Ex & Industrial Switches

Ex Position (Limit) Switches & Ex Proximity Switches for explosive gases & dusts
Industrial Position (Limit) Switches & Industrial Proximity Switches

SIGMA

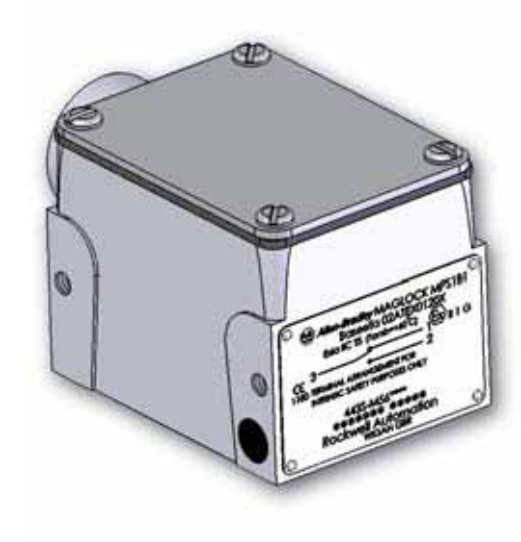
Ex ATEX

LISTEN.
THINK.
SOLVE.®

Allen-Bradley • Rockwell Software

Rockwell Automation

Content



Ex & industrial switches & sensors

Explosion Proof & Industrial switches

Rockwell Automation manufactures switches, sensors and limit switches for the control and monitoring of machinery, vehicles and processes. The Sigma switches have a long established reputation as one of the leading producers of explosion proof and intrinsically safe devices for use in hazardous atmospheres.

Sigma switches are manufactured at our modern factory where all the necessary facilities for manufacturing, testing and shipping are present in strength. The expertise gleaned from years of switch development, particularly in the field of BASEEFA approved explosion proof switches has been retained at the switch development facility. These two facilities enabled Rockwell Automation to form a cohesive and powerful design and manufacturing process capable of meeting the requirements of industry in a new century.

This publication is intended to show the basic range of Sigma devices readily available. If the type of device you require is not illustrated please contact us to discuss your application and requirements.

Sigma switches have been used for many years in some of the most demanding and critical applications such as the petrochemical, mining and nuclear industries. Within these sectors, where safe and reliable operation is paramount, they are highly regarded for their total dependability and strength. In these industries there is no room for failure.

There is a variety of devices in this publication, whilst they may differ greatly in their type and application they all have one factor in common, total quality assurance. If it's Sigma it's safe.

Applications

Sigma switches have extensive and diverse applications which include areas such as:

- Machinery control
- Luffing and slewing controls for mobile cranes
- Position indication on pipeline valves
- Gasometer height control
- Levelling of lifts at desired floor level
- Component position sensing on mass production conveyor systems
- Switching of electro-mechanical or solid state counters
- Various industrial control applications
- Door position sensing for public transport vehicles

general introduction

SIGMA limit and proximity switches are available in two basic types of devices:

Ex devices

These devices are suitable for use in explosive or potentially explosive atmospheres.

Industrial devices

Those suitable for general or heavy duty usage but not suitable for use in explosive or potentially explosive atmospheres.

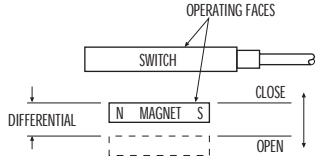
The following pages cover the various ranges of SIGMA limit and proximity switches and give information required for selection of the correct switch device for a given application. However, the SIGMA MAGLOCK range of magnetic and ferrous actuated proximity switches covers a wide variety of devices. The selection of a suitable MAGLOCK switch and actuator depends upon a brief knowledge of Maglock proximity switching techniques. Relevant details are given here.

Maglock proximity switching techniques

magnetically actuated switches

In all magnetic switch applications the switch and actuator must be brought together to within a specific proximity or operating distance of each other. The actual distance involved in a particular case will depend upon their relative attitudes, sensitivity and direction of closing. When the actuator (magnet) is brought close enough the switch will operate and when it is withdrawn the switch resets itself. The gap between the switch and the actuator when the switch operates is always less than the gap at which the switch resets itself, the difference between the two being referred to as the 'operating differential'.

