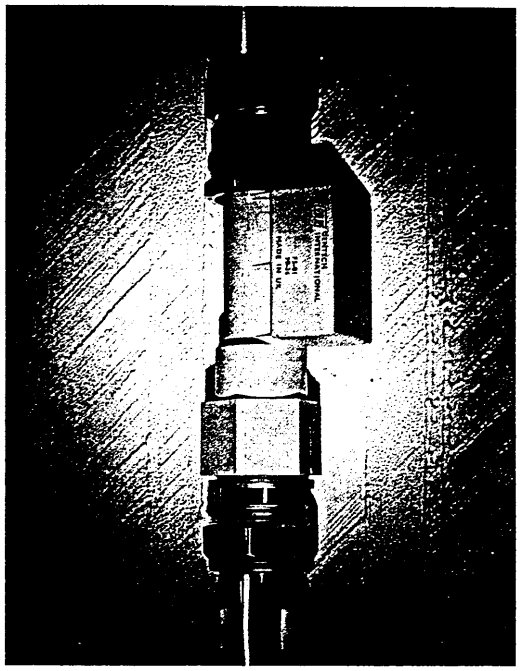
Gentech International

FLOW SWITCHES

The Gentech FS Flow Switch series design represents a major step forward in Fluid Management technology with minimal pressure drop in low flow rate applications. Suitable for a variety of sensing/switching applications, the FS series is ideal for switching domestic shower pumps where a small head of water gives low pressure resulting in low flow.



DESIGN FEATURES

- High grade Noryl construction on FS 01, 02, 03 & 04 models meeting UL 94-V1 flammability rating
- FS-05 & 06 models with brass construction and integral 22mm compression fittings have acetal housing meeting UL 94-HB flammability rating
- Operates with a small head of liquid
- Vertical mount
- Axial design for ease of installation
- Choice of British 3/4" BSP male and female connection designed to mate with fittings to BS864 or 3/4" American NPSC parallel male and female connection (FS 01, 02, 03 & 0.4 models)
- FS 05 & 06 models connect directly to 22mm pipe to BS2871
- All types suitable with appropriate adaptors for connection to 15mm, 22mm and 28mm pipes
- FS 01 & 02 models British Water Research Council Listed (Cert. No. 9112034) for hot (85°C) and cold potable water applications
- Maximum pressure 10 Bar
- Solid State ac mains or reed switch dc switching versions available

TECHNICAL SPECIFICATIONS

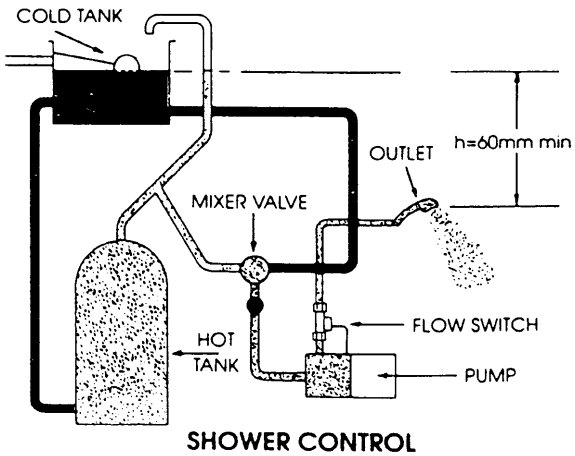
Switch Rating (max)
Models FS–01, FS–03 & FS–05 250 volts rms; 3 amps
Models FS–02, FS–04 & FS–06 300 volts dc; 0.5 amps; 10 watts
Temperature Range –30°C to +100°C

MECHANICAL SPECIFICATIONS

Mounting Position	Vertical ±15°
Shock (Reed switch only)	50g for 11 milli-secs
Vibration (Reed switch only)	35g up to 500Hz
Nominal Cable Length	0.5 metres

TYPICAL APPLICATIONS

Shower control, Central heating systems, Mains water control, Flow sensing.

