Industrial Automation

IMI Norgren

Model 140 Failsafe Series
Current to pressure (I/P) electronic converter
2011-035
Model 140-I&M - Handbook

Breakthrough engineering for a better world

Installation and operating instructions

Before starting work read these instructions.

Contents

1 General

1.1 Information about these instructions

These instructions will enable you to safely install, set up and operate the Model 140 electro-pneumatic converter.
These instructions are an integral part of the product and must be accessible to personnel. Personnel must carefully read through and understand these instructions before starting work of any kind on the valves. Following all of the safety and handling instructions contained in this manual is a fundamental requirement for safe working.

1.2 Explanation of symbols Safety notice

DANGER
This symbol and the word 'danger' indicates an immediately dangerous situation that may result in death or serious injury if not avoided.

WARNING!
This symbol and the word 'warning' indicates a potentially dangerous situation that may result in death or serious injury if not avoided.

CAUTION!
This combination of symbol and signal word indicates a possibly hazardous situation that may result in damage to property or environmental damage if it is not avoided.

Indicates tips and other useful information.

Other symbols

The following symbols are used to emphasise instructions, outcomes, lists, references and other elements in these instructions.

Symbols	Meaning
1., 2., 3. ...	Step-by-step instructions
•	Lists with no specific order

1.3 Liability and warranty

Modifications to the Model 140 converter may only be carried out by the manufacturer's personnel. If the converter requires repairs or servicing beyond the scope of the activities described in these instructions, this work may only be carried out by the manufacturer of the converter or by persons who have been expressly authorised and trained by the manufacturer. Failure to observe the above will void the warranty. The manufacturer accepts no liability for damages incurred.

1.4 Warranty statement

Items sold by IMI International are warranted to be free from defects in materials and workmanship for a period of two years from the date of manufacture, provided said items are used according to IMI International's recommended usages. IMI International's liability is limited to the repair of, refund of purchase price paid for, or replacement in kind of, at IMI International's sole option, any items proved defective, provided the allegedly defective items are returned to IMI International prepaid. The warranties expressed above are in lieu of and exclusive of all other warranties.

There are no other warranties, expressed or implied, except as stated herein. There are no implied warranties of merchantability or fitness for a particular purpose, which are specifically disclaimed.

IMI International's liability for breach of warranty as herein stated is the exclusive remedy, and in no event shall IMI International be liable or responsible for incidental or consequential damages, even if the possibility of such incidental or consequential damages has been made known to IMI International.

IMI International reserves the right to discontinue manufacture of any product or change product materials, design, or specifications without notice.

Our policy is one of continuous research and development. We therefore reserve the right to amend without notice the specifications given in this document. Customers are responsible for ensuring that the product is used only for the purpose of which it is intended. In case of doubt IMI Norgren will be pleased to advise.

2 Safety

This section provides an overview of all major safety aspects for the protection of people and for safe, fault-free operation. Further task-related safety notices appear in the sections on transportation, installation, checks before initial operation, and maintenance.

2.1 Intended use

The Model 140 converter is a precision electronic pressure regulator which provides an output pressure that is proportional to a given control signal. It is intended for pneumatic applications where fine control of air pressure, or regular automated pressure changes are required.

Misuse

WARNING!
Dangerous if misused!

- Incorrect use of proportional control valves can create dangerous situations.
- In areas where an explosive atmosphere may be present, only use Hazardous Area Certified equipment

2.2 General dangers

The following section lists residual risks which may be present even if the safety valves are used correctly.

Compressed air

WARNING!
Danger of injury caused by compressed air!

Compressed air can cause injuries if not handled correctly.

- Ensure systems are depressurised before work begins.
- Have all work carried out by pneumatics specialists.

2.3 Personnel requirements

WARNING!

Danger of injury caused by lack of training!

People who lack proper training cannot assess the risks when handling the proportional pressure control valves and they place others at risk of serious injury or death.

- Have all work on the pneumatic system carried out by pneumatics specialists.
- Have all electrical installation work carried out by qualified electricians.

Pneumatics specialist

Pneumatics specialists are trained for the specialist area they work in, and they know the relevant standards and regulations.

Because of their special training and experience, pneumatics specialists can carry out work on pneumatic, electropneumatic and mechatronic systems and identify and avoid risks by themselves.

Qualified electrician

Because of their specialist training, knowledge and experience, and their knowledge of the relevant standards and regulations, qualified electricians are able to carry out work on electrical installations and identify and avoid possible risks by themselves.

Qualified electricians are specially trained for the area they work in, and they know the relevant standards and regulations.

2.4 Personal protective equipment

While carrying out work of various kinds on and with the proportional valves, personnel must wear personal protective equipment which is referred to in the individual sections in these instructions.

For all work, always wear:

Protective clothing
Protective clothes are heat-resistant and close-fitting clothes with low tear strength, close-fitting sleeves and without any parts sticking out.

Safety shoes
Safety shoes protect the feet from crushing, falling parts and slipping on slippery surfaces.

For special activities, wear:

Protective gloves
Protective gloves protect the hands and forearms against contact heat and sharp objects.