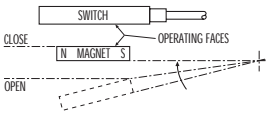
The principle actuation situations are discussed in the succeeding paragraphs together with other relevant factors.



perpendicular movement

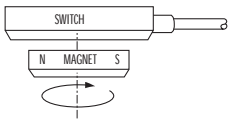
In this situation the operating faces (those with the labels attached - except MPS1) approach and withdraw from each other perpendicularly. This is the most widely adopted method of actuation.

pivoting movement



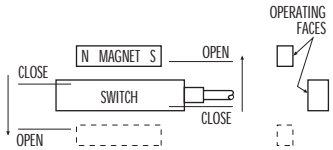
This movement is similar to the perpendicular movement previously described but due to the angle of approach and withdrawal the operating differential is greater.

rotary movement



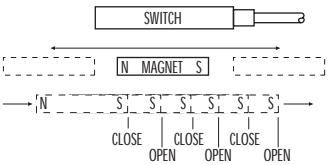
Aligning the switch and magnetic actuator opposite each other (similar to perpendicular operation) and then rotating the magnet will result in two switch operations per revolution.

parallel movement across the width of the switch



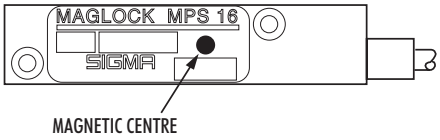
In this case the face of the magnet slides across the face of the switch with a constant distance between them, the direction of movement being across the width of the components rather than lengthwise. As the switch is approached by the magnet it will operate. Continued movement to a given point will result in the switch resetting itself. The same sequence and relative positions of operation and reset will occur if the magnet is now moved across the switch in the reverse direction.

parallel movement along the length of the switch



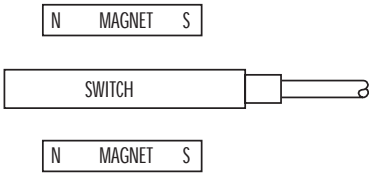
This movement is similar to the parallel movement across the component widths, the difference being that sliding the components past each other lengthwise results in a number of switch operations taking place during a complete traverse. This method is not recommended unless travel is limited such that only one cycle of operation occurs, i.e. one operation and reset, either by mechanical limitation or adjustment of the gap between the switch and the path of actuator travel such that the magnetic field is weakened to allow only one cycle of operation to occur.

magnetic centre



The magnetic centre of a Maglock switch or actuator is denoted by a symbol on the operating face as indicated in the diagram.

magnetic centre



It may be desirable in some instances to change the basic operating mode of a switch, i.e. a normally open switch may need converting to a normally closed switch to suit a particular application. This is normally achieved by means of magnetic biasing whereby a permanent magnet is situated close enough to a normally open switch to maintain its contacts in a closed position. The approach of a normal magnetic actuator will effectively cancel the influence of this additional magnet and return the switch to its original position.

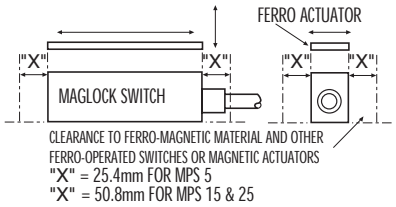
ferro-actuated switches

The fundamental difference between a Maglock magnetically actuated switch and a ferro-actuated switch is that the latter has a 'built-in' system of permanent magnets. Whereas the magnetically actuated switch requires the approach of an external permanent magnet actuator before it will operate, the ferro-actuated version operates upon the approach of a simple piece of ferro-magnetic material, e.g. mild steel. The effect of the ferro-magnetic material is to modify or shunt a part of the internal magnetic field surrounding the switch contacts, thus allowing the switch to operate.

There are two basic types of ferro-actuated switch.

