



Applied Standards on InstruMate pressure transmitters:

Process Connections:
EN837, ASME B1.20.1

Electrical Connectors:
as per DIN 175301-803A&C, Circular M12X1,
or Cable

InstruMate[®]

InstruMate Pressure Transmitters
Messenger Series
Models 3110 & 3103

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1) Introduction

- 1-1) All InstruMate pressure transmitters are made under the management system certified to ISO9001 and strictly controlled for production process.
- 1-2) Installation site regulations and local safety requirements are to be observed prior to this instruction manual.
- 1-3) It is recommended to skilled worker or personnel to study instruction manual before handling the instrument.
- 1-4) This instrument in your hands is suitable for the applications and specifications given in the corresponding product data sheet.
- 1-5) InstruMate Co., Limited insists on permanent improvement. As a result, technical info are subject to modifications.

Data sheets and more information can be found at: www.instrumate.com

Technical consults: info@instrumate.com

2) Overview



- ① Electrical Connector
- ② Transmitter Housing
- ③ Spanner Flats for Installation
- ④ Thread

3) Proper Application & Safety Measures

- 3-1) InstruMate pressure transmitters are devices made to convert low-level electrical outputs from pressure-sensing elements to higher level signals that can be transmitted over a long distance for further processing and use in various systems and manufacturer shall not be claimed responsible for operations other than stated.
- 3-2) Models 3110 and 3103 are intended to use in industrial applications.
- 3-3) User shall pay attention to applying condition like ambient temperature and process temperature which can affect the performance of the device if not observed according to product data sheets.
- 3-4) Only Skilled personnel shall carry out handling of this instrument based on their training or technical knowledge.

4) Storage, Package and Transport

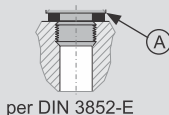
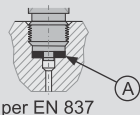
- 4-1) Humidity shall be in a way that no condensation happens. Storage temperature is explained in permissible temperature ranges table.
- 4-2) Package is specially designed to protect the instrument from shock and possible damage while transportation. It is advised to keep the package if there is a chance to change the installation site or send for recalibrations.
- 4-3) Before mounting the instrument, check its appearance for obvious damages possibly caused in transportation.

5) Installation

- 5-1) Carry out a visual inspection before installation. No leaking fluid shall be noticed.
 5-2) There must be standard sealing faces; cleaned and undamaged.

Parallel threads

Seal the sealing face (A) with flat gasket, lens-type sealing ring or InstruMate profile sealing materials.



Tapered Threads

Wrap threads with sealing material (e.g. PTFE tape).



NPT, R and PT

- 5-3) Use the proper sealing according to above diagram.
 5-4) Tighten on spanner flats using a torque spanner.
 5-5) Power Supply must be according to product requirement stated on the label and the voltage supply shall be suitable for operation corresponding to installation site altitude.
 5-6) Cable diameter shall match the cable connector on transmitter and no humidity shall ingress in that place.
 5-7) Grounding shall take place by connecting the instrument to the equipotential bonding of the system or plant. This can be done through the process connection of the instrument.
 5-8) Assemble the cable outlet or connector according to product data sheet pin assignments.

pin assignments:

Angular Connector DIN 175301-803 A

	2-wire	3-wire
	1	1
U _B	1	1
0V	2	2
S+	-	3

Angular Connector DIN 175301-803 C

	2-wire	3-wire
	1	1
U _B	1	1
0V	2	2
S+	-	3

Circular Connector M12x1 (4-pin)

	2-wire	3-wire
	1	1
U _B	1	1
0V	3	3
S+	-	4

Cable Outlet, unshielded

	2-wire	3-wire
	red	red
U _B	red	red
0V	black	black
S+	-	green

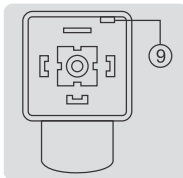
*U_B Positive power Supply terminal

*0V Negative power Supply terminal

*S+ Analogue output

6) Fitting an angular connector - step by step guide

- 6-1) Loosen the screw ① .
- 6-2) Loosen the cable gland ② .
- 6-3) Pull the angular connector ⑤ + ⑥ away from the instrument.

