

# WORKING INSTRUCTIONS

## ARGUS RANGE

This working instruction leaflet covers the following ranges of switches:-

P510	Medium Pressure Switch
P520	Medium Pressure Switch
P510 3"	Low Pressure Switch
P510 4"	Low Pressure Switch
P510FD	Flush Diaphragm Pressure Switch
P530	High Pressure Switch
P540	High Pressure Switch
P560	Low Pressure Switch
V560	Vacuum Switch
DP560	Differential Pressure Switch
DP590	High Static Differential Pressure Switch
T570	Capillary Temperature Switch
L510	Horizontal Level Switch
L520	Vertical Level Switch
L520S	Reed Level Switch
F510	Flow Switch

## INSTALLATION

### HEALTH AND SAFETY AT WORK ACT 1974

#### WARNING

Your attention is drawn to the electrical potential that will be present if the terminal cover is removed while the switch is connected to a live supply. The electrical supply must be isolated prior to removal of the terminal housing cover.

Similarly, on pressurised process systems, prior to removal of an instrument it should be isolated from the pressurised medium or the system pressure should be relieved.

Precautions must be taken with regard to the possible operating temperatures present when performing adjustment.

The units must be specified, installed and operated by competent personnel, and their use be limited to within the published specifications. (All hazardous area models must be installed in accordance with BS EN 60079-14).

Unauthorised modification, repair or operation outside the specified limits may invalidate the warranty. Servicing should be carried out by qualified personnel only.

On pressure devices, should pulsation or surges be anticipated, then a suitable pressure snubber should be fitted.

## FAILURE HAZARD

#### Pressure switches.

Element/primary seal failure.  
This would allow the system-pressurised medium to enter and pressurise the main body. In this event, to prevent the over pressurising of the main body and creating a potential hazard, a blow out disc has been fitted at the rear of the body. In the event that the body is pressurised, the disc will relieve the pressure to atmosphere.

**When mounting the switch via the body fixing holes, the supplied 10mm stand off should always be utilized to allow sufficient clearance for the correct operation of the safety blow out disc.**

On pressure switches, the process medium temperature should not be allowed to exceed that stated in the product data and under the "OPERATING TEMPERATURES" section in this document. If process temperatures in excess of those stated are possible, then the switch should be remote mounted via a length of tubing or pipe to ensure dissipation of heat.

## PROCESS CONNECTIONS

#### Pressure & Differential Pressure Switches

Various process entries are available, and the installation will vary dependent upon exact type. It is recommended that PTFE tape is used on tapered fittings and the use of the correct size bonded seal on parallel fittings.

#### Temperature Switches

These are usually provided either with a thermowell having a male screwed connection or a flange to a recognised international standard or with a male screwed fitting allowing the bare sensing probe to come in contact with the process medium. Suitable pipe sealant or flange gasket should be incorporated when installing to ensure a good leak free fit.

## MATERIALS

The materials of construction are as follows: -

Main Body and Outer Covers – PPS (Polyphenylene Sulphide) with stainless steel fibres or 316 stainless steel.  
Conduit Fitting – 316 stainless steel.  
Din Connector – Plastic.  
All Other Plastic Components – PPS.  
Wetted Parts - 316 stainless steel or Monel 400.  
Pressure Seals – Viton® or Nitrile  
Environmental Seals - Silicon  
Internal Switch Mechanisms – Stainless steel.  
External Fasteners - Stainless steel  
Internal Fasteners & Springs – Zinc plated carbon steel.  
Flow Plates – Phenolic resin or Gunmetal.

## OPERATING TEMPERATURES

The operating temperatures restrictions for the Argus series are as follows: -

**Ambient:**  
Operational (all models) -50°C to +85°C

**Ambient ('T' values as certified for hazardous areas).**

ATEX II1G Exia IIC certified.  
Without resistors: -50°C to +78°C T6  
-50°C to +93°C T5  
-50°C to +128°C T4

With resistors: -50°C to +72°C T5  
-50°C to +122°C T4

ATEX II2G Exd IIC certified:  
-50°C to +71°C T6  
-50°C to +86°C T5  
-50°C to +96°C T4

**Storage:** -50°C to +85°C

#### Process:

P510, P520, P560, DP560, V560 & HDP590  
Viton® -20°C to +150°C  
Nitrile -50°C to +90°C

P530 & P540  
Viton® -20°C to +150°C  
Nitrile -40°C to +120°C

L510, L520, L520S & F510  
0 to +100°C

T510, T520, & T570  
Refer to temperature range specification.

## MOUNTING INSTRUCTIONS

The Argus series is designed for grouped mounting and can be mounted in any orientation (\*except model DP560 diaphragm code 08N) with no effect on set point operation or setting accuracy. \*DP560 Diaphragm Code 08N should only be mounted with the switch case beneath the pressure plates.

