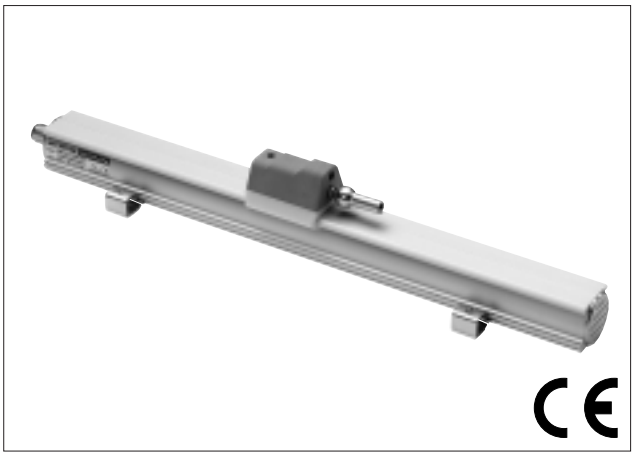
GEFRAN

MK4 S

CONTACTLESS MAGNETOSTRICTIVE LINEAR POSITION TRANSDUCER (SYNCHRONOUS SERIAL OUTPUT)



Main characteristics

- *Absolute transducer*
- *Contactless transducer for longer lifetime*
- *Strokes from 50 to 4000 mm*
- *Quick plug-in throught stainless steel connectors*
- *Sliding or floating magnetic cursor*
- *Synchronous Serial Interface direct to controllers*
- *Resolution from 2 to 40 mm*
- *Data format: binary or Gray code; incremental/ decremental*
- *Work temperature: -30...+75°C*
- *Resistance to vibration (DIN IEC68T2/6 12g)*
- *IP67 protection*
- *EMI CE compatibility (EN 50081-2 50082-1)*
- *EMI CE compatibility24Vdc ±20%*
- *Improved internal structure with security set screws*

Contactless magnetostrictive linear position transducer with RS422-SSI digital output interface. The absence of electrical contact on the cursor eliminates all wear and guarantees almost unlimited life. Compact size for simple installation. Full protection against outside agents for use in harsh environments with high contamination and presence of dust. Excellent linearity, repeatability, resistance to mechanical vibrations and shocks.

TECHNICAL DATA

Model	from 50 to 4000 mm
Measurement taken	displacement
Position read sampling time (typical)	1 ms
Shock test DIN IEC68T2-27	100g - 11ms - single shock
Vibrations DIN IEC68T2-6	12g / 10...2000Hz
Displacement speed	≤10 m/s
Max. acceleration	≤ 100 m/s² displacement
Resolution	2, 5, 10, 20, 40 µm
Cursor (see note)	Sliding cursor Floating separate cursor
Working temperature	-30...+75°C
Storage temperature	-40...+100°C
Coefficient of temperature	20 ppm FS / °C
Protection	IP67

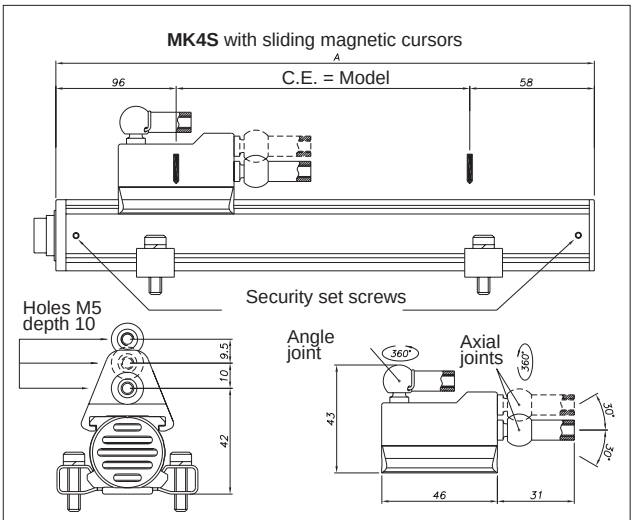
Note
1) For strokes > 2500 mt use sliding or floating cursors with max. distance of 4mm
2) For multi-cursor versions, the cursors have to work under the same distance and temperature conditions