Safety goggles
Safety goggles protect the eyes from flying objects and splashing liquids.

Ear protection
Ear protection protects the ears from damage caused by exposure to noise.

3 Specifications

The specifications for the proportional pressure control valve also appear on the type plates.

3.1 Technical data

Specification	Value
Medium:	Oil free, dry media, min filtered to 50 µm; internal in-built filter
Output pressure:	0,2 ... 1 bar (3 ... 15 psi) 0,2 ... 2 bar (3 ... 30 psi)
Supply pressure:	1,2 ... 10,3 bar (18 ... 150 psi)
Flow capacity:	up to 300 NL/min
Air Consumption:	< 2,5 NL/min at 50 % signal
Linearity (independent):	Typically <0.1%, guaranteed <0.2%
Hysteresis & deadband:	Typically <0.1%, guaranteed <0.2%
Response time:	<1 second (from 0 ... 90% or 90 ... 10% of output pressure into a 0,5 litre load)
Temperature sensitivity:	Typically <0.06% span/ºC between -40 ... +85 ºC (-40 ... +185 ºF)
Port sizes:	Main ports: G1/4 or ¼ NPT Integral gauge ports: G1/4 or ¼ NPT Exhaust ports: 1/8 NPT
Calibration:	Independent user adjustment of 0% and 100% calibration points. Independent adjustment of tight shut off point. Adjustable by potentiometers up to 20 % of output range. Unit is factory calibrated to within 1 % of span.

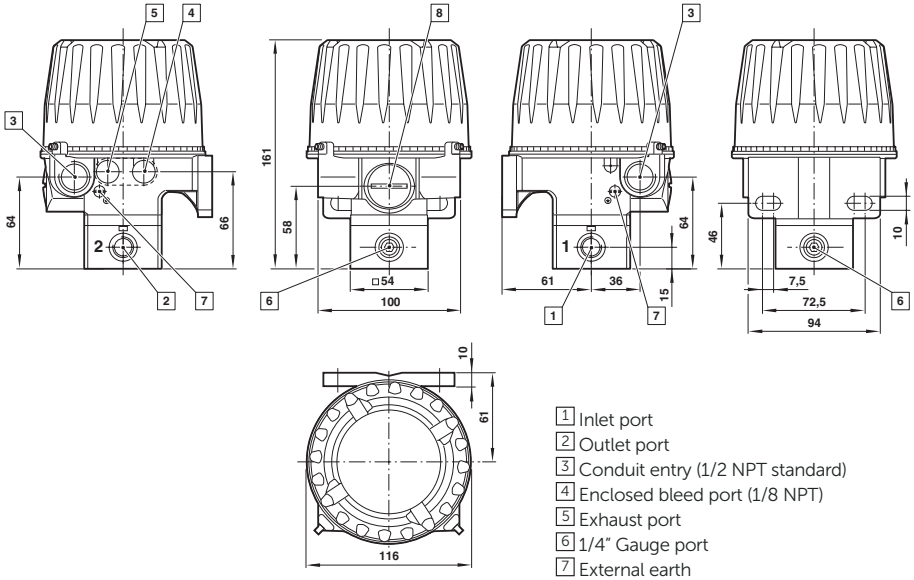
Schematic

Specification	Value
Operating temperature:	-40 ... +85 °C (-40 ... +185 °F) Air supply must be dry enough to avoid ice formation at temperatures below +2°C (+35°F).
I.P. Rating:	IP66, NEMA Type 4X
Maintenance:	Modular Electronics and in-built filter offered as field replaceable parts.
Mounting position:	Integral bracket allows for flat surface or 2" (50 mm) pipe mounting in any orientation. Designed for mounting with 57 ... 73 mm pitch U bolts.
Vibration effect:	Output pressure changes less than 3 % for vibration amplitude 4 mm 5 ... 15 Hz, 2g 15 ... 150 Hz,1g 150 ... 1000 Hz
Materials:	Body: aluminium and zinc diecasting. Diaphragms: NBR Black polyester powder coating standard.

Electrical parameters

Specification	Value
Input Signal	4 ... 20 mA (two wire) Terminal voltage < 6,5 V at 20 mA
Failure Mode	Pressure falls to below 15 mbar (0,2 psi) in < 2 sec when input signal fails
Overload Protection	100 mA max overload current
Insulation Resistance	> 100 MΩ at 850 V d.c., electrical terminals to chassis
Connections	1/2" NPT or M20; internal terminal block with capacity up to 2,5 mm2 conductor
Span/Zero	Independently adjustable
Tight Shut Off:	Independently adjustable tight shut off point adjustable up to 4,5 mA
Input Impedance	Approx. 1370Ω at 4mA Approx. 470Ω at 12mA Approx. 290Ω at 20mA

Dimensions



1 Inlet port
2 Outlet port
3 Conduit entry (1/2 NPT standard)
4 Enclosed bleed port (1/8 NPT)
5 Exhaust port
6 1/4" Gauge port
7 External earth
8 Air filter

4 Transport and storage

Transport

Individual packed items are packed according to the expected transportation conditions. Packaging is intended to protect the individual components against transportation damage, corrosion and other damage until they are installed. Only remove the packaging just before installation

Check package on delivery to make sure it is complete and has not been damaged in transit.

