

ARGUS

This User Guide is applicable to the following switch types:

• P_51	Low pressure
• P_51	Medium pressure
• P_51	Flush diaphragm
• P_52	Medium pressure
• P_53	High pressure
• P_54	High pressure
• P_56	Low pressure
• V_56	Vacuum
• D_56	Differential pressure
• T_51	Rigid stem temperature
• T_52	Rigid stem temperature
• T_57	Capillary temperature
• L_51	Horizontal level
• L_52	Vertical level
• L_52	Reed level
• F_51	Flow

General precautions

- Products should be specified, installed, set and maintained by competent personnel in line with relevant health and safety regulations.
- They must not be used outside their stated specifications as this may affect safety and/or performance.
- Any unauthorised modification, repair or use outside the stated specifications may invalidate a product's warranty.
- The installation of products that are certified either Ex d or Ex ia must be in accordance with IEC/EN 60079-14.
- It is the responsibility of the end-user to ensure that the product's materials of construction are compatible with the process media and the surrounding atmosphere.
- If products are being fitted to a system where fluid flow can become unstable and cause pressure to pulsate or surge rapidly, it is imperative that a means of protecting the sensing element be provided; by adding a pressure snubber for example.
- If products are being fitted to a system where the process temperature could exceed the limits stated for that particular configuration (please consult "Temperature limitations"), they must be remote-mounted so as to allow for sufficient heat dissipation.
- Products should always be mounted such that any free movement is minimal. Those mounted via process or electrical connections must be properly supported so as to avoid damage from vibration or accidental impact.
- The end-user is advised to utilise PTFE tape on tapered process connections and appropriately sized bonded seals on parallel process connections.
- All compression fittings must be sufficiently tightened so as to prevent leakage.

Materials of construction

Please see overleaf for a full list covering switch outer case and cover, wetted parts, external parts, internal parts, diaphragms and pressure seals, environmental seals, fasteners, electrical connections and cable.

CE marking

Hazardous area products carry a CE mark to signify conformity with Directive 2014/34/EU (ATEX).

Industrial products carry a CE mark to signify conformity with Directive 2014/35/EU (Low Voltage).

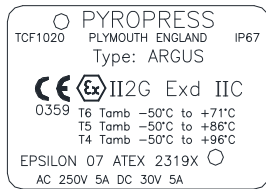
All Argus switch types are deemed to fall within the sound engineering practice (SEP) category, as defined by Chapter 1, Article 4, paragraph 3 of Directive 2014/68/EU (Pressure Equipment). As such, CE marks borne by Argus products do not signify conformance with Directive 2014/68/EU, but rather with Directive 2014/34/EU or Directive 2014/35/EU.

Hazardous area use

Ex d certified products satisfy the applicable essential health and safety requirements contained in Annex II of European Directive 2014/34/EU through compliance with the following standards:

- BS EN 60079-0:2006
- BS EN 60079-1:2007

They are marked as shown below:



The end-user must adhere to the special conditions for safe use laid down on the Ex d certificate:

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

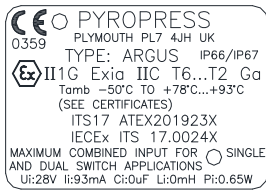
Ex ia certified products satisfy the applicable essential health and safety requirements contained in Annex II of European Directive 2014/34/EU through compliance with the following standards:

- BS EN 60079-0:2012+A11:2013
- BS EN 60079-11:2012

In addition, they comply with IEC standards:

- IEC 60079-0:2011
- IEC 60079-11:2011

These dual ATEX/IEC certified products are thus marked as shown below:



The end-user must adhere to the special conditions for safe use laid down on the Ex ia certificates:

- During live maintenance, adjustment or servicing of the equipment the Aluminium parts may be exposed. Care shall be taken to avoid the risk of ignition from incendive, impact or abrasion sparks.
- The DIN plug cover is made of non-conductive plastic material. Care shall be taken to avoid electrostatic discharge during maintenance, adjustment or servicing. Clean only with a damp cloth.

WARNING: It is the end-user's responsibility to carry out an assessment in order to ensure that there are no hazards due to mechanically generated sparks. End-users are advised to carry out assessments in accordance with the requirements of appropriate, recognised standards. The person or persons undertaking this task must be suitably qualified and legally responsible for site/company safety.

NOTE: The cable gland supplied by Pyropress is certified Ex d e.

