



Code 85196  
Edition 11/2013

### Contents

1. General precautions	pag 2
2. Transmitters with analog output 4-20 mA	pag 2
Standard installation	pag 2
Electrical connections	pag 3
Interfaces with SRP/CS and current devices	pag 3
3. Technical specifications	pag 4
4. Safety (content according to IEC/EN 62061 paragraph 7)	pag 5

This manual is related to KX Series pressure transmitter, SIL2 certified according to the standard IEC/EN62061 with Report No. FS 28713306 from TÜV Rheinland.

## 1. General Precautions

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 installed in accordance with the electrical characteristics and the safety and installation instructions as specified in the document 85178 "SAFETY NOTE KX" and in this document.

## 2. Transmitters with analog output 4-20mA

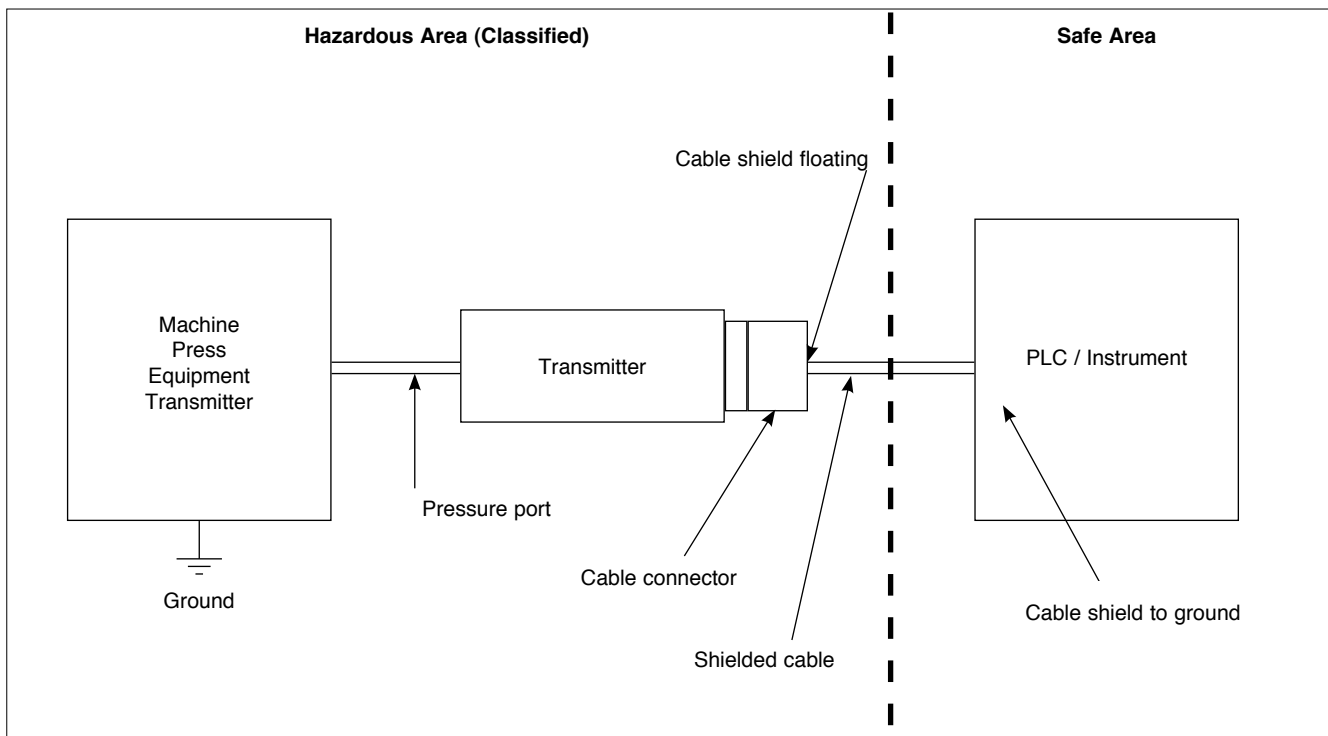
**Transmitters:** Series KX SIL2

**Output:** 4...20mA

### Installation remarks

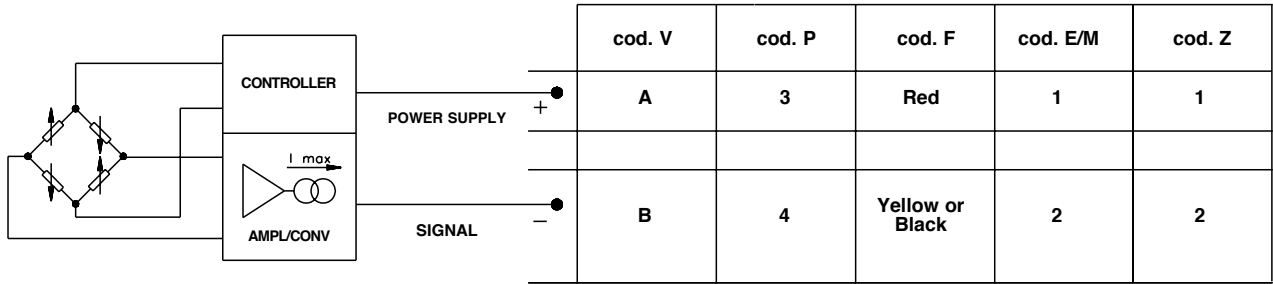
- The transducer must be grounded (normally through the machine body or equipment it is installed on).
- Use a shielded cable only. The cable shield must be grounded on PLC side in safe area and left floating on machine side.
- To prevent interference, separate the power cables from the signal cables.
