BMF Sensors for Pneumatic Cylinders
Magnetic sensors for pneumatic cylinders
Reliable upgrade from failure-prone reed and Hall Effect switches
Sensors for Pneumatic Cylinders
Move up to reliability...move up to Balluff BMF

Cylinder switch failures got you down?

Today’s pneumatic cylinders are compact, reliable, and cost-effective prime movers for automated equipment. Unfortunately, they are often provided with unreliable reed or Hall Effect switches that fail well before the service life of the cylinder itself is expended. Too often, life with pneumatic cylinders involves continuous effort and cost to replace failed cylinder position switches. As a result, some OEMs and end users have abandoned magnetic cylinder switches altogether in favor of more reliable—yet more costly and cumbersome—external inductive proximity sensors, brackets, and fixed or adjustable metal targets. There has to be a better way!

Fortunately, there is. Balluff’s magnetic field cylinder sensors are based on non-contact, solid-state sensor technology that is compatible with both reed and Hall Effect magnetic pole orientations, making them the ideal replacement for standard magnetic switches. Electrically rugged, they feature short circuit protection, overload protection, and reverse polarity protection...all backed by Balluff’s exclusive Lifetime Warranty. Improved sensor performance and better reliability results in less downtime and increased productivity. With Balluff’s magnetic field sensors, you install and forget them.

Balluff BMF Magnetic Field Sensors

- Proven magnetoresistive (MR) and giant magnetoresistive (GMR) technologies
- Compact size, perfect for short stroke cylinders and mini grippers
- Low hysteresis, precise switch points
- Shock and vibration resistant
- High noise immunity
- Reliable position detection, even at high speeds
- Lifetime warranty

BMF = No More Failures

- No moving parts to wear out
- No contact wear/pitting/burning
- No contact bounce
- No slow response time
- No double switch points

Lifetime warranty
Make the switch to Balluff BMF magnetic field sensors and never pay to replace the same cylinder sensor again.
The toughest applications demand the toughest Balluff BMF magnetic field sensors.

Welding applications
Balluff magnetic field sensors are available in weld field immune (WFI) versions that can operate reliably in AC welding fields as strong as 200kA/m with no false signals or electrical damage. The weld field immune sensors are available in metallic housings to further guard against hot weld spatter that would melt into a plastic-bodied sensor.

Extreme temperatures
Extreme temperatures can shorten the life of a sensor; most manufacturers’ sensors are rated for 70º C. Balluff magnetic field sensors can reliably operate in temperatures as low as -40º C and as hot as 105º C. All standard magnetic field sensors are rated for 85º C, except for reed versions.

Metal housings
Balluff magnetic field sensors with metal housings are built to survive the most abusive applications. Impact, abrasion and harsh environments can destroy standard plastic bodied sensors. Metal housings that are weld field immune or extended temperature range can extend the life of the sensor in the most aggressive applications.

Connections made easy
Balluff’s magnetic field sensors are available with pre-wired cable and flying leads, or with integral or pigtail M8, M12 and in some cases M5 connectors. Pigtail connector versions have 0.3 meter length standard, although other lengths are also available. Many styles available with V-Twin.
Sensors for Pneumatic Cylinders
C-slot and T-slot cylinders: compact sensors for position detection

Balluff’s compact BMF sensors are designed to fit either C-slot or T-slot extrusions and require no additional brackets for mounting. These sensors fit down flush into the slot, offering better sensor protection…nothing sticking out and nothing in the way. Flush mounting sensors make installation in space critical applications easier and less time consuming. In addition, cable clips are included for cleaner cable routing and better strain relief.

Position detection with compact sensors for C-slots

BMF 204—Designed for 3.8 mm C-slot
- Slides into the C-slot from the end
- Superior holding strength
- Miniature design for short stoke cylinders and grippers
- Precise, accurate positioning

BMF 214—Designed for 4 mm C-slot
- Slides into the C-slot from the end
- Superior holding strength
- Miniature design for short stoke cylinders and grippers
- Precise, accurate positioning

BMF 273—Easy installation for C-slots
- Installs from above into the slot—drop-in installation
- Installs with standard screwdriver or 1.3 mm Allen wrench
- Clutched mounting screw prevents over-tightening
- Precise, accurate positioning

Position detection with compact sensors for T-slots

BMF 235—The new standard for every T-slot
- Large, ultra-bright LED for easy diagnostics
- Installs from above into the T-slot—drop-in installation
- Installs with standard screwdriver or 1.5 mm Allen wrench
- Short, compact design with greater holding strength

BMF 307—Proven holding strength and performance
- Slides into T-slot from the end
- Solid state or reed switch option
- Secure hold in the slot
- One piece, bracketless design

BMF 315—Smallest weld field immune sensor on the market
- Installs from above into the slot—drop-in installation
- Metal housing available
- Standard and Weld Field Immune versions
- Weld Field Immune version with LED in the connector

Tie rod and round body cylinders

T-slot sensors with “stay put brackets” offer solutions for tie rod and round body cylinders.

BMF 235—tie rod

BMF 235—round body
Built around the concept of “one sensor, many brackets”, Balluff's BMF magnetic field sensors with flexible mounting systems offer a wide range of solutions to fit a variety of manufacturers’ cylinders. Many of the brackets are “stay put brackets”, meaning that the switch point setting is maintained by the bracket—even when the sensor itself is replaced. One sensor type can be adapted to fit many different cylinders, reducing spare parts inventory and costs.