Packaging and storage

During transportation:

- Do not drop packaged units.
- Do not throw packaged units.

The proportional valves are packed for immediate installation upon delivery.

If they are going to be stored for extended periods, please:

- Leave the packed units in the box they were shipped in.
- Do not store them outdoors.
- Store them in a dry, dust-free place.
- Don't expose them to aggressive media, such as salty air.
- Protect them from direct sunlight.
- Storage temperature: -40 to +85 °C.
- Relative humidity: 90% max.

5 Brief user guide

Please read these instructions carefully BEFORE this instrument is installed or maintained.

The Model 140 I/P converters are not intended to be used as a Safety accessory or as a means to isolate equipment from over-pressurisation or under-pressurisation. The system builder has the responsibility to provide all necessary measures to ensure safe operation of the overall system, taking into account all possible functional failures of this product. The equipment has been designed and manufactured according to the sound engineering practice as specified by the pressure equipment Directive 97/23/EC.

These converters are intended for use in industrial compressed air systems only. Ensure that adequate pressure relief provision is installed if application of system supply pressure could cause downstream equipment to malfunction. Installation should be in accordance with local and national compressed air and instrumentation codes.

Products certified for use in Potentially Explosive Atmospheres and Hazardous Area installations MUST:

a) Be installed in accordance with local and national codes for hazardous area installations, and in accordance with this manual.
b) Only be used in situations which comply with the certification conditions stated in this handbook.
c) Only be maintained by qualified personnel with adequate training on hazardous area instrumentation.

Before using these products with fluids other than air or for non-industrial applications consult IMI.

This is a quick guide to connecting the instrument for the convenience of personnel who are familiar with this type of product.
More comprehensive instructions are contained later in this manual:

1. Connect a clean air supply of about 2,0 bar (30 psig) to the IN port (1/4").
2. Connect a pressure gauge or actuator to the OUT port.

CAUTION:
DO NOT use PTFE tape or similar to seal the ports. Use a minimum of soft setting anaerobic compound, e.g. Loctite Hydraulic Seal 542

3. Unscrew the lid to obtain access to the terminals

DANGER:
The cable will need to be sealed by an approved gland for Flame-proof installation.
For suitable cable gland and blanking plug refer to Instruction - section 12.

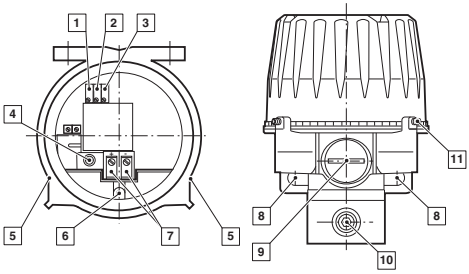
4. Connect a 4 .. 20 mA current source, either through the Jack-Plug source or Terminal connections. Ensure that it can supply at least 6,5 V at 20 mA. Check for correct polarity.

CAUTION:
DO NOT use a voltage source; it will irreversibly damage the converter.

5. Switch on the air supply and current source and allow a few seconds stabilisation time. Adjust span and zero, via the trimpots if necessary.

If the instrument fails to operate refer to the Simple Functional Checks.

6 Connections



1 Span
2 Zero
3 Tight shut-off
4 3,5 mm Jack socket, alternative power, supply & monitor
5 1/2 NPT or M20 conduit entry
6 Internal earth
7 4 ... 20 mA Input terminals
8 External earth
9 Air filter, do not remove when pressurized, do not use with filter removed
Air filter BS2000 with 98% efficiency - at 2 µm water and oil absorption
10 1/8 inch gauge port
11 LID locking

7 General description

These converters are precision electronic pressure controllers designed for continuous process control applications. The units operate a closed loop system incorporating a feedback sensor ensuring long term stability and high accuracy performance, with 'fail-safe' operation, i.e. the output falls to a low pressure upon failure of the loop current.
These instruments combine substantial flow capacity, with the ability to give precise control into closed volume 'dead end' applications

The instrument has been designed to withstand the rigours of industrial environments; such as shock, vibration and positional effects. As with any other precision instrument, dropping the unit onto a hard surface may result in shifts in calibration or possibly permanent damage. The unit may be mounted directly upon a control valve. A mounting bracket is provided for surface mounting, or the instrument may be fixed directly to rigid pipework.

The electronics are enclosed within a watertight housing which is suitable for outdoor use if a suitable cable gland is used. The lid should be firmly tightened, the use of a tool for this purpose is not recommended.

8 Installation

Before installation, please note

- For new systems, ensure all connections and lines are clean, free from burrs, fluids and debris. Do not remove blanking covers from the proportional valves until just before installation.

Mounting

The converter must be securely mounted to prevent accidental damage from occuring during operation. The converter can be mounted directly onto a valve, onto any suitable flat surface, or onto 2" (50 mm) pipe.
These converters will operate in any position, with slight re-calibration adjustments, normal operation is in the upright position, i.e. with the screwed lid horizontal. The unit is weather resistant when the lid is removed for connection or calibration, but should not be left uncovered during operation or for extended periods of time. The unit is unaffected by typical levels of shock and vibration, but severe vibration environments are best avoided.

