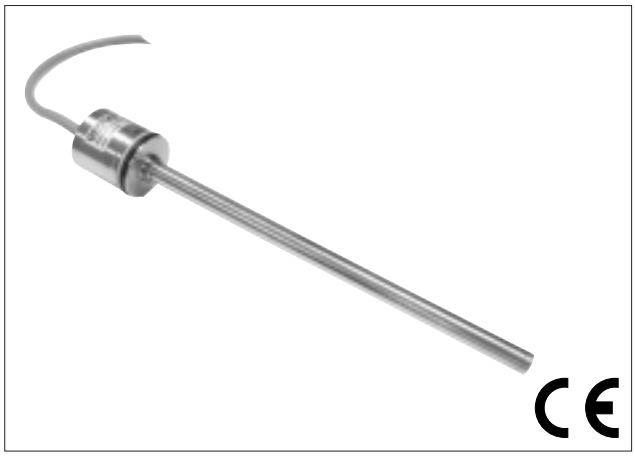
GEFRAN

RK-2

CONTACTLESS MAGNETOSTRICTIVE LINEAR POSITION TRANSDUCER WITH FLANGED HEAD

(ANALOG OR START/STOP OUTPUT)



Main characteristics

- *Absolute transducer*
- *Strokes from 50 to 4000mm (RK-2-_ _ _ _ -N/E/S)*
- *Digital output RS422 Start/Stop (RK-2-_ _ _ _ -S)*
- *Direct analog output (RK-2-_ _ _ _ -N/K/E)*
- *Operating temperature: -30...+90°C*
- *Resistance to vibration (DIN IEC68T2/6 20g)*
- *Power supply 18Vdc...30Vdc*
- *Optional 12Vdc power supply (RK-2-_ _ _ _ -K)*
- *The digital version (RK-2-_ _ _ _ -S) allows the remote connection (max. 50 m) of optional electronics for use of advanced analog (EKA) or CANopen (EKC) interfaces*

Contactless linear position transducer with magnetostrictive technology: the absence of electrical contact on the cursor eliminates problems of wear and consumption and guarantees almost unlimited life.
The head's flanged shape and small size make the RK-2 series ideal for applications requiring installation completely inside the hydraulic cylinder.
The overall dimensions of the sensor are among the smallest available on the market.
For the interface signal, you can choose between a start/stop interface (which allows the use of multiple cursors) and an analog interface that gives the displacement of a single cursor (available in the several ranges in Voltage or Current).
Excellent linearity, repeatability, resistance to mechanical vibrations and shocks complete the product's specifications overview.

TECHNICAL DATA

Model	from 50 to 4000 mm (max. 1250 mm RK-2-_ _ _ _-K)
Measurement taken	Displacement
Position read sampling time (typical)	1 ms
Shock test DIN IEC68T2-27	100g, 11ms single shock
Vibrations DIN IEC68T2-6	20g, 10...2000Hz
Displacement speed	≤10 m/s
Max. acceleration	≤ 100 m/s² displacement
Resolution	Infinite, limited by noise (10µm)
Working pressure	350 bar (peak max 500 bar)

