



Data Sheet

I/P and E/P converters

RS stock numbers 729-470, 729-486

Standard (electro-mechanical)



Operation

These are force balance instruments having a coil suspended in a magnetic field on a flexible mount. At the lower end of the coil is a flapper valve which operates against a precision ground nozzle to create a back pressure on the servo diaphragm of a booster relay.

As the input signal to the instrument is carried, current flowing in the coil produces a proportional force between the coil and its flapper valve thereby controlling servo pressures and the output pressure.

Zero adjustment is made by means of an adjusting screw which varies the distance between the flapper valve and the air nozzle.

Range adjustment is made by varying a potentiometer which shunts input current past the coil.

An integral volume flow booster provides adequate flow capacity to give fast response for the majority of applications.

Construction

Housing _____ Zinc diecastings, passivated and black epoxy paint, environmental class IP44

Materials of construction _____ Nitrile diaphragms, stainless steel flapper, nozzle and supply valve

Mounting _____ Integral surface mounting bracket provided for preferred vertical mounting

Pneumatic connections _____ 1/4in NPT female (plus two integral 1/4in NPT gauge ports)

Electrical connections _____ 16mm square connector DIN 43650 provided, oriented in 4 directions
Alternative 30mm connector can be specified

Controls _____ Span and zero with weatherproof covers

Weight _____ 1300gm.

General technical information

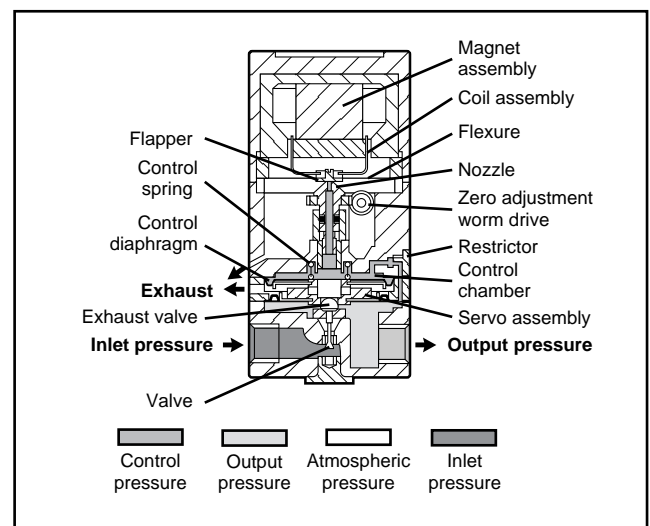
Media _____ Oil free clean dry air filtered to 25µm

Temperature operating _____ -10 to +60 Celsius
compensated range

Storage _____ -20 to +70 Celsius

Insulation _____ Electrically isolated; tested to 500Vdc.

Principle of operation



Note: Customers are responsible for ensuring that the product is used only for the purpose for which it is intended. In case of doubt our technical help line will be pleased to advise.

I/P converter

**Low pressure – 2 wire, 4-20mA,
3 to 15 psi output (RS stock no. 729-470)**

This version is intended for standard process control pressure ranges, especially standard valve actuation or positioner control, (normally 3-15 psig or 0.2-1 bar).

Specification

Accuracy:

Linearity error (bsl) _____ Typically $\pm 0.2\%$ span, test limit $\pm 0.5\%$

Hysteresis _____ Typically $\pm 0.1\%$ span, test limit $\pm 0.35\%$

Resolution _____ Better than $\pm 0.05\%$ span

Temperature coefficient ____ Typically better than 0.1% span/Celsius span and zero over operating range

Supply sensitivity _____ Better than 0.025% span output change/% supply pressure change

Standard input _____ 4-20mA dc 2 wire instrument resistance is less than 300 Ohms

Alternative input signals can be accommodated including 2 wire E/P version with range 2-10V resistance typically 500 Ohms

Pneumatic performance:

Air consumption _____ Typically 0.03 scfm (0.85 litres/min)

