Baumer

Sensor Solutions
Motion Control
Vision Technologies
Process Instrumentation

Application report:

The most compact switch with micrometer accuracy on the market!

The My-Com precision switch made by Baumer electric claims to be the most accurate and most compact mechanical limit switch available today. A micro-mechanical masterpiece unparalleled to date made possible only by consequently applying newest technologies, materials and manufacturing methods.

the My-Com family: the most accurate limit switch worldwide

One micrometer, one µ or 0,001mm

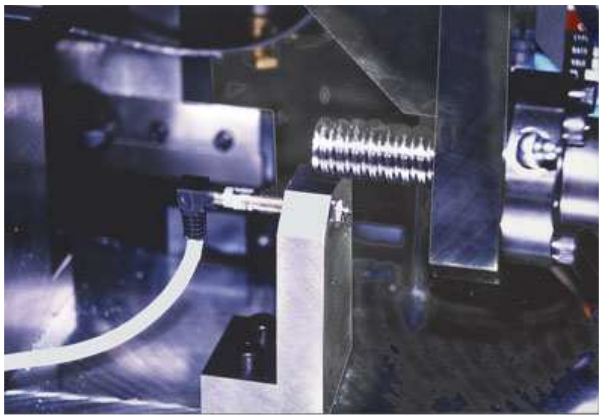
Setting reference points, checking tolerances, monitoring, adjusting. And this fast, reliable and highly precise. Arrays of measuring equipment and all kinds of tool machines can be referenced, gauged or calibrated with a precision of 1 micrometer by means of a My-Com precision switch. In order to guarantee such a high accuracy with a purely mechanical device, entirely new approaches had been applied in designing the product and in specifying materials used. The activating pin as well as its collar have been manufactured using high performance technical ceramics. All electrical contacts are gold plated, the precision blow molded plastics parts as well as all other mechanical components meet highest specifications.

Reliable and long-lasting design

Reducing the total number of components to the absolute minimum was one of the major aims when the My-Com precision switch was designed. Few moving parts, there are only three in a standard My-Com, as well as the high quality components used allow a high number of switching operations guaranteeing highest repeatability. Extremely short and linear movements in two directions only and a generously designed mechanical overrun are further reasons for the outstanding reliability and life expectancy of the My-Com family of precision switches. Minute activating forces – starting at 30 cN – allow to use them in applications involving fragile target materials without running into danger of scratching or damaging the surfaces of the objects to be probed by this tactile device. The 2-wire precision switch is of NC design, the contacts of which are forcefully closed when there is no activating force applied to the plunger. Such reduces the susceptibility against EMI providing additional security in a great number of applications.

My-Com applications

The setting of reference points on tool machines, laboratory equipment, robots, handling devices and assembly lines represents one of the classical applications for My-Com precision switches. One such application is nicely illustrated on photograph 2 showing part of an automatic turning lathe producing miniature metal parts.

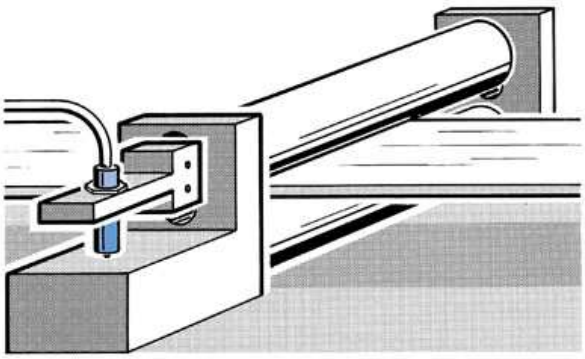


My-Com precision switch applied on an automatic turning lathe producing miniature metal parts

The turning worm-screw moves the metal target on the right side of the picture slowly towards the activating pin of the My-Com to the point of the device being activated thereby providing the exact home position of the mechanics which has to be re-calibrated within previously determined time intervals.

Since the required repeat accuracy in this application is 0,001 mm the My-Com BS used in this case is supported by a robust and for that reason very stable mounting bracket.

Even for the detection of extremely small movements, as for instance when measuring the thickness of films or sheets or as frequently encountered in double sheet control applications, (picture 3) My-Com precision switches are used to serve the purpose.