- For correct Intrinsically Safe installation according to II 1G Ex ia T6/T5/T4 Ga you must comply to electrical characteristics and to the safety and installation instructions as specified in the document 85178 "SAFETY NOTE KX".

### Standard installation (recommended)



## Electrical connections

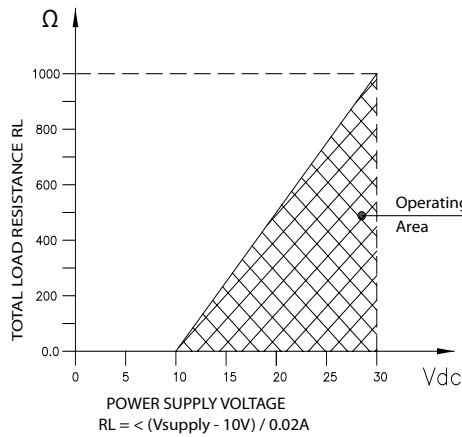
### AMPLIFIED CURRENT OUTPUT - mod. E



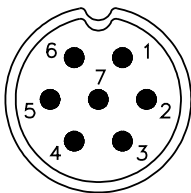
## Interfaces with SRP/CS and current devices

The interface with SRP/CS (Safety Related Part of a Control System) is made by mean of multipolar connectors showed on pictures below, where the connections are specified for amplified current output with 2 wire system. The sensor is connected in series with the current loop.

### LOAD DIAGRAM (current output)

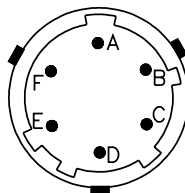


#### P - 7 pole connector



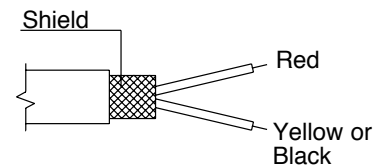
Male connector 7 pole M16x0.75  
Protection rating IP67

#### V - 6 pole connector



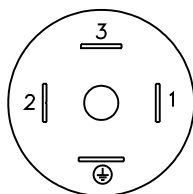
Male connector, 6 pole bayonet  
Protection rating IP66

#### F - 2 pole cable



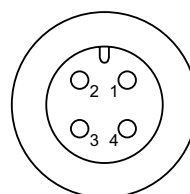
Shielded cable 2x0.25 - 1m.  
Protection rating IP65