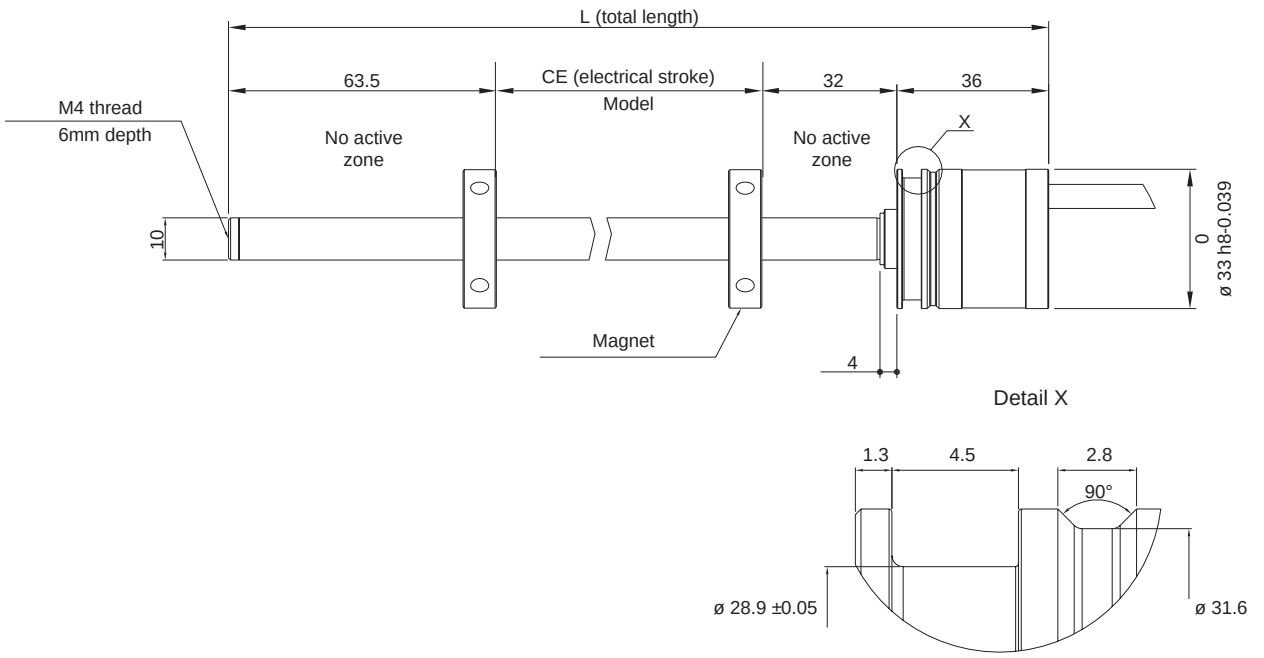
ELECTRICAL DATA

Nominal power supply	18...30Vdc opt. 12Vdc (RK-2-_ _ _ _-K)
Max. power ripple	1Vpp
Output signal	Start/Stop (RK-2-_ _ _ _ -S) 0.1...10.1Vdc (RK-2-_ _ _ _ -N) 0.1...5.1Vdc (RK-2-_ _ _ _ -K) 4...20mA (RK-2-_ _ _ _ -E)
Max. analog output load	5KΩ
Output current consumption	max 40 mA (load on start/stop output: 300 Ω)
Electric isolation	100 Vdc
Protection against polarity inversion	Yes
Protection against overvoltage	Yes