The instruments are protected against environmental effects, to a level of Type 4X (IP66). Sensible positioning should be used if the local environment is severe.

Temperature compensation is designed into these converters which will operate over a range from -40 ... +85°C (-40 ... +185°F). Maximum life is obtained if extreme temperature cycling is avoided. In extreme direct sunlight, sunshading is advised.

The pneumatic exhaust and the bleed are routed through the baffles.

8.1 Pneumatic connection

Improper pneumatic connection

DANGER!
Danger of injury caused by improper connection!

Faulty pneumatic connections can impair the safe operation of the converter and may cause injuries during operation.

- Do not install any additional components between the load and the converter.
- Connect pipe-work using 6 mm or 1/4" OD, 4 mm ID, plastic pipe, cut cleanly at right angles, with push-fit pipe connections, or with suitable rigid piping.

WARNING

Care should be taken to prevent blocking of the exhaust port. Failure to do so may result in unwanted effects within the surrounding system.

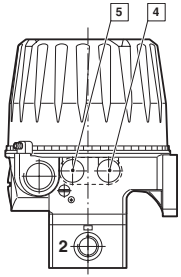
8.2 Captured bleed version

The baffles and the baffle cover are fitted to maintain the adequate Ingress Protection (IP) rating of the instrument. Removal of these protective parts will invalidate the IP and the NEMA 4X rating of the instrument.

For captured bleed installation, remove the baffle cover and unscrew both the baffles, fit 1/8" NPT fittings to two separate lengths of pipes, to exhaust and bleed gas to a safe area.

Vented gas from the enclosure through bleed port must not be re-circulated and introduced back into the process stream. Exhaust port installation must not have any restriction to create back-pressure that would cause instrument malfunction. Instrument installation for the captured bleed version must be under the installer's discretion.

Note: Exhaust Port is nearer the conduit entry (LH side) Enclosure Bleed Port is on the RH side.



4 Enclosed bleed port (1/8 NPT)
5 Exhaust port

Pneumatic installation

These instruments are recommended for use with clean, dry, oil free instrument grade air to BS 6739 or ISA-7.0.01-1996

Dew Point: At least 10°C (50°F) below (-40°C) minimum anticipated ambient temperature.
Dust: Filtered to below 50 microns.
Oil Content: Not to exceed 1ppm mass.

The instrument is factory calibrated with a supply pressure of 30 psig (2 bar) ±10%. Operation is possible at any pressure between 18 and 150 psig (1,3 ... 10 bar), though recalibration may be necessary towards these limits to maintain specified accuracy.

The inlet and outlet ports are threaded 1/4"NPT female and suitable fittings should be used. For most installations 1/4" (6mm) pipe will be adequate. If a large actuator, high flow rates or long pipework is necessary then a larger diameter should be used.

Plastic tubing, e.g. Nylon is preferable where circumstances permit, since it is normally very clean internally. In all cases, purge the supply pipework before conection to the converter.

Two gauge ports are provided to facilitate direct mounting ofa pressure gauge. To use one of these ports remove the plug (using a 1/4" or 3/16" Hexagon Key) in a de-pressurized state, and connect the gauge. The ports are threaded 1/4" NPT at the back of the unit and 1/8" NPT at the front.

CAUTION:
Under no circumstances should PTFE tape be used for sealing the fittings as this tends to shred small particles which may contaminate the instrument and cause malfunctions.

The use of a soft setting anaerobic hydraulic seal is recommended, (e.g. Loctite Hydraulic Seal 542). Follow the manufacturer's recommendations.

CAUTION:
Do not use an excessive amount as this will not set and could find its way into the instrument.

If the air supply is not of adequate quality this can normally be achieved by the use of air filter regulators.

Compressed air

WARNING!

Danger of injury caused by compressed air!

Compressed air can cause injuries if not handled correctly.

- Make sure the machine is depressurised before work begins.

Personnel:

- Pneumatics specialist

Protective equipment:

- Safety goggles
- Protective gloves

Connections

CAUTION!

Avoid damaging the thread when removing the blanking covers.

1. Carefully remove the blanking covers from the proportional pressure control valve.

2. Connect air supply equipment for drying and filtering before connecting the valve.
   For requirements for operating media and consumables, see section 3.1.

Sealing

Fit and seal pipes and hose connections to the valve and from the valve to the load, following national standards and regulations as applicable.

An airtight compressed air system helps to save energy, which protects the environment.

8.3 Electrical connection

Improper electrical connection

DANGER!

Danger of injury caused by improper connection!

Danger of death through contact with live components. When switched on, electrical components can perform uncontrolled movements and result in serious injury

- Isolate the electrical supply before starting work and make sure it cannot be switched back on.

Electrical installation

Personnel:

- Qualified electrician

Protective equipment:

- Safety goggles
- Protective gloves

The electrical connections should be made as shown in the connection drawing on page 11. The instrument is protected against reverse polarity to -100mA, no operation is possible in this condition.