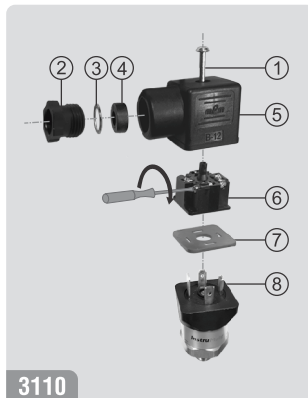


- 6-4) **CAUTION!**
Improper mounting
The seal of the angle housing will be damaged.

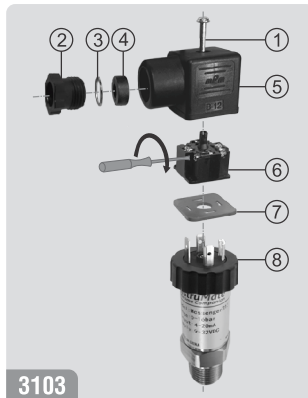


Via the mounting hole ⑨, lever the terminal block ⑥ out of the angle housing ⑤.

- 6-5) Slide the cable through the cable gland ②, the ring ③, the sealing ④ and the angle housing ⑤.
- 6-6) Connect the cable ends to the terminal blocks ⑥ in accordance with the connection diagram.
- 6-7) Press the angle housing ⑤ onto the terminal block ⑥.
- 6-8) Make sure that the seals are not damaged and that the cable gland and seals are correctly seated in order to ensure ingress protection.
- 6-9) Tighten the cable gland ② around the cable.
- 6-10) Place the flat gasket ⑦ over the instruments connection pins.
- 6-11) Push the angular connector ⑤ + ⑥ onto the instrument.
- 6-12) Tighten the screw ①.



3110



3103

7) Adjusting Zero point and span - Step by step guide (only on Model 3103)

Notice: The span shall be adjusted only if your calibration equipment is at least 3 times better accuracy than the pressure transmitter.

7-1) Disconnect the instrument from all electrical connections.

7-2) Remove (A) , (B) , (C) carefully.

7-3) Pull the instrument connector (D) out of the housing carefully and connect it to power supply and display unit.

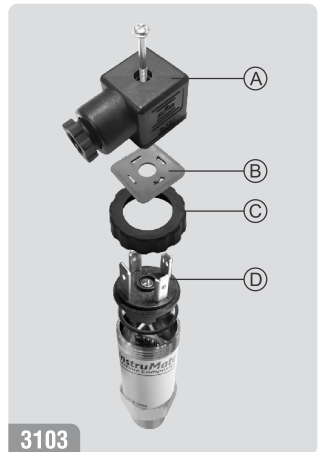
7-4) for zero adjustment, use potentiometer (Z) and adjust the minimum output signal.

7-5) for span adjustment, use potentiometer (S) and adjust the maximum output signal.

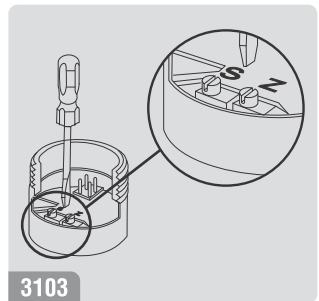
Doing this, may affect the zero point. Check zero point again to see if there is a need to readjust it. Repeat this procedure if needed.

7-6) disconnect the instrument connector (D) from power supply and display unit and then carefully put it back into the housing. Be careful not to damage wires and seals. Finally tighten the clamping nut (C) and the angular connector back into place.

Need for readjustments depend on pressure and temperature tensions the instrument has experienced. Annual recalibration is suggested in general.



3103



3103

8) Faults and Errors

InstruMate pressure transmitters are tested in the factory before dispatch to customers to make sure there is no fault in their operation. If by any means, faults are noticed in their commissioning, they must be taken out of the operation.

In some industrial process, hazardous media pressure is measured. If faults occur in such process, there is the danger of physical injury, or damage to property or environment. Wear personal protective equipment as there might be exposure to high pressure and high temperature aggressive media.