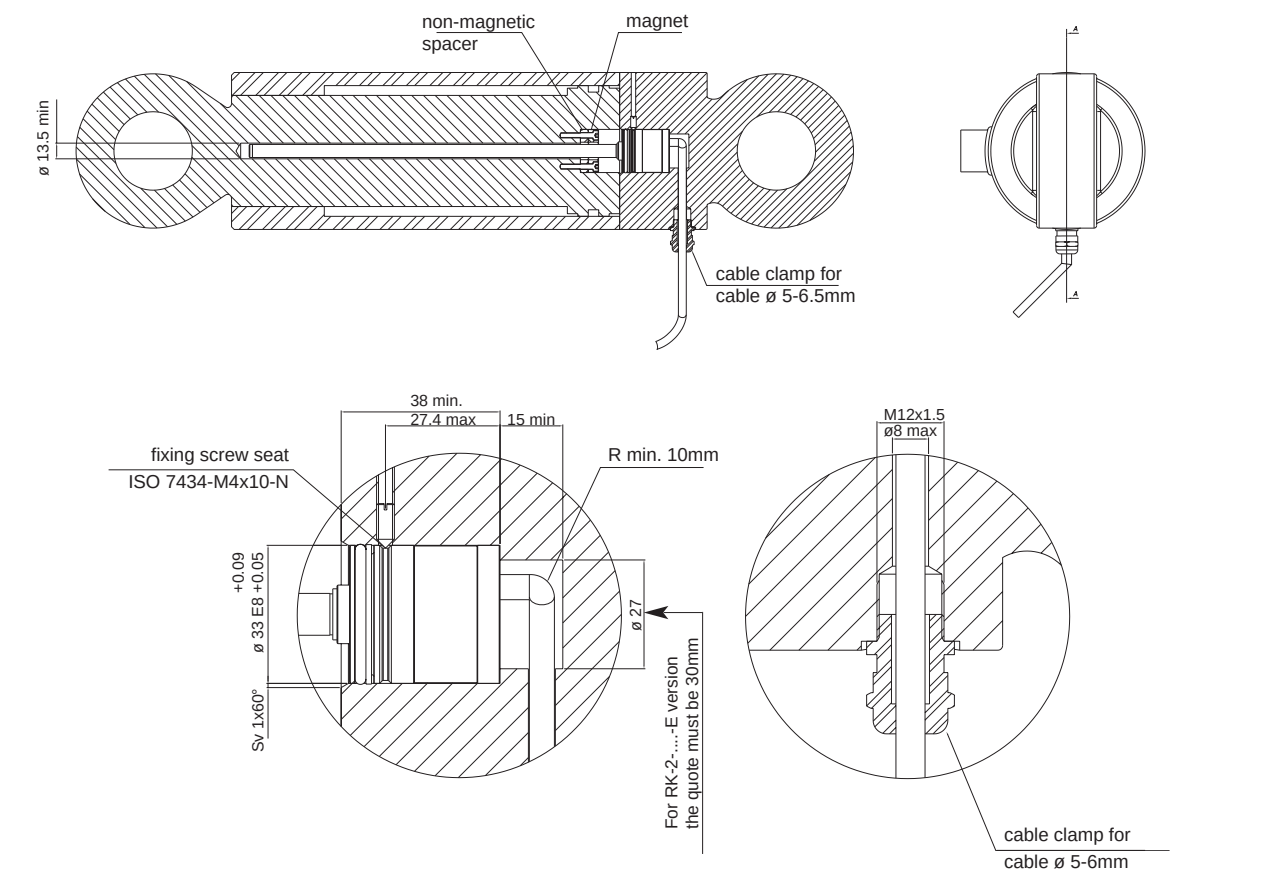
ENVIRONMENTAL DATA

Protection in hydraulic circuit area	IP 67
Operating temperature	-30°…+90°C for strokes ≤ 2500 mm and power supply ≤ 24 Vdc otherwise -30...+70°C
Storage temperature	-40°…+100°C
Coefficient temperature	0.005% FS / °C

MECHANICAL DIMENSIONS



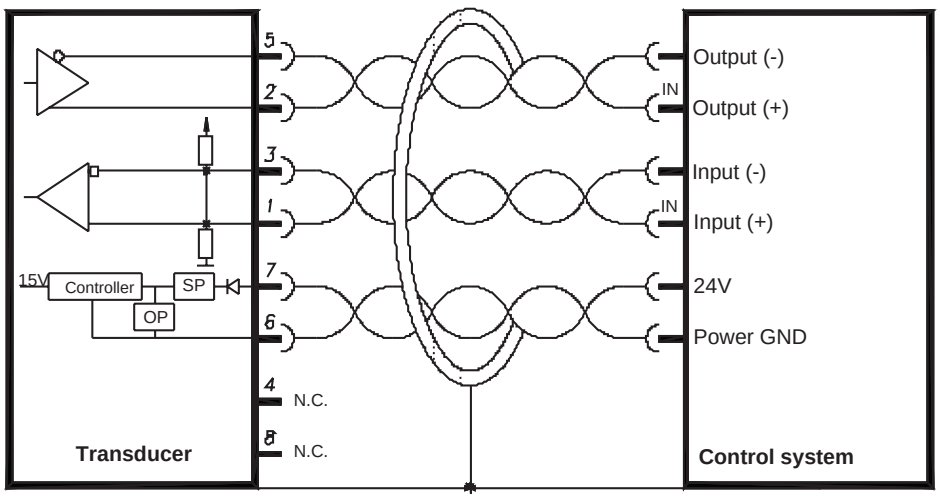
MOUNTING INSIDE A CYLINDER



ELECTRICAL / MECHANICAL DATA

Model		50	100	130	150	200	225	300	400	450	500	600	700	750	800	900	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000
Electrical stroke (C.E.)	mm	**Model**																											
Independent linearity		< ± 0.02% F.S. (Min. ± 0.060 mm)																											
Max. dimensions (L)	mm	**Model +** 131.5 (excluding cable)																											
Repeatability	mm	< 0.01																											
Hysteresis		< ± 0.005% F.S.																											
Sampling time	msec	**1** (**1.5** for strokes from 1100 to 2000) (**2** for strokes from ≥2000)																											