ELECTRICAL DATA

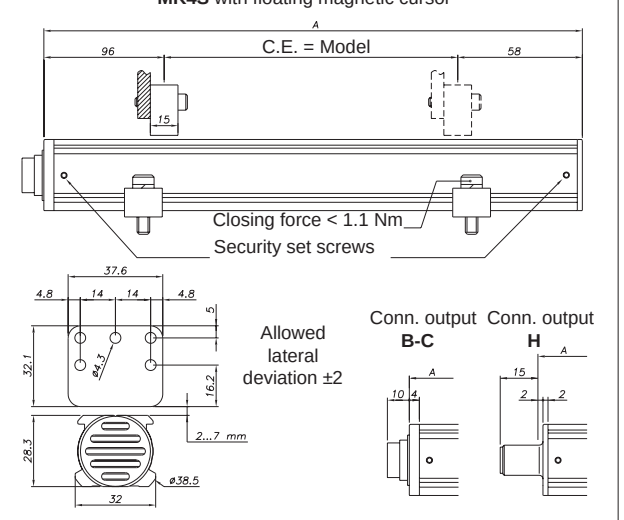
Output signal	Synchronous Serial (SSI); Binary/Gray; Incremental/Decremental
Data length	24 - 25 bit
Nominal power supply	24 Vdc ±20%
Max. power ripple	1Vpp
Max. input	100mA
Output load	RS422/485 standard
Electrical isolation	500V (D.C. supply/earth)
Protection against polarity inversion	Yes
Protection against overvoltage	Yes
Self-resetting internal fuse	Yes

MECHANICAL DIMENSIONS

MK4S with sliding magnetic cursors



MK4S with floating magnetic cursor

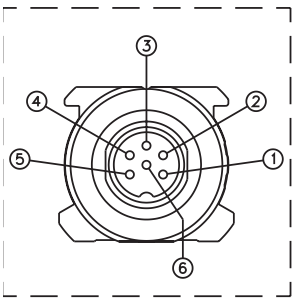


ELECTRICAL / MECHANICAL DATA

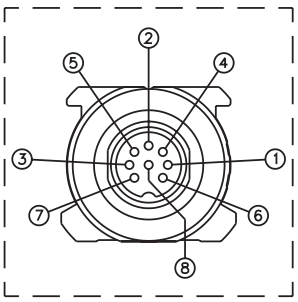
Model		50	75	100	130	150	175	200	225	250	300	350	360	400	450	500	550	600	650	700	750	800	850	900	950	1000	1100	1200	1250	1300	1400	1500
		1750	2000	2250	2500	2750	3000	3250	3500	3750	4000																					
Electrical stroke (E.S.)	mm	**Model**																														
Independent linearity	± %F.S.	typical 0.02 (Max. 0.04)																														
Max. dimensions (A)	mm	**Model + 154**																														
Repeatability	mm	< 0.01																														
Hysteresis	mm	< 0.01																														
Sampling time	ms	**0,5** (**1** for stroke from 300 to 1100) (**1,5** for stroke from 1100 to 2000) (**2** for strokes >2000) (**3** for strokes ≥ 3000)																														