Please check if the instrument was mounted correctly in both mechanical and electrical terms before contacting the supplier.

Anyway, we will NOT charge you the complaint processing fees.

A list of common faults and their reasons:

Faults & Errors	Reasons	Measures
There is no signal	Cable is broken	Check Cable continuity
Signal Deviation at zero point	Exceeding the safety overload	Permissible overload safety must always be observed
Signal Deviation at zero point	Process temperature is more or less than the instrument capability	Permissible temperatures must always be observed
Varying signal span	There is electromagnetic interference in environment	Remove source of interference from the instrument and use shielded cable
Inaccurate signal span	Process temperature is more or less than the instrument capability	Permissible temperatures must always be observed
Output signal does not change corresponding to change in pressure	Overpressure – mechanical damage to sensor	Instrument shall be replaced
Weak or dropping signal span	Overpressure – mechanical damage to sensor	Instrument shall be replaced

9) Maintenance & Cleaning

InstruMate pressure transmitters are maintenance-free. They are built economically to save industry costs so they are not for repair. Recalibrations can be carried out periodically.

Only the surface of a pressure transmitter can be cleaned with considerations regarding its label using only water, normal dishwashing detergent and a soft towel. The transmitter must be dismantled from process and electric connections before cleaning.

10) Uninstallation & disposal

Due to the process media characteristics, the pressure transmitter might be infected with hazardous media like corrosive, toxic, radioactive or flammable substances. So the personnel shall wear the protective equipment, and start dismantling after de-pressurizing the instrument and disconnecting the electrical connections.

You shall follow your country regulations in case of the disposal of the instrument.

11) Specifications

Gauge Pressure ranges (bar)	Permissible over pressure		Compensated medium temperature ¹	Permissible medium temperature
	3110	3103	3110 & 3103	3110 & 3103
0...0.05	400% FS	400% FS	-10...70°C	-25...125°C
0...0.1	300% FS	300% FS	-10...70°C	-25...125°C
0...0.16	300% FS	300% FS	-10...70°C	-25...125°C
0...0.25	300% FS	300% FS	-10...70°C	-25...125°C
0...0.4	200% FS	200% FS	-10...70°C	-25...125°C
0...0.6	300% FS	300% FS	-10...70°C	-25...125°C
0...1	200% FS	200% FS	-10...70°C	-25...125°C
0...1.6	200% FS	200% FS	-10...70°C	-25...125°C
0...2.5	200% FS	200% FS	-10...70°C	-25...125°C
0...4	200% FS	200% FS	-10...70°C	-25...125°C
0...6	200% FS	200% FS	-10...70°C	-25...125°C
0...10	200% FS	200% FS	-10...70°C	-25...125°C
0...16	200% FS	200% FS	-10...70°C	-25...125°C

Gauge Pressure ranges (bar)	Permissible over pressure		Compensated medium temperature ¹	Permissible medium temperature
	3110	3103	3110 & 3103	3110 & 3103
0...25	200% FS	200% FS	-10...70°C	-25...125°C
0...40	150% FS	200% FS	-10...70°C	-25...125°C
0...60	150% FS	200% FS	-10...70°C	-25...125°C
0...100	150% FS	200% FS	-10...70°C	-25...125°C
0...160	150% FS	200% FS	-10...70°C	-25...125°C
0...250	150% FS	150% FS	-10...70°C	-25...125°C
0...400	150% FS	150% FS	-10...70°C	-25...125°C
0...600	150% FS	150% FS	-10...70°C	-25...125°C
0...1000	—	130% FS	-10...70°C	-25...125°C

1. Compensated medium temperature refers to the temperature range within which the pressure transmitter will maintain its promised accuracy.