ELECTRICAL CONNECTIONS (RK- 2 - _ _ _ _ - S)



RK-2-_ _ _ _ -S	**Cable**
Output (+)	Gray
Output (-)	Green
Input (+)	Yellow
Input (-)	Pink
Power supply +	Brown
Power supply GND	Blue

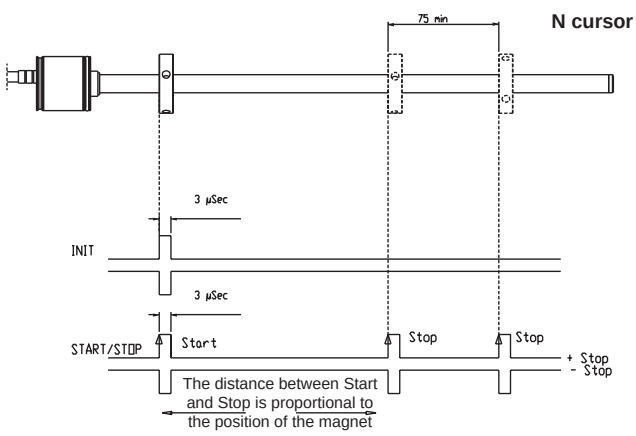
ELECTRICAL CONNECTIONS (RK- 2 - _ _ _ _ - N/K/E)

RK-2-_ _ _ _ -N	**RK-2-_ _ _ _ -K**	**RK-2-_ _ _ _ -E**	**Cable**
Output 0.1...10.1Vdc	Output 0.1...5.1Vdc	Output 4...20mA	Yellow
Output GND	Output GND	Output GND	Pink
Power supply +	Power supply +	Power supply +	Brown
Power supply GND	Power supply GND	Power supply GND	Blue

IMPORTANT: in case of cable lenggth shortening, after cutting the cable take care of soldering and insulating the green and grey wires together

DIGITAL OUTPUT RK- 2 - _ _ _ _ - S

Series RK-2-_ _ _ _ -S magnetostrictive transducers supply digital outputs in START/STOP format with RS422 differential serial transmission.
The transducer requests an Initialisation pulse that launches sampling. The following pulses are transmitted on the outputs:
Start: the Initialisation pulse retransmitted
Stop: the pulse corresponding to the position of each magnet.
The time between the Start pulse and the subsequent Stop pulses is proportional to the position of each magnet according to the "Magnetostrictive wave propagation speed" constant, equal to about 2900 m/Ssec.



P= Time * 2900m/Sec

The correct propagation speed for each product is shown on the product label.
Resolution in terms of metres is linked to the resolution used to measure time

1 µSec (1MHz) ==> 2.9 mm
10 nSec (100 MHz) ==> 0.029mm
1 nSec (1GHz) ==> 2.9 µm

The measurement reference is the leading edge of the pulse.
Optimum width of the interrogation pulse is 3µSec, but the transducer works correctly for times from 1.5 to 5µSec

ORDER CODE

Position transducer R K 2 ☐ ☐ ☐ ☐ ☐

Model

Output		
Start/Stop	Start/Stop interface	**S**
Analog	0.1...10.1Vdc interface (power supply 18...30Vdc)	**N**
Analog	0.1...5.1Vdc interface (power supply 12Vdc)	**K**
Analog	4...20mA interface (power supply 18...30Vdc)	**E**

0 0 0 0 X 0 0 0 X ☐ ☐ X 0 X X

Connection cable to remote element (PUR)

00 = 1 mt **02** = 2 mt **03** = 3 mt
04 = 4 mt **05** = 5 mt **10** = 10 mt
15 = 15 mt

Mechanical and/or electrical characteristics differing from those in the standard version may be arranged on request.

