



MODEL K-712

**2-WIRE INDICATING
PRESSURE TRANSMITTER
INTRINSICALLY SAFE VERSION**

**OPERATION
AND
INSTRUCTION MANUAL**



Switzer Instrument Limited

Regd. Off: 29 (Old# 14), Thanikachalam Road, P.B.No.1423, Chennai 600 017

Internet web-site
www.switzerinstrument.com

Sales – Head Office

17 (Old# 9), South Boag Road, Chennai 600 017

Ph : 044-24340999 / 24343956 / 24344321

Fax : 044-24347887 **e-mail** : sales@switzerinstrument.com

Works

127 Sidco Estates, Chennai 600 098

Ph : 044-26242244 / 26242255 / 26243355

Fax : 044-26248849 **e-mail** : works@switzerinstrument.com

INTRODUCTION

SWITZER Model K-712 2-wire Indicating Pressure Transmitters offer economical alternative to conventional transmitters without compromising either accuracy or performance to measure gauge pressure of liquids, gases and vapours. The process pressure is converted into standard analog dc signal of 4-20mA current proportional to the input pressure with an added feature of displaying the pressure reading on a 3½ digit LCD inbuilt with the instrument.

The transmitter utilize latest thin film technology and high stability electronics resulting in exceptional performance and endurance.

These transmitters are approved to be used for **Intrinsically Safe applications** by CMRI, India to conform to **IS:5780-2002** and are housed in cast aluminum enclosure which are weatherproof / flameproof for use in hazardous industrial environment.

PRINCIPLE OF OPERATION

The primary pressure sensing element for the detection is a silicon wafer on which ion implanted piezo-resistive elements are configured in a bridge form. The bridge elements are laser trimmed to unity ratio of corresponding arms.

The sensing wafer is suitably protected by 316 SS diaphragm. When the diaphragm is subjected to a pressure, the stress on silicon wafer produces a strain on the deposited bridge to give an electrical output when excited by constant DC current. The sensor is temperature compensated to ensure minimal drift with ambient and process temperature changes.

The mV output signal of the sensor is suitably conditioned to generate the 4-20mA output current and the numerical readings for the LCD, proportional to applied pressure. The fully assembled board is provided with conformal coating on both sides to protect from adverse environmental conditions.

INSTALLATION INSTRUCTIONS

This can be installed directly on to the pressure line. 2" pipe mounting option is also possible for which necessary mounting brackets with clamps are to be used. The process pressure connection can either be 1/2"NPTM or 1/4"NPTF. Both these threads, on the process connector, are provided as a standard fitment in the instrument for user convenience.

Use a 32mm A/F wrench at the hexagonal portion of the process connector to fix the transmitter on a pressure line.

*** CAUTION**
Do not rotate the unit by holding the casting which may cause irreparable damage to the mechanical mounting of the pressure sensor and also to the internal wiring from the sensor to electronics. Warranty service shall not be applicable in cases of violation.

Important installation notes:

- Enclosure is W/P only when all entries and joints are suitably sealed.
- Use certified cable gland when not supplied by SWITZER.

- Mounting plate and clamps are not supplied for Direct Mounting option.

