



cod. 85192C Edition 04/2015

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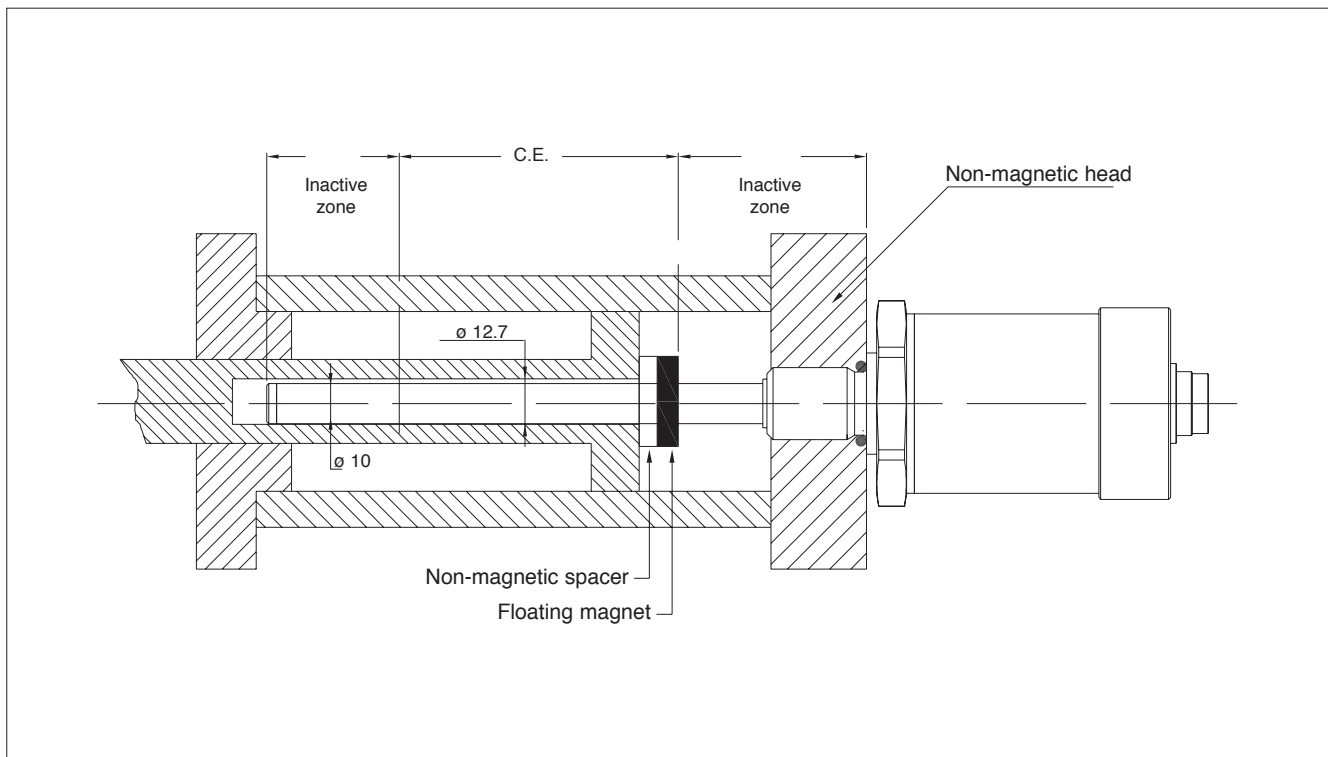
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1. General Precautions

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/PCUR039), 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: ONP1-A / MK4-A / IK4-A / RK-2 / RK-4

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

MK4 installation notes

- To guarantee the correct electrical insulation of the transducer from the machine, always assemble the brackets using the plastic washers provided in the package as shown in the fig. a and fig. b.
- The braiding of the shielded transducer connection cable must be connected to the case of the female connector or to the appropriate PIN of screen (ONP1) so that the shielding is connected to the transducer case.
- The cable shielding on PLC side must be grounded.

Standard installation (recommended)