The Model 140 approximates a constant voltage load of 6,5 volts across the loop terminals therefore it is essential that the loop controller be capable of providing a constant current in the range 4 ... 20mA with an output voltage of at least 6,5 volts.

CAUTION:
Voltage output controllers (e.g. variable voltage power supplies) are entirely unsuitable for the Model 140 and could severely damage the electronic circuits.

IMPORTANT NOTE
The control electronics of the Model 140 incorporate precision electronics. The calibration of the unit may be affected by very high voltage spikes. Consequently, in environments where static electricity may be present ESD precautions should be used.

WARNING:
These instruments must be installed in accordance with local and national codes of practice, especially for hazardous area installations. The electronic circuits are isolated from the chassis and grounding is unnecessary for functional purposes. However, grounding may be necessary to conform to installation codes.

To meet the EMC specifications screened cable should be used for installation. The cable screen should be connected to the internal earth bonding point of the device. An earth strap should also be connected from the external earth bonding point of the device to a common earth point. The cable screen should not be connected at the signal source when used in intrinsically safe environments. The device has been thoroughly tested in accordance with:-

Electromagnetic compatibility (EMC)
- Generic Standards – Immunity for Industrial Environments
- Generic Standards – Emission Standard for Industrial Environments

The results obtained from these tests show that with the screen arrangement not shown, the typical sustained output pressure shift is <+/-5% full scale.
Consult supplier for further details.

Conduit entry

The instrument has twin conduit entry threaded 1/2" NPT or M20. For Flame-proof installation, a sealed conduit gland conforming to Flame-proof specifications must be used. A ground terminal is provided both internally and externally and should be used if ground continuity is essential.

DANGER:
The unit is supplied with plastic blanking plugs, which must be removed before operation/calibration and replaced with a blanking plug conforming to the hazardous area certification rating applicable

9 Calibration

Personnel:

- Pneumatics specialist

Protective equipment:

- Safety goggles
- Protective gloves
- Ear protection

The instruments are designed for continuous operation without the necessity for routine overhaul, with continuous monitoring, adequate precautions and replacement of the filter no longer than every 5 years.
The most common source of failure for pneumatic instrumentation has been found to be inadequate air quality, allowing contaminants to block internal orifices. Air filtering is included within the instrument but cannot cope with sustained poor air quality, which may ultimately lead to failure.

The recommendations in the Pneumatic Installation section should be rigorously observed.

NOTE:
These instruments are factory calibrated at a supply pressure of 30 psig (2 bar)

The instrument cover must be unscrewed to obtain access to the trimpots.

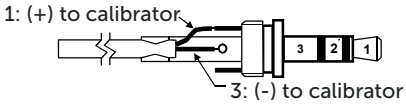
DANGER:
Do not remove the instrument cover in a potentially explosive atmosphere when the instrument is powered.

An accurate current source of 4-20mA and pressure gauge are required. These should be of good quality with an accuracy of 0.1% or better. The current source should be checked to ensure that it provides at least 6,5 V at 20 mA output compliance.

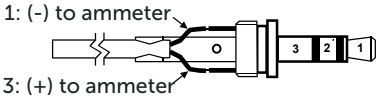
- Connect the instrument as described in the installation section or the test-jack section below.
- Remove the instrument cover to gain access to the trimpots and jack-socket.
- Set the current to 4.00mA – the instrument outlet should be 3.00+/-0.05psig (0.200+/-0.003 bar). Adjust the Zero trimpot if necessary.
- Set the current source to 20.00mA – the instrument outlet should be 15.00 +/-0.05psig (1.00+/-0.003 bar) Adjust the Span trimpot if necessary.

If either Span or Zero controls are adjusted it may be necessary to repeat the above steps until both ends are within the calibration limits. Alternatively the jack plug can be connected to calibrate and test the unit. The Jack Plug can be either set-up for Monitoring or Calibration/Operation set-up.

Calibration with the Test Jack:
Connect pin 1 of the Jack plug to the positive (+) lead of the current calibrator and pin 3 of the Jack plug to the negative (-) lead of the current calibrator and then insert the Jack Plug into the Test Jack.
The current calibrator is now the input signal source.
Calibrate as stated above. Removing the Jack Plug will return operation of the unit back over to the original current source.



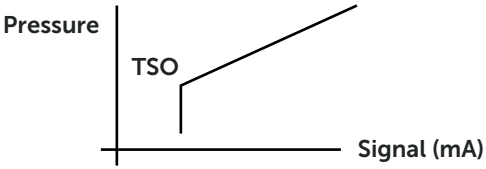
Monitoring with the Test Jack:
Connect pin 1 of the Jack Plug to the negative (-) lead of the ammeter and pin 2 of the Jack Plug to the positive (+) lead of the ammeter. Insert the Jack Plug into the Test Jack and use the ammeter to monitor the input current loop.



Tight shut-off adjustment instructions

The Tight Shut-Off potentiometer can be adjusted to set the zero point at which the instrument 'shuts off'.

For Example:



Tight shut-off is deactivated in the factory.