ELECTRICAL CONNECTIONS

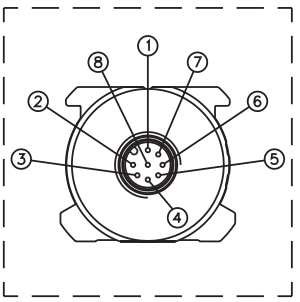
OUTPUT MK4S B



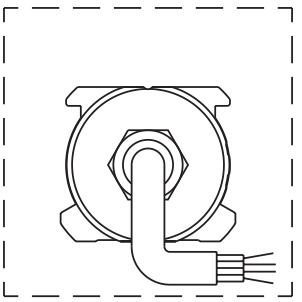
OUTPUT MK4S C



OUTPUT MK4S H



OUTPUT MK4S F/R



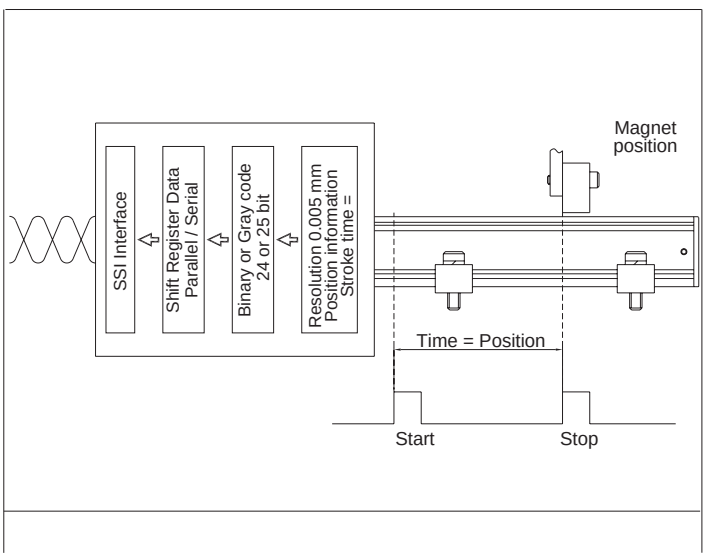
Function	MK4S B	MK4S C	MK4S H	MK4S F	MK4S R	MK4S H
	6-pin M16	*8-pin M16*	*8-pin M12*	*Cable output*	*PUR Cable output*	*With optional 8-pin cable*
Data -	1	5	5	Orange	White	Green
Data +	2	2	2	Orange / White	Blue	Gray
Clock +	3	1	3	Green / White	Gray	Pink
Clock -	4	3	1	Green	Yellow	Yellow
Power supply +	5	7	7	Blue / White	Green	Marrone
Power supply GND	6	6	6	Blue	Brown	Blue
n.c.	-	8	8	-	Pink	White
n.c.	-	4	4	-	-	Red

The transducer case must be grounded with the cable sheathing on the control system side only.

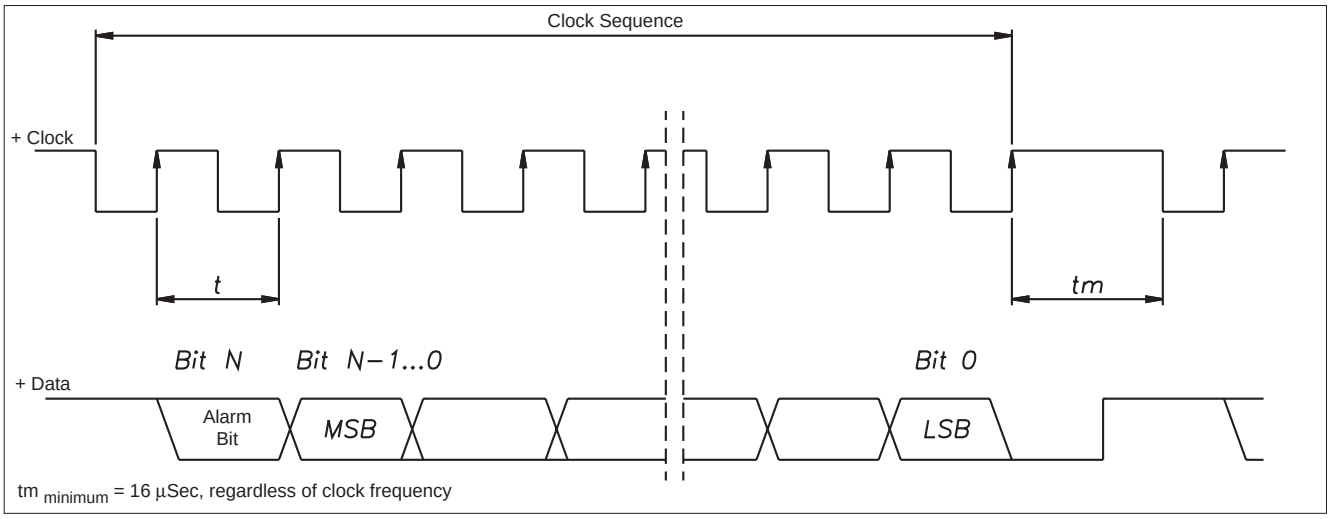
SYNCHRONOUS SERIAL OUTPUT MK4 SSI (Description)

The diagram illustrates the operation of an MK4 S sensor with Synchronous Serial Interface SSI.
Magnet position on the sensor is determined by the magnetostrictive system.
The shift signal is supplied in binary or Gray Code at 24-25 bits and transmitted to the controller via SSI interface.
The refresh rate can reach up to 2000 measurements per second (depending on length).
In addition, the output is absolute, assuring that information on magnet position are immediately available even when the system is switched on.