Compound & Vacuum ranges (bar)	Permissible over pressure		Compensated medium temperature	Permissible medium temperature
	3110	3103	3110 & 3103	3110 & 3103
-0.025...+0.025	150% (dry & clean gas only)	150% (dry & clean gas only)	-10...70°C	-25...125°C
-0.05...+0.05	400% FS	400% FS	-10...70°C	-25...125°C
-0.06...+0.1	300% FS	300% FS	-10...70°C	-25...125°C
-0.1...+0.15	200% FS	200% FS	-10...70°C	-25...125°C
-0.2...+0.2	200% FS	200% FS	-10...70°C	-25...125°C
-0.3...+0.3	300% FS	300% FS	-10...70°C	-25...125°C
-0.5...+0.5	400% FS	400% FS	-10...70°C	-25...125°C
-1...0	300% FS	300% FS	-10...70°C	-25...125°C
-1...0.6	300% FS	300% FS	-10...70°C	-25...125°C
-1...+1.5	300% FS	300% FS	-10...70°C	-25...125°C
-1...+3	200% FS	200% FS	-10...70°C	-25...125°C
-1...+5	200% FS	200% FS	-10...70°C	-25...125°C

Compound & Vacuum ranges (bar)	Permissible over pressure		Compensated medium temperature	Permissible medium temperature
	3110	3103	3110 & 3103	3110 & 3103
-1...+9	200% FS	200% FS	-10...70°C	-25...125°C
-1...+15	200% FS	200% FS	-10...70°C	-25...125°C
-1...+24	200% FS	200% FS	-10...70°C	-25...125°C

Absolute Pressure ranges (bar)	Permissible over pressure		Compensated medium temperature	Permissible medium temperature
	3110	3103	3110 & 3103	3110 & 3103
0...0.25	300%FS	300%FS	-10...70°C	-25...125°C
0...0.4	200%FS	200%FS	-10...70°C	-25...125°C
0...1	200%FS	200%FS	-10...70°C	-25...125°C
0...1.6	200%FS	200%FS	-10...70°C	-25...125°C
0...2.5	200%FS	200%FS	-10...70°C	-25...125°C
0...4	200%FS	200%FS	-10...70°C	-25...125°C
0...6	200%FS	200%FS	-10...70°C	-25...125°C
0...10	200%FS	200%FS	-10...70°C	-25...125°C
0...16	200%FS	200%FS	-10...70°C	-25...125°C
0...25	200%FS	200%FS	-10...70°C	-25...125°C

Technical details applicable on Models: 3110 and 3103

Reference Conditions	Ambient Temperature	15...25°C
	Atmospheric Pressure	860...1060 mbar
	Humidity	45%...75%
	Power Supply	24V DC
Load	Current (2-wire)	
	Voltage (3-wire)	
	Ratiometric (3-wire)	

Technical details applicable on Models: 3110 and 3103

Ingress protection	Angular Connector Form A	IP65
	Angular Connector Form C	IP65
	Circular Connector M12x1	IP67
	Cable Outlet	IP67
Rated Insulation Voltage	500 V DC	
Polarity Protection	YES	
Anti-Jamming Circuit	YES	

Permissible Temperature Ranges:

Permissible temperature ranges	3110	3103
Storage	-35...+75 °C	-35...+75 °C
Ambient	-20...+75 °C	-20...+75 °C
Temperature Error (within 0...80 °C)	$\leq \pm 0.055 \times (t_2 - t_1)$ % of the span for ranges less than 350 mbar $\leq \pm 0.035 \times (t_2 - t_1)$ % of the span for ranges over 350 mbar	$\leq \pm 0.035 \times (t_2 - t_1)$ % of the span for ranges less than 350 mbar $\leq \pm 0.02 \times (t_2 - t_1)$ % of the span for ranges over 350 mbar

* t_1 Reference temperature.

* t_2 Ambient temperature.

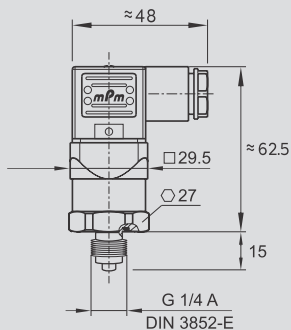
Performance:

Performance factors	3110	3103
Zero Point and Span Adjustability	By the use of software	By potentiometers ($\pm 10\%$)
Long-term Stability	Less than 0.25% of span per year	Less than 0.2% of span per year
Non-linearity	$\leq \pm 0.25\%$ of span	$\leq \pm 0.2\%$ of span
Non-repeatability	$\leq \pm 0.2\%$ of span	$\leq \pm 0.125\%$ of span
Accuracy ¹	$\pm 0.5\%$ BFSL	$\pm 0.25\%$ BFSL

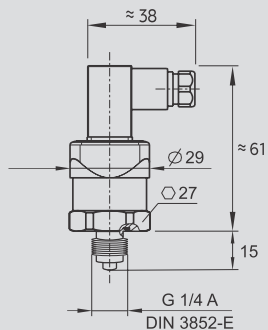
* Strong Electromagnetic sources can increase the instrument measuring error.

