



Edition 07/09

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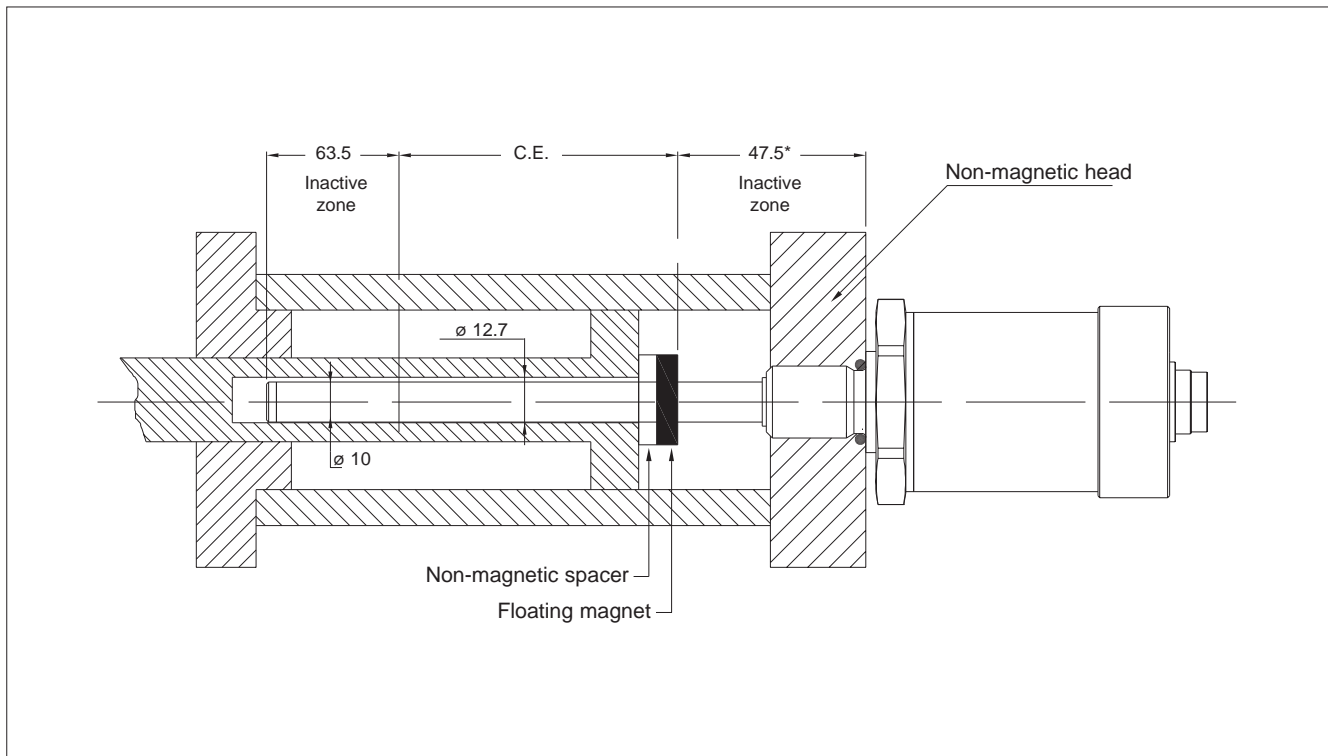
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# 1. General Precautions

## Installing the transducer

- The transducer must be installed away from sources of magnetic fields, both static and 50 Hz (electric motors, solenoids, etc.).
- If it uses a floating cursor (PCUR034), the assembly support must be made with nonmagnetic material.
- The transducer connection cable must be wired separate from power cables and/or solenoid controls, drives, or remote switches.
- The 24 VDC feed must be dedicated to the transducers or must be drawn directly from the power terminals and as near as possible.
- Since the transducer cursor is a magnet, make sure there are no iron filings or small fragments of magnetic metal near the transducer. This could produce an accumulation of material on the cursor, with consequent sliding problems.
- The cylinder head (in which the threaded hole will be drilled for inserting the transducer) must be made of nonmagnetic material. If not, the residual magnetization caused by drilling the threaded hole must be less than 4 Gauss.
- The system must be used only in accordance with the required protection level.
- The sensor must be protected against accidental knocks and used in accordance with the instrument's ambient characteristics and performance levels.
- The sensors must be powered with non-distributed networks and always at lengths of less than 30 mt.
- In case of outdoor installations, follow the instructions in paragraph 6.

## Mounting inside a cylinder



## 2. Analogs

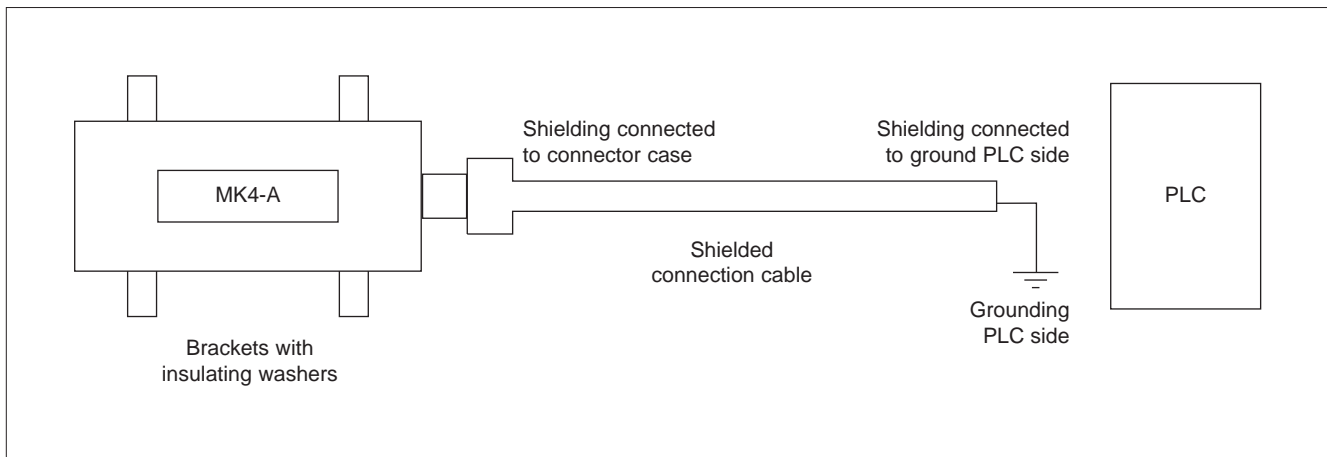
Transducers: MK4-A / IK4-A / RK-2 / RK-4