The 510, 530 & T570 can be mounted from fixings in the body via the stand off supplied or mounted from the conduit entry (flying lead version only).

The P520, P510FD, P540 & F510 are direct mounted from their process entry.

The P560, V560, DP560 & DP590 are mounted via their integral mounting bracket.

The T510 is mounted from the supplied thermowell.

The T520 can be mounted from either the supplied stem head or via the conduit entry (flying lead version only).

The L510, L520 & L520S are mounted via their level head assembly.

When installing direct mounting pressure switches, particular care should be taken to ensure the internal ¼" nipple is not loosened during the positioning or tightening procedure. If the unit is likely to be subjected to high shock levels or physical loads then additional supports should be incorporated.

## ELECTRICAL INSTALLATION

Options available:  
Exd, Exia or Industrial Flying Lead.  
Exia or Industrial Din 43650 Connector.  
Exia or Industrial Female M20.

#### Exd or Exia Flying Lead.

The Exia version with or without Cable Gland comes with one or two cables of 0.75mm<sup>2</sup> 3-core double insulated cable sealed to IP67 via a sealing grommet.

The Exd version without Cable Gland comes with one or two cables of 0.75mm<sup>2</sup> 3-core double insulated cable sealed to IP67 via a sealing grommet.

The Exd version with Cable Gland comes with one cable of either 0.75mm<sup>2</sup> 3-core or 0.75mm<sup>2</sup> 6-core double insulated cable sealed to IP67.

Conduit Adaptor or Cable Gland are available with either ½" NPT or M20 male thread.

#### Wiring Designation

1 - Common  
2 - Normally closed 1&3 make rising  
3 - Normally open 1&2 break rising

#### Exia or Industrial Din Plug.

The cable entry consists of a Din 43650 connector sealed to IP67, suitable for cables single or multi-strand up to 1.5mm<sup>2</sup> with an outside sheath between 6mm and 9mm. Alternatively it can be fitted with a conduit via a PG11 end fitting.  
**The cable socket should not be opened while connected to a live supply.**

#### Exia or Industrial M20 Female.

All models are supplied with a straight M20 conduit entry. This can be fitted with either a suitable gland or directly with conduit, to suit the installation. Access to the terminals is gained by removing the front cover. The switch should be electrically isolated before removal of this cover. Connection details are provided on the inside of the cover, and should be studied to ensure the correct mode of operation is selected. The connection detail varies dependant on whether rising or falling operation is required. Terminals are suitable for cables, single or multi-strand, up to 1.5mm<sup>2</sup>.

#### Wiring Designation

1 - Common  
2 - Normally closed 1&2 make rising  
3 - Normally open 1&3 break rising

**Note:** Dual switches if required are mechanically linked to give a DPDT switching action, reset of the switches may be up to 3% apart.

**For specific wiring details please refer to product drawings on reverse.**

The Argus range is certified to be installed in a CAT 1 (Zone 0) environment, when supplied from an approved Intrinsically Safe Interface that is compatible with the following electrical parameters:

Ui: 28Vdc  
Ii: 93mA  
Pi: 0.65W  
Ci: 0 nF  
Li: 0mH

## SETTING & CALIBRATION

The Argus series are supplied pre-calibrated:

P510, P510FD, P520, P530, P540, P560, V560, DP560, DP590 & T570.

A scale is fitted internally for on site adjustment. The scale plate is situated at the bottom right hand corner of the mechanism, and is read against the red indicator line of the adjuster screw. Adjustment can be made by rotating the adjustment screw assembly, with the supplied 0.3mm tommy bar until the desired set point is reached.

Basic adjustments of set point for all microswitch combinations is carried out from behind the front cover. The factory set range and switch point setting is detailed on the internal label located inside the front cover.

All of the above calibrations and settings can be performed by Pyropress before delivery. Please refer to the sales office for details.

## ATEX CERTIFICATION

The Argus range of switches comply with the following standards:

Intrinsically Safe.  
BS EN 60079-0:2006, BS EN 60079-11:2007, BS EN 60079-26:2004.

Flameproof.  
BS EN 60079-0:2006, BS EN 60079-1:2007.  
The equipment is designed to satisfy the requirements of Clause 1.2.7 of the Essential Health and Safety Requirements ANNEX II of directive 94/9/EC.