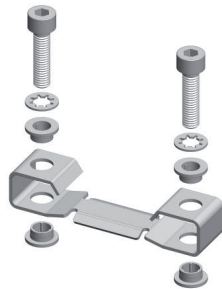
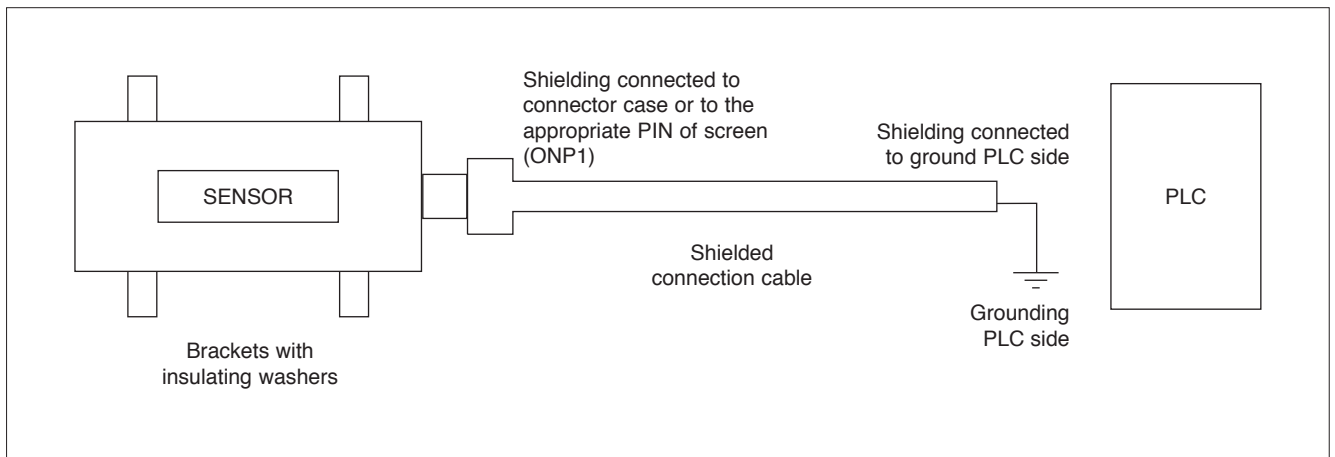


fig. a

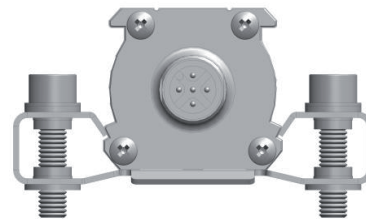
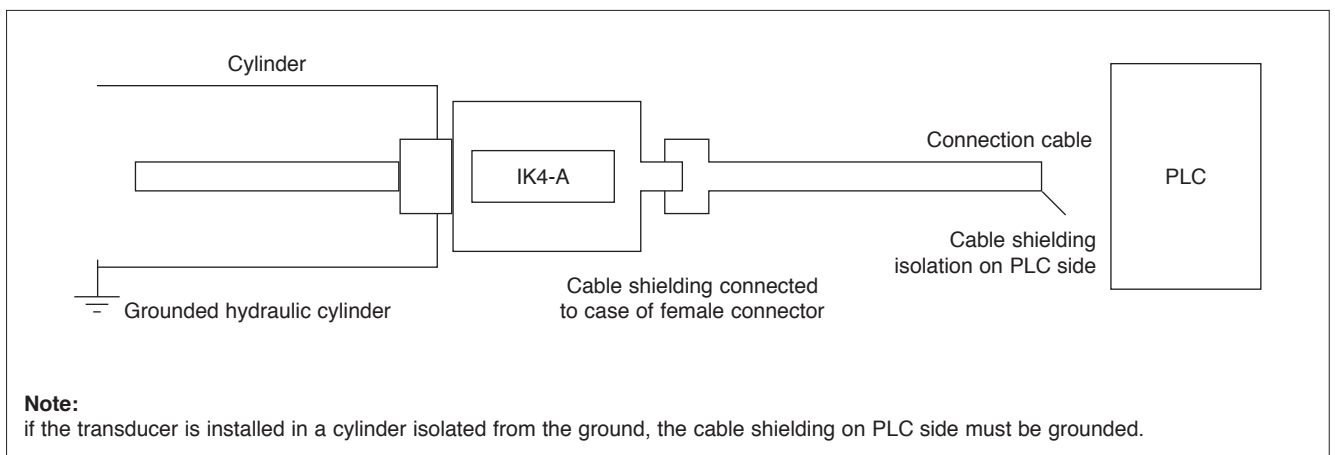


fig. b

IK4, SK4, 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)



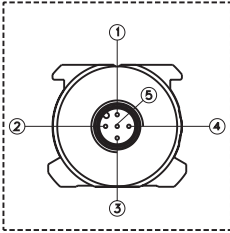
Note:

if the transducer is installed in a cylinder isolated from the ground, the cable shielding on PLC side must be grounded.