Pressure limitations

Maximum process media pressures are as follows;

P_51, P_52, P_53, P_54, P_56, V_56 and D_56:

Various - Please refer to relevant datasheets and labels for maximum pressures.

T_51, T_52 and T_57;

Stem head:	35 barg max.
Standard thermowell:	35 barg max.
High pressure thermowell:	420 barg max.

L_51: **3.5 barg max.**

L_52 (Vertical level): **0 barg max.**

L_52 (Reed level): **10 barg max.**

F_51;

Metallic plates:	8 barg max.
Non-metallic plates:	12 barg max.

Temperature limitations

Products can be stored and operated between the following temperatures;

Storage: **-40°C to +85°C** except for;

T_51 and T_52 types with Viton® seals: **-20°C to +85°C**

Operational ambient:

T_51 and T_52 types	200°C to 240°C range	-40°C to +75°C
	170°C to 210°C range	
	140°C to 180°C range	-40°C to +80°C
	All other types and ranges	-40°C to +85°C

Upper ambients will be further restricted if products are;

ATEX II 2 G Ex d IIC certified; and installed in a T6 environment: **-40°C to +71°C**

or

ATEX/IECEx II 1 G Ex ia IIC certified; and installed in a T6 environment: **-40°C to +78°C**

Process media temperatures are limited to;

P_51 low pressure, P_51 medium Pressure, P_51 flush diaphragm, P_52 medium pressure, P_53 and P_54 high pressure and 1", 2", 3" and 8" P_56, V_56 and D_56 types;

Viton®:	-20°C to +150°C
Nitrile:	-30°C to +100°C
EPDM (P_53 and P_54 types only):	-35°C to +100°C
PTFE (P_53 and P_54 types only):	-40°C to +150°C

T_51, T_52 and T_57;

Various - Please refer to applicable datasheets and adhesive labels for details.

L_51, and L_52;

Viton®:	0°C to +100°C
Nitrile:	0°C to +100°C

F_51: **-30°C to +100°C**

WARNING: Upper temperature limits for process media can be further restricted for Ex d and Ex ia certified products. If the applicable temperature on the Ex d or Ex ia certificate is lower than one given in this User Guide, the one on the certificate prevails. Please refer to the relevant certificate for details.

Other limitations

Ex d certified, Ex ia certified and Industrial products maintain a versatile rating of IP66/IP67.

End-users requiring information about shock and vibration limits should contact Pyropress.

Mechanical installation

Products can be mounted in any orientation without affecting function or performance (except the 8" P_56, V_56 and D_56 types which must only be mounted inverted).

When mounting via the **switch outer case:**

Feed two M5 screws through the clearance holes in the switch outer case and mounting spacer and tighten to secure the product in place.

WARNING: Mounting spacers must remain fitted to ensure there is at least 10mm between the back of the switch outer case and adjacent surfaces. This allows room for a blow-out disc to detach itself and relieve any over-pressure in the event of process media leaking past diaphragms/pressure seals and into the switch outer case.

When mounting via a **cable gland and/or junction box;**

If the cable gland possesses a parallel thread: Unscrew the 30mm A/F locknut supplied. If connecting to a bracket, dispense with the bonded seal. If connecting to a junction box leave the bonded seal in position. Feed the male threaded portion of the gland through the clearance hole or screw directly into the female thread then replace the locknut and tighten with a spanner to clamp the product in place.

If the cable gland possesses a tapered thread: Screw the gland directly into the female thread and tighten with a spanner.

If connecting directly to a junction box; When the switch outer case is made of PPS: Insert two M5 full nuts into the voids that interconnect with the Ø5.2mm holes in the top end of the switch outer case. Ensuring a suitable gasket is in place, align the corresponding holes in the junction box with the Ø5.2mm holes. Thread two M5 screws into the M5 full nuts and tighten to clamp the items together.

When the switch outer case is made of Stainless Steel: Ensuring a suitable gasket is in place, align the corresponding holes in the junction box with the M5 tapped holes in the top end of the switch outer case. Thread two M5 screws into the tapped holes and tighten to clamp the items together.

To attach junction boxes directly to other surfaces use their integral mounting holes/slots and the requisite number of appropriately specified fasteners.

WARNING: When installing products fitted with cable glands and junction boxes in hazardous areas, the end-user must ensure that the cable gland and junction box certifications are compatible. Please note that the specification of any junction box attached directly to an Ex ia certified product must still satisfy the applicable requirements of IEC/EN 60079-11. Installation must be in accordance with IEC/EN 60079-14.