BLOCK DIAGRAM

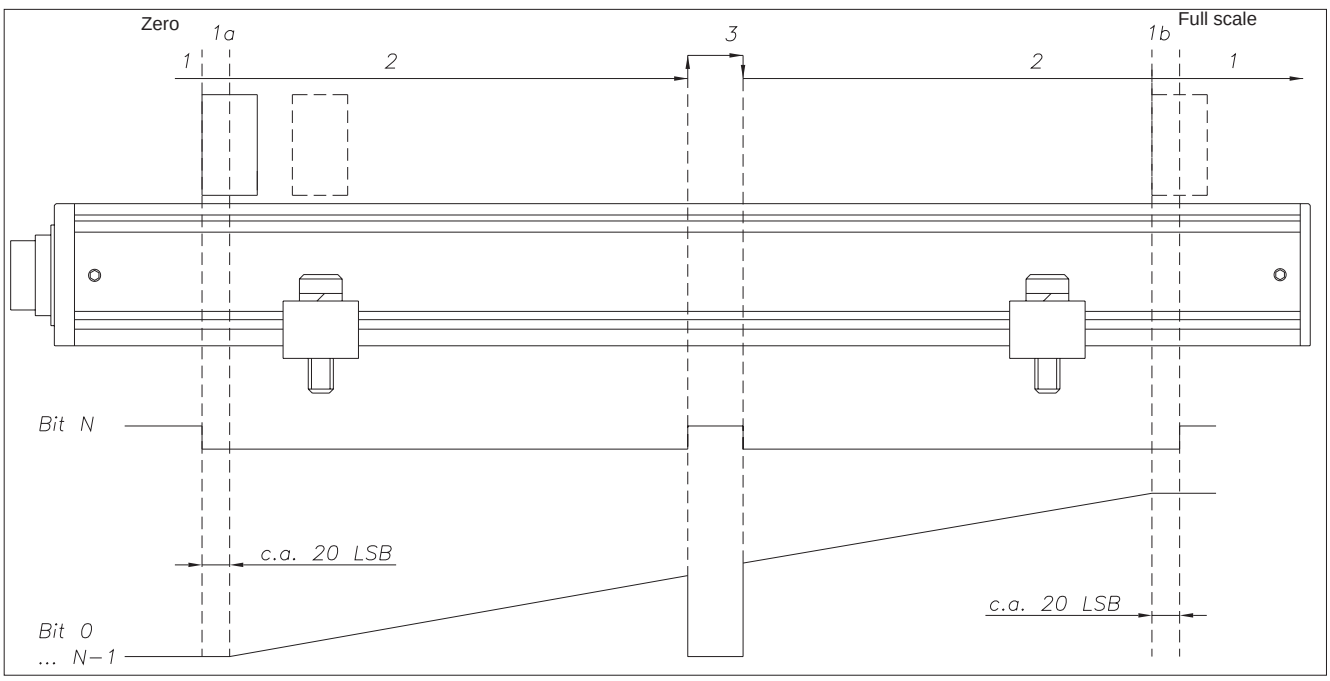


DATA FORMAT



tm $_{minimum}$ = 16 µSec, regardless of clock frequency

ERROR MESSAGES



Magnet position	Bit N	Bit N-1...0
1: Outside measurement range	1	0
1a: Outside measurement range	0	0
1b: Outside measurement range	0	Full scale
2: Inside measurement range	0	Prop. to dist.
3: Magnet not present	1	0

SYNCHRONOUS SERIAL OUTPUT MK4 SSI (input/output Synchronization Option)