BMF 103—Optimized for short stroke cylinders and grippers
- Perpendicular mounting for very short linear footprint
- Extremely compact size—shortest housing on the market
- Schunk gripper versions available (tuned for Schunk magnets)
- Two sensors can be installed as close together as 5 mm

BMF 303—Miniature, flush mounting
- Flush mounting—disappears into the slot
- Precise, accurate positioning
- Schunk gripper versions available (tuned for Schunk magnets)

BMF 305—The universal solution
- Widest variety of mounting brackets
- Weld Field Immune versions
- Metal housing versions
- Extended temperature ranges

BMF 21—Integrated swinging arm bracket
- Ideal for tie rod and external rail profiles
- Self-adjusting brackets fit a variety of cylinder sizes
- LED function indication
- Pre-wired cable or integrated M08 connector

BMF 32—Made for the most demanding applications
- Rugged, super tough design
- Offered only in metal housings
- Weld Field Immune versions
- Integral metal connectors with porthole LEDs

Tubular Proximity Style: ultra-long range sensing
- Sensing range up to 90 mm, depending on power of magnet
- Reacts only to magnetic fields
- Stainless steel housings—wide temperature range
- Precision switching option for lateral magnet approach

Bracket variety*

* visit online cylinder resource center for complete application information
www.balluff.com/bmfcnter
**Sensors for Pneumatic Cylinders**  
Know your cylinder? Find your sensor.

Balluff’s exclusive, easy-to-use online Pneumatic Cylinder Sensor Resource Center is designed to help you select the best solution for specific cylinder models.

The web-based interface will generate up to three sensor recommendations for each application. The Resource Center is designed to help you make a preliminary selection of products so you can download sensor datasheets and mounting bracket installation instructions.

The Resource Center will reduce your design time, aid you in component standardization, and ultimately provide you with a reference guide that will help reduce downtime when a replacement sensor is needed.

Visit:  
[www.balluff.com/bmfcenter](http://www.balluff.com/bmfcenter)

1. Log-in or sign-up for BMF user name.
2. Select your pneumatic cylinder.
3. Select sensor family.
Balluff technologies

Magnetoresistive (AMR)
The operating principle of AMR magnetoresistive sensors is simple: the sensor element undergoes a change in resistance when a magnetic field is present, changing the flow of a bias current running through the sensing element. A comparator circuit detects the change in current and switches the output of the sensor. The magnetoresistive element responds with a robust 3-4% change in bias current. The practical magnetic field strength required to operate a magnetoresistive sensor can be as low as 15 Gauss.

Giant Magnetoresistive Sensors (GMR)
The latest magnetic field sensing technology is called giant magnetoresistive (GMR). Compared to AMR technology, GMR sensors have an even more robust reaction to the presence of a magnetic field, at least 10%. Due to their high sensitivity, less physical chip material is required to construct a practical GMR magnetic field sensor, so GMR sensors can be packaged in much smaller housings for applications such as short stroke cylinders.

AMR and GMR Advantages
- Reacts to axially and radially magnetized magnets
- No double switch points
- Superior noise immunity
- Fast
- Vibration resistant
- Smaller physical size
- Overload protected
- Reverse polarity protected
- Short circuit protected
- Low magnetic strength required
- Reliable
- Standard 24V DC operation

Other technologies

Reed Switches
The simplest magnetic field sensor is the reed switch. This device consists of two flattened ferromagnetic nickel and iron reed elements, enclosed in a hermetically sealed glass tube. As an axially aligned magnet approaches, the reed elements attract the magnetic flux lines and draw together by magnetic force, thus completing an electrical circuit.

Reed Advantages
- Low cost
- AC or DC – two wire
- No power required
- High noise immunity

Reed Disadvantages
- Slow
- Finite life, prone to failure
- Double switch points
- Contact bounce
- Vibration sensitive
- High magnet strength required
- Reacts only to axially magnetized magnets

Hall Effect Sensors
Hall Effect sensors are solid-state electronic devices. They consist of a voltage amplifier and a comparator circuit that drives a switching output. As a radially oriented magnet approaches, the magnetic field is perpendicular to the current flow through the Hall element. The presence of the perpendicular magnet pushes the electrons out of their straight-line path and towards one side of the chip. The imbalance of electron charge thus creates a potential voltage across the Hall Effect element. The small micro-voltage that is created is proportional to the strength of the magnetic field. Once the voltage amplitude generated across the chip has satisfied the threshold level of a comparator circuit, the sensor output switches on.

Hall Effect Advantages
- Electronic
- Fast
- Vibration resistant

Hall Effect Disadvantages
- High magnet strength required
- Reacts only to radially magnetized magnets
- Double switch points
- Often lack electrical protection

www.balluff.com/bmf
Sensors for Pneumatic Cylinders
Low cost absolute analog position feedback

Balluff's magneto-inductive analog position sensor (BIL) provides continuous position feedback, ideal for short and medium stroke length applications up to 160 mm. Non-contact operation with an absolute analog output and passive magnetic position marker make it ideal for applications such as robotics/handling, clamping cylinders, packaging, gripper position sensing.

Balluff's Micro-BIL is a unique solution for continuous position sensing on pneumatic short stroke cylinders and grippers with T-slot extrusions. When used on grippers the analog output can be used to trigger multiple set points or to differentiate between fully clamped objects of different physical sizes.

- Non-contact
- Compact, rugged housing
- Magnetic target
- Replaces linear potentiometers and LVDTs
- Voltage or current outputs

Balluff technology blogs

Sensor Technology Blog
http://sensortech.wordpress.com/

The Sensor Technology blog is here to offer expertise, ideas, guidance, and support for sensor specifiers, installers, and users to help them get the most out of their automation technology investments.

Industrial RFID Technology Blog
http://rfidspec.wordpress.com/

The Industrial RFID blog is to provide a forum for any one from a first-time industrial or commercial RFID (Radio Frequency Identification) user interested in finding information about RFID to experienced users looking to share ideas or address specific subjects out there.