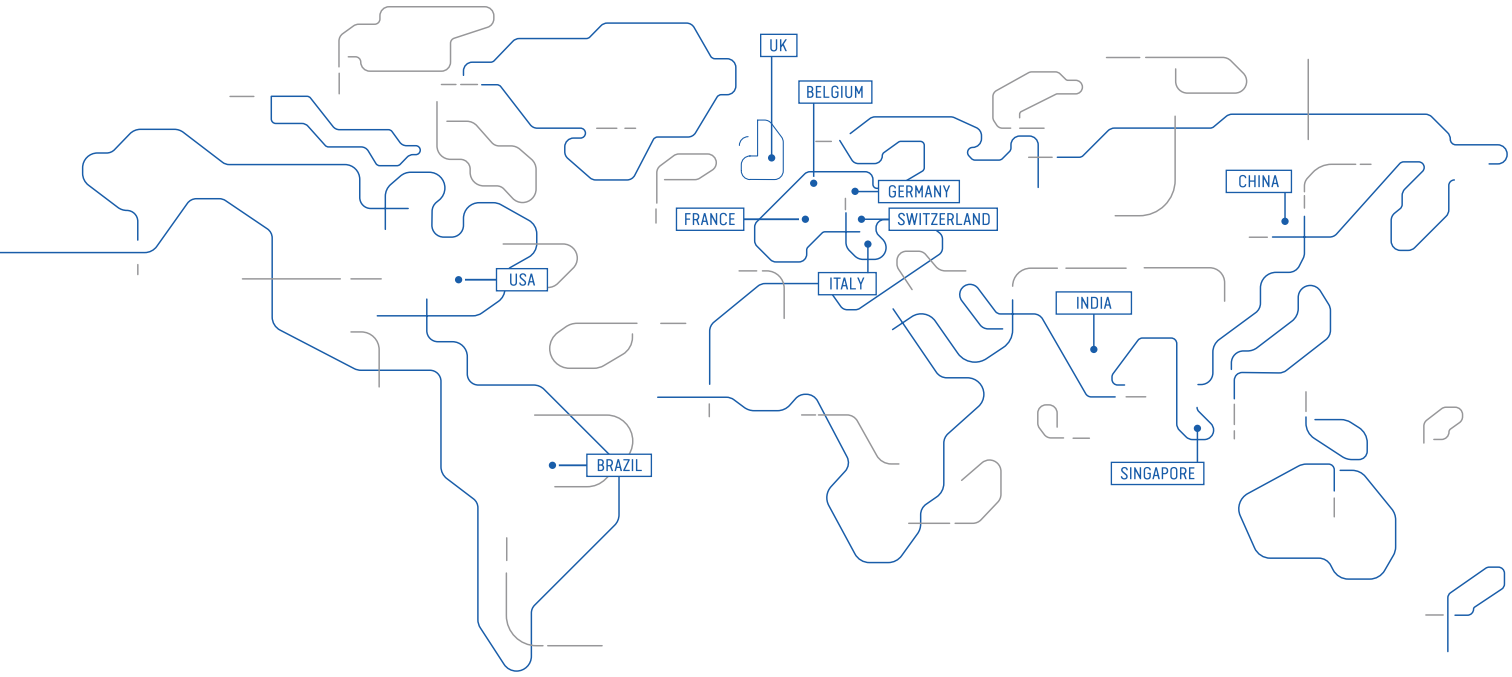


FLANGE MODEL B - FLA034



GSF/GSH-S/GSH-A POSSIBLE FIXING CONFIGURATIONS

COD. 81341H



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