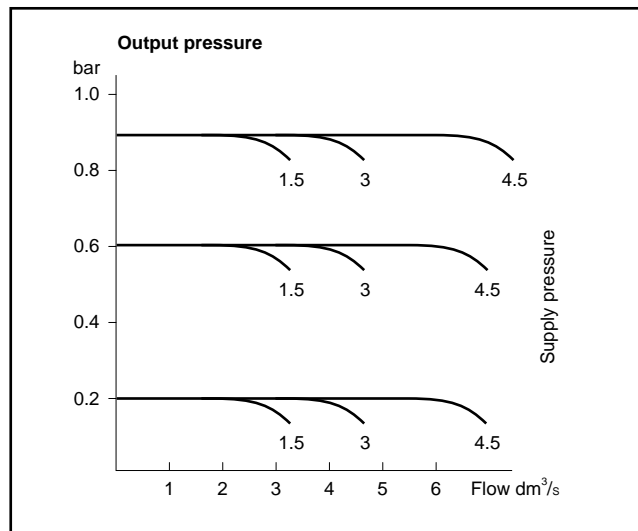
Flow _____ Typically 10scfm (280 litres/min)

See graph below

Supply pressure _____ 20-80psig (1.4-5.5 bar) recommended supply 25-30psig (1.7-2 bar)

Response time _____ Dependent upon pressure range, typically less than 0.25 sec for 3-15 psig (0.2-1 bar) version for 10-90% step pressure change.

Performance



E/P converter

**High pressure – 2 wire, 1-10 Volt,
2 to 120 psi output (RS stock no. 729-486)**

This high pressure version is intended for use with industrial pneumatic and process control systems requiring pressures up to 120 psi (8 bar). Their applications include paper and converting industries, energy management, power generation and general industrial control.

Specification

Accuracy:

Linearity error (bsl) _____ Typically $\pm 0.35\%$ span, test limit $\pm 1\%$

Hysteresis ____ Typically $\pm 0.1\%$ span, test limit $\pm 0.5\%$

Resolution _____ Better than $\pm 0.05\%$ span

Temperature coefficient _____ Typically better than 0.1% span/Celsius span and zero over operating range

Supply sensitivity _____ Better than 0.025% span output change/% supply pressure change

Standard input _____ 0-60mA dc 2 wire. Instrument resistance is less than 180 Ohms

The standard version can be used for lower full scale pressure applications, the current requirement being reduced proportionally, typically 500 Ohms.

See graph overleaf

Pneumatic performance:

Air consumption _____ Typically 0.06 scfm (1.75 litres/min)

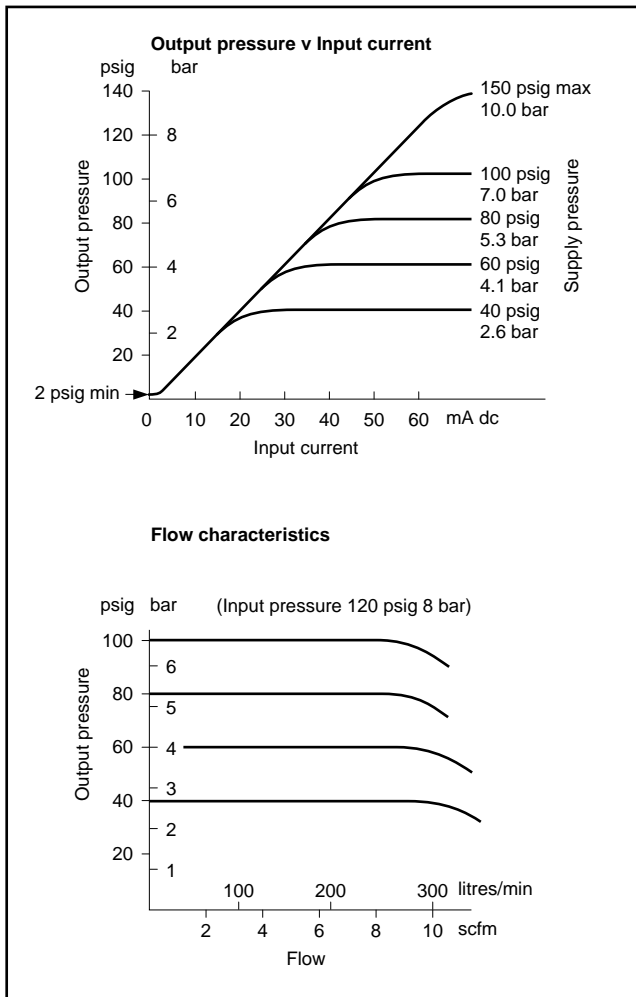
Flow _____ Typically 10scfm (283 litres/min)