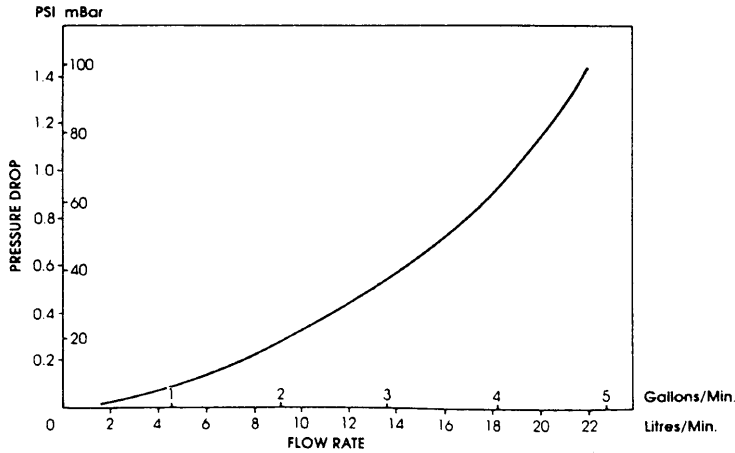


SHOWER CONTROL

FLOW RATE AT SWITCH ON

Water	1.0 L/min (0.22 U.K. gal/min) (0.264 U.S. gal/min)
Air	0.00255 m³/s (0.09 ft³/s)

FLOW RATE v PRESSURE DROP



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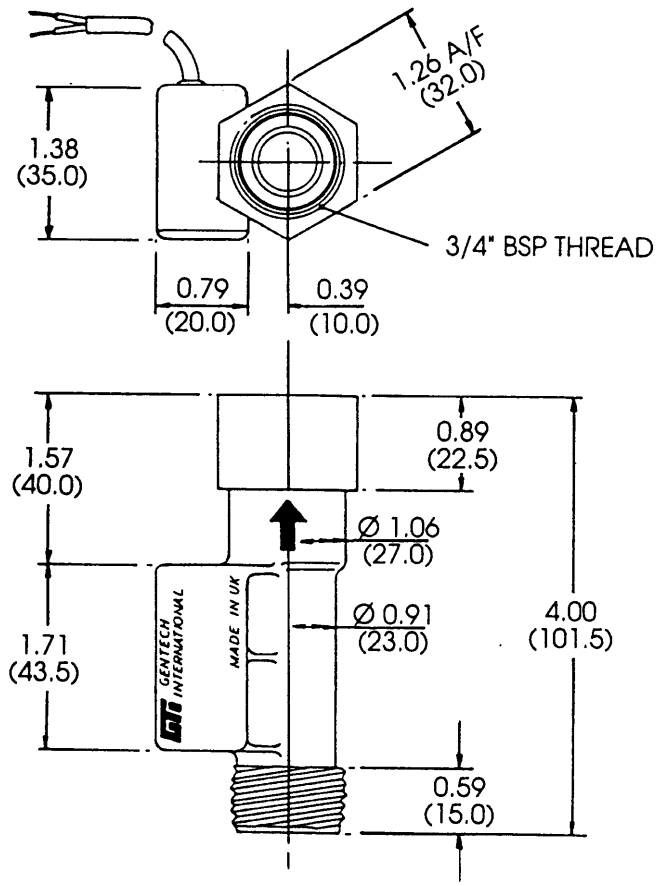
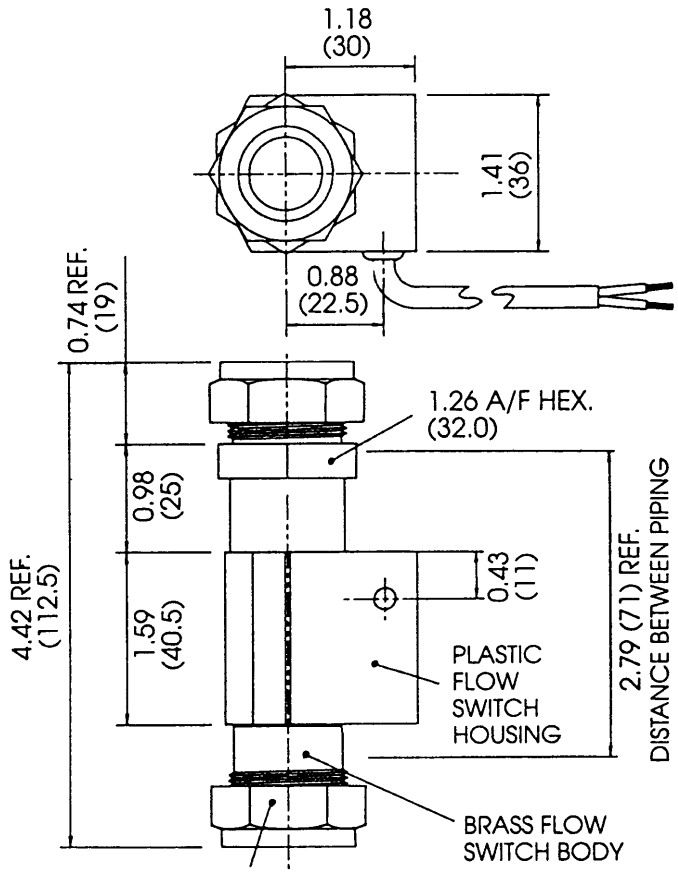
FLOW SWITCHES *continued*