SYNCHRONOUS SERIAL OUTPUT MK4 SSI (SYNCHRONIZED VERSION)
Magnet position on the sensor is determined by the magnetostrictive system.
In this case, internal sample rate is synchronized with the SSI external enquiry rate coming from the control.
The shift signal is supplied in binary or Gray Code at 24 bits and transmitted to the controller via SSI interface.
The output is absolute, assuring that information on magnet position are immediately available even when the system is switched on.
The Synchronous Serial Interface SSI is commonly used as an interface between an absolute position sensor and a controller.
The SSI uses a pulse train to initialize the sensor output.
Position data are continuously updated and made available in the shift register.
To maintain synchronism between the internal and external sample rate, the refresh rate can vary from a minimum of 2 KHz (for strokes up to 750 mm) to a maximum of 125 Hz.
The minimum sample rate time can be optimized for shorter strokes.
The data transmitted when the sensor receives the pulse train from the controller refer to the internal sampling just ended.
In case of lack of cursor or measurement error, all 24 bits are set to zero.

SYNCHRONOUS SERIAL OUTPUT MK4 SSI (Oversampling Option)

Magnet position on the sensor is determined by magnetostrictive technology.
The internal sample rate of the position can vary from 2 KHz to 500 Hz according to the stroke. The shift signal is supplied in binary or Gray Code at 24 bits and transmitted to the controller via SSI interface. The output is absolute, assuring that information on magnet position are immediately available even when the system is switched on. Normally, when data are available, they are transmitted to the SSI shift register, where they are available to the controller. Therefore, the refresh rate of the shift register is the same as the internal sample rate. In the "oversampling" version, the transducer's electronics synchronize with the frequency of the external SSI clock, and adjusts the internal timings before every external enquiry. The supplied data is calculated by a first level interpolation, and equals:

$$Out = M + V * T$$

M = last internal measurement
V = magnet speed
T = time elapsed since last measurement

The data is supplied to the shift register taking account of any Jitter in the sampling time of the controller (considered to be 40 µSec). Lower Jitter values guarantee better interpolation results (Figure 1). To maintain synchronization between SSI clock and shift register refresh, the sample frequency can vary from a minimum of 5.5 KHz to a maximum of 125 Hz. Typical value considered = 4KHz.

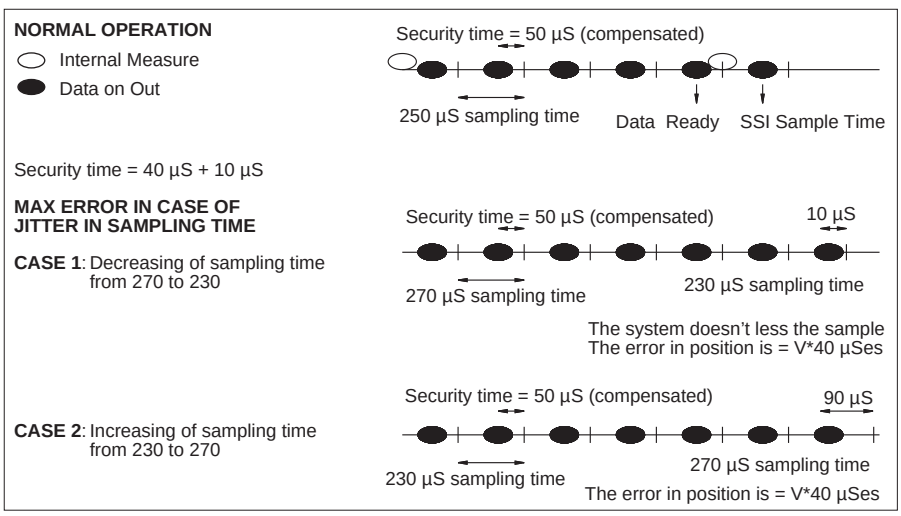
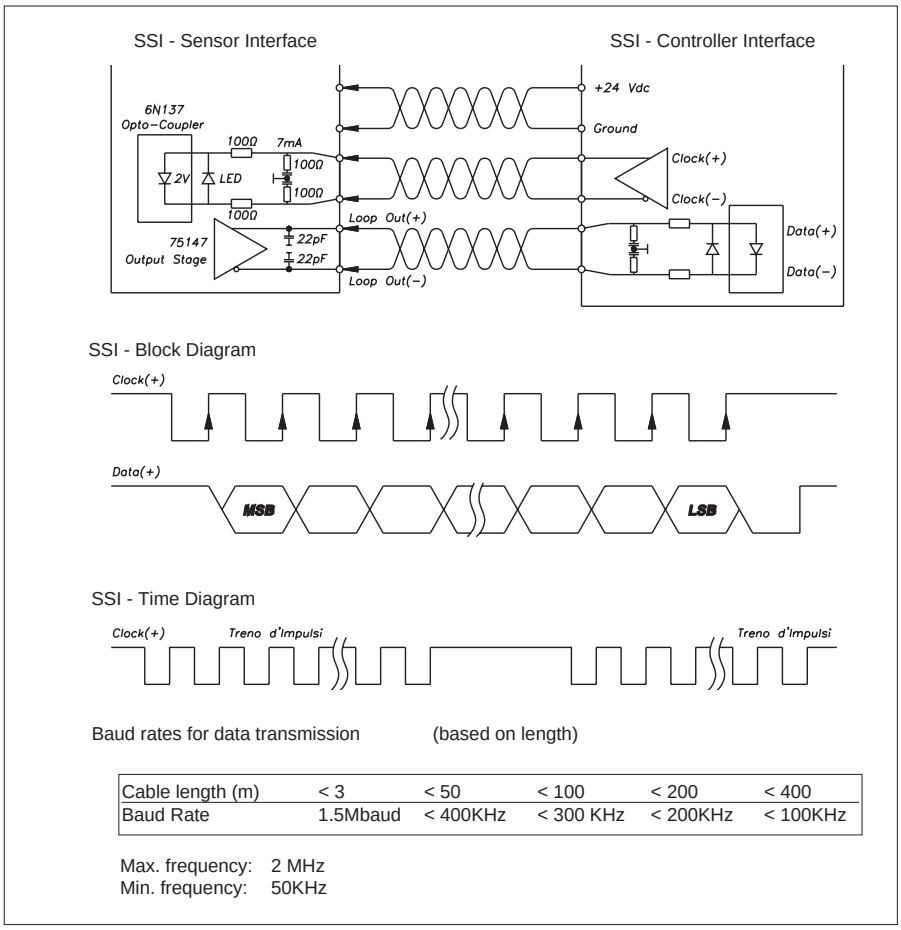