Outputs: 0...10V, 4...20mA

### MK4 installation notes

- The transducer must be attached with brackets fitted with insulating washers. In this way, the transducer case is electrically isolated from the metal structure of the machine it is installed on.
- The braiding of the shielded transducer connection cable must be connected to the case of the female connector so that the shielding is connected to the transducer case.
- The cable shielding on PLC side must be grounded.

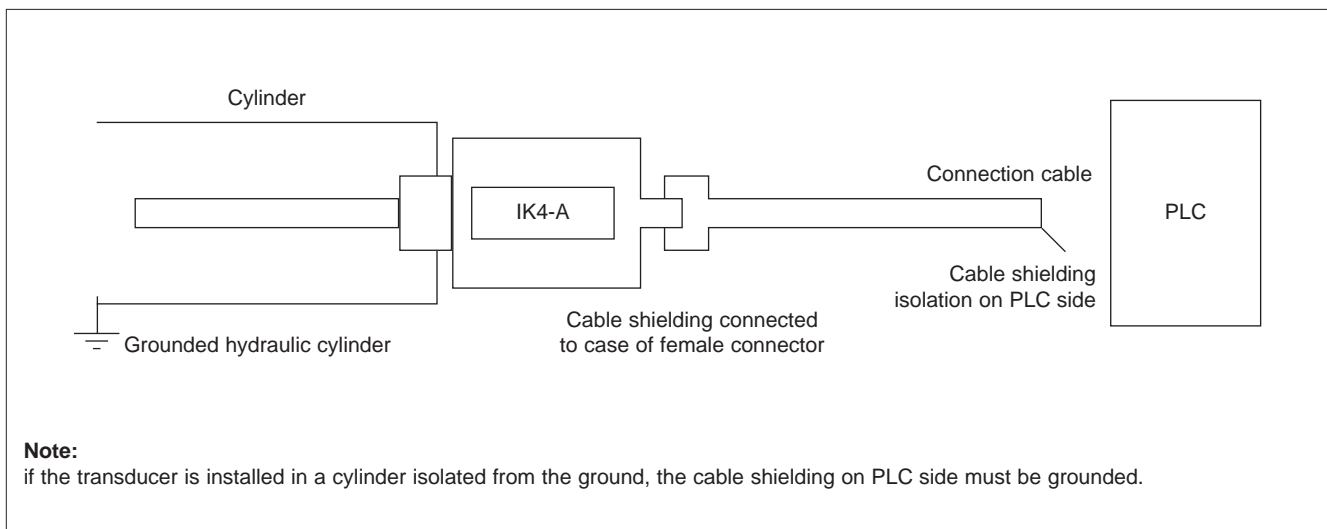
### Standard installation (recommended)



### IK4, RK installation notes

- The transducer must be on a grounded metallic cylinder.
- The braiding of the shielded transducer connection cable must be connected to the case of the female connector so that the shielding is connected to the transducer case.
- The cable shielding on PLC side must be isolated.

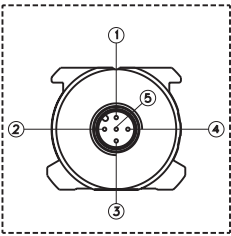
### Standard installation (recommended)



