

WORKING INSTRUCTIONS

TITAN RANGE

This working instruction leaflet covers the following ranges of switches:

PF/R261	Pressure Switch – Case Mounted
PF/R262	Pressure Switch – Stem Mounted
PF/R261 3"	Low Pressure Switch
PF/R261 4"	Low Pressure Switch
PF/R261FD	Flush Diaphragm Pressure Switch
PF/R 263	High Pressure Switch – Case Mounted
PF/R264	High Pressure Switch – Stem Mounted
PF/R266	Low Pressure Switch
VF/R266	Vacuum Switch
DPF/R266	Differential Pressure Switch
DPF/R296	High Static Differential Pressure Switch
TF/R171	Temperature Switch with Thermowell
TE/R171	Temperature Switch with Thermowell
TF/R172	Temperature Switch without Thermowell
TE/R172	Temperature Switch without Thermowell
TF/R175	Capillary Temperature Switch without Thermowell
TF/R176	Capillary Temperature Switch with Thermowell
LF/R34	Horizontal Level Switch
LF/R35	Vertical Level Switch
FF/R503	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 should be specified, installed and operated by competent personnel, and their use must be limited to within the published specifications. (All hazardous area models must be installed in accordance with IEC/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, a suitable pressure snubber should be fitted.

FAILURE HAZARD

Element/primary seal failure.

Rubber Diaphragm, Flush Mounted Diaphragm, Piston, Low Pressure, Differential Pressure & Flow.

In the event of the above the process medium will be prevented from entering and pressurising the main body by a secondary seal and will be vented to atmosphere via a vent hole.

The process medium temperature should not be allowed to exceed that stated in the product data and under the "STORAGE & 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 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.

Suitable pipe sealant or flange gasket should be incorporated when installing to ensure a good leak free fit.

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.

Flush Mounted & Flow Switches

These are supplied with mounting holes and flange to a specified standard, it is recommended that a suitable flange gasket is used.

Level Switches

These are supplied with a bonded seal for parallel threads.

MATERIALS

The materials of construction are as follows:

Main Body: Black anodised aluminium or stainless steel.
Terminal Cover: Black anodised Aluminium or Stainless Steel.
Wetted Parts: Stainless Steel or Monel® 400.
Diaphragm: Viton® or Nitrile
Pressure Seals: Viton®, Nitrile, EPDM, Kalrez® or PTFE
Environmental Seals: Nitrile, Neoprene Rubber and Silicone
External Fasteners: Stainless Steel
Internal Fasteners & Springs: Zinc plated Carbon Steel

STORAGE & OPERATING TEMPERATURES

The temperature restrictions for the Titan series are as follows:

Ambient:

Operational -40°C to +85°C
Or as stated on the switch.

Ambient and process 'T' values as certified for hazardous areas

ATEX & IECEx Certified.

ATEX Certificate No: ITS13ATEX27301X
IECEx Certificate No: IECEx ITS 13.0055X
II1G Exia IIC T6...T2 Ga

Without resistors:

Ambient and process:

T6...T5 Tamb -50°C to +78°C T6
T5...T4 Tamb -50°C to +93°C T5
T4...T2 Tamb -50°C to +128°C T4

II1G Exia IIC T5...T2 Ga

With resistors

Ambient and process:

T5...T3 Tamb -50°C to +72°C T5
T4...T2 Tamb -50°C to +122°C T4

ATEX Certificate No: ITS14ATEX17965X
IECEx Certificate No: IECEx ITS 14.0006X
II2G Exd IIB+ T6...T2 Gb.

With or without resistors:

Ambient:

T6 Tamb -60°C to +75°C

T5...T2 Tamb -60°C to +90°C

Process:

T6 -60°C to +65°C

T5 -60°C to +80°C

T4 -60°C to +130°C

T3 -60°C to +195°C

Storage: -40°C to +85°C

Process:

PF/R261, PF/R262, PF/R263, PF/R264, PF/R 266,
VF/R266, DPF/R266 & DPF/R296:

Viton® -20°C to +150°C

Nitrile -30°C to +100°C

LF/R34, LF/R35 & FF/R503:
0°C to +100°C

TF/R61 & TF/R62:

Refer to temperature range specification.

Special versions available. Please contact Pyropress Engineering Sales department for any assistance.