#### Conditions for use apply:-

Exia CAT1 Applications.  
**ATEX certification for CAT1 environments to the Non-electrical standard BS EN 13463-1:2001. Clause 8.2 states that:**

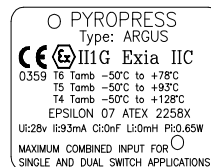
**Equipment manufactured from aluminium of greater than 10% by mass, are only suitable for CAT1 environments if, 'the ignition assessment shows that there is no risk from incandive friction, impact or abrasion sparks' reference to BS EN 1127-1:1998 Clause 6.4.4.**

**This product has been certified with an 'X' suffix, indicating it is the responsibility of the end user to carry out an assessment of the equipment and installation to establish that "no hazards due to mechanically generated sparks have been identified". This assessment to be performed by a qualified person, legally responsible for the site/company safety.**

**Exd**  
**The permanently attached cable associated with the apparatus shall be terminated in accordance with EN 60079-14**  
**Appropriate overload protection must be provided during installation.**

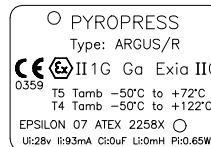
#### INTRINSICALLY SAFE LABEL

Without resistors fitted.



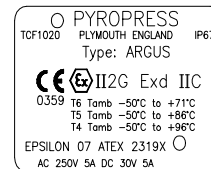
#### INTRINSICALLY SAFE LABEL

With resistors fitted.



#### FLAMEPROOF LABEL

Without resistors fitted.



## PRESSURE EQUIPMENT DIRECTIVE

#### Pressure Equipment Directive (PED)

It is a requirement that all items of pressure equipment and assemblies with a maximum allowable pressure of over 0.5 bar be assessed under the PED. Installers should be aware and address the following sections of the PED.

**These switches are classified as pressure accessories and are manufactured to Sound Engineering Practice (SEP) Art.3 (3). The CE mark is for compliance to the ATEX Directive or Low Voltage Directive.**

#### Handling

Notice is drawn to the installation warnings with respect to: Closures and openings, access to the process entry when pressurised, surface temperature and the existence of a blow out disk in case of failure.

#### Operation

In the case of fluids, which may become unstable and/or over-pressure (including surge), and/or over-temperature it is the installer's responsibility to ensure the device is operated within the published specifications and instructions.

#### Misuse

Notice is drawn to the installation warnings with respect to: Operation outside the specified limits in terms of over pressure or temperature.  
**Degradation of materials, Erosion**  
Notice is drawn to the requirements of routine maintenance and the expected working life of elastomeric materials.

#### Corrosion/Chemical attack

It is the installer's responsibility to ensure the selection of construction materials from the published specification is compatible with the operating medium.

#### Mounting, Piping

Provide adequate support, constraint, anchoring, alignment and pre-tensioning to prevent free

movement and over-stressing of connections and flanges.  
Consider condensation within piping and the means of drainage.

Consider potential damage from turbulence and vortices and make allowances for wear if appropriate. Consider fatigue due to vibration.  
Keep appropriate records for maintenance, inspection and repair.

#### Toxic, Flammable fluids

For group 1 gas and fluids (explosive or toxic nature) provide means to isolate and assess for significant risk, protect as necessary. Clearly mark discharge points indicating fluid contents.

#### Mechanical damage

Consider potential damage from objects such as vehicles, falling bodies or adjacent machinery and house or protect as necessary.

#### Fire

Consider potential damage in the event of external fire and house or protect as necessary.

#### Supply Fault

Consider the consequence of a power supply fault, failure or overload and protect as necessary.

## ROUTINE MAINTENANCE

Routine inspection of the installation should take place at regular intervals. It is recommended that the switch is checked and operated every 6 months. Electrical connections and covers should be checked periodically to tightness.

It is recommended that the 'O' rings and diaphragms (on pressure and flow switches) be renewed every 3-5 years, and micro switch assemblies every 5-10 years dependant upon equipment usage.

Gore-tex filters fitted to the 3" and 4" low-pressure housings should be checked periodically for potential damage.

## FAULT DIAGNOSIS

If the Argus series fails to operate, the following should be checked: -

The installation of the switch.  
Electrical terminals are secure and tight.  
The micro switch function is correct.  
The mechanical function of the pushrod.  
Investigate for signs of process leakage.  
Investigate for signs of diaphragm failure (on pressure & flow switches).

## SPARES & REPLACEMENT PARTS

**Maintenance and overhaul of any type, should only be carried out by qualified personnel, in accordance with current health and safety requirements.**

Replacement microswitch assemblies and diaphragm kits are available.  
There are two diaphragm / 'O' ring kits available, either in Viton® or Nitrile.

Procedures for replacement of spare parts are as follows: -

Note: After replacement of spare parts it is advised to connect the switch to a suitable test device & check For:-

(i) Leakage via a pressure test to the switches max working pressure.

(ii) The change over state of the microswitch contacts & necessary re-adjust the main adjuster to obtain the original set point using a calibrated test gauge.