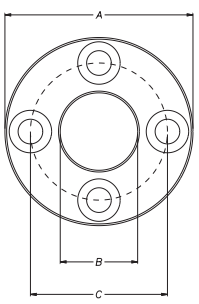
FLOATING CURSOR (to order separately)

P C U R ☐ ☐ ☐

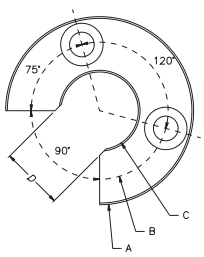
Cursors	
Cursor diameter 32.8	**022**
Cursor diameter 32.8 with 90° slit	**023**
Cursor diameter 25.4	**024**

Dimensions	A	B	C	Thickness
PCUR022	32.8	13.5	23.9	7.9
PCUR023				
PCUR024	25.4	13.5	-	

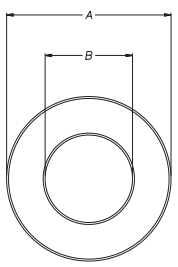
PCUR022



PCUR023



PCUR024



The **PCUR022** is supplied with:

N° 8 Brass nuts M4
N° 8 Brass washers D4
N° 4 Brass screws M4x25

The **PCUR023** is supplied with:

N° 4 Brass nuts M4
N° 4 Brass washers D4
N° 2 Brass screws M4x25

OPTIONAL ACCESSORIES (to order separately)

Cable clamp	**PRE060**

OPTIONAL REMOTE ELECTRONICS FOR RK-2- _ _ _ _ -S

Available in two versions

- With analog voltage or current output for displacement and speed measurement (model EKA)
- With CANopen DS-301 V4.01 Device Profile DS-406 V2.0 interface (model EKC)

Main features

- Option for zero and full-scale adjustment over 100% of the stroke via “magnetic pen” (available on model EKA)
- Power range 10...30Vdc
- Connection to remote electronics via connector or screw terminal (PUR cable, ø 5 mm)
- MAX distance of remote electronics from sensor: 50 m

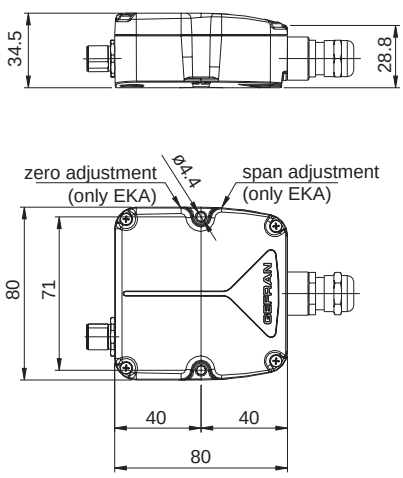
TECHNICAL DATA (EKA)

Measurement taken	Displacement / Speed	
Speed range	0.1 ... 10 m/s	
Accuracy speed	< 2 % (in all F.S.)	
Speed calculation time	Sampling time + 500µsec	
Resolution	16 bit	
Output signal	0...10V (N,P) 0...5V (K)	4...20mA (E,F) 0...20mA (B,C)
Nominal power supply	10...30Vdc	10...30Vdc
Max. power ripple	1Vpp	1Vpp
Current consumption	Depends on power supply voltage: max 70mA with power supply of 30Vdc * max 85mA with power supply of 24Vdc * max 110mA with power supply of 18Vdc ** max 200mA with power supply of 10Vdc ** * peak 0.2A at power ** peak 0.4A at power	
Output load	2 KΩ	< 500 Ω
Max. output ripple	< 5 mV pp	< 5 mV pp
Max. output value	10.6 V	25 mA
Electrical isolation	200 V	200 V
Protection against polarity inversion	YES	YES
Protection against overvoltage	YES	YES
Self-resetting internal fuse	YES	YES

TECHNICAL DATA (EKC)