See graph overleaf

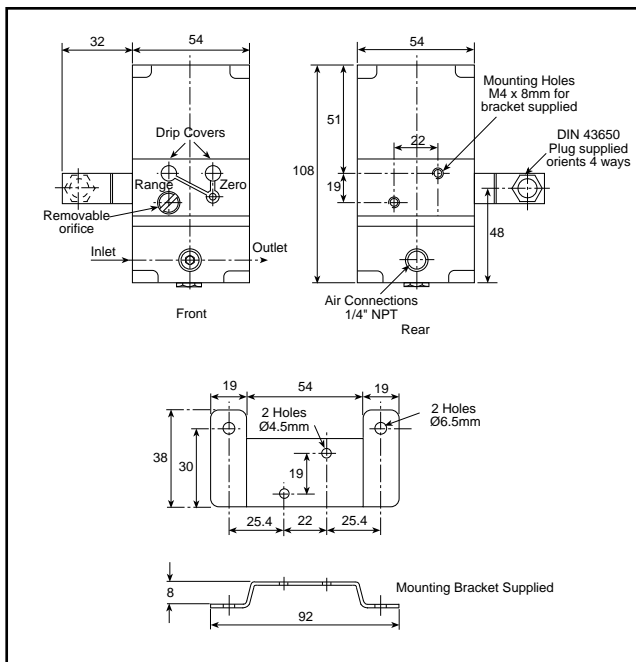
Supply pressure _____ At least 10 psi above the maximum required output pressure, maximum 150 psi (10 bar)

Response time _____ Dependent upon pressure range, typically less than 0.25 sec for 3-15 psig (0.2-1 bar) version for 10-90% step pressure change.

Performance



Dimensions (I/P and E/P versions)



Failsafe electronic I/P converter



Unlike other I/P converters, which use fragile and sensitive electromechanical pressure control, the electronic I/P employs a rugged high sensitivity Reedex Valve for pressure control. This offers extreme reliability, freedom from vibration effect and long life, together with low air consumption and hysteresis.

The pneumatic design of the electronic I/P allows an output capacity of up to 10scfm, so that no volume booster is necessary for high flow applications such as large valves.

Operation

The 4-20mA control signal is used to operate the micro-miniature solenoid valve to vary the control pressure of a high flow volume booster which provides regulated output pressure. Pressure is monitored by an internal precision pressure transducer to provide a feedback signal to the pulse width modulation electronics which control the valve maintaining the output pressure at the desired level. The instrument derives its electrical power from the 2 wire 4-20mA control signal.

The control volume has a small bleed so that when the control signal is lost the Reedex Valve will close and the output pressure quickly drops to zero; hence fail-safe operation is guaranteed.

Accuracy

Parameters marked with * are tested on every unit by computer controlled test equipment. Other parameters are typical.

- * **Control characteristic:** Linear, pressure proportional to signal
- * **Max. error (combined effect of non-linearity, hysteresis, deadzone & repeatability):** Within $\pm 0.5\%$ span of a terminally based straight line.
- * **Hysteresis + Resolution:** Less than 0.1% span
- * **Supply pressure effect:** See graph

Temperature effect (span & zero): Typically less than 1% FS over compensated range