#### P510 & P520 Diaphragm Kit.

The process entry can be unscrewed from the body; this will require a 33mm A/F spanner or socket. Once removed the diaphragm and 'O' ring (if fitted) can be replaced.

The process entry can now be refitted and secured with a suitable locking compound (Loctite® 242) and torque to the correct setting of 20 N.m (15lb.ft).

**3" & 4" Low Pressure** – Remove M5 retaining screws securing the process entry, replace diaphragm (there is no sealing 'O' ring). Replace process entry taking care to align retaining screws with punched holes in diaphragm and re-tighten M5 screws evenly to an approximate torque of 6 N.m (4.4lb.ft).

#### P530 & P540 Piston Assembly 'O' rings Kit.

Unscrew the Piston assembly from the switch. Remove the adaptor / dowty seal from the piston assembly.

Withdraw the piston; remove lock nut from the piston housing using a suitable pin spanner (Pyropress Part No. 16913). Remove the piston guide & piston support

& outer 'O' ring from the housing, Remove the 'O' rings & backing rings (note order in which they are fitted) from the lock nut & piston support, after applying a suitable grease (Moly slip®) fit the replacement 'O' rings & backing rings to the lock nut & piston support in correct order. Fit the replacement outer 'O' ring to the lock nut, locate the piston guide onto the outer 'O' ring / lock nut ensuring the centre hole chamfer is facing upwards, locate the piston support onto the guide, apply suitable grease (Moly slip®) to piston & refit to assembly. Refit assembly into housing & tighten securely. Replace the sealing band. Apply a suitable locking compound (Loctite® 242) to the threads of the housing after ensuring the internal diaphragm is in place refit the piston assembly to the switch head tighten down. Apply a suitable locking compound (Loctite® 242) to the adaptor threads, replace the dowty seal & screw into the piston assembly. Tighten securely.

**A complete pre-assembled and leak tested replacement piston housing assembly is available; contact Sales department for information.**

#### P560, V560 & DP560 Diaphragm & Bellofram® Kit.

To replace Diaphragm & belloframs of the 1" build remove the 4 off M5 screws retaining the pressure housing. Once the pressure housing has been removed from the switch remove the spacer nut & washer(s) from the M4 centre head screw, Undo the M4 screw / nut & remove thus allowing the assembly to split in two. This will allow access to the diaphragm and two Belloframs® (& 'O' rings) which are held in place by circlips.

Assembly is the reverse of the above. It is recommended that a suitable grease (Moly slip®) be applied to the Belloframs® prior to re-assembly.

Tighten M5 retaining screws to a torque setting of 6 N.m (4.4lb.ft).

**For 2", 3" & 8" builds please contact Sales dept for spare part replacement procedure.**

#### P590 Diaphragm & 'O' ring Kit.

Remove the 2 off M5 screws retaining the bracket & remove. Remove the 4 off M5 screws retaining the pressure housing & remove. Remove the 2 off M5 screws & split the pressure housing in two. Remove the piston assembly & remove the M4 screw, split piston assembly. Remove the 'O' rings & backing rings (note order in which they are fitted) from the two piston halves.

After applying a suitable grease (Moly slip®) replace the 'O' rings & backing rings (in correct order), replace the diaphragm & reassemble the piston assembly. Assembly is the reverse of the above.

Tighten M4 screw to a torque setting of 3 N.m (2.2lb.ft). Tighten M5 screws to a torque setting of 6 N.m (4.4lb.ft).

**A complete pre-assembled diaphragm assembly is available.**

**Contact Sales department for information**

#### P510FD Flush Mounted Diaphragm.

**T570 Temperature.**  
**L510, L520 & 520S Level.**  
**F510 Flow.**

**Due to the complexity of these assemblies, it is recommended that these products are returned to Pyropress for overhaul.**

#### Microswitch assemblies

There are 4 microswitch assemblies available, V4 with Din connector, V4 with flying lead, single Exd and double Exd.

#### V4 microswitch with Din plug.

Unscrew the Din socket and remove from the switch base.

Remove the 3 screws securing the Din connector base to the body of the Argus.

Remove the 2 off M2 pan head screws securing the microswitch and feed through the rear slot in the body. Assembly is the reverse of the above.

#### V4 microswitch with flying lead.

Disconnect the flying leads from their termination and remove the grommet from the rear of the switch.

Remove the 2 off M2 pan head screws securing the microswitch and feed through the rear slot in the body. Assembly is the reverse of the above.

#### Exd microswitch with flying lead.

Disconnect the flying leads from their termination and remove the grommet from the rear of the switch.

Remove the 2 off M3 screws securing the microswitch or dual microswitch assembly and pull the switch and cable from the body.

Assembly is the reverse of the above.

#### Exd microswitch with Cable Gland.

These products are not site repairable and should be returned to Pyropress for overhaul.

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