Figure 1



Baud rates for data transmission (based on length)

Cable length (m)	< 3	< 50	< 100	< 200	< 400
Baud Rate	1.5Mbaud	< 400KHz	< 300 KHz	< 200KHz	< 100KHz

Max. frequency: 2 MHz
Min. frequency: 50KHz

Figure 2

ORDER CODE

Position transducer

M	K	4	S	B							0	0	0	0	X	X			X			X	0	X	X

SSI digital output	**S**

Connector	
DIN45322 6-pin connector output	**B**
Available on request	
DIN45326 8-pin connector output	**C**
M12 8-pin connector output	**H**
Cable output PVC 6-pin (1 meter)	**F**
Cable output PUR high flexibility 7-pin 7x0,14	**R**

Model

Output	
Binary data code output	**B**
Gray data code output	**G**

Data length	
Data length 24 bit	**3**
Data length 25 bit	**4**
Data length 21+1 bit (FM357)	**5**

System resolution	
0.002 mm	**0**
0.005 mm (standard)	**1**
0.010 mm	**2**
0.020 mm	**3**
0.040 mm	**4**

Scale orientation	
Ascending (standard)	**1**
Descending	**2**
Ascending (syncronized) (*)	**3**
Descending (over sampling refresh output 4 KHz)	**4**

(*) = See supplemental data

Outputs	
B, **C**, **H** Outputs	**00**
F outputs cables length	
1 meter (standard)	**00**
2 meters	**02**
3 meters	**03**
4 meters	**04**
5 meters	**05**
10 meters	**10**
15 meters	**15**

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

Ex.: MK4-S-B-0400-B-3, 0000-X-X-1-1-X-00-X-0-XX
Transducer model MK4, SSI output, connector B, model 400,
binary data code output, data length 24 bit, system resolution 0.005mm, scale orientation ascending

GEFRAN spa reserves the right to make aesthetic or functional changes at any time and without notice