Fig-1: Overall Dimension Drawing – Front View

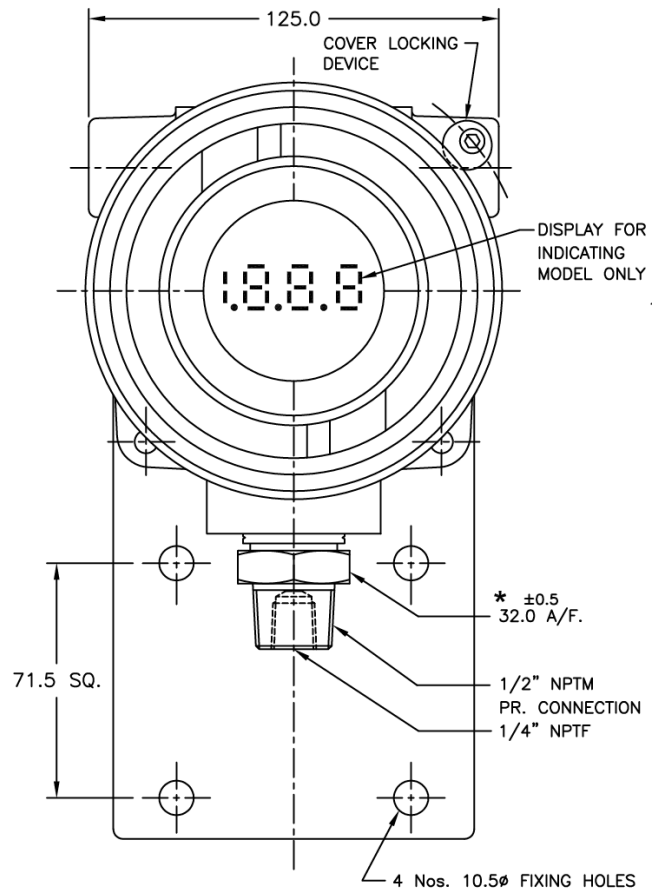
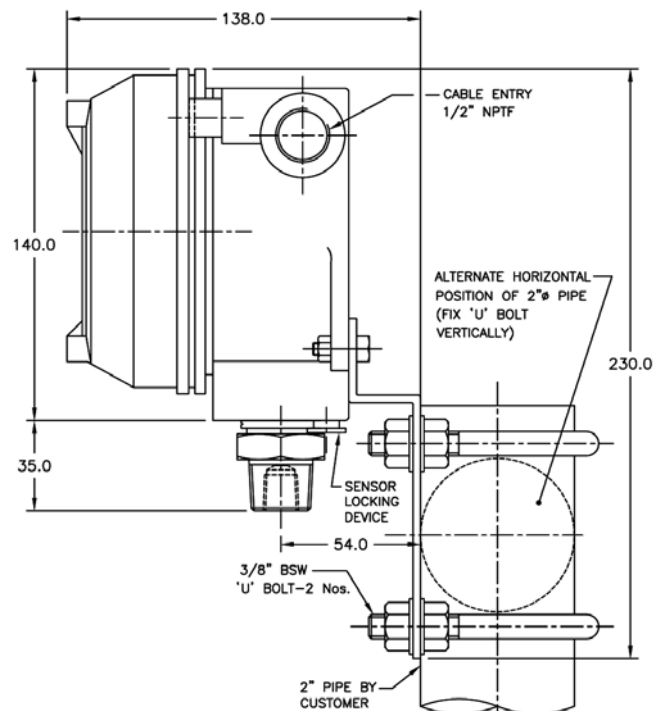


Fig-2: Overall Dimension Drawing – Side View



COVER LOCK

The instrument is provided with cover lock facility to enable it to be used for weatherproof or flameproof applications. The cover is fully threaded onto the body and locked in position for proper sealing with o-ring to ensure compliance to weatherproof and flameproof requirements.

The cover is locked in position when the instrument is shipped after manufacturing.

Unlock method:

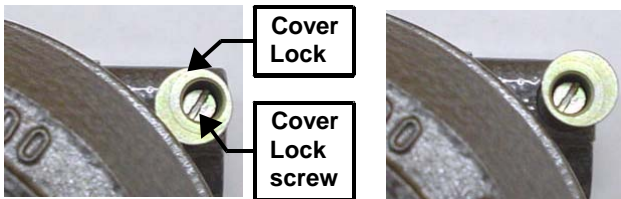
- Loosen the lock screw.
- Rotate the lock by 180° and ensure that tongue of lock is out of the cover groove.
- Unscrew cover in anticlockwise direction to access internals of the instrument.

Lock method:

- Fix the cover and rotate clockwise to fully seat on body and seal the o-ring.
- Rotate lock and ensure that the tongue of lock enters the groove on cover.
- Tighten the cover lock screw.

Fig-3: Cover Locked

Fig-4: Cover Unlocked



WIRING INSTRUCTION

The terminals for electrical connection are located on the PCB inside the enclosure. Terminals can be accessed upon removal of the cover. The terminals used are screw clamp type and can accommodate a maximum of 2.5mm² wires. Refer to drawing 40905-18 for wiring with zener barriers and to comply with Intrinsic Safety requirements.