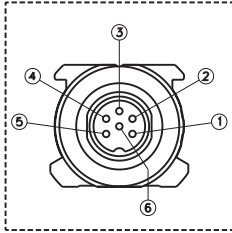
Electrical connections

Series MK4-A

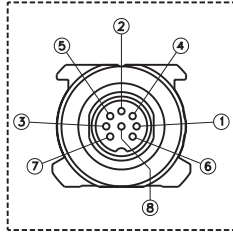
Output MK4A A



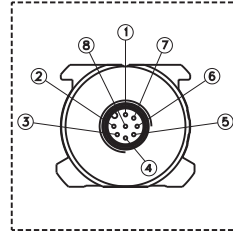
Output MK4A B



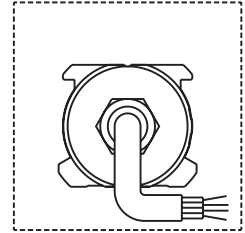
Output MK4A C



Output MK4A H



Output MK4A F




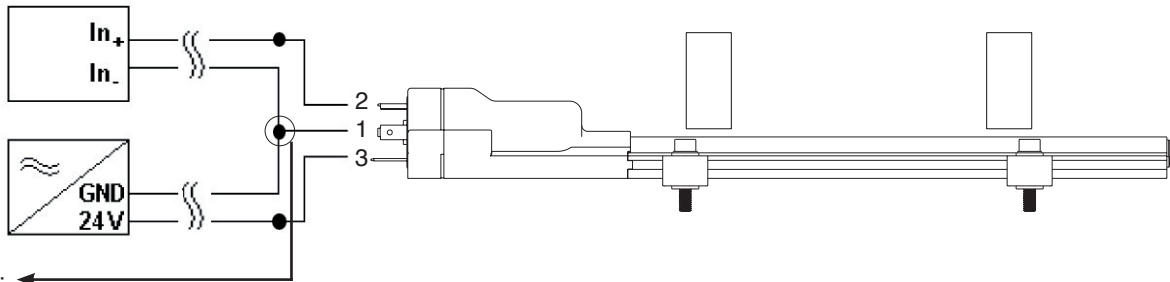
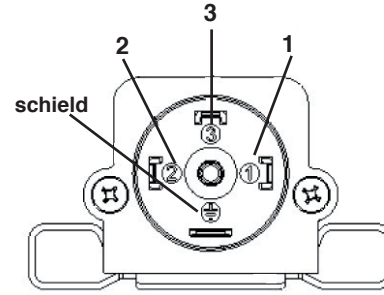
Function	CONNECTORS				CABLE MK4A-F Standard cable	OPTIONAL CABLES FOR	
	MK4A-A 5-pin M12	MK4A-B 6-pin M16	MK4A-C 8-pin M16	MK4A-H 8-pin M12		MK4A-A 5-pin pre-assembled	MK4A-H 8-pin pre-assembled
Output cursor 1 0,1...10,1V 0...10V 4...20mA 0...20mA -10...+10V -5...+5V	1	1	5 (1*)	5	Grey	Brown	Green
GND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

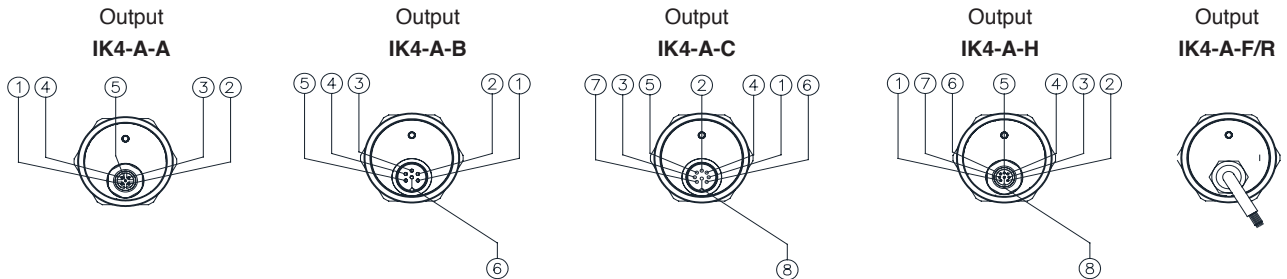
Serie **ONP1-A**

PIN	FUNCTION
1	Power supply -
2	Output
3	Power supply +
	Cable Shield (must be connected to the panel side, too)



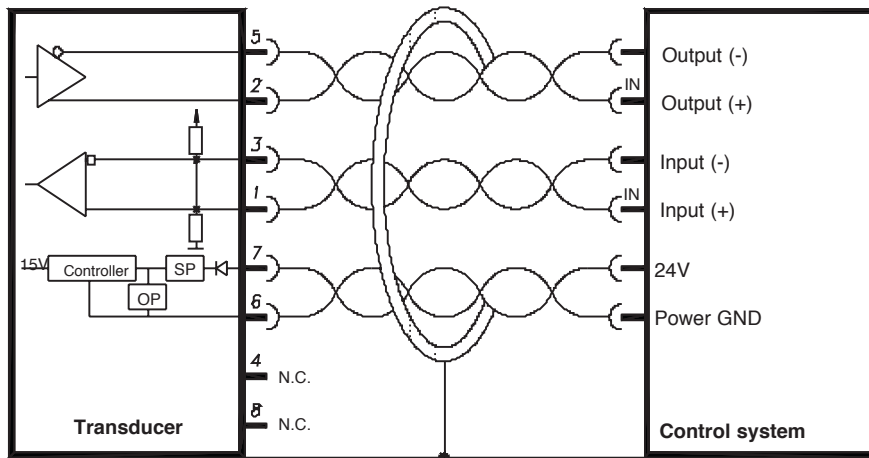
Note:  Make a connection as close as possible to transducer