Long term stability: Typically $\leq 0.5\%$ span per annum

Pneumatic

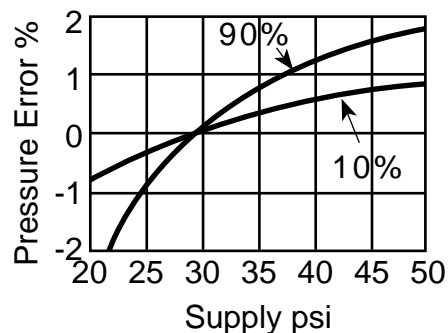
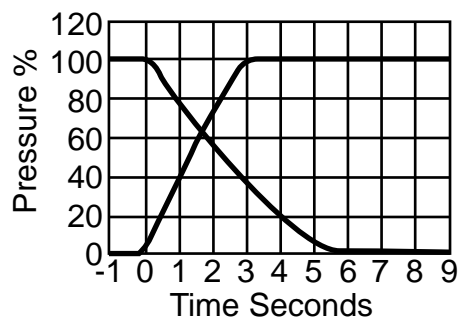
- * **Output signal:** 0.2-1 bar (3-15psig)
- * **Response time:** See graph
- * **Minimum outlet pressure:** Less than 15mbar (0.2psig)
- * **Consumption:** Typically 400cc/min (0.02scfm)
- Flow capacity:** Up to 300NI/min (10scfm)
- Output ripple:** Less than $\pm 0.5\%$ span at 10Hz into zero load volume
- Media:** Oil free, dry air filtered to 5 microns
- Supply pressure range:** 1.5-3.5bar (20-50psig)
- Preferred range:** 1.7-2.5bar (25-35psig)
- Connections:** $\frac{1}{4}$ in NPT female (plus two integral $\frac{1}{4}$ in NPT gauge ports).

Electrical

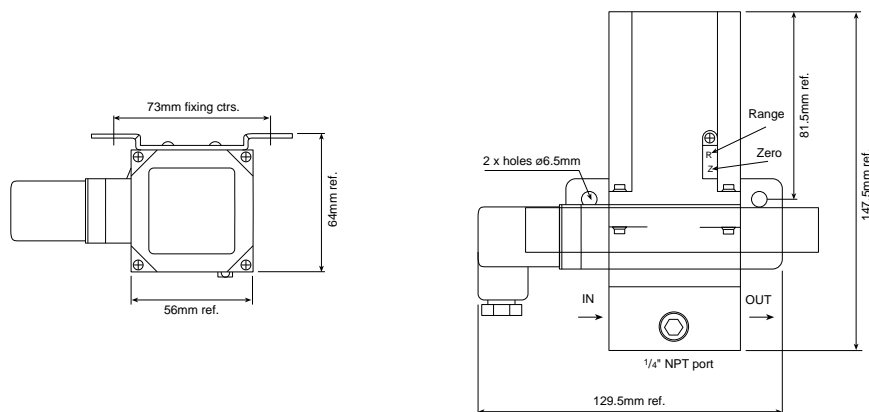
- * **Input signal:** 4-20mA two wire
- * **Load:** Presents a constant voltage drop to the current source of 10V ± 0.5 V
- * **Start up time:** Less than 6 seconds
- * **Min. current failure mode:** Typically 2mA
- Insulation:** Tested to 500Vdc
- Reverse voltage:** -100V
- Over current:** 100mA continuous. 500mA for 1 second
- Rangeability:** More than $\pm 20\%$ on zero and span
- Connections:** 30mm square connector DIN 43650 provided, orientable in four directions
- Failure mode:** On failure of input signal the output pressure will fall to below 15mbar (0.2psig).

Environmental and Physical

- Vibration:** The unit possesses a high degree of immunity
- Life:** Designed MTTF more than 8 years
- Electromagnetic compatibility:** Emissions more than 20dB below accepted limits (BS800). Instrument immune to conducted transient interference up to 4kV
- Operating temperature:** -20°C to +70°C
- Compensated range:** -10°C to +60°C
- IP rating:** IP65
- Material of construction:** Zinc diecasting passivated and epoxy painted, Verton glass/nylon cover, Nitrile diaphragms
- Mounting:** Integral surface mounting bracket provided for vertical mounting. Operation in any attitude is possible without recalibration
- Weight:** 800gm.