DIMENSIONAL CHARACTERISTICS

FS 01, 02, 03 & 04



FS 05, & 06



Dimensions in inches (mm)

CABLE SPECIFICATION

2 core 0.5mm²
BS6500 cable
Is PVC covered
Cable Colour

FS–01 – White
FS–02 – Grey
FS–03 – White
FS–04 – Grey
FS–05 – White
FS–06 – Grey

ORDERING INFORMATION

(Pipe Fittings)

Model	Thread
FS–01	British 3/4" BSP
FS–02	British 3/4" BSP
FS–03	American 3/4" NPSC
FS–04	American 3/4" NPSC
FS–05	22mm compression fitting
FS–06	22mm compression fitting

INSTALLATION AND APPLICATION NOTES

1.0 The unit should be mounted vertically ±15°, with the direction of flow arrow pointing in the up direction.

2.0 When British Standard (BSP) 3/4" or American Parallel (NPSC) fittings are used for connection it is recommended that the sealing washers supplied are used. When using American 3/4" Tapered (NPT) fittings it is permissable to use a tape or sealant, provided either is applied sparingly. A tightening torque of 15lb/ft (20Nm) must NOT be exceeded when making connections to the flow switch. Flow must be in the direction of arrow on side of body.

3.0 On brass models ensure the mating pipe is clean, undamaged, and pushed fully home before tightening the compression fitting.

4.0 There is no electrical output from the flow switch, only switching capability. It should be connected to the device to be switched as shown in figure 1. (Mains version FS–01 only)

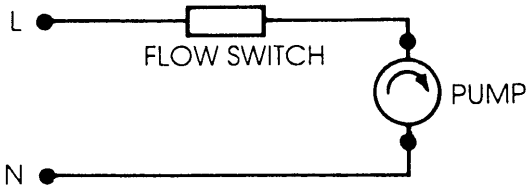


FIGURE 1

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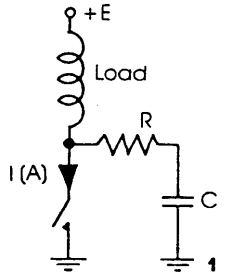
TECHNICAL NOTEBOOK

CONTACT PROTECTION CIRCUITS

When a reed switch is connected to an inductive load or a load where surge current or in-rush current flows (such as capacitive lamp, long cable, etc) the following contact protection circuits are recommended.

Inductive Load

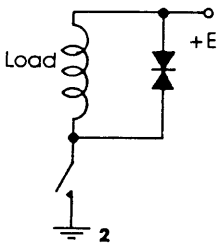
When an electromagnetic relay, electromagnetic solenoid, or electromagnetic counter which has an inductive component as the circuit load; the energy stored in the inductance will cause an inverse voltage when the reed contacts break. The voltage, although dependent on the inductance value, sometimes reaches several hundred volts and becomes a major factor in contact deterioration. To prevent this, many protection circuits are available, typical examples of which are shown.