When mounting via a **male process connection:**

Screw the stem head or thermowell directly into the associated female thread and tighten with a spanner (utilise a suitable seal in conjunction with parallel threads, whilst for tapered threads the use of PTFE tape is recommended). Rotate the switch to the desired position then tighten the coupling nut to secure firmly in place. Please note that care should be taken when rotating and tightening so as not to loosen the internal nipple.

When mounting via a **flange connection:**

Having ensured that all mating surfaces are clean, feed the correct number of appropriately sized bolts through the clearance holes in the flange and gasket then tighten to clamp the product in place. The end-user should verify that gasket materials are compatible with the process media likely to be encountered. If utilising a liquid gasket, liberally coat mating faces and allow sufficient time to cure before use.

When mounting via a **bracket;**

2" pipe bracket: Unscrew the two M8 full nuts from the 'U' bolt. Separate the saddle and 'U' bolt from the mounting bracket then from each other. Place the 'U' bolt around the pipe and slide the saddle into place. Feed the 'U' bolt back through the clearance holes in the mounting bracket. Evenly tighten the M8 full nuts until the product is clamped firmly to the pipe.

8" P_56, V_56 and D_56 types' integral bracket: Feed four M8 screws through the Ø8.5mm holes in the mounting bracket and tighten to secure the product in place. Please note that this build must always be mounted inverted.

To mount **L_51 horizontal level** types;

Loosen the 5/16" BSW nut then unscrew the float. Unscrew and remove the 1.3" A/F locknut but leave the bonded seal in place. Feed the remaining assembly through the hole (Ø27mm) in the tank, replace the 1.3" A/F locknut then tighten it with a spanner to clamp the product firmly in place. Reattach the float and lock in place by re-tightening the 5/16" BSW nut with a spanner.

To mount **L_52 vertical level** types,

Loosen the set screw in the lower adjusting collar with a 2.5mm A/F hex tool. Remove the split pin at the end of the float guide tube, the plain washer, the lower adjusting collar and the float. Unscrew and remove the 1.3" A/F locknut but leave the bonded seal in place. Feed the remaining assembly through the hole (Ø27mm) in the tank, replace the 1.3" A/F locknut then tighten it with a spanner to clamp the product firmly in place. Replace the float, the lower adjusting collar, the plain washer and the split pin. Align the set screw in the lower adjusting collar with the hole in the float guide tube and then re-tighten.

To mount **L_52 reed level** types,

Screw the product into the associated female thread and tighten with a spanner (leave bonded seal in place if thread is parallel). Rotate the switch to the desired position then tighten the coupling nut to secure firmly in place. Care must be taken when rotating and tightening so as not to loosen the internal nipple.

Electrical connections

Flying lead products sold with or without a cable gland;

- Products with a single microswitch have one double insulated cable of nominal outer diameter 6.8mm containing 3 cores of cross-sectional area 0.75mm².
- Products with dual microswitches and a cable gland have one double insulated cable of nominal outer diameter 9.2mm containing 7 cores of cross-sectional area 0.75mm².
- Products with dual microswitches but without a cable gland have two double insulated cables, each of nominal outer diameter 6.8mm and containing 3 cores of cross-sectional area 0.75mm² respectively.

The products sold without a cable gland are fitted with a sealing grommet conferring a versatile rating of IP66/IP67.

When flying lead products sold without a cable gland are

to be installed in a hazardous area, the end-user must specify and fit a suitable cable gland themselves.

NOTE: On dual microswitch types, core 7 should not be connected.

Wiring details (covering flying lead only);

Microswitch 1:	Microswitch 2 (when fitted):
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1 = common	1 or 4 = common
2 = normally closed	2 or 5 = normally closed
3 = normally open	3 or 6 = normally open

M20 x 1.5 female conduit entry products (Ex ia and Industrial only);

- Products with a single microswitch are fitted with a 3-way terminal block capable of accepting conductors with cross-sectional areas of up to 1.5mm².
- Reed level types are fitted with either a 2, 3, 4 or 6-way terminal block capable of accepting conductors with cross-sectional areas of up to 1.5mm².

All terminal blocks utilise screw terminations.

WARNING: Terminals must not be accessed unless the product has been electrically isolated. A suitable sealing device must be used in conjunction with electrical conduit or armoured cable in order to maintain the product's IP rating.