Serie **IK4-A/SK4-A**



Function	CONNECTORS				CABLES	OPTIONAL CABLES	
	IK4-A-A	IK4-A-B	IK4-A-C	IK4-A-H	IK4-A-F/R	CAV00_	CAV01_/CAV02_
	5 pin M12	6 pin M16	8 pin M16	8 pin M12	Standard cables	Pre-assembled cable 8 pin IK4A-H	Pre-assembled cable 5 pin IK4A-A
Output 1 (position) 0...10V 4...20mA 0...20mA	1	1	5 (1*)	5	Grey	Green	Brown
GND Output 1 (0V)	2	2	2	1	Pink	Yellow	White
Output 2 (inverse position) 10...0V 20...4mA 20...0mA	3	3	3	3	Yellow	Pink	Blue
GND Output 2 (0V)	2	4	6	2	Green	Grey	White
Power supply +	5	5	7	7	Brown	Brown	Grey
Power supply GND	4	6	8	6	White	Blue	Black
n.c.	-	-	4	4	-	Red	-
n.c.	-	-	1 (*5)	8	-	White	-

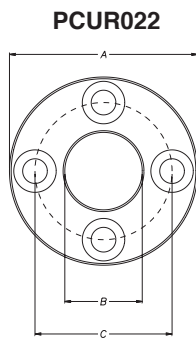
Electrical connections (RK - 2 - _ _ _ _ - S)



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

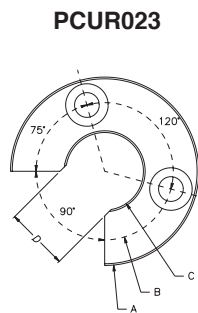
Electrical connections (RK - 2 - _ _ _ _ - N / K / E)

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



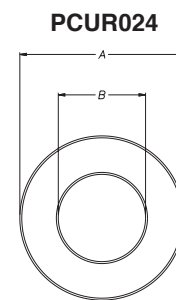
The **PCUR022** is supplied with:

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

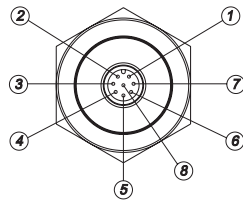
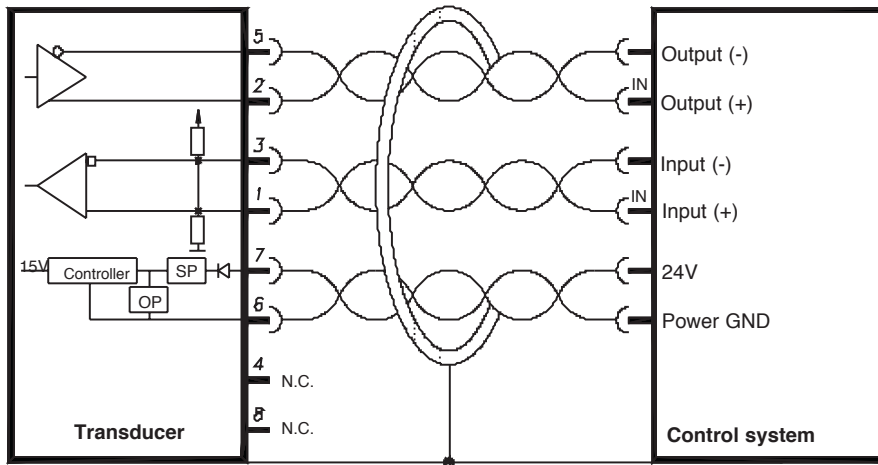


The **PCUR023** is supplied with:

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

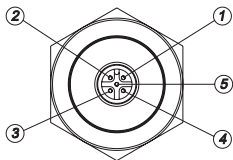


Electrical connections (RK - 4 - _____ - S)



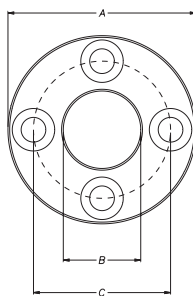
1	Input +
2	Output +
3	Input -
4	n.c.
5	Output -
6	Power supply GND
7	Power supply +
8	n.c.

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 +

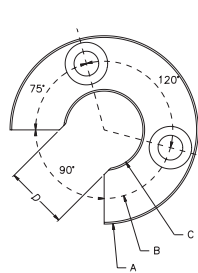
PCUR022



The PCUR022 is supplied with:

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

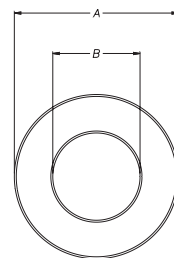
PCUR023



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

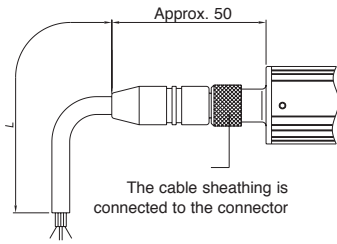
Outputs: SSI

Installation notes

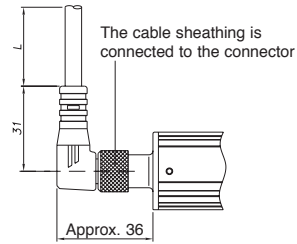
- Connections with instructions taken from MK4-S data-sheet.
- Braiding grounded on PLC side for both MK and IK.
- The braiding must always be wired so that it is electrically connected to the connector case on transducer side.
- Cable length is based on baud rate.