Setting of shut-off point:

1. With the instrument under test connected to the required supply pressure and load ports, apply a demand current signal of that value at which shut-off is required
2. If the output pressure is >start-up pressure (~0psi), adjust potentiometer slowly clockwise until the output pressure falls to zero, do not turn the pot beyond this point. The shut-off point is now set.

Shut-off point check:

Increase the input signal by approximately 0,5 mA (e.g. to 3,8 mA) the output pressure will rise above 0psi.

Reset the input signal to the required shut off point (e.g. 3,3 mA) and the output pressure will fall to zero.

Simple functional checks

Apply a 4-20mA signal and an air supply of 30 psig and observe the output on a pressure gauge. It should control smoothly. The Test Jack can also be connected as a monitor measure.

Problem	Possible Causes	Suggested Action
Maximum output not available	Supply pressure too low Calibration error Air leak in instrument Excess outlet flow	Check and adjust supply Recalibrate Locate leak and repair Check with specification
Minimum output too high	Calibration error	Recalibrate Replace converter
Delay on start up	A delay of a few seconds is normal	None
Erratic operation at low pressure	Signal currents below 3.5mA are insufficient for normal operation	Increase current. May need recalibration Tight shut-off set
No Output Available	Tight shut off potentiometer adjusted	Turn TSO anti-clockwise till output pressure increases
Erratic at all pressures	Controller cannot provide 6.5V continuously Contamination	Reduce loop resistance or change converter Check I/P filter status

10 Maintenance

Servicing requirement
Replacement valves

WARNING:
Risk of injury from using incorrect replacement valves! Using incorrect or faulty replacement valves may endanger personnel and cause damage, malfunctions, or total failure.

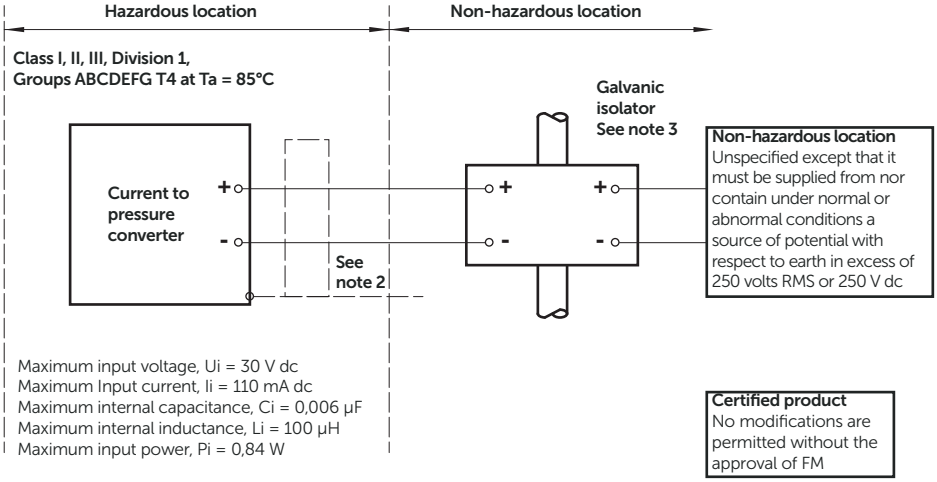
- Only use the manufacturer's original replacement valves.
- Contact the manufacturer for information about replacement valves, see the manufacturers address on the rear of this booklet.

11 Disposal

CAUTION!
Improper disposal may result in risks to the environment.

- At the end of their life, have proportional pressure control valves disposed of by a licensed waste disposal contractor.
- If in doubt, ask the local municipal authority or special waste disposal contractors for more information.

12. Control drawing
12.1 Control drawing FM



Notes:

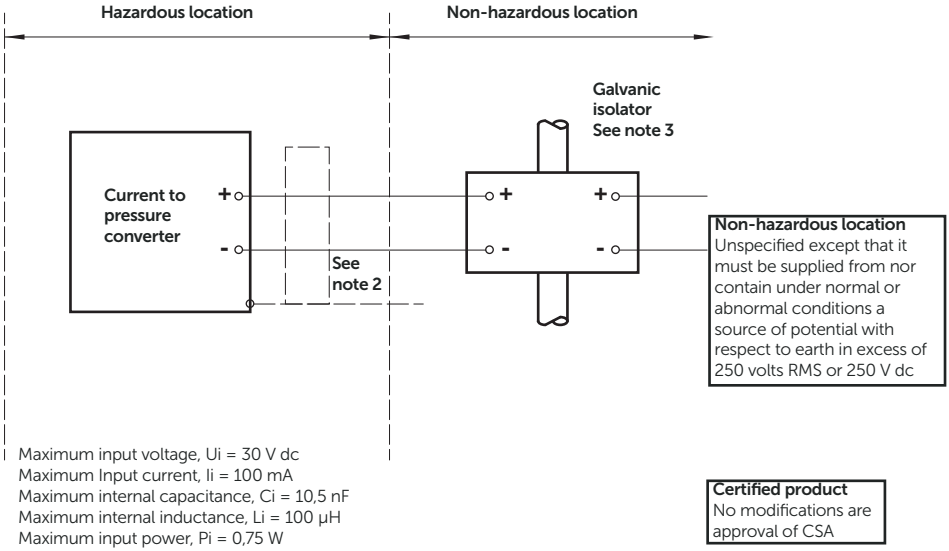
1. The electrical circuit in the hazardous area must be capable of withstanding an ac test voltage of 500 volts R.M.S. to earth or frame of the apparatus for 1 minute

