

# Application & Guidance Notes



## Limit Switches

### Operating principle

Most of the limit switches and micro-switches in this catalogue contain “fast-acting” (snap-action) mechanisms. The switching action is spring-assisted, giving a number of advantages over a “slow acting” mechanism. The following are some of the advantages.

### Speed of operation

For power switching, a fast-switching action is guaranteed, irrespective of the speed at which the actuator is moved. This fast action is important, since a slow making or breaking contact will sustain arcing and reduce the life of the contact.

### Self cleaning

A fast-acting switch has a “wiping” action on the contacts which effectively cleans the contacts every time the switch operates. This type of switch is better suited to switching low-level signals, such as Programmable Controller inputs.

In addition to this, the ‘F’ series’ limit switches have bifurcated contacts which have an inherently lower resistance than standard types.

### Note.

**The Health and Safety Inspectorate should be consulted with any queries on the correct application of a limit switch for safety purposes.**

## Glossary

The following is a glossary of terms in specifying actuator characteristics:

### Operating force (OF)

The force applied to the actuator required to operate the switch contacts.

### Releasing force (RF)

The value to which the force on the actuator must be reduced to allow the contacts to return to the normal position.

### Total force (TF)

The force applied to the actuator required to reach the stopper from the free position.

### Free position (FP)

The initial position of the actuator when there is no external force applied.

### Operating position (OP)

The position of the actuator at which the contacts snap to the operated contact position measured with respect to the centres of the mounting holes.

### Releasing position (RP)

The position of the actuator at which the contacts snap from the operated contact position to their normal position.

### Versatile contact configuration

In the British and European standard BS/EN60947-5-1, there are three contact arrangements that can be used in changeover circuits. Of these, only two can also be used in separate NO and NC circuits, but only one, the Zb type, has completely electrically separate NO and NC contacts. This is particularly important when switching inductive loads, yet still retaining full isolation without risk of arcing between NO and NC circuits.

This style, the Zb, is the only one used by IMO in the ‘F’ series limit switches for complete versatility.

### Safety

One area where a slow-acting switch is often used is in the field of safety. Since a fast-acting switch relies on a spring for its operation, if the spring breaks or the contacts weld under a fault condition, normally, the switch will fail to open.

Many of the IMO ‘F’ series safety action limit switches incorporate a mechanism that combines the benefits of a fast-acting switch with a “positive break” on the normally closed contacts. This type of action is a requirement for any installation where personnel safety is dependent on the correct action of the switch.

### Total travel position (TTP)

The position of the actuator when it reaches the limit of travel – must not be exceeded.

### Pretravel (PT)

The distance or angle through which the actuator moves from the free position to the operating position.

### Overtravel (OT)

The distance or angle of the actuator movement beyond the operating position.

### Movement differential (MD)

The distance or angle from the operating position to the releasing position.

### Total travel (TT)

The sum of the pretravel and overtravel expressed by distance or angle.