Optional cables

PRE-ASSEMBLED CABLE WITH STRAIGHT CONNECTOR



PRE-ASSEMBLED CABLE WITH 90° CONNECTOR

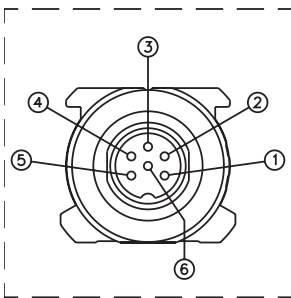


8-pin cable code		MK4S - H	
Length "L"		CODE	
		Straight cable	Cable to 90°
2	mt	CAV002	CAV005
5	mt	CAV003	CAV006
10	mt	CAV004	CAV007
15	mt	CAV009	CAV008

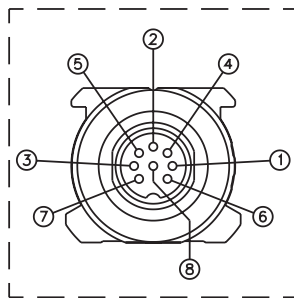
Electrical connections

Series MK4-S

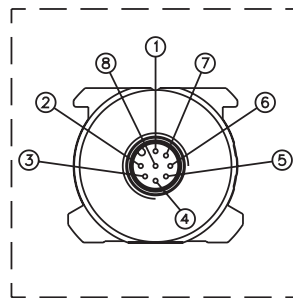
Output MK4-S B



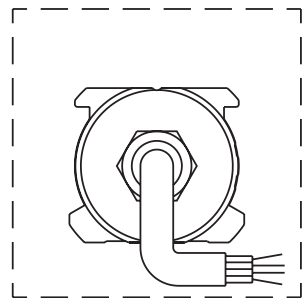
Output MK4-S C



Output MK4-S H



Output MK4-S F/R

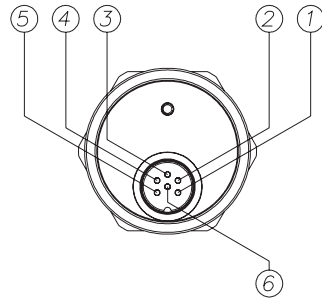


Function	MK4-S B	MK4-S C	MK4-S H	MK4-S F	MK4-S R	CAV00X
	6-pin M16	8-pin M16	8-pin M12	Cable output	PUR cable output	Optional 8-pin cable
Data -	1	5	5	Orange	White	Green
Data +	2	2	2	Orange / White	Blue	Gray
Clock +	3	1	3	Green / White	Gray	Pink
Clock -	4	3	1	Green	Yellow	Yellow
Power supply +	5	7	7	Blue / White	Green	Brown
Power supply GND	6	6	6	Blue	Brown	Blue
n.c.	-	8	8	-	Pink	White
n.c.	-	4	4	-	-	Red

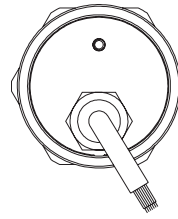
The transducer case must be grounded with the cable sheathing on the control system side only