M12 circular connector products (Ex ia and Industrial only);

- Come with a 3 contact, A-coded plug to IEC 61076-2-101. The mating thread is M12 × 1 male.

DIN plug and cable socket products (Ex ia and Industrial only);

- Come with square, form A connectors to EN 175301-803. There are 3 contacts plus a protective earth (PE) that are capable of accepting conductors with a cross-sectional area of up to 1.5mm². Termination method is via screws. The gland is suitable for cables of between 4.5mm and 11mm nominal outer diameter. The gland thread is PG 11.

WARNING: The cable socket must not be opened whilst the electric supply is live.

Wiring details (covering M20, M12 and DIN connections);

Microswitch 1:

	M20	M12	DIN
Common	Terminal 1	Pin 1	Pin 1
Normally Open	Terminal 2	Pin 3	Pin 2
Normally Closed	Terminal 3	Pin 4	Pin 3

NOTE: Wiring details relating specifically to the functions of L_51 and L_52 level types can be found overleaf.

WARNING: The end-user must ensure that all products are properly earthed in accordance with IEC/EN 60079-14.

The Argus is suitable for use in CAT 1 (Zone 0) environments when supplied from an approved intrinsically safe interface with the following limits:

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

Set-point adjustment

WARNING: Set-points can be altered with the switch connected to a live electric supply. When the end-user is shielded from live parts by an insulator, it must not be removed whilst adjustment is being undertaken.

Products supplied by Pyropress are always calibrated but, if necessary, can be reset once installed. To alter a product's setting(s) follow one of these procedures:

For P_51, P_52, P_53, P_54, P_56, V_56, D_56, T_57 and F_51 types:

1. Remove the switch cover.
2. Using a Ø3mm tommy bar, rotate the adjuster screw – clockwise (anti-clockwise if the switch is inverted) to increase the set-point or anti-clockwise (clockwise if the switch is inverted) to decrease the set-point – until its red indication line sits opposite the desired setting on the scale.
3. Replace the switch cover.

For T_51 and T_52 types:

1. Remove the switch cover.
2. Whilst using a suitable tool to prevent the plunger from turning, rotate the adjuster screw using a Ø3mm tommy bar - clockwise (anti-clockwise if the switch is inverted) to increase the set-point or anti-clockwise (clockwise if the switch is inverted) to decrease the set-point – until the requisite setting on the adjuster screw's scale sits opposite the indication line on the plunger.
3. Replace the switch cover.

NOTE: As L_51 and L_52 types cannot be adjusted, the end-user should refrain from altering the position of the adjuster screw.

Routine maintenance

WARNING: The end-user must ensure that products are isolated from pressurised media prior to disconnecting them from the system. Temperatures of exposed surfaces should be checked before handling so as to avoid injury.

Pyropress recommends that all products be inspected and operated at least once every 6 months. Process and electrical connections should be checked to ensure they remain tight.

In addition, the Gore-Tex® vents should be visually checked for signs of damage.

O-rings, bonded seals, gaskets and diaphragms should be renewed every 3 to 5 years. Microswitch assemblies should be renewed every 5 to 10 years, depending on usage.

Fault diagnosis

In the event that a product fails to operate correctly, please check that:

1. All process entry connections are screwed/clamped tight and there is no discernible leakage of the media.
2. Electrical wires are terminated correctly and held tightly in place.
3. There are no foreign objects inside the switch outer case impeding operation.
4. The pushrod moves freely in response to changes in pressure, vacuum, temperature, level or flow.
5. Microswitches are functioning correctly by observing a change in contacts, both when they operate and when they reset.

If after taking these steps the problem still persists, please contact Pyropress.

Spares

Diaphragm, pressure seal and environmental seal kits are available for the following switch types:

- P_51 Low pressure
- P_51 Medium pressure
- P_51 Flush diaphragm
- P_52 Medium pressure
- P_56 Low pressure
- V_56 Vacuum
- D_56 Differential pressure

A pressure seal and environmental seal kit is also available for:

- P_53 High pressure
- P_54 High pressure

A complete, pressure-tested piston assembly can be supplied as an alternative to this kit if required.

The complex nature of the rigid stem and capillary temperature, horizontal, vertical and reed level and flow switch types is such that they should be returned to Pyropress for overhaul.

New microswitch assemblies are available for products with the following electrical connections:

- Flying lead sold without a cable gland
- M20 female conduit entry (except for L_52 reed level)
- M12 circular connector (except for L_52 reed level)
- DIN plug (except for L_52 reed level)

Flying lead products sold with a cable gland should be returned to Pyropress for overhaul.