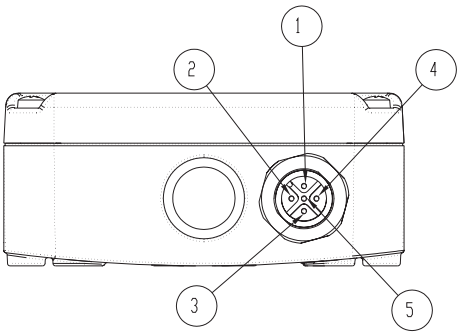
Measurement taken	Displacement / Speed
Displacement resolution	5 µm (2 µm on request)
Speed resolution	Up to 0.01 mm/sec
Speed calculation time	Sampling time + 500 µsec
Output signal	CANopen digital commuication
Nominal power supply	10...30Vdc
Max. power ripple	1V pp
Current consumption	Depends on power supply voltage: max 70mA with power supply of 30Vdc * max 85mA with power supply of 24Vdc * max 110mA with power supply of 18Vdc ** max 200mA with power supply of 10Vdc ** * peak 0.2A at power ** peak 0.4A at power
Electrical isolation	200V
Protection against polarity inversion	YES
Protection against overvoltage	Varistors on power supply line
Overcurrent protection	PTC (internal self-resetting fuse on power supply line)

MECHANICAL DIMENSIONS

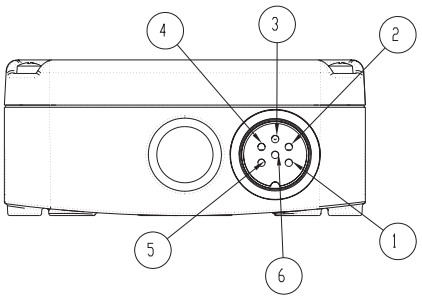


ELECTRICAL CONNECTIONS

RK-_-_ _ _ _-S-EKA- _ -M-_ - _
RK-_-_ _ _ _-S-EKC- _ -M-_ - _



RK-_-_ _ _ _-S-EKA- _ -B-_ - _
RK-_-_ _ _ _-S-EKC- _ -B-_ - _



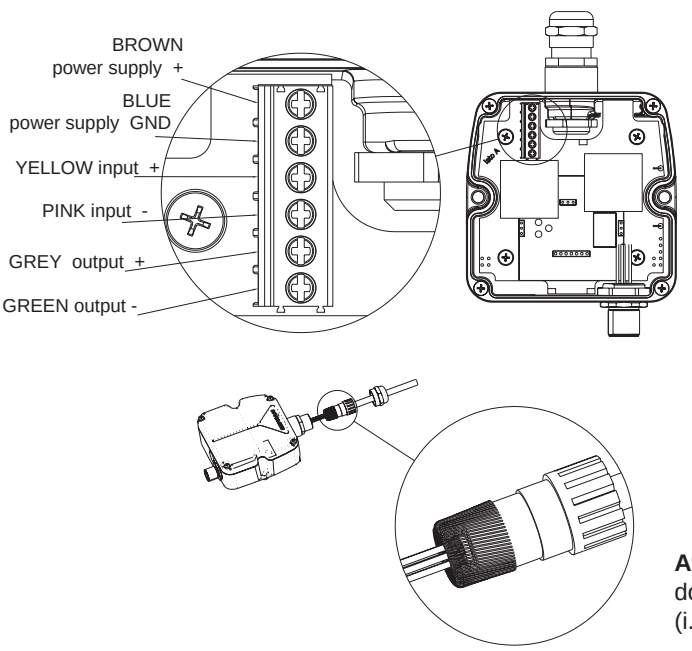
Function	EKA-_-M-_-_ M12 5-pin	EKA-_-B-_-_ M16 6-pin DIN 45322	Optional cable for M12
Output 1 (displacement) 0...10V 0...5V 4...20mA 0...20mA	1	1	Brown
GND shift 1 (0V)	2	2	White
Output 2 (reverse displacement, or speed depending on the model) 0...10V 0...5V 4...20mA 0...20mA	3	3	Blue
GND shift 1/2 (0V)	2	4	White
Power supply +	5	5	Grey
Power supply -	4	6	Black

Function	EKC-_-M-_-_ M12 5-pin	EKC-_-B-_-_ M16 6-pin DIN 45322	Optional cable for M12
CAN L	5	1	Grey
CAN H	4	2	Black
n.c.	1	3	Brown
n.c.	-	4	-
Power supply +	2	5	White
Power supply -	3	6	Blue