1. Including non-linearity, hysteresis, zero offset and end value deviations.

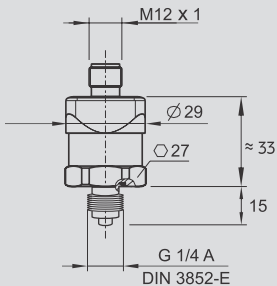
12) Dimensions - Messenger 3110 (mm)



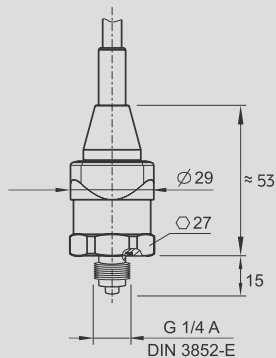
Angular Connector form A



Angular Connector form C

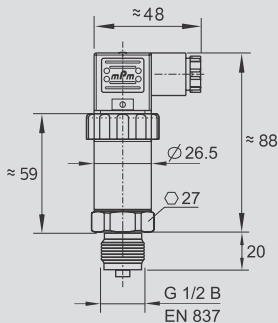


Circular Connector M12x1

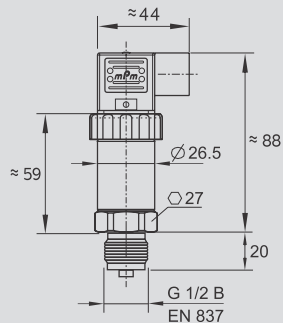


Cable Outlet

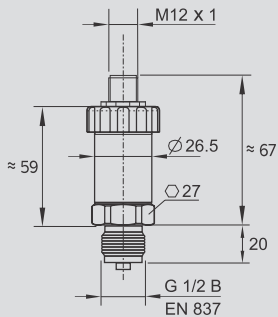
13) Dimensions - Messenger 3103 (mm)



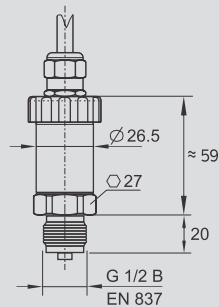
Angular Connector form A



Angular Connector form C



Circular Connector M12x1



Cable Outlet

14) Available Process Connections

process connections:

Standard	sizes	Model 3110	Model 3103
EN 837	G 1/8 B	✓	✓
	G 1/4 B	✓	✓
	G 1/4 Female	✓	✓
	G 3/8 B	✓	✓
	G 1/2 B	✓	✓
DIN EN ISO 1179-2	G 1/4 A	✓	✓
	G 1/4 Female	✓	✓
	G 1/2 A	✓	✓
	M14 x 1.5	✓	✓
ANSI/ASME B1.20.1	1/8 NPT	✓	✓
	1/4 NPT	✓	✓
	1/4 NPT Female	✓	✓
	1/2 NPT	✓	✓
SAE J514 E	7/16-20 UNF O-ring BOSS	✓	✓
	7/16-20 UNF with 74° taper	✓	✓
	M20 x 1.5	✓	✓
	G 1/2 male / G 1/4 Female	✓	✓
DIN 16288	M20 x 1.5	✓	✓
ISO 7	R 1/4	✓	✓
	R 3/8	✓	✓
	R 1/2	✓	✓
KS	PT 1/4	✓	✓
	PT 1/2	✓	✓
	PT 3/8	✓	✓

These were the general technical specifications of the products mentioned. For the product in your hand, you must note confirmed specifications at the time of the order. Standard version is shipped to customer by default and its details are explained in product data sheet.

InstruMate[®]

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