Fig-5: Wiring Terminal location

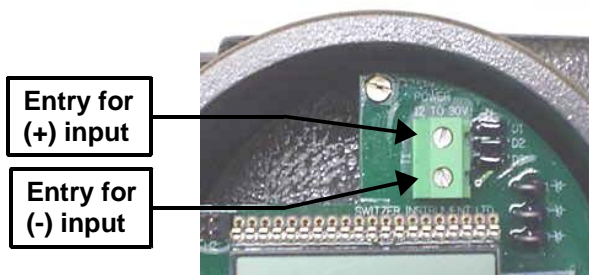
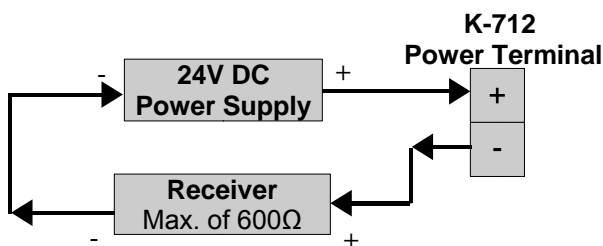


Fig-6: Wiring diagram



CALIBRATION INSTRUCTION

The pressure transmitters are factory calibrated to the required range and hence normally do not require any recalibration prior to installation. The following calibration procedure can be followed during any maintenance activity. Proper tools are to be used during calibration to ensure trouble free and precise performance of the transmitter.

Equipment required

1. A pressure source for the required range of the transmitter with an accuracy of 0.1% or better.
2. A 24VDC supply.
3. A 3-1/2 digit multimeter with 20.00 mA current range.

Calibration adjustment locations

See Fig-7 for the potentiometer locations for calibration adjustments. Two sets of potentiometers are provided for calibrating the current output and display readings. *It is to be noted that Current Output calibration is to be performed prior to Display calibration.*

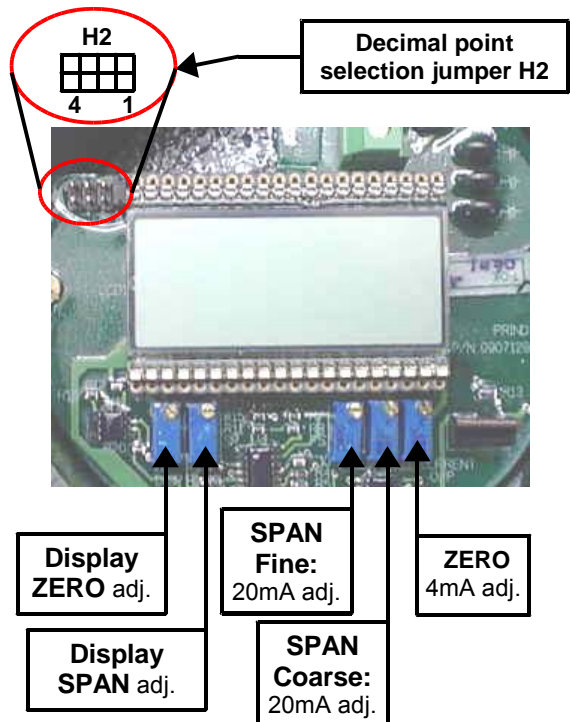
Current output calibration potentiometers

1. ZERO for adjustment of 4 mA output.
2. SPAN COARSE for coarse adjustment of 20 mA output.
3. SPAN FINE for fine adjustment of 20 mA output

Display reading adjust potentiometer

1. Display ZERO for 000 adjustment on display.
2. Display SPAN adjust for full scale value on display.

Fig-7: Calibration pots and decimal jumper location



Procedure

1. Establish the necessary pressure connection to the transmitter in the external 1/2" NPTM or internal 1/4" NPTF appropriately.
2. Unscrew the cover of the transmitter housing.
3. Connect the supply wires to the terminals marked (+) and (-) appropriately as per the wiring diagram in Fig-6. This will also carry the 4-20 mA current output. The output current can be measured by connecting a current

meter or multimeter in series with the power supply wires.

4. Initially vent the pressure to atmosphere.
5. Without applying any pressure, adjust the ZERO 4mA pot, for current meter to read 4.00 mA.
6. Adjust Display ZERO Pot for the display to read 000.
7. Apply a pressure of 99% of the full range pressure, marked on the name plate of the transmitter.
8. Adjust the SPAN Coarse 20mA pot for the meter to read between 19.79 mA and 19.89 mA.
9. Trim the SPAN Fine 20mA pot for the precise output current of 19.84 mA.
10. Adjust Display SPAN pot for the display to read the appropriate counts. Eg. For a FS range of 7.00 bar, the display should be adjusted to 700 counts; for a FS range of 20 psi, the display span counts shall be 2000.
11. Vent the pressure to atmosphere and check ZERO for current output of 4.00 mA and display reading of 000. Trim if necessary.
12. Similarly, apply full scale pressure and recheck SPAN for current output of 20mA and FS counts on display.
13. Check at various intermediate values for linearity.
14. This ends calibration.