Pyropress recommends that the end-user thoroughly tests refurbished products before re-introducing them into service.

Contact details

Pyropress Engineering

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Fax: +44 (0)1752 336681

E-mail: sales@pyropress.com

Website: www.pyropress.com

MATERIALS OF CONSTRUCTION

SWITCH OUTER CASE AND COVER:

- 316 STAINLESS STEEL
- POLYPHENYLENE SULPHIDE (PPS) WITH STAINLESS STEEL FIBRES

WETTED PARTS:

- 303, 304, 316 AND 321 STAINLESS STEELS
- MONEL® 400
- POLYPROPYLENE (L_51 TYPES ONLY)
- NITRILE (L_52 REED LEVEL TYPES ONLY)
- GUNMETAL (F_51 TYPES ONLY)
- COTTON FABRIC REINFORCED EPOXY RESIN (F_51 TYPES ONLY)
- ACETAL C (F_51 TYPES ONLY)
- BRASS (F_51 TYPES ONLY)
- POLYVINYL CHLORIDE (F_51 TYPES ONLY)
- NYLON (F_51 TYPES ONLY)

OTHER EXTERNAL PARTS:

- 303, 304 AND 316 STAINLESS STEELS
- PPS WITH STAINLESS STEEL FIBRES
- PPS
- NYLON
- GLASS REINFORCED EPOXY RESIN
- PHOSPHOR BRONZE (L_51 TYPES ONLY)
- BRASS (L_51 TYPES ONLY)

INTERNAL PARTS:

- 303, 304 AND 316 STAINLESS STEELS
- PPS
- SPRING STEEL
- CHROME-PLATED STEEL
- NYLON
- ALUMINIUM
- PTFE
- POLYESTER
- BRASS
- POLYCARBONATE
- ZINC-PLATED STEEL
- GLASS REINFORCED EPOXY LAMINATE
- COPPER
- GLASS REINFORCED POLYESTER

DIAPHRAGMS AND PRESSURE SEALS:

- VITON®
- NITRILE
- SILICONE
- PTFE (P_53 AND P_54 TYPES ONLY)
- EPDM (P_53 AND P_54 TYPES ONLY)
- NEOPRENE CORK (F_51 TYPES ONLY)

ENVIRONMENTAL SEALS:

- SILICONE
- NITRILE
- VITON®
- GORE-TEX®
- EPDM

FASTENERS:

- A2 STAINLESS STEEL
- ZINC-PLATED STEEL
- NYLON

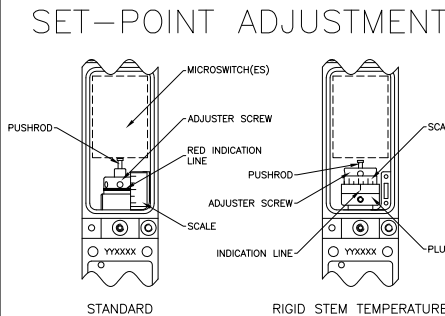
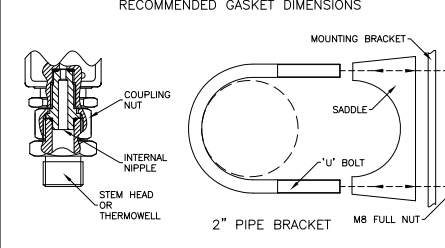
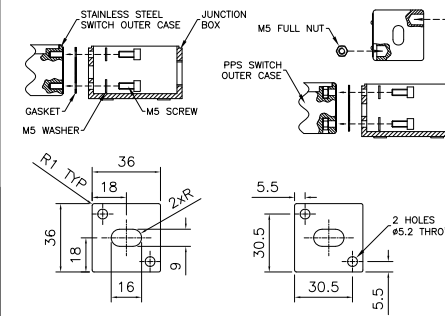
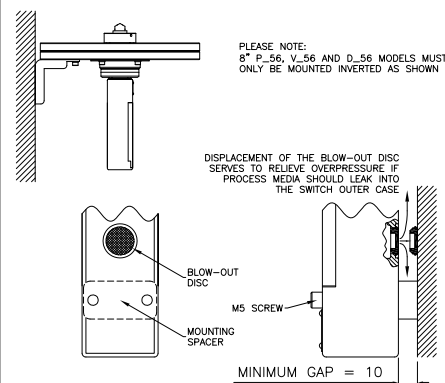
ELECTRICAL CONNECTIONS:

- 316 STAINLESS STEEL
- GLASS REINFORCED POLYESTER
- GLASS
- NICKEL ALLOY

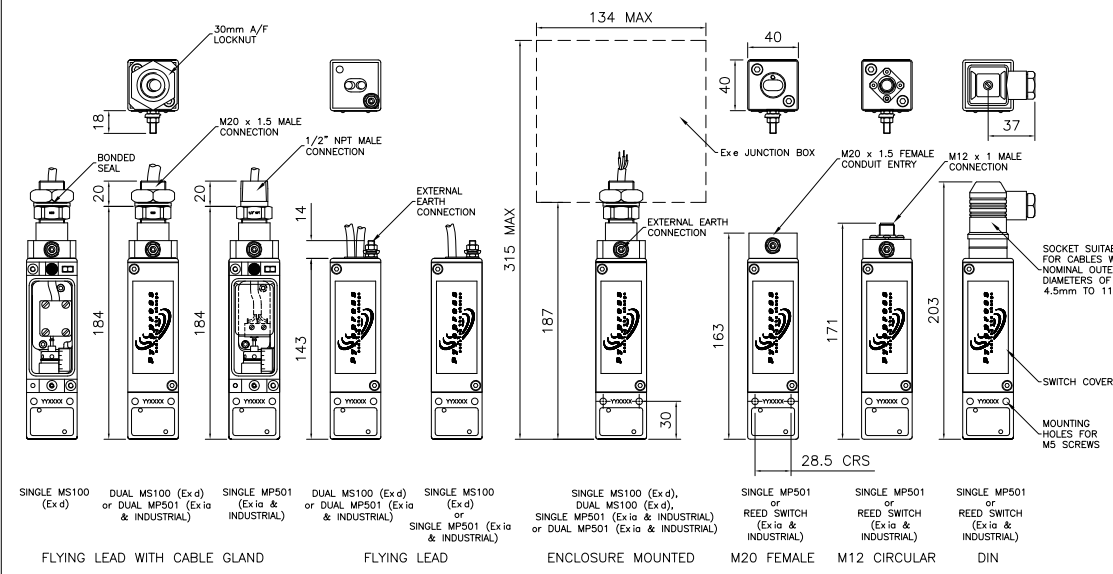
CABLE:

- COPPER
- SILICONE

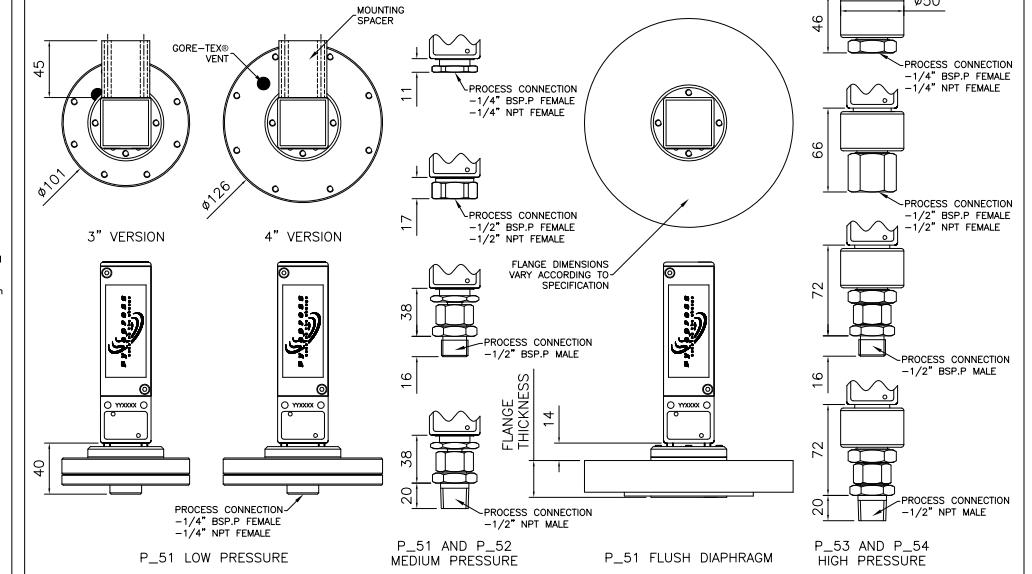
MECHANICAL INSTALLATION



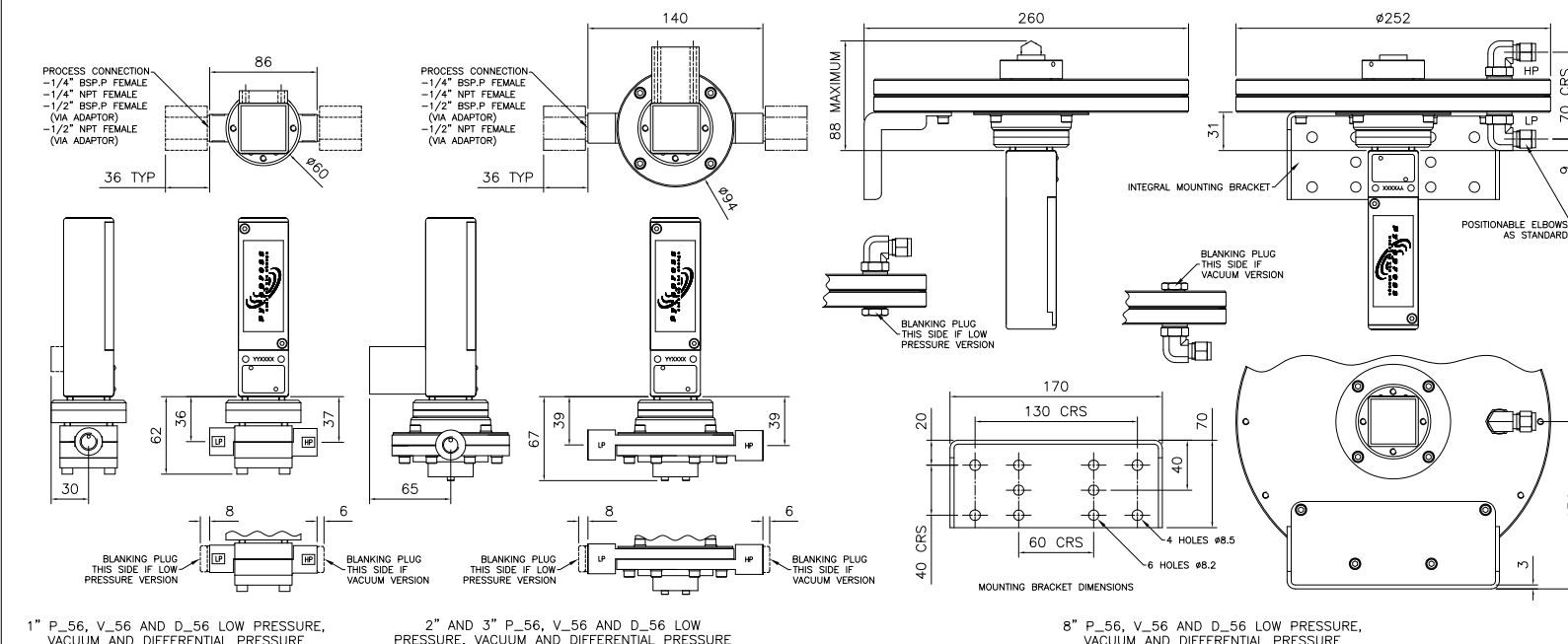
ELECTRICAL CONNECTIONS



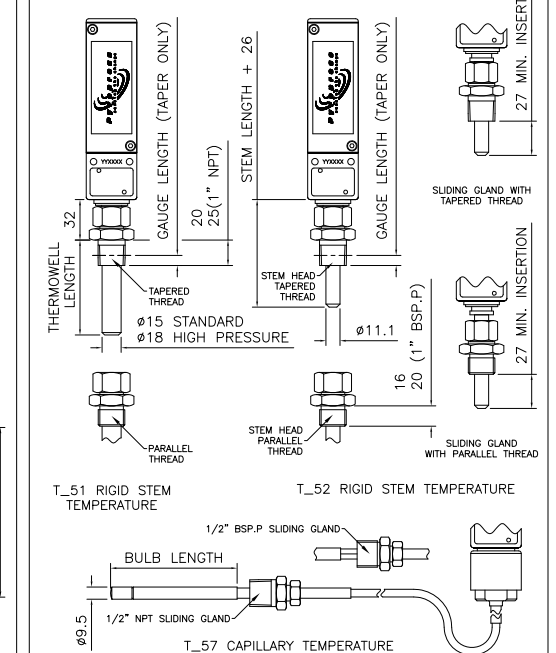
PRESSURE



LOW PRESSURE, VACUUM AND DIFFERENTIAL PRESSURE



TEMPERATURE



MICROSWITCH DETAILS

250V AC 5A RESISTIVE/2A INDUCTIVE
30V DC 5A RESISTIVE/2A INDUCTIVE

SINGLE MICROSWITCH (FLYING LEAD)