MOUNTING INSTRUCTIONS

Pressure, Vacuum, Differential Pressure and Capillary Temperature Switches

Surface mounting models have the conduit entry to the right, process connection at the bottom with terminal access at the top and adjustment access to the front.

All switches ("except the 8" Differential Pressure and 4" Low Pressure) can be mounted in any orientation to suit, without effecting accuracy, set point or operation. "8" Differential Pressure and 4" Low Pressure, should be mounted with the switch case beneath the pressure plates.

When installing direct mounting pressure switches, particular care should be taken to ensure the internal 1/4" 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.

The 'Titan' range has been certified for mounting against a flush wall or bulkhead via the fitted bracket, therefore the flamepath minimum distances specified in EN 60079-14 are not applicable.

Rigid Stem Temperature Switches

Rigid stem temperature switches are usually supplied with a thermowell or stem head. The stem head is supplied to allow the sensing stem to be inserted directly into the process medium. Bracket mounting for ambient measurement is also available.

Level Switches

Level switches are supplied with a parallel thread for direct mounting via the level head assembly, with a suitable bonded seal and threaded fastening.

Flush Mounted & Flow Switches

These products are designed to be mounted directly via their mounting flange connection.

ELECTRICAL INSTALLATION

All models are normally supplied with a straight M20 conduit entry, other options including straight M25 or 1/2" NPT or angled M20 are available upon request. This can be fitted with either a suitable gland or directly with conduit, to suit the installation. Access to the terminals is via a removable top cover, though the electrical supply must be isolated prior to this activity.

Switch connection details are provided on the inside of the cover. This should be referred to when connecting to the terminal strip as the N.O. / N.C. terminal numbers vary dependant on whether the switch setting is rising or falling. Terminals are suitable for cables, single or multi-strand, up to 2.5mm². Terminals for dual micro switches are only suitable for cables, single or multi-strand, up to 1.5mm².

Options of 1 or 2 SPDT micro switches are available.

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

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

It is the responsibility of the installer to ensure that the Titan is not subjected to electrical parameters outside those stated and that suitable overload protection is provided.

All wiring is to have a minimum of 0.5mm of insulation on each core and maintain a Dielectric Strength >500V ac.

The Titan range is certified for installation in a CAT1 (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

SETTING & CALIBRATION

Adjustment of the switch set point may be carried out without isolating the electrical supply.

Prior to despatch, switches are subjected to a specified maximum static pressure and operation check and set to mid-range. They can be pre-set at a specified value against a calibrated test instrument.

The switch has tamperproof adjustment accessed by removal of the adjustment chamber cover.

Turning the adjustment nut to the left to raise the set point or to the right to lower it carries out adjustment to the set point.

HAZARDOUS AREA CERTIFICATION

The Titan range of switches complies with the following standards:

Intrinsically Safe Exia.

EN60079-0:2012, EN60079-11:2012

EN60079-26:2007

IEC60079-0:2011

IEC60079-11:2011, IEC60079-26:2006

Flameproof Exd.

IEC 60079-0:2011 & EN 60079-0:2012.

IEC 60079-1:2007 & 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 2014/34/EU.

Conditions of certification apply:

Appropriate overload protection must be provided during installation.

It is the responsibility of the installer to ensure that installation of this equipment in a chemically aggressive atmosphere is avoided.
For pressure limitations refer to specific switch specification.

It is the responsibility of the installer to ensure that the Titan is suitably earthed in accordance with IEC/EN60079-14.

For Intrinsically Safe installations the internal earth point within the terminal chamber must not be connected directly or indirectly to the Barrier Earth. This equipment satisfies the requirements of IEC60079-11 Clause 6.3.13 Dielectric Strength 500V ac.

Special Conditions

This product has been certified with an 'X' suffix, indicating it has the following Special Conditions for safe use (refer to certificate for full detail):

Intrinsically Safe Exia

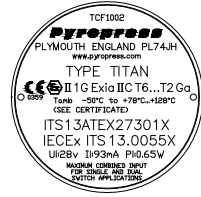
Aluminium housing may only be used when the ignition hazard assessment shows that there is no risk of ignition from incendive, impact or abrasion sparks. This assessment is to be performed by a qualified person, legally responsible for the site/company safety.

Flameproof Exd

No modifications may be made to the flamepaths without consulting the certified drawings. The cable selected shall be suitable rated based on the application and T-Classes previously given. Fasteners of yield strength 240Nmm², or greater, are to be utilised. Only suitable Ex d IIC Gb cable glands are to be used.