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.	-	-	-

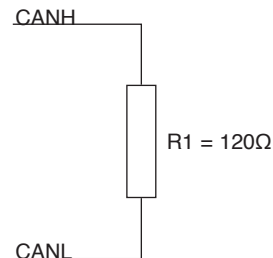
4. CAN ISO 11898

Transducers: MK4-C / IK4-C

Outputs: CANopen DP406

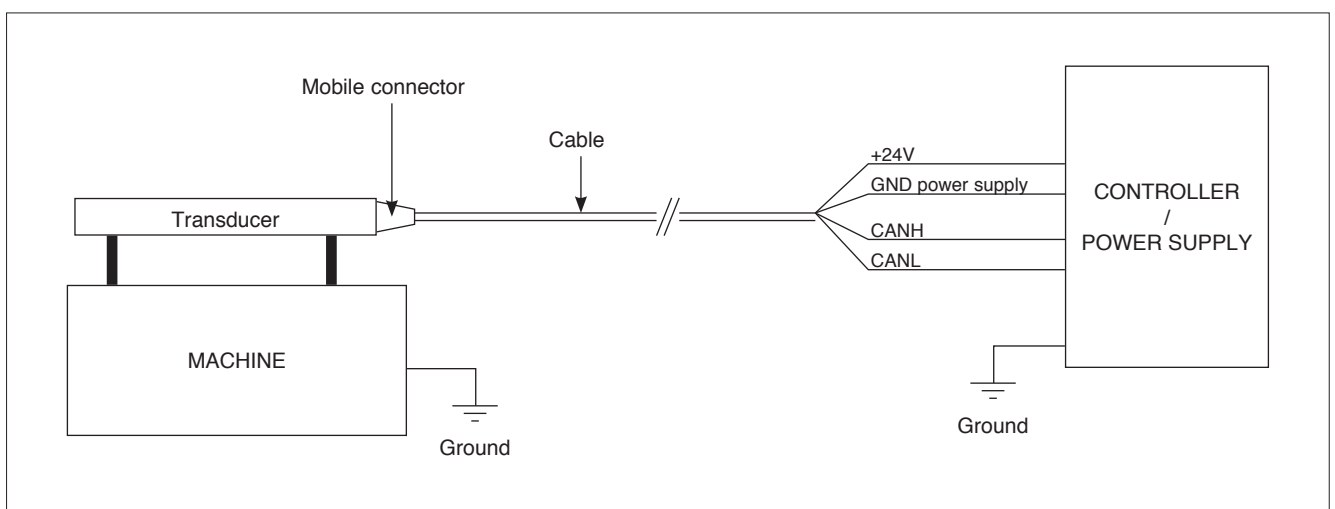
Installation notes

- 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.

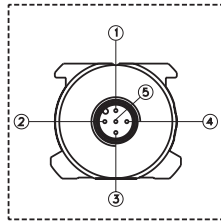
Standard installation (recommended)



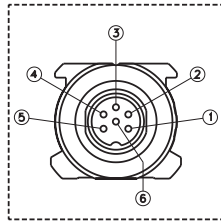
Electrical connections

Series MK4-C

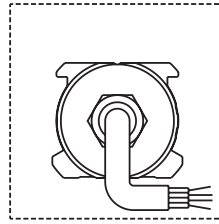
Output MK4-C A



Output MK4-C B



Output MK4-C F

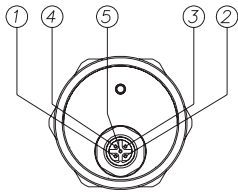


Function	Connector (B) Pin°	Connector (A) Pin°	Cable (Wire color)
CAN L	1	5	Blue
CAN H	2	4	White
n.c.	3	1	-
n.c.	4	-	-
Power + Vdc	5	2	Red
GND power supply	6	3	Black

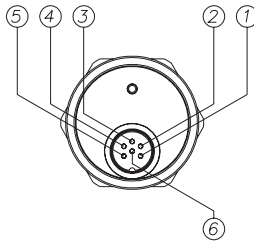
ATTENTION ! Do not connect the GND to the ground or to the cable sheathing

Series IK4-C

Output IK4-C-A



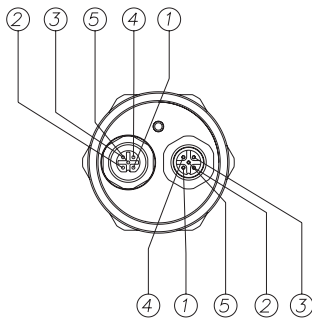
Output IK4-C-B



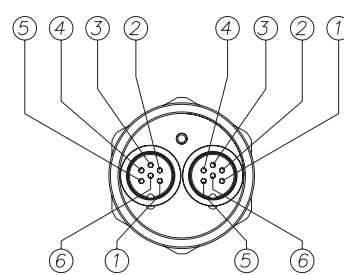
Output IK4-C-F



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	BLUE
CAN H	4	2	4	4	2	2	WHITE
CAN GND (n.c.)	1	3	1	1	3	3	-
n.c.	-	4	-	-	4	4	-
Power supply +	2	5	2	2	5	5	RED
Power supply GND	3	6	3	3	6	6	BLACK