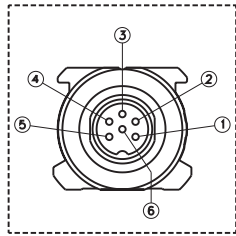
## Electrical connections

### Series MK4-A

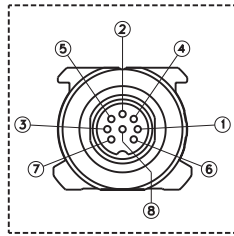
Output **MK4A A**



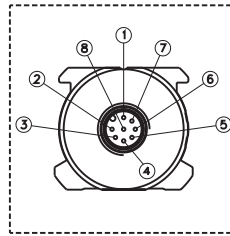
Output **MK4A B**



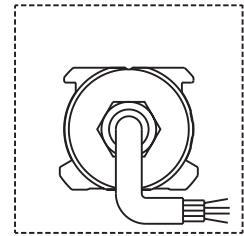
Output **MK4A C**



Output **MK4A H**



Output **MK4A F**



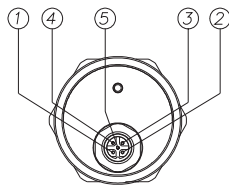
Function	CONNECTORS				CABLE MK4A-F Standard cable	OPTIONAL CABLES FOR	
	MK4A-A 5-pin M12	MK4A-B 6-pin M16	MK4A-C 8-pin M16	MK4A-H 8-pin M12		MK4A-A 5-pin pre-assembled	MK4A-H 8-pin pre-assembled
<b>Output cursor 1</b> 0,1...10,1V 0...10V 4...20mA 0...20mA -10...+10V -5...+5V	1	1	5 (1*)	5	Grey	Brown	Green
<b>GND</b> <b>Output cursor 1</b> (0V)	2	2	2	1	Pink	White	Yellow
<b>Inverse output cursor 1</b> <b>Output cursor 2</b> <b>Output speed</b> (not present on W version) 0...10V 4...20mA 0...20mA -10...+10V -5...+5V	3	3	3	3	Yellow	Blue	Pink
<b>GND</b> <b>Output cursor 1</b> <b>Output cursor 2</b> <b>Output speed</b> (0V)	2	4	6	2	Pink	White	Grey
<b>Power supply +</b>	5	5	7	7	Brown	Grey	Brown
<b>Power supply GND</b>	4	6	8	6	White	Black	Blue
<b>n.c.</b>	-	-	4	4	-	-	Red
<b>n.c.</b>	-	-	1(5*)	8	-	-	White

(\*) = for version 4...20mA / 0...20mA

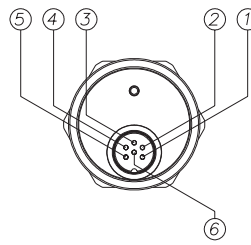
The transducer case must be grounded with the cable sheathing on the control system side only.

Series **IK4-A**

Output **IK4-A-A**



Output **IK4-A-B**

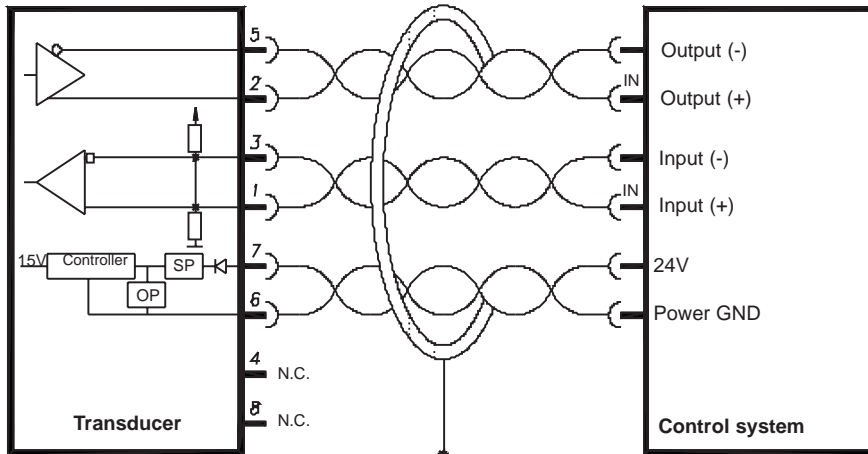


Output **IK4-A-F/R**



Function	CONNECTORS		CABLES	OPTIONAL CABLES
	IK4-A-A	IK4-A-B	IK4A-F/R	CAV01_/CAV02_
	5-pin M12	6-pin M16	Standard cable	Pre-assembled 5-pin for IK4A-A
<b>Output 1 (position)</b> 0...10V 4...20mA 0...20mA	1	1	Grey	Brown
<b>GND Output 1</b> (0V)	2	2	Pink	White
<b>Output 2 (inverse position)</b> 10...0V 20...4mA 20...0mA	3	3	Yellow	Blue
<b>GND Output 2</b> (0V)	2	4	Green	White
<b>Power supply +</b>	5	5	Brown	Grey
<b>Power supply GND</b>	4	6	White	Black
n.c.	-	-	-	-
n.c.	-	-	-	-

Electrical connections (RK - 2 - \_\_\_\_\_ - S)

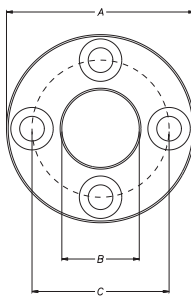


RK- _____ -S	Cable
Output (+)	Gray
Output (-)	Green
Input (+)	Yellow
Input (-)	Pink
Power supply +	Brown
Power supply GND	Blue

Electrical connections (RK - 2 - \_\_\_\_\_ - N / K / E)

RK- _____ -N	RK- _____ -K	RK- _____ -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

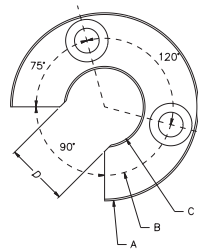
PCUR022



The **PCUR022** is supplied with:

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

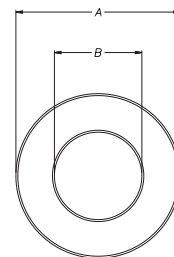
PCUR023



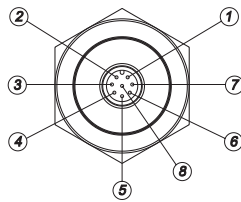
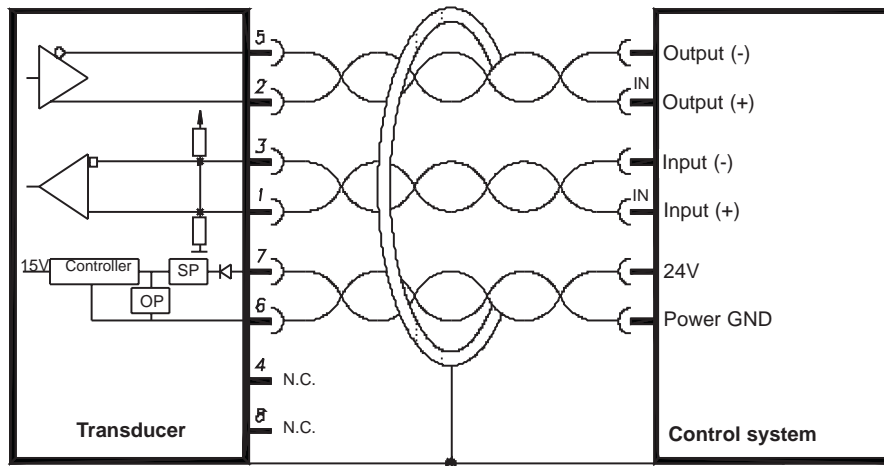
The **PCUR023** is supplied with:

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

PCUR024

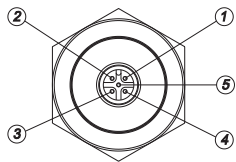


Electrical connections (RK - 4 - \_\_\_\_\_ - S)



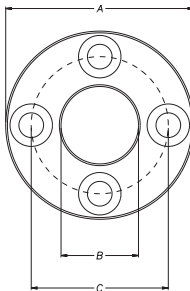
1	Input +
2	Output +
3	Input -
4	n.c.
5	Output -
6	Power supply GND
7	Power supply +
8	n.c.

Electrical connections (RK - 4 - \_\_\_\_\_ - N / K / E)



	RK-4-_____-N	RK-4-_____-K	RK-4-_____-E
1	Output 0,1...10,1Vdc	Output 0,1...5,1Vdc	Output 4...20mA
2	Output GND	Output GND	Output GND
3	n.c.	n.c.	n.c.
4	Power supply GND	Power supply GND	Power supply GND
5	Power supply +	Power supply +	Power supply +

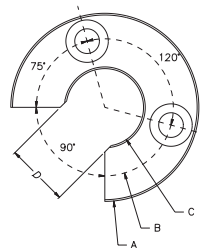
PCUR022



The PCUR022 is supplied with:

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

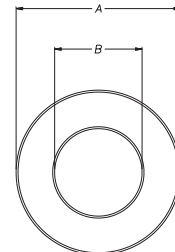
PCUR023



The PCUR023 is supplied with:

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

PCUR024



### 3. SSI

Transducers: MK4-S / IK4-S

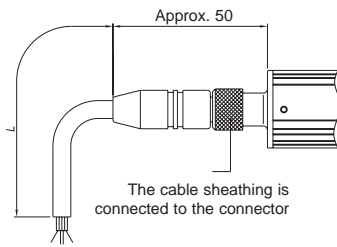
Outputs: SSI

#### Installation notes

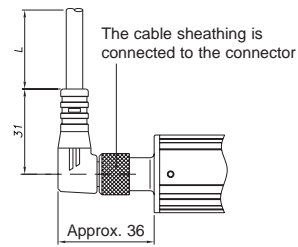
- Connections with instructions taken from MK4-S data-sheet.
- Braiding grounded on PLC side for both MK and IK.
- The braiding must always be wired so that it is electrically connected to the connector case on transducer side.
- Cable length is based on baud rate.

#### Optional cables

##### PRE-ASSEMBLED CABLE WITH STRAIGHT CONNECTOR



##### PRE-ASSEMBLED CABLE WITH 90° CONNECTOR

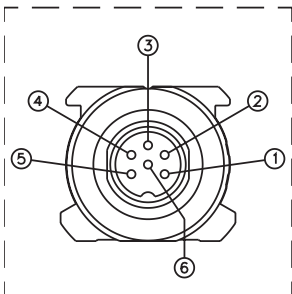


8-pin cable code		MK4S - H	
Length "L"		CODE	
		Straight cable	Cable to 90°
2	mt	CAV002	CAV005
5	mt	CAV003	CAV006
10	mt	CAV004	CAV007
15	mt	CAV009	CAV008

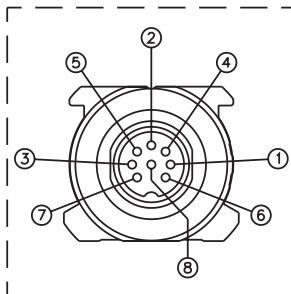
#### Electrical connections

##### Series MK4-S

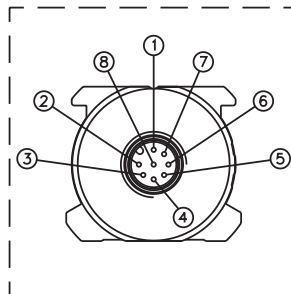
##### Output MK4-S B



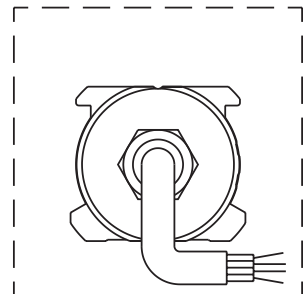
##### Output MK4-S C



##### Output MK4-S H



##### Output MK4-S F/R



Function	MK4-S B	MK4-S C	MK4-S H	MK4-S F	MK4-S R	CAV00X
	6-pin M16	8-pin M16	8-pin M12	Cable output	PUR cable output	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	Brown
Power supply GND	6	6	6	Blue	Brown	Blue
n.c.	-	8	8	-	Pink	White
n.c.	-	4	4	-	-	Red

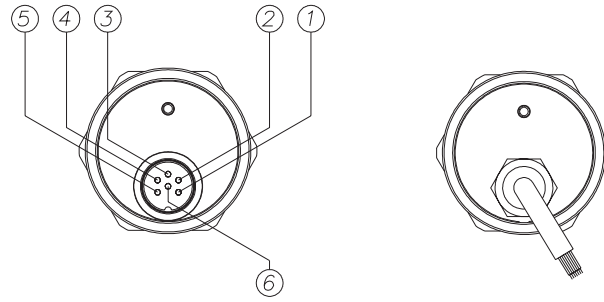
The transducer case must be grounded with the cable sheathing on the control system side only