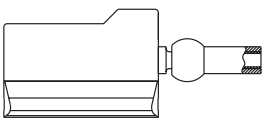
CURSORS ON REQUEST

P C U R □ □ □ 0 1

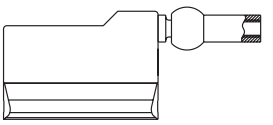
Cursors	
Sliding cursor, axial joint (low) (STANDARD)	035
Sliding cursor, axial joint (high)	036
Sliding cursor, angle joint	037
Floating cursor	034

Number of cursors

PCUR035

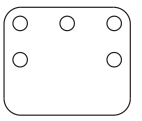


PCUR036

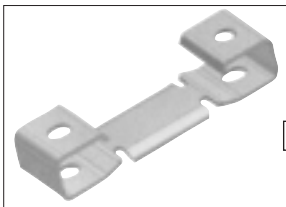


PCUR037

PCUR034

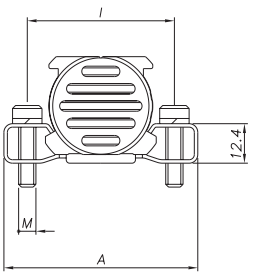


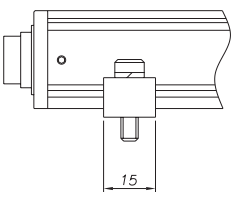
BRACKETS ON REQUEST



P K I T □ □ □

Brackets (2 brackets for every kit)	
Steel bracket, center distance 42.5mm	090
Steel bracket, center distance 50mm	091





Brackets code	Center distance (i)	Screw (V)	Dimensions (A)
PKIT090	42.5	**M4**	**56**
PKIT091	50	**M5**	**63.5**

OPTIONAL CONNECTORS

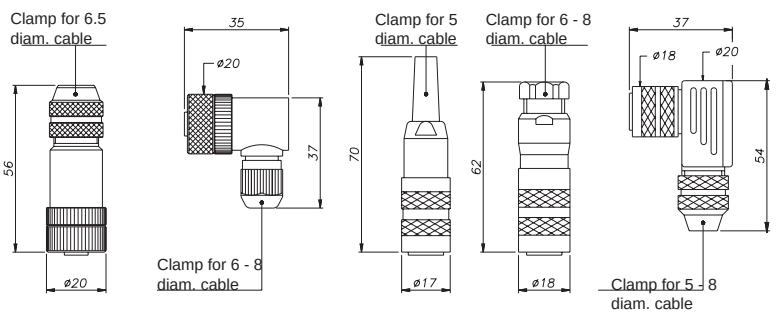
For output H, M12 connector thread

Codes: **CON035** for 8-pin output (MK4S H)
CON042 for 8-pin output (MK4S H)

For outputs B-C, M16 connector thread

Codes: **CON021** for 6-pin output (MK4S B)
CON022 for 6-pin output (MK4S B)
CON023 for 6-pin output (MK4S B)
CON026 for 8-pin output (MK4S C)
CON027 for 8-pin output (MK4S C)
CON028 for 8-pin output (MK4S C)

Connector extraction length 10 mm



CON035 IP67 - IEC 48B

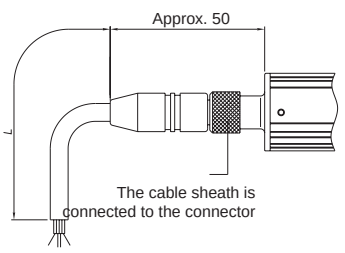
CON042 IP67

CON021 CON026 IP40 - EMC

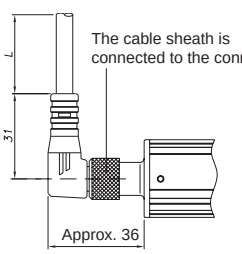
CON022 CON027 IP67 - EMC

CON023 CON028 IP67 - EMC

OPTIONAL CABLES OUTPUT H



PREWIRED CABLE WITH STRAIGHT CONNECTOR



PREWIRED CABLE WITH 90° CONNECTOR

Code for 8-pin cable		MK4S - H	
Length "L"		CODE	
		Straight cable	90° cable
2	mt	**CAV002**	**CAV005**
5	mt	**CAV003**	**CAV006**
10	mt	**CAV004**	**CAV007**
15	mt	**CAV009**	**CAV008**

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