2. Cable capacitance and inductance plus the I.S apparatus unprotected capacitance (Ci) and inductance (Li) must not exceed the allowed capacitance (Ca) an inductance (La) indicated on the associated apparatus

3. Any safety galvanic isolator whose output parameters are:
   Maximum open circuit voltage, Uo √ 30V
   Maximum output current, Io √ 110 mA
   Maximum output power, Po √ 0,84 W

4. The installation including the barrier earthing arrangements must comply with the installation requirements of the country of use.
   In the USA, installation of the equipment shall be in accordance with the NEC® and ISA RP12.6 Recommended practice for the installation of intrinsically safe circuits.
   In Europe, as specified in IEC 60079-14

12.2 Control drawing CSA



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2. Cable capacitance and inductance plus the I.S apparatus unprotected capacitance (Ci) and inductance (Li) must not exceed the allowed capacitance (Ca) an inductance (La) indicated on the associated apparatus

3. Any safety galvanic isolator whose output parameters are:
   Maximum open circuit voltage, Uo √ 30V
   Maximum output current, Io √ 100 mA
   Maximum output power, Po √ 0,75 W

4. The installation including the barrier earthing arrangements must comply with the installation requirements of the country of use.
   In the USA, installation of the equipment shall be in accordance with the NEC® and ISA RP12.6 Recommended practice for the installation of intrinsically safe circuits.
   In Europe, as specified in IEC 60079-14

13 Instructions

The following instructions apply to equipment covered by certificate numbers
Sira 01ATEX1006 and Sira 01ATEX2007X

13.1 Instructions - specific to hazardous area installations

(Reference European ATEX Directive 94/9/EC, Annex II, 1.0.6)

1. The Model 140 is Triple certified, and may be installed as intrinsically safe, flameproof or Type n:
   - Zone 0 or 20 installations require the equipment to be installed as intrinsically safe via suitable associated apparatus.
   - Zone 1 or 21 installations require the equipment to be installed as intrinsically safe or flameproof; if installed as flameproof, associated apparatus is not required, but there are more onerous requirements for cable entry – refer to EN60079-0
   - Zone 2 or 22 installations may be intrinsically safe, flameproof or Type n
   - It is recommended that the installer indicates on the equipment which certification code applies
2. The equipment should not be used outside the stated ambient temperature range.
3. The equipment has not been assessed as a safety-related device (as referred to by Directive 94/9/EC Annex II, clause 1.5)
4. Installation and maintenance of this equipment shall be carried out by suitably-trained personnel in accordance with the applicable codes of practice (EN 60079-14 and EN 60079-17 within Europe)
5. Repair of this equipment shall be carried out by the manufacturer or in accordance with the applicable code of practice (IEC 60079-19)
6. When installing the equipment as flameproof cable gland (M20 parallel thread) or a conduit (1/2" NPT tapered thread), the installer should verify the thread form and ensure that the appropriate matching thread is used. The pneumatic connections are not flameproof entries.
7. The certification of this equipment relies on the following materials used in its construction:

Enclosure:	aluminium alloy and zinc alloy
O-ring:	nitrile rubber
Encapsulant:	polyurethane

   - Only approved cable glands are to be used which must maintain an Ingress Protection of IP66.
   - Unused entry port hole must be blanked off using suitably approved blanking plug.

If the equipment is likely to come into contact with aggressive substances, then it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised.

- Aggressive substances: e.g. acidic liquids or gases that may attack metals or solvents that may affect polymeric materials.
- Suitable precautions: e.g. regular checks as part of routine inspections or establishing from the material's data sheet that it is resistant to specific chemicals
- Not to be used with pure oxygen or oxygen enriched media as the process fluid

13.2 Instructions - Special conditions for safe use

The following instructions apply to equipment covered by certificate number: Sira 01ATEX1006 and Sira 01ATEX2007X

- For operational reasons, it may be necessary to connect the screen of the cable to the enclosure of the equipment in the hazardous area. If this is the case, then the equipment shall be installed in accordance with EN 60079-14:2008 (specifically clauses 12.2.2.3 and 12.2.4), typically using a galvanically-isolated interface with no other connections to earth apart from via the enclosure of the equipment.
- The enclosure is made from light metal which could cause ignition due to impact and friction. This shall be taken into consideration when the apparatus is installed in locations that specifically require equipment protection level Ga.
- Under certain extreme circumstances, the non-metallic parts incorporated in the enclosure of this equipment may generate an ignition-capable level of electrostatic charge. Therefore, when it is used for applications that specifically require equipment protection level Ga, the equipment shall not be installed in a location where the external conditions are conducive to a build-up of electrostatic charge on such surfaces. Additionally, the equipment shall only be cleaned with a damp cloth.
- The option for the air vented from the enclosure to be re-circulated and introduced back into the process stream shall not be used when the equipment is installed in locations that specifically require equipment protection level Ga for Group II category 1G or Da for Group III catergory 1D equipment.