INTERCONNECTION BETWEEN PRIMARY SENSOR AND REMOTE ELECTRONICS

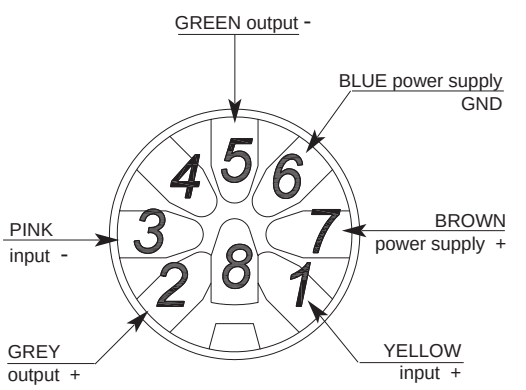
RK- _ - _ _ _ _ - S-EKA - _ - _ - R - _
RK- _ - _ _ _ _ - S-EKC - _ - _ - R - _

(interconnection with wire clamp and screw terminals)



RK- _ - _ _ _ _ - S-EKA - _ - _ - M - _
RK- _ - _ _ _ _ - S-EKC - _ - _ - M - _

(interconnection with M12 8-pin connector)



Attention:
do all wiring BEFORE powering the electronics (i.e., with unit off).

CALIBRATION WITH MAGNETIC PEN (option RK- _ - _ _ _ _ -S-EKA-D- _ - _ - _)

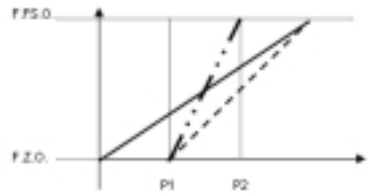
The magnetic pen is needed to calibrate the useful stroke of the transducer in a manner other than as configured in the factory (default).

• CALIBRATION OF ZERO POINT
when the magnet is at the required zero point, position the magnetic pen in the ZERO zone for a time between 0.5 and 10 seconds.

• CALIBRATION OF FULL-SCALE POINT
when the magnet is at the required full-scale point, position the magnetic pen in the FS zone for a time between 0.5 and 10 seconds.

• SAVING THE NEW CALIBRATION
position the magnetic pen in the ZERO or FS zone for a time between 10 and 60 seconds. The programmed configuration will be saved and active at the next power-up.

• RESTORING FACTORY DEFAULT CALIBRATION
position the magnetic pen in the ZERO or FS zone for more than 60 seconds. This will restore the original factory calibration in the internal EEPROM.



Factory

Zero button with Magnet in P1

FS button with magnet in P2

F.Z.O: 0V, 4mA, 0mA, -10V, -5V

F.F.S.O: 10V, 20mA, 0mA, +10V, +5V

ORDER CODE (RK-2 with EKA analog remote electronics)

Position transducer

R	K	2					S	-	E	K	A				

0	0	0	0	X							X	0	X	X

Model

Analog output	**A**
Analog output with zero and span setting	**D**

Output connector type

M12, 5-pin connector output	**M**
DIN 45322 6-pin connector output	**B**

Type of connection to the primary sensor

Internal screw terminal	**R**
M12, 8-pin connector	**M**

Output

0...10Vdc	1 Cursor, double output position (standard)	**N**
0...10Vdc	1 Cursor, position and speed	**P**
4...20mA	1 Cursor, double output position	**E**
4...20mA	1 Cursor, position and speed	**F**

Available on request

0...20mA	1 Cursor, double output position	**B**
0...20mA	1 Cursor, position and speed	**C**
0...+5Vdc	1 Cursor, double output position	**K**

Output of speed

Only for analogic output option C, F, P

Max. measurable speed: 0.1 ÷ 10.0 m/s

00.0	Function not required

Power supply

S	10...30V (standard)

Connection cable to remote element

00 = 1 mt **02** = 2 mt **03** = 3 mt
04 = 4 mt **05** = 5 mt **10** = 10 mt
15 = 15 mt

Mechanical and/or electrical characteristics differing from those in the standard version may be arranged on request.