#### E/M – Connector EN 175301-803



**E** – 4 pin DIN type A  
Protection rating IP65  
**M** – 4 pin microDIN type C  
Protection rating IP65

#### Z - Connector 4 pin M12 x 1



4 pole male connector  
Protection rating IP67

### 3. Technical Specifications

Output signal	Current 4-20 mA (2 wire system)
Accuracy (1)	± 0.15% FS typical; ± 0.2% FS max
Non Linearity	<± 0.1% FS BFSL
Hysteresis	<± 0.1% FS
Repeatability	<± 0.05% FS
Pressure ranges	from ±1 bar to 1000 bar (see table)
Resolution	Infinite
Overpressure (without degrading performance)	See table
Pressure containment (Burst test)	See table
Pressure media	Fluid compatible with 17-4PH and AISI 430F Stainless Steel
Housing	Stainless Steel INOX AISI 304
Power supply	10...30Vdc
Dielectric strength	In conformity to 500 Vac @ 60 sec. test
Zero output signal	4mA (nominal)
Full scale output signal	20mA (nominal)
Max allowed load	See load diagram
Long term stability	< 0.1% FS/year
Operating temperature range (process)	-40...+125°C (-40...+257°F) limited to temp. T4/T5/T6 (see table below)
Operating temperature range (ambient)	-40...+105°C (-40...+221°F) limited to temp. T4/T5/T6 (see table below)
Compensated temperature range	-20...+85°C (-4...+185°F)
Storage temperature range	-40...+125°C (-40...+257°F)
Temperature effects over compensated range (zero)	± 0.01% FS/°C
Temperature effects over compensated range (span)	± 0.01% FS/°C
Response time (10...90%FSO)	< 1 msec.
Zero offset tolerance	± 0.15% FS typ; ± 0.25% FS max
Span offset tolerance	± 0.15% FS typ; ± 0.25% FS max
Mounting position effects	Negligible
Humidity	Up to 100%RH non-condensing
Weight	110 gr. nominal
Mechanical shock	100 g / 11 msec. according to IEC 60068-2-27
Vibrations	20 g max at 10-2000Hz according to IEC60068-2-6
Ingress protection	IP65/IP66/IP67
Output short circuit and reverse polarity protection	YES
CE Conformity	According to EC Directive 2004/108/CE

1 Includes combined effects of Non Linearity BFSL (Best Fit Straight Line), Hysteresis and Repeatability (acc. to IEC 61298-2)

#### PRESSURE RANGES

RANGES (Bar)	2	2.5	4	6	10	16	20	25	40	60	100	160	200	250	400	600	1000
Overpressure (Bar)	4	5	8	12	20	32	40	50	80	120	200	320	400	500	800	1200	1200
Burst pressure (Bar)	8	10	16	24	40	64	80	100	160	240	400	640	800	1000	1500	1500	1500
COMPOUND RANGES (Bar)	-1..+1	-1..+1.6	-1..+2	-1..+2.5	-1..+4	-1..+6	-1..+10										
Overpressure (Bar)	4	5	6	7	10	14	22										
Burst pressure (Bar)	8	10	12	14	20	28	44										

#### INTRINSIC SAFETY CHARACTERISTICS

	II 1G Ex ia IIC T6	II 1G Ex ia IIC T5	II 1G Ex ia IIC T4
Maximum voltage $U_i$	30Vdc	30Vdc	30Vdc
Maximum current $I_i$	100mA	100mA	100mA
Maximum power $P_i$	0.75W	0.75W	0.75W
Maximum inductance (*) $L_i$	0.25 mH	0.25 mH	0.25 mH
Maximum capacity (*) $C_i$	15nF	15nF	15nF
Fluid temperature	-40...+60°C	-40...+70°C	-40...+80°C
Ambient temperature	-40...+60°C	-40...+70°C	-40...+80°C

(\*) Includes inductance and capacity values of a cable:(L typical 1 µH/m and C typical 100 pF/m) with maximum length 15 mt

## 4. Safety (content according to IEC/EN 62061 paragraph 7)

### Restrictions on use

The device in order to remain compliant with the designated category should be used only as indicated in these instructions and as required in the operating manual concerning mechanical installation, electrical connection, environmental conditions and usage limits.

### Maintenance and periodic inspections

Periodic maintenance to carry-out in order to guarantee the justified exclusion of failures are:

- Visual inspection of the status of the electrical and mechanical connections.