Supply sensitivity**Response time (no load)**

Dimensions



Compact failsafe rail mount I/P



The instrument can be conveniently mounted on DIN rail, or surface mounted, or onto a high density manifold, which eliminates much plumbing.

Operation

The 4-20mA signal is stored until sufficient energy is available to operate the miniature high speed solenoid valve which increases the control pressure of a high flow volume booster which provides regulated output pressure. This is monitored by an internal pressure transducer to give a control signal to the pulse width modulation electronics which modulates the valve until the desired pressure is achieved.

The control volume has a small bleed so that when the control signal is lost the Reedex Valve will close and the output pressure quickly drops to zero; hence fail-safe operation is guaranteed.

Accuracy

Parameters marked with * are tested on every unit by computer controlled test equipment. Other parameters are typical.

- * **Control characteristic:** Linear, pressure proportional to signal
- * **Max. error (combined effect of non-linearity, hysteresis, deadzone & repeatability):** Within $\pm 0.5\%$ span of a terminally based straight line
- * **Hysteresis and resolution:** Less than 0.1% span
- * **Supply pressure effect:** See graph

Temperature effect (span & zero): Typically less than 1% FS over compensated range

Long term stability: Typically <0.5% span per annum.

Pneumatic

- * **Output signal:** 0.2-1 bar (3-15psig)
- * **Response time:** See graph
- * **Minimum outlet pressure:** Less than 15mbar (0.2psig)
- * **Consumption:** Typically 200cc/min (0.01scfm)

Flow capacity: Up to 150N litres/min (5scfm)

Output ripple: Less than $\pm 0.5\%$ span at 10Hz into zero load volume

Media: - Oil free, dry air filtered to 5 microns

Supply pressure range: 1.5-3.5 bar (20-50psig)

Preferred range: 1.7-2.5 bar (25-35psig)

Connections: $\frac{1}{8}$ in NPT female.

Electrical

- * **Input signal:** 4-20mA two wire
- * **Load:** Presents a constant voltage drop to the current source of $10V \pm 0.5V$
- * **Start up time:** Less than 6 seconds
- * **Min. current failure mode:** Typically 3mA

Insulation: Tested to 500Vdc

Reverse voltage: -100V

Over current: 100mA continuous. 500mA for 1 second; fitted internal fuse 160mA

Rangeability: More than ±20% on zero and span

Connections: Two part quick release terminal block with capacity up to 2.5mm² cable

Failure mode: On failure of input signal the output pressure will fall to below 15mbar (0.2psig).