Decimal point selection method

Select the appropriate decimal point as per the below table to display the proper pressure reading. This jumper selection does not depend on the calibration of instrument. Refer to Fig-7 for the decimal point jumper H2 location. This is located on the left side of the display below the cable entry.

Decimal point jumper H2 position	Displayed value
1	X X X . X
2	X X . X X
3	X . X X X
4	X X X X

ENTITY PARAMETERS FOR IS BARRIER REQUIREMENTS:

The following are the entity parameter of this model, which are to be considered when used with Safety Barriers.

- V_{max} = 30VDC
- I_{max} = 100mA
- C_i = 0.01 μ F
- L_i = 0.0 μ H

The safety barrier shall have the limiting values as

- V_{oc} \leq 30VDC
- I_{sc} \leq 100mA
- C_a \geq C_i (0.01 μ F) + C_{cable}
- L_a \geq L_i (0.0 μ H) + L_{cable}

MAINTENANCE INSTRUCTIONS:

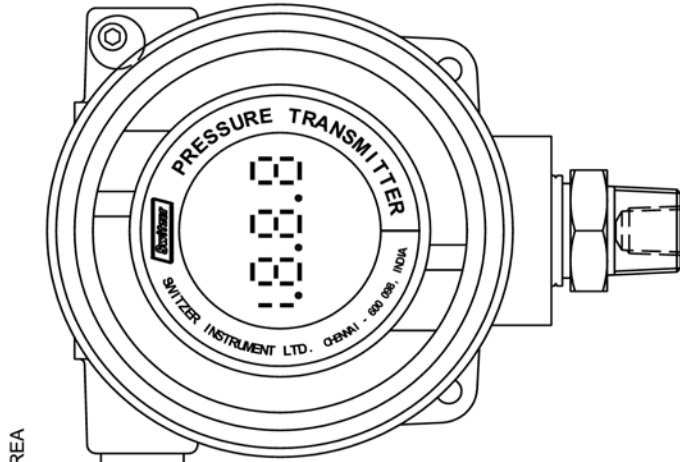
There are no user serviceable parts in this transmitter. The transmitter may need only a recalibration occasionally. Recalibration can be done at site by following the procedure as described earlier. Keep the sensor port clean to enable accurate measurement. If there is any clogging of the port with any debris, remove it gently with a tweezer. Do not use any sharp tool that can damage the diaphragm. Non-corrosive solvents can be used for cleaning the pressure port such as iso-propyl alcohol.

Return instrument to factory if there is any malfunction. Indiscriminate replacement of components may not conform to intrinsic safety requirements and IS certification may stand void, if any part is replaced.