Series **IK4-S**

Output **IK4-S-B**

Output **IK4-S-F/R**



Function	IK4S B	IK4S F	IK4S R
	6-pin M16	Cable output	PUR cable output
Data -	1	Orange	Pink
Data +	2	Orange / White	Blue
Clock +	3	Green / White	Gray
Clock -	4	Green	Yellow
Power supply +	5	Blue / White	Green
Power supply GND	6	Blue	Brown
n.c.	-	-	-
n.c.	-	-	-

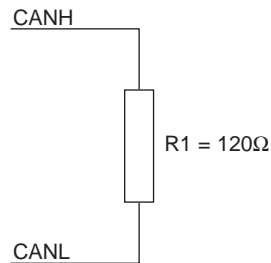
**4. CAN ISO 11898**

Transducers: MK4-C / IK4-C

Outputs: CANopen DP406

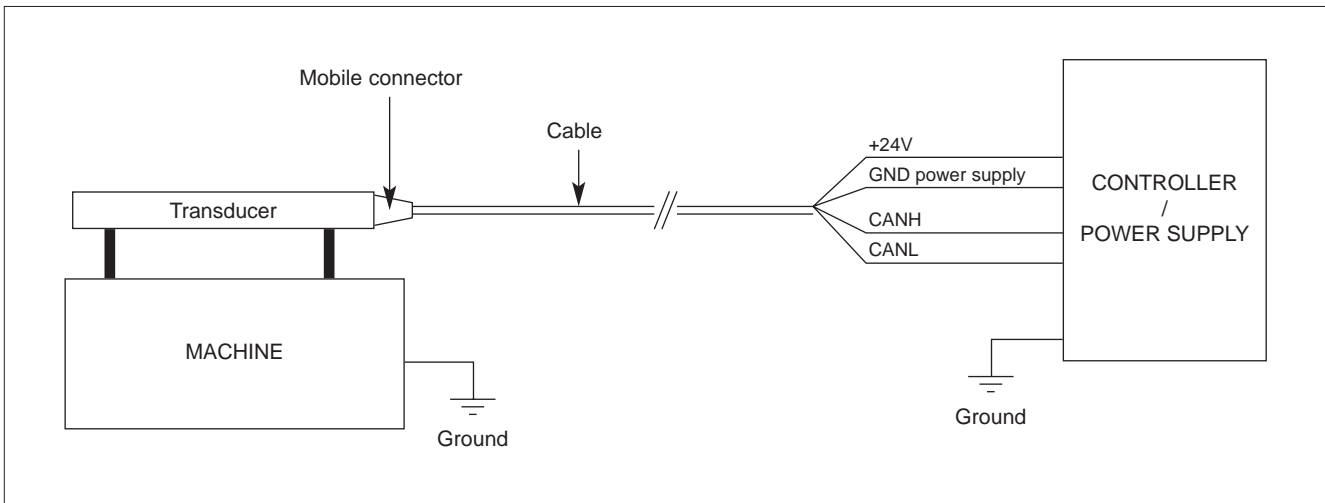
**Installation notes**

- Make sure that the transducer body is electrically connected to the machine body (ground).
- If a shielded, prewired cable was not purchased, make sure to connect the braiding (shielding) of the cable to the body of the mobile female connector.
- DO NOT connect the power supply GND to earth or to the cable shielding.
- Connect the cable shielding only on transducer side and not on power supply side.
- Make sure that there is a terminator plug (120Ω resistor between CANH and CANL lines) at the beginning and end of the network.



- For inside cylinder applications, make sure that the cylinder head is not magnetized.

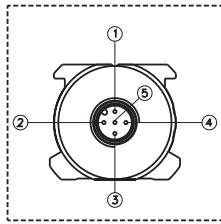
**Standard installation (recommended)**



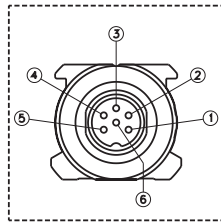
## Electrical connections

### Series MK4-C

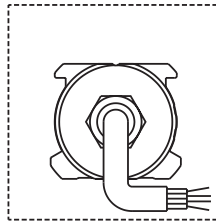
Output MK4-C A



Output MK4-C B



Output MK4-C F

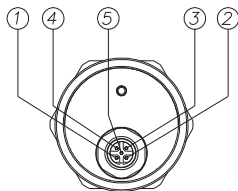


Function	Connector (B) Pin°	Connector (A) Pin°	Cable (Wire color)
CAN L	1	5	Blue
CAN H	2	4	White
n.c.	3	1	-
n.c.	4	-	-
Power + Vdc	5	2	Red
GND power supply	6	3	Black

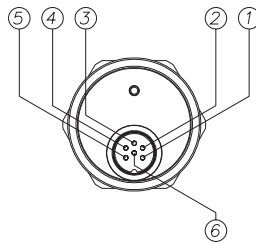
**ATTENTION !** Do not connect the GND to the ground or to the cable sheathing