Environmental and physical

Vibration: The unit possesses a high degree of immunity

Life: Designed MTTF greater than 8 years

Electromagnetic Compatibility: RFI protection is incorporated in the instrument

Operating temperature: -10°C to +60°C

Compensated range: 0°C to +50°C

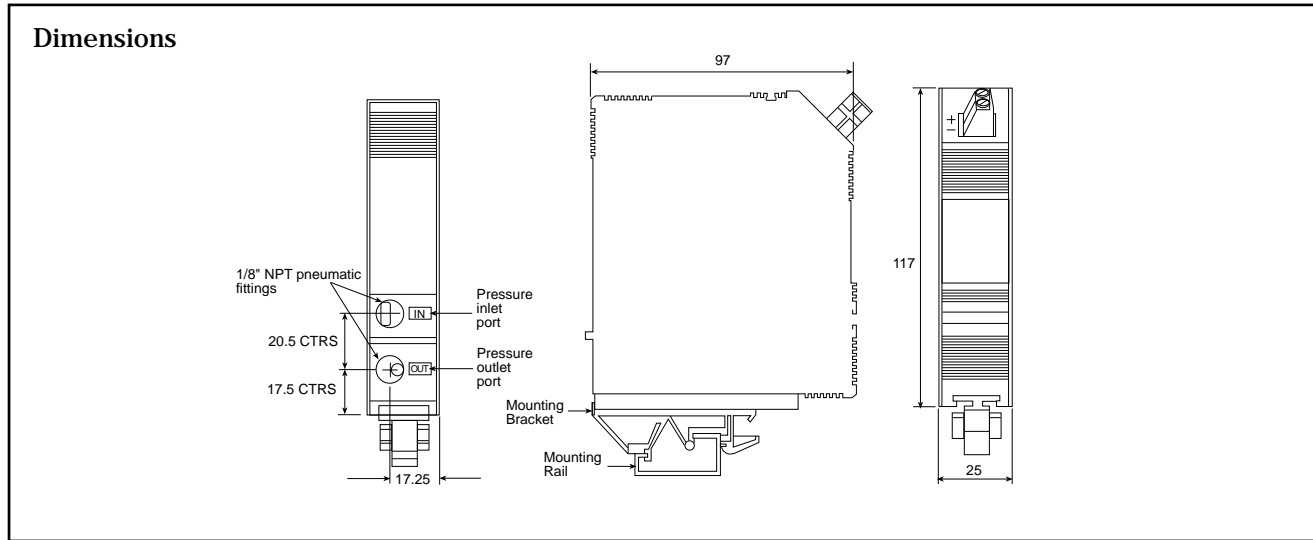
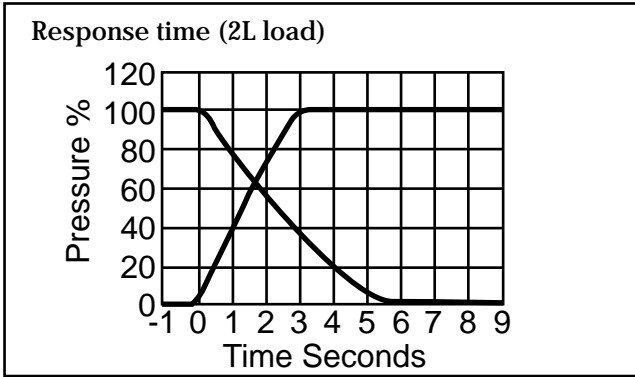
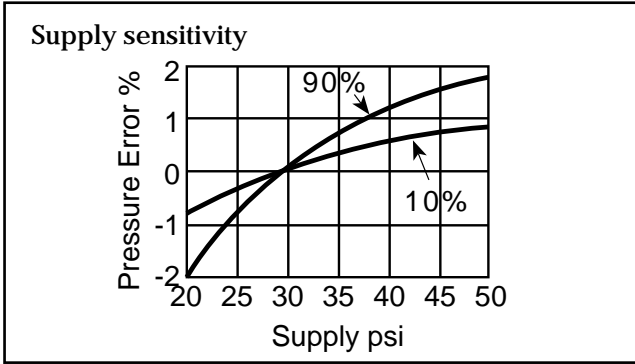
IP rating: IP40

Material of construction - Anodised natural aluminium

Mounting: Any orientation. A rail clip for TS32 (EN50035)/TS35(EN50022) rail is provided with each instrument.

Weight: 600gm.

Graphs



10 way manifold for use with compact fail-safe rail mount I/P

The manifold consists of a purpose-designed aluminium extrusion available in several lengths with a single air supply. Each converter should be fitted with an adapter kit which then allows them to be plugged in to a self-sealing pneumatic supply port, which has an individual output port at the bottom of the manifold for single pneumatic installation. The extrusion includes a cable tray to route the converter wiring tidily.

The manifold will normally be surface mounted and the principle air supply can be connected to either end. It is recommended that an appropriate filter regulator be fitted to supply all converters.