The maintenance is designed to evaluate possible problems due to situations of incorrect mounting endured over time or particular aggressiveness of the material processed.

Frequency: every two years

#### Check obstruction of the channel under pressure

- The maintenance has the purpose to verify that there are no occlusion of the pressure channel, which would lead to malfunctioning.

The inspection is visual, after removing the probe from the process seat.

Frequency: every year.

#### Testing the sensor calibration

- The test is intended to check the correctness of the transduction curve of the sensor. It's done by applying known pressure points to the transducer and checking the output values of the probe.

Frequency: every four years.

### Indication of response time

The response time to the pressure transduction is equal to 1 ms

### Indications and alarms

The KX Series pressure transmitters in the case of some specific anomalies provide output saturation (positive HIGH or negative LOW).

The table 1 indicates the detected failures, their effect on the electrical output, and the recovery mode of the device.

Table 1: failures, effects on the outputs

Failure	Analog Current Output
Power supply cable broken	LOW < 3.6mA
Sensor not connected	LOW < 3.6mA
Power supply broken	LOW < 3.6mA
Broken bridge	*LOW < 3.6mA *HIGH > 24mA
(*) variable according to the type of failure	

### Applications to use the relevant category

The pressure sensors of KX Series may form part of a system for detecting the pressure that, when a threshold value is exceeded, deactivates all the elements of pressure generation, through a control system.

The diagram "A" (Fig. 1) shows a possible application: the sensor detects the pressure and transduces it in an analog electrical signal proportional to the value of the measured value; the SRP / CS compares the signal with the one set as the alarm threshold: in case of exceeding the threshold it shall disable the elements of pressure generation.

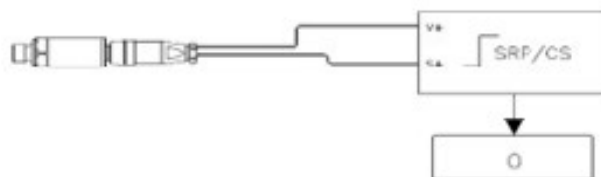


Fig. 1: application diagram A

## Failures and troubleshooting

In case of failures or malfunctions, on Table 2 you can find the most common failures and the means of appropriate search:

Table 2: troubleshooting

Failure	Possible causes	Means of research
The sensor does not feel pressure	Obstruction of pressure channel Fault on electronics output stage	1. Power down and remove the sensor 2. Verify eventual occlusion of the channel under pressure. Clean any residues and material caps
The sensor is in alarm mode type "HIGH"	Bridge broken Detachment of pins Failure on primary element	1. Power down and remove the sensor 2. Check for overheating of electronics housing. Remove the causes of overheating, wait until it cools down and power the sensor. 3. Powered the probe again, if the problem persists, you should send back the probe to Factory for repair.
The sensor is in alarm mode type "LOW"	Power supply cable /connector broken Sensor not connected Sensor not powered Bridge broken	1. Power down and remove the sensor 2. Check that the power supply is connected. If necessary, restore the power supply. 3. Check for continuity between the pins of the connector and the power supply. If necessary, replace the cable and the connector. 4. Check if the power values are within the specifications indicated in this manual. If necessary, replace the power supply. 5. If the problem persists, you should send back the probe to Factory for repair.

### IMPORTANT NOTE

KX series pressure transmitters are designed and manufactured according to European standards:

EN60079-0: 2009 / EN 60079-11:2012 / EN 60079-26:2007.

The protection mode is Ex ia IIC T4/T5/T6 Ga: T6 ambient temperature from -40 °C to +60 °C, T5 ambient temperature from -40 °C to +70 °C and T4 ambient temperature from -40 °C to +80 °C.

KX series pressure transmitters must be installed and maintained in accordance with the systems and maintenance rules related to areas classified against the risk of explosion due to the presence of gas (eg.: EN 60079-14, EN 60079-17 or other national standards / rules ).

KX series pressure transmitter must be connected to associated certified equipments [Ex ia] IIC having the following characteristics:

Maximum voltage  $U_o \leq 30$  V; maximum current  $I_o \leq 100$ mA;  $\leq$  maximum power  $P_o \leq 0.75$ W; linear source.