The My-Com detects even the tiniest axial movements of the upper metal barrel in a double sheet control assembly

Highly accurate and high above

Micrometer repeatability and highest precision are not only demanded down on earth but also high up in the vacuum and weightlessness of space. On the European weather satellite “Meteosat MSG” My-Coms take care of the accurate zero positioning of a mirror in the so called Scan Optic Module. The components’ space fitness is tested by applying the tough evaluation methods of the industry and they are produced by applying among the most rigorous manufacturing constraints. In this application it was imperative that neither thermal nor mechanical load would result in any glitches of the switching point. The My-Com precision switches survived the high vibration and acceleration forces as encountered during the take-off phase as well as during the subsequent trajectory into the geo-stationary orbit. My-Com precision switches have also been successfully used on the international space station ISS as well as on a couple of more space probes. The small weight of 14 grams only for the My-Com B 75 proved to be another advantage in said applications. The experience gathered several hundred kilometers above the earth’s surface is increasingly flowing into more down to earth applications in vacuum environments such as in physics laboratories and nuclear research facilities.

Accurate mirror zero positioning on the "Meteosat MSG" weather satellite is being taken care of by a Baumer electric My-Com precision switch. Photo courtesy of ESA.

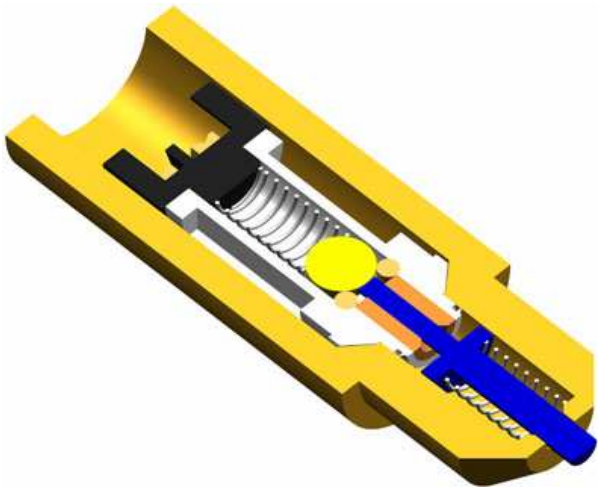
Contrary to tactile measuring systems and measuring probes of comparable repeat accuracy it is the outstandingly compact design of the My-Com precision switch that puts it aloft the rest of the pack. Thanks to its very compact design the My-Com can be easily integrated even where space is at a premium. With little effort it can be directly put into the tips of measuring probes, tactile feelers and the like. An outstanding feature which renders the product exceptionally interesting in the face of unbroken miniaturization trends in metrology and automation.

Preferred areas of applications for the My-Com precision switch

- Tool machines
- Special machines
- Watch making industry
- Robotics
- Textile industry
- Packaging industry
- Metrology and related industries
- Assembly and handling
- Medical equipment
- Electro mechanics
- Quality control

The My-Com family

The innovative My-Com product family is compact and manageable and many a high precision application can be tackled using switches available off the shelf. Standard products either come in round housings with a fine thread or in rectangular enclosures. In many applications it is not only the shape or size of the housing though which determines whether a product will be used in the end or not. Also the activating force required, the material and the shape of the activating pin itself might be a determining or specifying factor. The modular design of the My-Com provides a high flexibility in adapting the precision component to various industry requirements be it for an application specific adaptation only or even for a totally custom tailored solution (picture 4). There is an array of activating tips to chose from made of a choice of different materials featuring sharp, flat or even spherically shaped tips. Also the required activating force can be determined by choosing a spring having the appropriate force or tension. Said components can be quite freely combined such creating products that suit the application. For applications requiring a higher than standard load current there are also options with integrated NPN or PNP transistor output. These 3-wire versions have been laid out for a 5 - 30 VDC supply voltage range and a 50 mA load current which enables them to drive PLCs as well as similar electronic inputs or circuitry directly. Latter versions are of normally open (NO) design as opposed to the NC design of the standard 2-wire My-Com. IP 67 protected types are available for applications in very dusty and wet environments.



Above cutaway shows the special design of a custom tailored My-Com precision switch. The second spring in the head part of the device is non-standard, housing and activating pin are made of stainless steel.

Setting reference points, checking tolerances, monitoring, gauging, calibrating. All this of course quickly, reliably and highly precise: in an industrial environment with an unbroken trend towards miniaturization and more and more complex components a constant, daily challenge to the design engineer. My-Com precision switches have been developed and laid out precisely to help tackle such challenges. This today as well as tomorrow. Repeat accuracy 1 micrometer. For critical applications where just accurate is simply not accurate enough!