### Series IK4-C

Output IK4-C-A



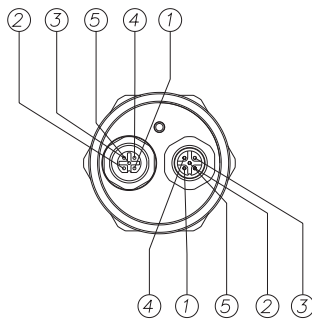
Output IK4-C-B



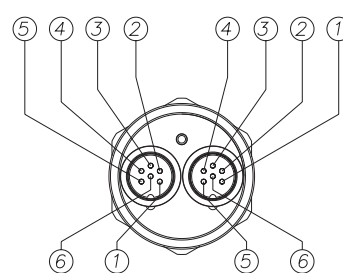
Output IK4-C-F



Output IK4-C-Y



Output IK4-C-X



Function	CONNECTORS						CABLE
	IK4-C-A	IK4-C-B	IK4-C-Y		IK4-C-X		IK4-C-F
	5-pin M12	6-pin M16	Double connector 5-pin M12 (male + female)		Double connector 6-pin M16 (male + female)		Standard cable 4-pin
			male	female	male 1	male 2	
CAN L	5	1	5	5	1	1	<b>BLUE</b>
CAN H	4	2	4	4	2	2	<b>WHITE</b>
CAN GND (n.c.)	1	3	1	1	3	3	-
n.c.	-	4	-	-	4	4	-
Power supply +	2	5	2	2	5	5	<b>RED</b>
Power supply GND	3	6	3	3	6	6	<b>BLACK</b>

## 5. Profibus IEC 61158 Type 3

**Transducers:** MK4-P / IK2-P

**Outputs:** Profibus DP

### Installation notes

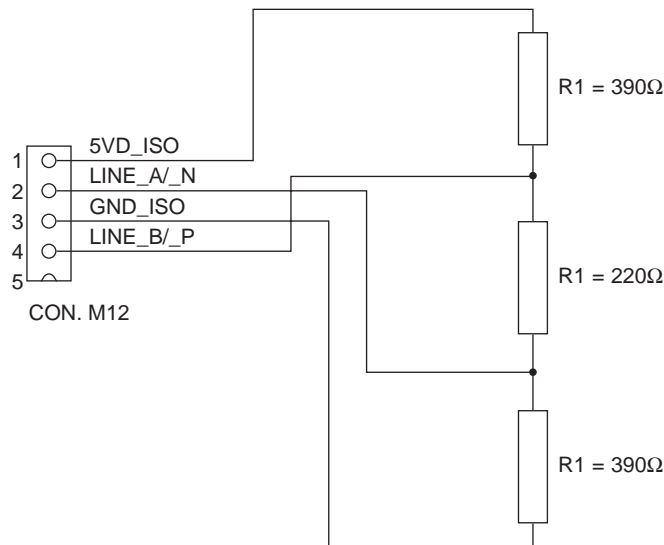
A Profibus network lets you connect peripheral devices called Slaves (transducers or actuators) to central control units called Class 1 Masters (typically PLCs). Network software must be installed by means of a Class 2 Master that contains the database with the GSD files for all connected devices. The network is designed and parameterized with a graphics tool, then the configuration is downloaded to the Class 1 Master in the network.

The Class 1 Master(s) launch(es) the communication process with the peripherals according to the configuration received from the Class 2 Master. This process includes an exchange of initial data regarding identification, parameterization, and configuration of the Slaves.

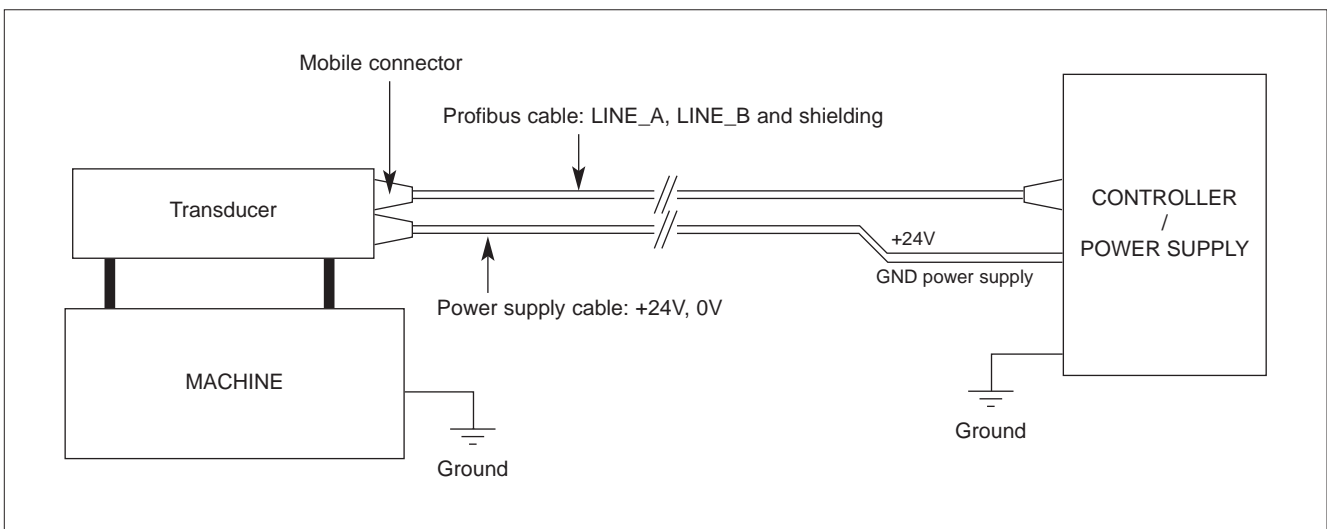
When this process is finished, management of the application begins with an exchange of process data on the network.

The GSD file contains all data for device identification, supported functions, length and format of data packets.