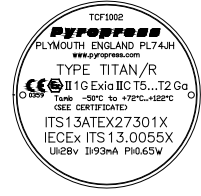
INTRINSICALLY SAFE LABEL

Without resistors fitted.



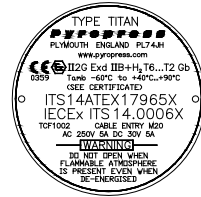
INTRINSICALLY SAFE LABEL

With resistors fitted.



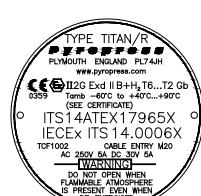
FLAMEPROOF LABEL

Without resistors fitted.



FLAMEPROOF LABEL

With 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, and surface temperature.

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.

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 size for significant risk, protect as necessary.

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 dependent 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 Titan 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 & differential pressure)

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 (Bellofram® / 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 & if necessary re-adjust the main adjuster to obtain the original set point using a calibrated test gauge.

PF261 & PF262 Diaphragm Kit

Standard Pressure - Remove 4 off M5 retaining screws securing the process entry, remove process entry, diaphragm, lower bush, secondary diaphragm assembly & upper bush. Replace upper bush O-Ring, & refit upper bush, replace secondary diaphragm, replace sealing band & refit lower bush, replace diaphragm, replace sealing O-Ring. Replace process entry. The 4 off M5 retaining screws should be re-assembled with a suitable thread sealant (Permagard® A131 or equivalent) and tightened evenly to a torque setting of 6 N.m (4.4lb.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).

PF261(7) & PF262(7) Bellofram® Kit.

Remove 4 off M5 retaining screws securing the process entry, remove process entry, Bellofram®, lower bush, secondary diaphragm assembly & upper bush. Replace upper bush O-Ring & refit upper bush, replace secondary diaphragm, replace sealing band & refit lower bush, replace Bellofram®, replace sealing O-Ring. Replace process entry. The 4 off M5 retaining screws should be re-assembled with a suitable thread

sealant (Permagard® A131 or equivalent) and tightened evenly to torque setting of 6 N.m (4.4lb.ft). **PF263 & PF264 Piston O-Ring Kit.**

Unscrew the Piston assembly from the switch.

Remove the adaptor/bonded 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 (MolySlip® or equivalent) 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 (MolySlip® or equivalent) to piston & refit to assembly. Refit assembly into housing & tighten securely.

Replace the sealing band. Apply a suitable locking compound (Loctite® 243 or equivalent) to the threads of the housing & refit the piston assembly to the switch-head. Apply a suitable locking compound (Permagard® A131 or equivalent) to the adaptor threads, replace the bonded 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.

PF266, VF266 & DPF266 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 cap head screw, undo the M4 Cap head 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. The 4 off M5 retaining screws should be re-assembled with a suitable thread sealant (Permagard® A131 or equivalent) and tightened evenly to a torque setting of 6 N.m (4.4lb.ft).

For 2", 3" & 8" builds please contact Sales department for spare part replacement procedure. PF296 Diaphragm & O-Ring Kit.

Remove the 4 off M5 screws retaining the pressure housing.

Once the pressure housing has been removed from the switch split the pressure housing in two & remove the diaphragm assembly, remove M3 screw & split the diaphragm assembly in two. Replace the diaphragm, O-Rings and backing rings (ensure O-Rings and backing rings are in correct order). Reassemble the diaphragm assembly, & refit to pressure housings (it is recommended that a suitable grease (MolySlip® or equivalent) be applied to the O-Ring bores prior to re-assembly). Refit the pressure housing to switch.

The 4 off M5 retaining screws should be re-assembled with a suitable thread sealant (Permagard® A131 or equivalent) and tightened evenly to a torque setting of 6 N.m (4.4lb.ft).

A complete pre-assembled diaphragm assembly is available.

Contact Sales department for information.

FF503 Flow – metal flange material. Procedure for replacement of spare parts is supplied with the relevant part kits.

PF261 Flush Mounted Diaphragm.

TF171, TF172, TF175 & TF176 Temperature.

LF34 & LF35 Level and FF503 Flow – Tufnol® flange material.

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

Replacement microswitch assemblies</