ORDER CODE (RK-2 with EKC CANopen remote electronics)

Position transducer

R	K	2	□	□	□	□	S	-	E	K	C	A	□	□	□	□	0	0	0	0	□	□	□	□	□	□	□	X	0	X	X

Model

Output connector type

M12, 5-pin connector output	**M**
DIN 45322 6-pin connector output	**B**

Type of connection to the primary sensor

Internal screw terminal	**R**
M12, 8-pin connector	**M**

Type (see table 1)

Transmission speed (see table 2)

System resolution

1	0.002 mm
2	0.005 mm (standard)
3	0.010 mm
4	0.020 mm
5	0.040 mm

Programming node number

XXX	Standard; node = 127
nnn	Node specified by customer

Power supply

S	10...30V (standard)

Connection cable to remote element

00 = 1 mt **02** = 2 mt **03** = 3 mt
04 = 4 mt **05** = 5 mt **10** = 10 mt
15 = 15 mt

Termination resistance

0	Without resistance
1	Resistance 120Ω

Table 1

Type	N. cursors	PD01	PD02	PD03	PD04
A	1	Displacement Speed Cams	No data	No data	No data
B	2	Displacement 1 Speed 1 Cams 1	Displacement 2 Speed 2 Cams 2	No data	No data

Displacement = 4 Byte - Speed = 2 Byte - Cams = 1 Byte

Tabella 2 - velocità di trasmissione

1 = 1 Mbaud	6 = 100 kBaud
2 = 800 kBaud	7 = 50 kBaud
3 = 500 kBaud	8 = 20 kBaud
4 = 250 kBaud	9 = 10 kBaud
5 = 125 kBaud	

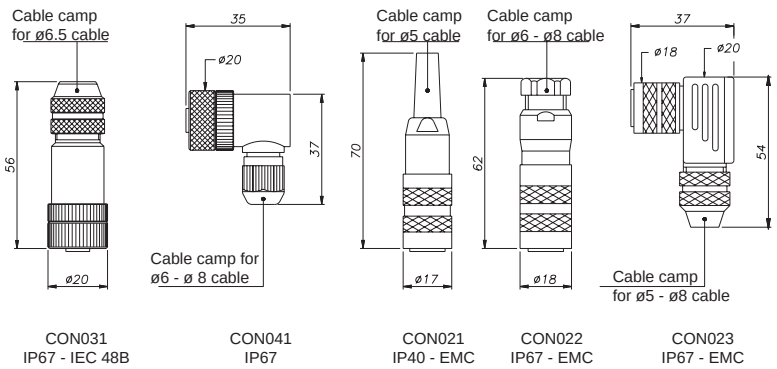
Mechanical and/or electrical characteristics differing from those in the standard version may be arranged on request.

OPTIONAL CONNECTORS FOR EKA and EKC OUTPUT (to order separately)

For M outputs, M12 thread connector
(for RK-_-_ _ _ _-S-EKA-_-M-_-_)
(for RK-_-_ _ _ _-S-EKC-_-M-_-_-_)
Code: **CON031** 5-pin
CON041 5-pin

For B outputs, M16 thread connector
(for RK-_-_ _ _ _-S-EKA-_-B-_-_)
(for RK-_-_ _ _ _-S-EKC-_-B-_-_-_)
Code: **CON021** 6-pin
CON022 6-pin
CON023 6-pin

Connector extraction length: 10mm



CON031 IP67 - IEC 48B | CON041 IP67 | CON021 IP40 - EMC | CON022 IP67 - EMC | CON023 IP67 - EMC

OPTIONAL CABLES FOR EKA and EKC OUTPUT (to order separately)

Cable code (for RK-_-_ _ _ _-S-EKA-_-M-_-_-_) (for RK-_-_ _ _ _-S-EKC-_-M-_-_-_)			
Length "L"		CODE	
		Straight cable	Cable to 90°
2	mt	**CAV011**	**CAV021**
5	mt	**CAV012**	**CAV022**
10	mt	**CAV013**	**CAV023**
15	mt	**CAV015**	**CAV024**

OTHER ACCESSORIES FOR USE WITH EKA and EKC (to order separately)

M12, 8-pin axial male connector
for interconnection **CON460**

Magnetic pen to calibrate
remote electronic (model EK-A-D) **PKIT312**

The EDS file can be downloaded from www.gefran.com

Sensors are manufactured in compliance with:
- EMC 2004/108/CE compatibility directive
- RoHS 2002/95/CE directive

Electrical installation requirements and Conformity certificate are available on our web site: www.gefran.com

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