- GSD file downloadable from website: [www.gefran.com](http://www.gefran.com)
- Make sure that the transducer body is electrically connected to the machine body (ground).
- If a shielded, prewired (Profibus) cable was not purchased, remember to connect the braiding of the cable to the body of the mobile connector.
- If a shielded, prewired (Power) cable was not purchased, remember to connect the braiding of the cable to the body of the mobile connector. Our power cables are supplied without shielding.
- DO NOT connect the power supply GND to earth or to the shielding of the power cable or Profibus signal cable.
- Connect the shielding of the Profibus signal cable on transducer side and on master side.
- DO NOT run the power cable and Profibus signal cable in the same raceway.
- Make sure that there is a terminator plug ( $220\ \Omega$  resistor between LINE\_A and LINE\_B,  $390\ \Omega$  resistor between LINE\_B and 5VD\_ISO,  $390\ \Omega$  resistor between LINE\_A and GND\_ISO) at the beginning and end of the network.
- For inside cylinder applications, make sure that the cylinder head is not magnetized.

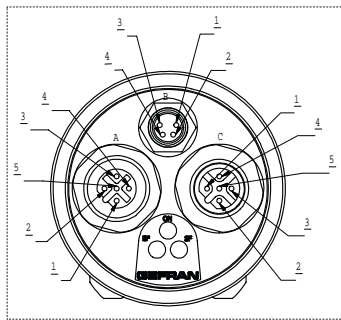


### Standard installation (recommended)



Series MK4-P / IK2-P

Output MK4-P W

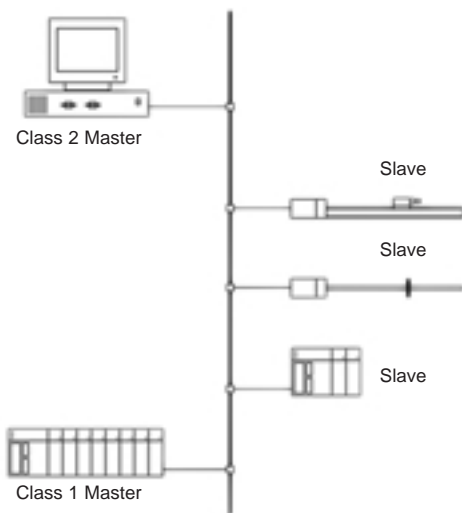


CONNECTOR A (M12 FEMALE)	
1	5VD_ISO
2	LINE_A/N
3	GND_ISO
4	LINE_B/P
5	GROUND

CONNECTOR B (M8 MALE)	
1	24V
2	N.C.
3	GND power supply
4	N.C.

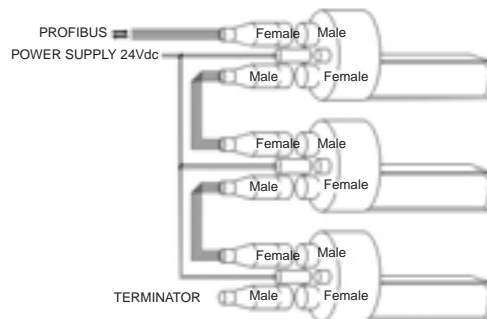
CONNECTOR C (M12 MALE)	
1	5VD_ISO
2	LINE_A/N
3	GND_ISO
4	LINE_B/P
5	GROUND

GREEN LED (ON)	RED LED (System Fault)	RED LED (Bus Fault)	CODE
OFF	OFF	OFF	Device not powered
ON	ON	ON	Internal device error (incorrect initialization) Master not connected to network
ON	OFF	ON	Correct initialization Network error, master not connected to network
ON	ON	OFF	Incorrect number of magnets Magnet out of measurement range Internal device error
ON	ON/OFF	FLASHING (f=1Hz)	Master connected to network Incorrect parameterization or configuration
ON	OFF	OFF	Device in data exchange