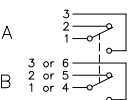
1 & 2 BREAK RISING
1 & 3 MAKE RISING

SINGLE MICROSWITCH (M12 CONNECTION)



1 & 3 BREAK RISING 1 & 4 BREAK RISING
1 & 2 MAKE RISING 1 & 3 MAKE RISING

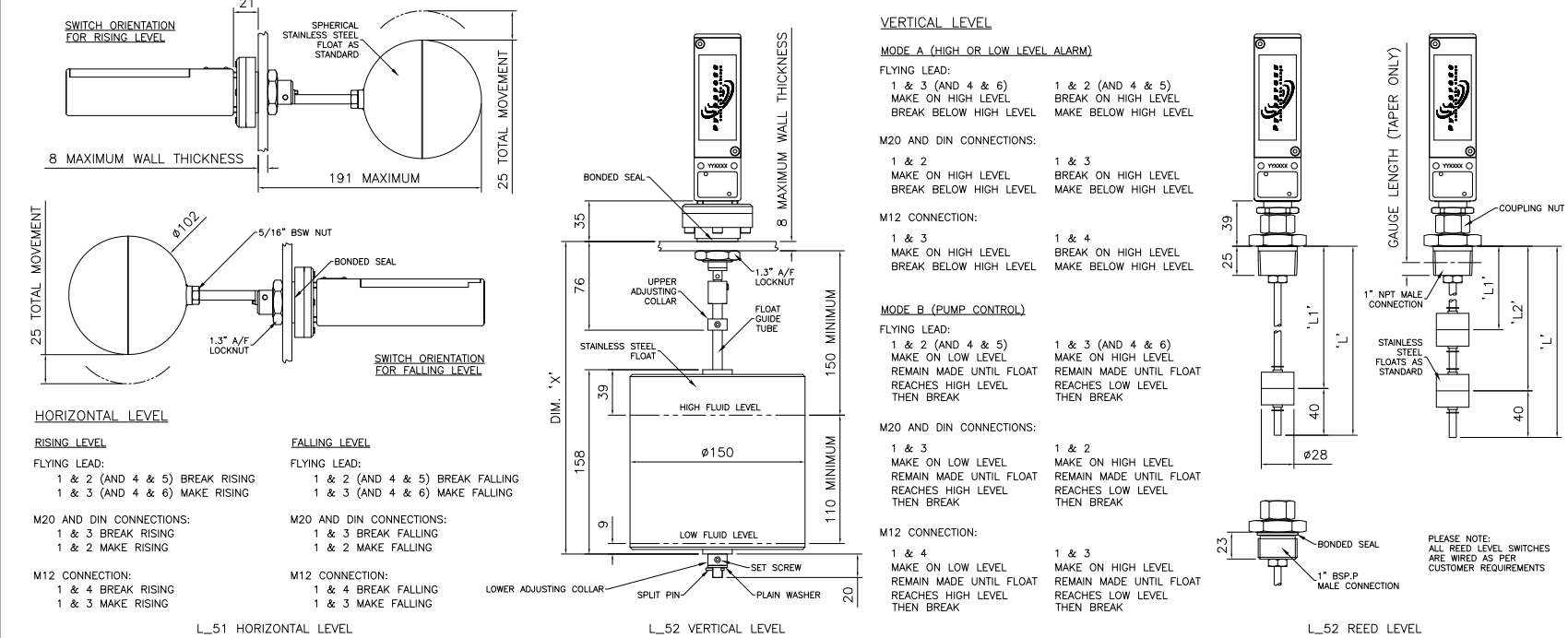
DUAL MICROSWITCHES



MICROSWITCH A: 1 & 2 BREAK RISING 1 & 3 MAKE RISING
MICROSWITCH B: 1 or 4 & 2 or 5 BREAK RISING 1 or 4 & 3 or 6 MAKE RISING

DETAILS FOR HORIZONTAL AND VERTICAL LEVEL TYPES CAN BE FOUND IN THE "LEVEL" SECTION

LEVEL



FLOW