TECHNICAL SPECIFICATIONS

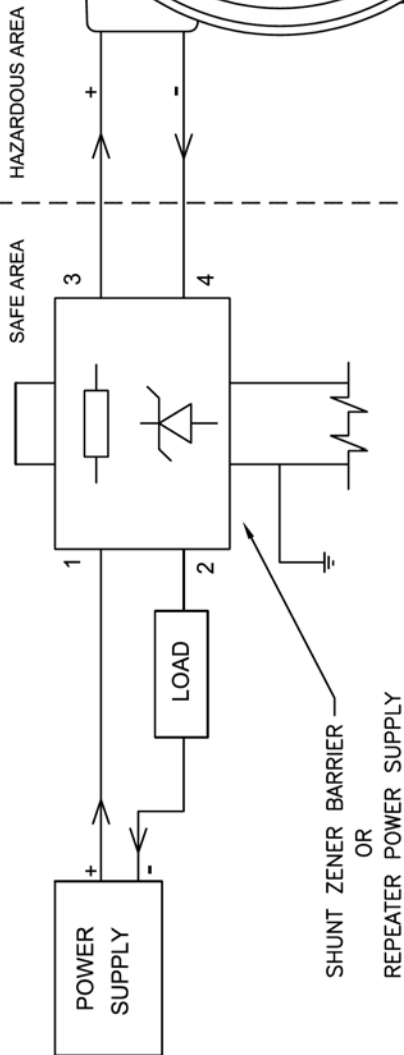
Characteristics	Specifications
Enclosure type	GR
Enclosure material	Aluminium
Range (1) mbar (2) bar	70, 350 1, 2, 3.5, 7, 20, 35, 70, 200, 350
Turn down ratio	2:1
Maximum working pressure	3x
Accuracy (inclusive of hysteresis and repeatability)	Current output : better than $\pm 0.25\%$ Display reading : better than $\pm 0.25\% \pm 1$ digit
Output	4 -20 mA
Output current limit	32 mA (max) ; 0.2mA(min)
Power supply	12 to 30V DC; 24V DC Nominal
Load capacity	600 Ω @ 24V DC
Process connection	1/2" NPTM & 1/4" NPTF
Electrical connection	Screw clamp terminals
Process temperature limits (1) 350 mbar & 1 to 350bar (2) 70 mbar	-40°C to 125°C -20°C to 70°C
Ambient temperature limits	0 to 55°C
Ambient Relative Humidity	95%
Mounting	Direct on line; Surface; 2" pipe; Wall
Approximate weight	1.8 Kg
Display (1) Type (2) Pattern (3) Character size	LCD - 3 1/2 digit 7 segment 12.7mm
Intrinsically Safe data	Ex ia IIC T4
Statutory compliance (1) Flameproof	Gr.IIA, IIB, IIC of IS:2148 for all ranges.
(2) Intrinsically safe	IS:5780-2002
Overall Dimension	125 x 110 x 175 mm

NO	REVISION	AUTH.BY	NO	REVISION	AUTH.BY



K - 712 2-WIRE PRESSURE TRANSMITTER WITH INDICATION

INTRINSIC SAFETY PARAMETERS
 V_{max} = 30V DC
 I_{max} = 100 mA
 C_i = 0.1 μ F
 L_i = 0.00 μ H



NOTES:

1. INSTALL IN ACCORDANCE WITH BARRIER MANUFACTURER INSTRUCTIONS.

2. (a) SAFETY BARRIER SHALL HAVE THE LIMITING VALUES AS

$$V_{oc} \leq 30V \text{ DC}$$

$$I_{sc} \leq 100 \text{ mA}$$

$$C_{barrier} \geq C_i (0.1 \mu\text{F}) + C_{cable}$$

$$L_{barrier} \geq L_i (0.00 \mu\text{H}) + L_{cable}$$

(b) VOLTAGE V_{max} & CURRENT I_{max} WHICH THE TRANSMITTER CAN RECEIVE MUST BE EQUAL TO OR GREATER THAN THE MAXIMUM OPEN CIRCUIT VOLTAGE V_{oc} & MAXIMUM SHORT CIRCUIT CURRENT I_{sc} WHICH CAN BE DELIVERED BY SOURCE DEVICE.

(c) MAXIMUM CAPACITANCE C_i & INDUCTANCE L_i OF INSTRUMENT & MAXIMUM CAPACITANCE AND INDUCTANCE OF INTER CONNECTING WIRING MUST BE EQUAL TO OR LESS THAN THE CAPACITANCE $C_{barrier}$ OR INDUCTANCE $L_{barrier}$ OF SOURCE DEVICE.

$$C_i + C_{cable} \leq C_{barrier}; L_i + L_{cable} \leq L_{barrier}$$

PLANT	
PROJECT	
CUSTOMER	
CONSULTANT	
CLIENT	
P.O.NO. & DATE	
SWITZER REF.	
MODEL NO.	
QUANTITY	
TAG. NO.	

DATE	DRN.	23.09.2005
	REVISED	
	ALL DIMENSIONS IN MM	
	THIRD ANGLE PROJECTION	
TOLERANCE		-
SCALE		N.T.S

K-712 2-WIRE INDICATING PRESSURE TRANSMITTER
 INSTALLATION WIRING DIAGRAM TO COMPLY WITH
 INTRINSICALLY SAFE REQUIREMENT

SWITZER INSTRUMENT LIMITED
 127 SIDCO ESTATES CHENNAI-98

# 4 0905-18-0		
DRN.	CHKD.	APPD.
R.G	VMR	VR