5. PROFIBUS DPV0 IEC 61158

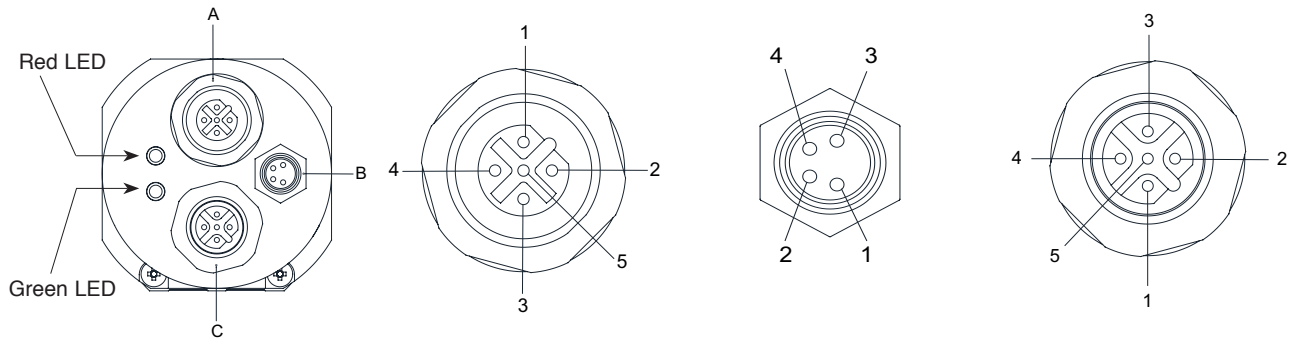
Transducers: MK4-P / IK4-P

Installation notes

- Connections with the information obtained from the datasheet dell'MK4-P and IK4-P
- Calza cavo connessa a terra dal lato PLC sia in caso di MK che IK.
- La calza del cavo deve essere sempre cablata in modo da essere elettricamente connessa al corpo del connettore dal lato del trasduttore.
- Lunghezze cavo in funzione del baud rate.

Electrical connections

MK4PW/IK4PW OUTPUT



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	0V
4	N.C.

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

PROFIBUS structure and connection

A Profibus network lets you connect peripheral Slave devices (transducers or actuators) to Class 1 Master central control units (typically PLCs).

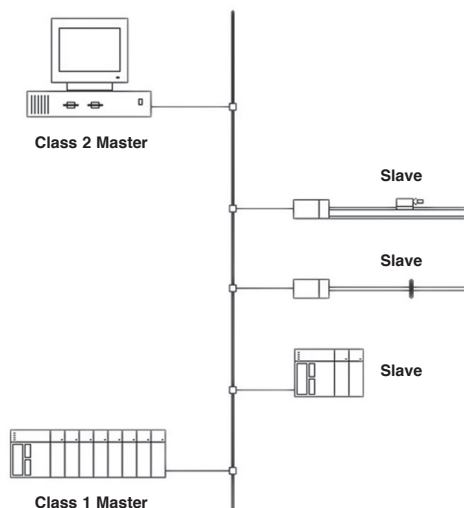
The network software is installed with a Class 2 Master containing a database with the GSD files of all connected devices. The network is designed and parameterized with a graphics tool, then the configuration is downloaded to the Class 1 Masters in the network.

The Class 1 Master(s) start(s) the communication process with the peripheral devices according to the configuration received from the Class 2 Master.

This process includes an initial data exchange regarding Slave identification, parameterization, and configuration.

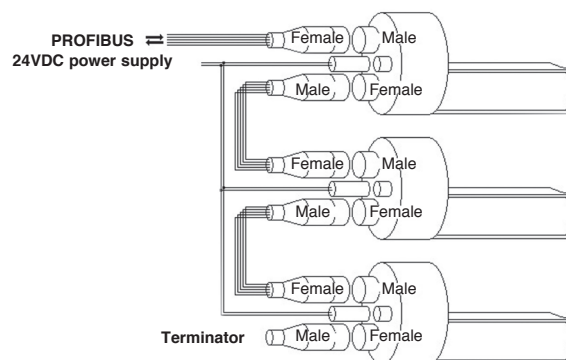
When this phase is done, application management begins with exchange of process data on the network.

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



Connection with two M12 connectors + 1 M8 connector:

- no T connection required
- standard M12 and M8 connectors
- separate power supply line (ideal for use of programmer)
- for power supply: use a shielded cable with metal connector and shield connected to connector case



Cable type and transmission speed

The cables must have the following characteristics:

Parameter		Cable Type A
Impedance	ohm	135...165
Capacity	pF/m	< 30
Loop resistance	ohm/km	< 110
Section of the core	mm ²	> 0.34 (AWG 22/1)

With this type of cable lengths to reach a bus segment, depending on the speed are:

Transfer Rate	kbit/s	9.6	31.25	45.45	93.75	187.5	500	1500	3000	6000	12000
Cable length	mm	1200	1200	1200	1000	1000	400	200	100	100	100

Optional cables

M8 4-pin axial female connector, pre-wired with 3-meter cable for power supply	PCAV700
M8 4-pin axial female connector, pre-wired with 5-meter cable for power supply	PCAV701
M12 5-pin axial female connector, pre-wired with 3-meter cable for communication	PCAV702
M12 5-pin axial female connector, pre-wired with 5-meter cable for communication	PCAV704
M12 5-pin axial male connector, pre-wired with 3-meter cable for communication	PCAV703
M12 5-pin axial male connector, pre-wired with 5-meter cable for communication	PCAV705

Optional accessories

Profibus terminator (M12 axial male connector)	CON049
M12 5-pin axial male flying connector	CON380
M12 5-pin axial female flying connector	CON390
Node number programmer	PNP-1
GSD file downloadable from www.gefran.com	

Optional node number programmer

The PNP-1 node number programmer lets you read and set the node number on a Profibus network for MK4-P and IK4-P series sensors.