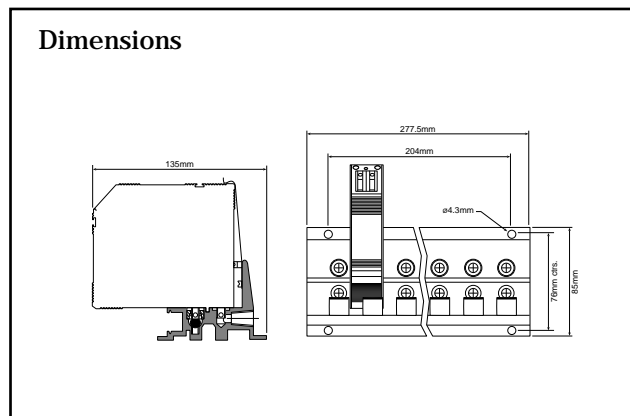
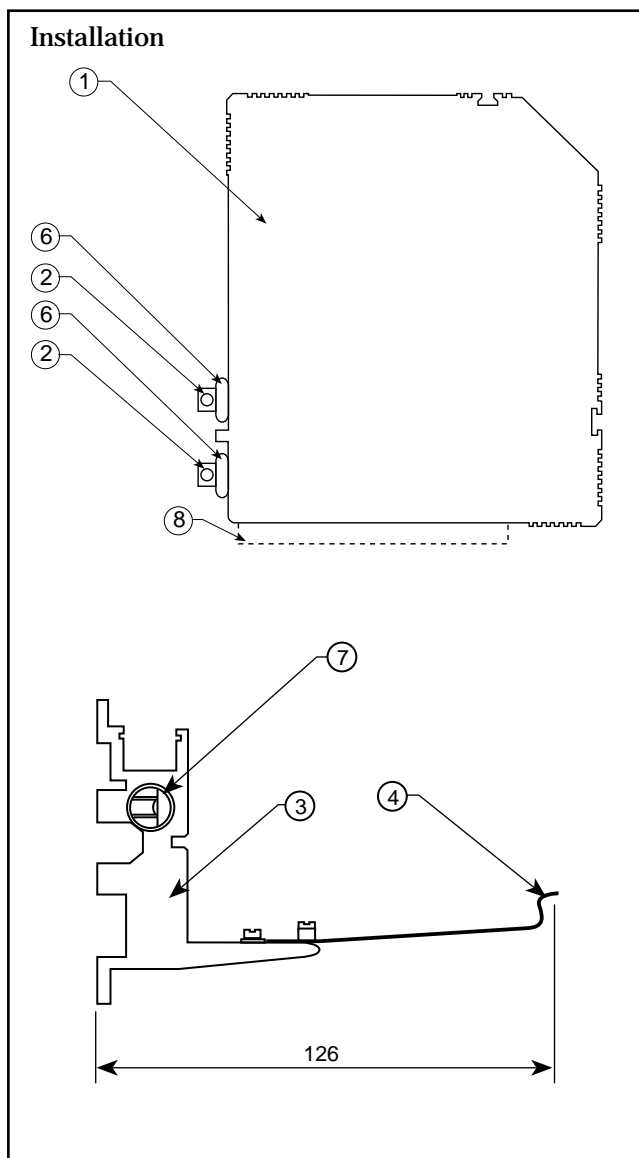
Specification

Materials: Aluminium extrusion, clear anodised Nitrile 'O' ring seals

Port sizes: Supply 1/4in NPT, output 1/4in NPT

Proof pressure: 150 psi (10 bar), pressure should be regulated to converter requirements.

WARNING: Maximum pressure should not be exceeded for safety reason.



Dimensions and installation

1. Remove mounting clip (8) by removing 2 screws in base of instrument.
2. Mount manifold (3) using 4 mounting holes. Screw $\frac{1}{4}$ in NPT fitting into outlet ports (5), and seal the threads using a sealant.
3. Connect either of 2 inlet ports (7) to a clean dry air supply, remove $\frac{1}{4}$ in NPT blanking plug to do this. See instrument handbook for further information on air supply.
4. Screw inlet and outlet tubes (2) into "IN" and "OUT" on instrument, sealing with thread sealant.
5. Place 'O' ring (6) over inlet and outlet tubes (2).
6. Slide assembled unit (1) into manifold (3), making sure the inlet and outlet tubes are aligned with the manifold inlet and outlet ports.
7. Ease spring clip (4) upwards over front of instrument until fully located.
8. See instrument handbook for electrical connections.

WARNING: For safety reasons maximum pressure (150psi) should not be exceeded.

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