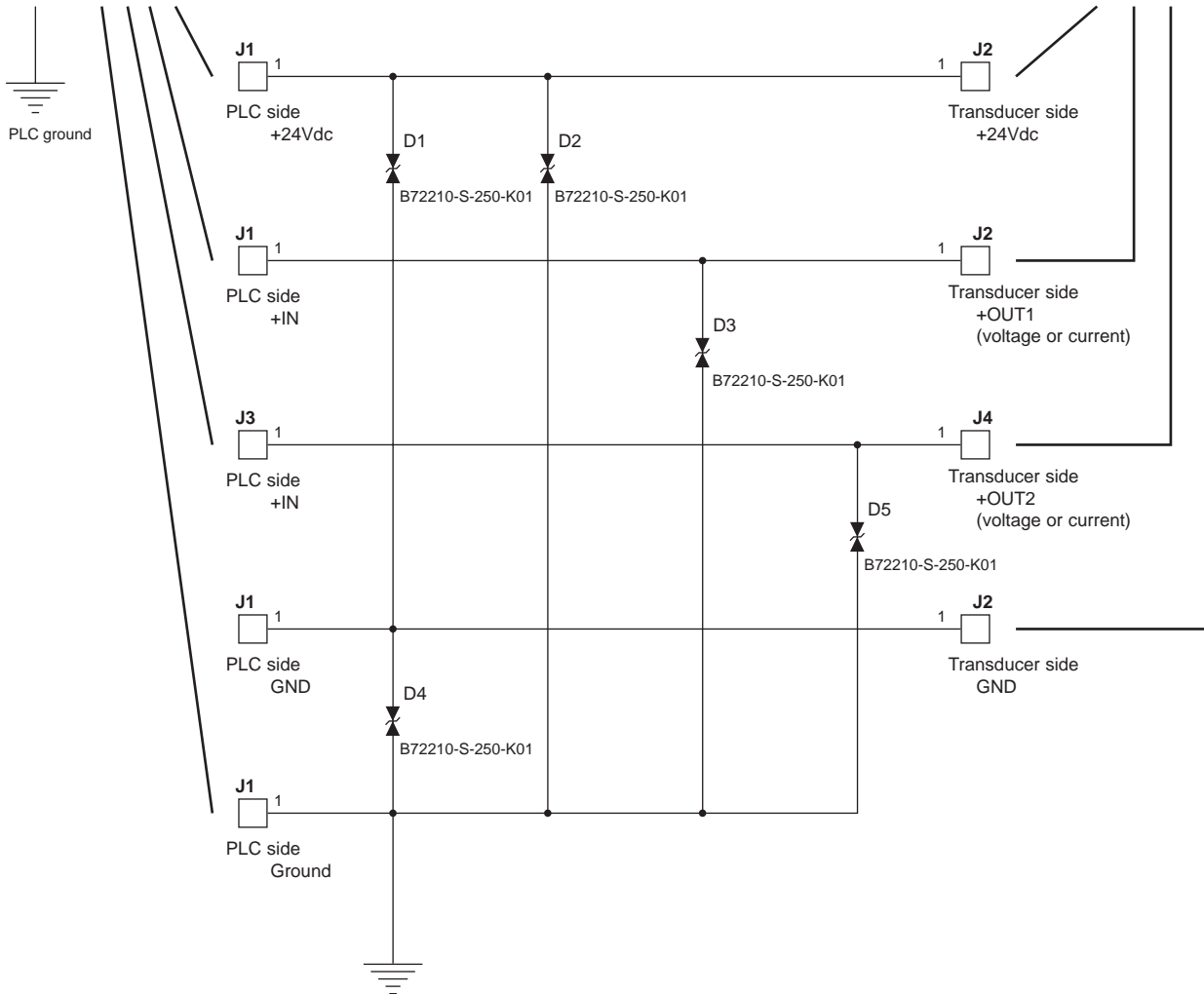
Connection with two M12 connector + 1 M8 connector:

- no T connection needed
- standard M12 and M8 connectors
- separate power supply line (ideal for use of programmer)



## 6. Protection for outdoor installations of analog sensors

### Analog magnetostrictive (MK / IK) voltage current output



## 7. Standard reference

Gefran products, described in this manual, are compliant to the European Directive 2004/108/CE.

They are tested according to the standard EN 61326-1 "Electrical equipment for measurement, control and laboratory use - EMC requirements", Part 1 "general requirements and EN 61326-2-3 "Electrical equipment for measurement, control and laboratory use - EMC requirements", Part 2-3: Particular requirements - Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning.

Electromagnetic Compatibility (EMC) requirements are classified in two types: Emission requirements, Immunity requirements

### Emission requirements

For class B equipment the limits, the measuring methods and the provisions given in CISPR11, EN 61000-3-2 and EN 61000-3-3 apply. Equipment classification and choice of respective limits shall be determined after taking into account the intended environment and emission requirement in the areas of use

### Immunity requirements

The immunity test requirements are given in table 1.

The tests shall be conducted in accordance with the basic standards. The tests shall be carried out one at a time.

**Table 1 - Immunity test requirements for equipment intended for use in industrial locations**

Port	Phenomenon	Basic standard	Test value	Performance criteria requested	Performance criteria applied by Gefran
Enclosure	Electrostatic discharge (ESD)	EN 61000-4-2	4 kV / 8 kV contact/air	B	A
	EM field	EN 61000-4-3	10 V/m (80 MHz to 1 GHz) 3 V/m (1,4 GHz to 2 GHz) 1 V/m (2,0 GHz to 2,7 GHz)	A	A
	Rated power frequency magnetic field	EN 61000-4-8	30 A/m	A	A (@ 400 A/m)
Power supply DC <sup>a)</sup>	Burst	EN 61000-4-4	2 kV (5/50 ns, 5 kHz)	B	A
	Surge	EN 61000-4-5	1 kV <sup>a)</sup> / 2 kV <sup>b)</sup>	B	B
	Conducted RF	EN 61000-4-6	3 V (150 kHz to 80 MHz)	A	A (@ 10V)
I/O signal/control (including functional earth lines)	Burst	EN 61000-4-4	1 kV (5/50 ns, 5 kHz) <sup>d)</sup>	B	A
	Surge	EN 61000-4-5	1 kV <sup>b), c)</sup>	B	B
	Conducted RF	EN 61000-4-6	3 V (10 kHz to 80 MHz)	A	A (@ 10V)

<sup>a)</sup> Line to line

<sup>b)</sup> Line to ground

<sup>c)</sup> Only in the case of long-distance lines

<sup>d)</sup> Only in the case of lines > 3 m

<sup>e)</sup> DC connections between parts of equipment/system which are not connected to a d.c. distribution network are treated as I/O signal/control ports

### Performance criterion A

During testing, normal performance within the specification limits.

Example

If electronic equipment is required to work with high reliability, the EUT shall operate without any apparent degradation from the manufacturer's specification.

### Performance criterion B

During testing, temporary degradation, or loss of function or performance which is selfrecovering.

Example

During testing, an analogue function value may deviate. After the test, the deviation vanishes.

### Performance criterion C

During testing, temporary degradation, or loss of function or performance which requires operator intervention or system reset occurs.

Example

In the case of an interruption in the mains longer than the specified buffer time, the power supply unit of the equipment is switched off. The switch-on may be automatic or carried out by the operator.

Copy of the conformity declaration is available for download on the Gefran web site [www.gefran.com](http://www.gefran.com)