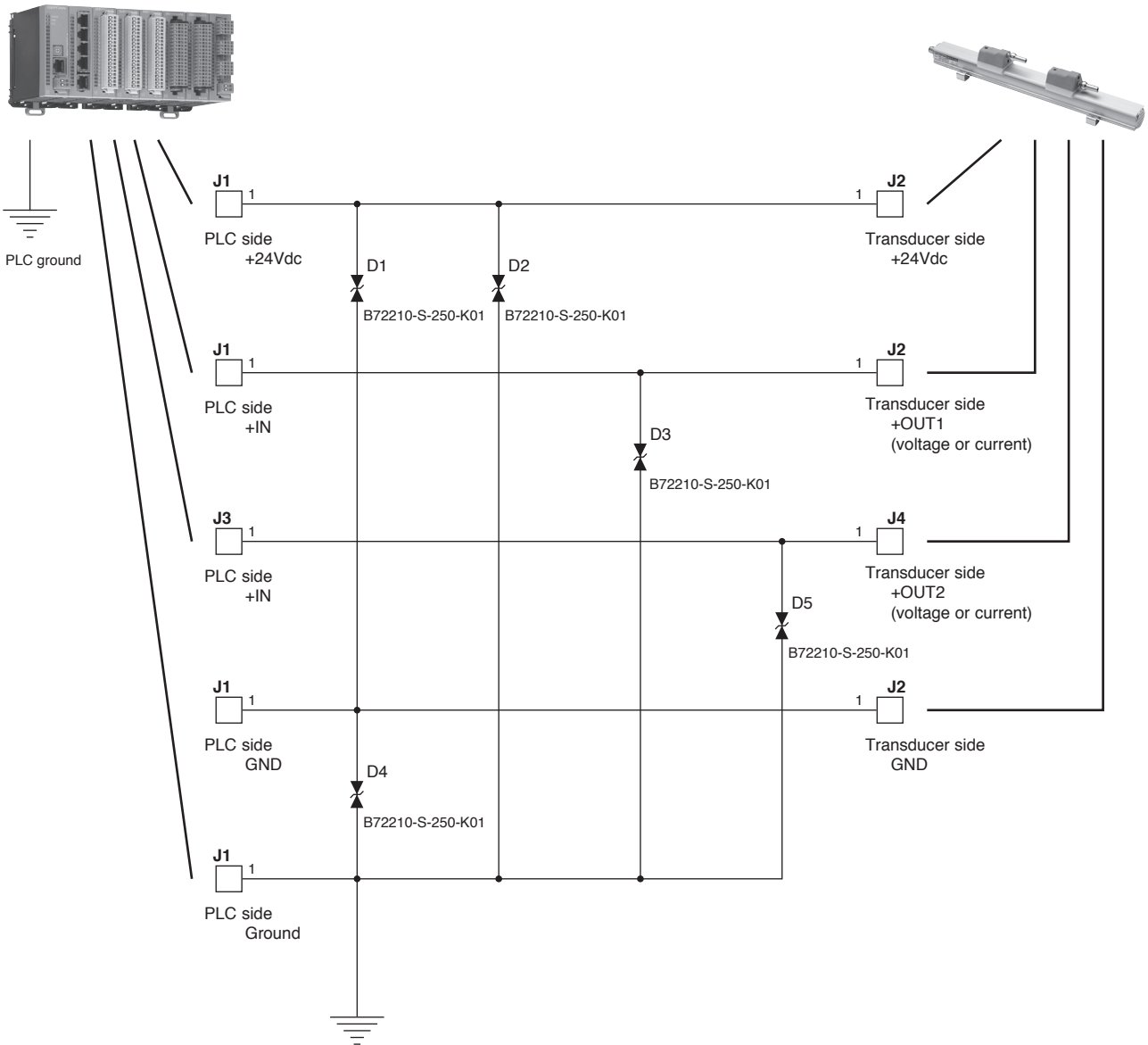
This accessory component is used if you do not have a Class 2 Master programmer.

See the PNP-1 programmer technical sheet and manual for detailed information.



6. Protection for outdoor installations of analog sensors

Analog magnetostrictive (ONP1 / MK4 / IK4 / SK4) 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 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 ^{e)}
	Rated power frequency magnetic field	EN 61000-4-8	30 A/m	A	A (@ 400 A/m)
Power supply DC ^{g)}	Burst	EN 61000-4-4	2 kV (5/50 ns, 5 kHz)	B	A
	Surge	EN 61000-4-5	1 kV ^{a)} / 2 kV ^{b)}	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) ^{d)}	B	A
	Surge	EN 61000-4-5	1 kV ^{b), c)}	B	B
	Conducted RF	EN 61000-4-6	3 V (10 kHz to 80 MHz)	A	A (@ 10V)

^{a)} Line to line

^{b)} Line to ground

^{c)} Only in the case of long-distance lines

^{d)} Only in the case of lines > 3 m

^{e)} For the ONP1-A series, the basic requirement 3V/m (from 80MHz to 1GHz) is applied

^{g)} 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