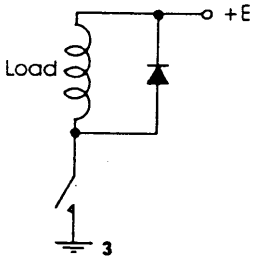
CIRCUIT 1
Contact protection with CR circuit.

$C = \frac{i^2}{10}\ (\mu F)$

$R = \frac{E}{10i(1+50/E)}\ (\Omega)$



CIRCUIT 2
In circuits where reed contacts are open for long periods and there is a possibility of voltage spikes in excess of switch rating, a varister is recommended. This applies to A.C. applications.



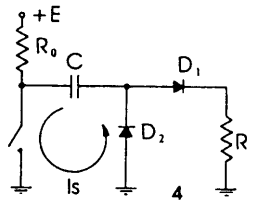
CIRCUIT 3
Contact protection with diode. The diode should have a withstand voltage of more than Ev and a forward current of:—

$\frac{5E}{\text{Load coil resistance}}$

Capacitive Load

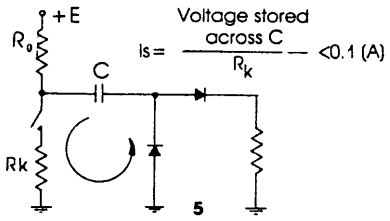
When a capacitor is connected in series or in parallel with reed switch contacts in a closed circuit, the in-rush current which flows at the time of capacitor charge and discharge will cause deterioration of the reed contacts. Typical examples of the protection circuits to prevent high in-rush current are shown.

CIRCUIT 4
Differential circuit without contact protection. The energy stored in C will cause in-rush current (Is) when the contacts close.

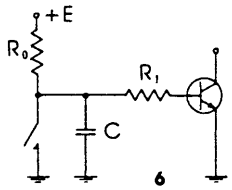


CIRCUIT 5
With a current limiting resistor (Rk) for contact protection.
The value of Rk (Ω) is calculated from the following:—

$Is = \frac{\text{Voltage stored across C}}{R_k} < 0.1\ (A)$

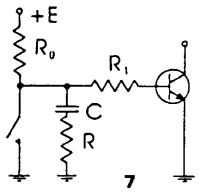


CIRCUIT 6
Circuit with C for chattering protection. In-rush current will be created similar to circuit 4.



CIRCUIT 7
With R for contact protection

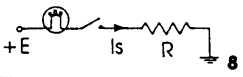
$R = 50 - 500\ (\Omega)$

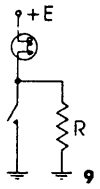


Lamp Load

If the reed switch is used for switching tungsten filament lamps, the in-rush current (5 to 10 times the steady-state current) at the contacts immediately the lamp is turned on, often causes excessive heating or sticking of the reed contacts. The lamp load is, therefore, considered similar to a capacitive load, thus requiring a contact protection circuit. Examples of protection circuits recommended are as shown.

CIRCUIT 8
R=Current limiting resistor
R should be calculated on the basis of the Reed contact rating.





CIRCUIT 9
R—Parallel resistance
By connecting R, the filament is heated and its resistance (Ω) is increased

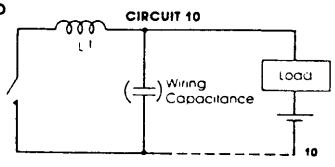
$R < \frac{\text{Filament resistance}}{3}$

Cable Capacitance

When the reed switch is connected to the load by a cable over a long distance, static capacitance induced by the cable will affect the contact performance of the reed switch. It is recommended that the user provides a protection circuit as shown to extend operating life of the reed switch.

A surge suppressor (L_s) inserted close to the reed switch contacts causes the in-rush current flowing to the contacts to be delayed. The value of L_s is 0.5 to 5mH depending on the load current. The L_s can be replaced by a very small resistor (current-limiting) of 10 to 500 ohms.

CIRCUIT 10



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