14. Certifications

Certification agency	Flame Proof / Explosion Proof	Intrinsically Safe	Type nL, nA Non-Incendive	others
SIRA (CENELEC ATEX approved)	Sira 01ATEX1006 Ex d IIC T4 Gb (Ta = -20 ... +40°C) Ex d IIB+H2 T5 Gb (Ta = -20 ... +80°C) Ex d IIB+H2 T6 Gb (Ta = -20 ... +65°C) Ex t IIIC T95 °C Db (Ta = -20 ... +85°C) Umax = 30 V d.c. 2GD	Sira 01ATEX2007X Ex ia IIC T4 Ga Ex ia IIIC Da T95°C (Ta = -40 ... +85°C) Ui = 30 V d.c. Ii = 110 mA Pi = 0.84 W Ci = 6 nF Li = 100 µH 1GD	Sira 01ATEX4008X Ex nA nL IIC T5 Gc (Ta = -40 ... +85°C) Umax = 30 V d.c. Ii = 24 mA Ci = 6 nF Li = 100 µH 3G	
FACTORY MUTUAL	Class I, Division 1, Group BCD. T6 Ta = 75°C, T5 Ta = 85°C.	Class I, II & III, Division 1, Group ABCDEFG. T4 Ta = 85°C. Vmax = 30 V d.c. Imax = 110 mA Ci = 0,006 µF Li = 100 µH Install as per control drawing 2001 - 072	Class I, Division 2, Group ABCD. T6 Ta = 75°C, T5 Ta = 85°C.	Dust Ingress Protection: Class II & III, Division 1, Group EFG. T6 Ta = 75°C, T5 Ta = 85°C. Suitable for: Class II, Division 2, Group FG, T6 Ta = 75°C, T5 Ta = 85°C; and Class III, Division 1 & 2.
CSA	Class I, Division 1, Group BCD. Ta = -20 ... +85°C; T5 Ta = -20 ... +65°C; T6	Ex ia, Class I, Division 1, Group ABCD. Ta = -40 ... +85°C; T4 Vmax = 30 V d.c. Imax = 100 mA Pmax = 0.75 W Ci = 10,5 nF Li = 100 µH (30 V d.c. max, 300 Ohms). Install as per control drawing 2001 - 081	Class I, Division 2, Group ABCD. Ta = -20 ... +85°C; T5 Ii = 24 mA Ci = 6 nF Li = 100 µH	

WARNINGS
POTENTIAL ELECTROSTATIC CHARGING, IMPACT & FRICTION HAZARD.
This shall be taken in consideration when apparatus is installed in Division 1 locations or locations that specifically require Equipment Protection Levels Ga and Da.
For additional warnings that may apply for safe use and installation, refer to the INSTRUCTIONS – SPECIAL CONDITIONS FOR SAFE USE section of this manual as identified on ATEX certificates numbers with an 'X' suffix.

15. Declaration of conformity

-ORIGINAL-

IMI International s.r.o.
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Tel: +420 532 278 111
Fax: +420 532 278 113
www.imi-precision.com

IČO: 25692089 DIČ: CZ25692089

EU – Declaration of Conformity in accordance with Directive: 2014/34/EU

Equipment: **Electronic pressure regulator**

Model series: **Model 140 I/P Converter**

Herewith the manufacturer declares that the named products are in conformity with all relevant provisions of the above-mentioned directive to use in potentially explosive atmospheres.

Referenced normative standards:

EN 60079-0:2018	General requirements
EN 60079-1:2014	Flameproof enclosure "d"
EN 60079-11:2012	Intrinsic safety “i“
EN 60079-31:2014	Protection by enclosure “t”

Equipment group, Categories, Types of protection:

II 2G Ex db IIC T4 Gb (T_a= -20°C to +40°C)
II 2G Ex db IIB+H_2 T5 Gb (T_a= -20°C to +80°C)
II 2G Ex db IIB+H_2 T6 Gb (T_a= -20°C to +65°C)
II 2D Ex tb IIIC T95°C Db (T_a= -20°C to +85°C)
II 1G Ex ia IIC T4 Ga (T_a= -40°C to +85°C)
II 1D Ex ia IIIC Da T95°C (T_a= -40°C to +85°C)

EU-Type Examination Certificate:

Sira 01ATEX1006 and Sira 01ATEX2007X

Issued by CSA Group Netherlands B.V.,
6812AR Netherlands (Notified Body No.: 2813)

EU-Certificate for quality system:

FTZU 25 ATEX Q 002

Issued by Fyzikálně technický zkušební ústav
716 07 Ostrava-Radvanice (Notified Body No. 1026)

In Modrice, March 2025

Jiří Tošovský
Industrial Automation R&D Manager

Roman Kameník
Authorized Representative

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CERTIFIED PRODUCT DOCUMENT

NO MODIFICATIONS ARE PERMITTED WITHOUT THE APPROVAL OF THE CERTIFICATION ENGINEER