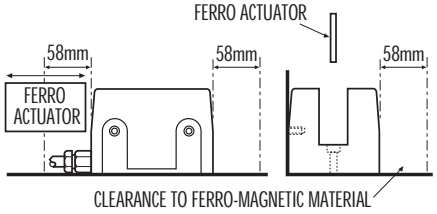
One type relies on the basic principles outlined in the previous paragraph which are akin to the magnetic biasing techniques described for certain magnetically actuated switch applications. The other type, a vane switch, operates when a ferro-magnetic sheet or vane is inserted into the switch body itself, the vane once again acting as magnetic shunt or shield but more in the form of an internal separator than an external biasing force.

parallel movement along the length of the switch



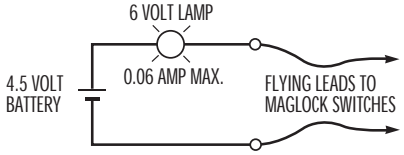
These switches are operated by the external approach of a ferrous actuator as shown in the diagram.

magnetic centre



These switches are operated by passing a ferrous vane through a slot in the body of the switch, the effect of the vane being to temporarily shield the contacts on one side of the switch from the influence of the permanent magnet system incorporated in the other side, thus allowing the contacts to operate. Removal of the vane allows the magnetic circuit to re-establish itself and return the switch to its initial state.

testing Maglock switches



When testing Maglock switches a simple lamp test circuit should be used as shown above or an ohm meter. On no account use 'bell' test sets.

testing Maglock switches

The life of the reeds used in magnetic reed switches can be greatly reduced if subjected to capacitive loads. An often overlooked source of such loads is cable capacitance in long cable runs. The damage is caused by the high current surge experienced with this type of load when the reed contacts close. If this is likely to be a problem the simplest form of protection is a resistor wired in series with the switch as close to it as possible. The resistors value should be sufficient to limit the current surge within the operational ratings of the switch being used.

Ex Limit Switches

Ex Limit Switches
Series 615

- BASEEFA certified
- Available in Group I or Group II versions
- High grade cast iron housing
- Extra heavy duty

MINES GROUP I GASES

Must be used with a suitable certified cable entry device, (with or without the interposition of a suitable certified flameproof thread adaptor) or suitable certified stopping plugs where appropriate.

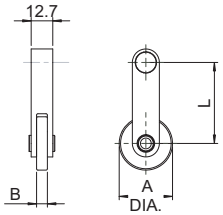
The flameproof cable entry devices, thread adaptors and stopping plugs must be certified as equipment (not a component) under an EC type examination certified to Directive 94/9/EC.

The cable entry devices and cabling methods used in service must be suitable for their intended duty and special types of cable used in Mining.

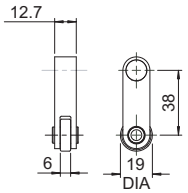
Must not be dismantled whilst energised or when an explosive gas is present.

Care must be taken not to damage the flamepaths during installation and maintenance.

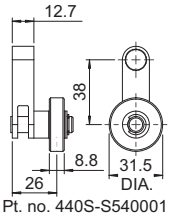
LEVERS
Switches and levers are supplied separately.



Part No	L mm	A mm	B mm	Pack Size
440S-S540014	41.3	31.7	6.4	1
440S-S540015-10	47.6	31.7	6.4	10
440S-S540016-10	50.8	19	6.4	10
440S-S540024	76.2	19	6.4	1
440S-S540039	127.0	19	6.4	1



Pt. no. 440S-S540000
Pack Size 1



Pt. no. 440S-S540001
Pack Size 1

GROUP II GASES

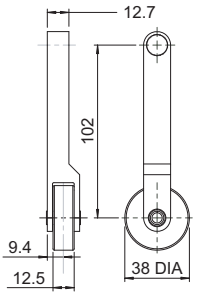
Must comply with the installation requirements as specified in EN60079-14.

Must be used with suitable Baseefa certified cable entry devices, or with or without the interposition of a suitable Baseefa certified flameproof thread adaptor.

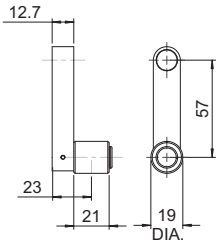
Suitable flameproof cable entry devices, thread adaptors and stopping plugs certified as equipment (not a component) under an EC type examination certified to Directive 94/9/EC may also be used in the manner specified above.

Must not be dismantled whilst energised or when an explosive gas is present.

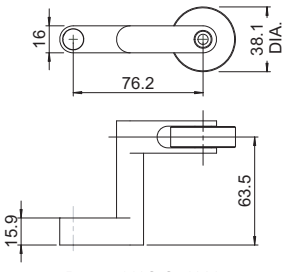
Care must be taken not to damage the flamepaths during installation and maintenance.



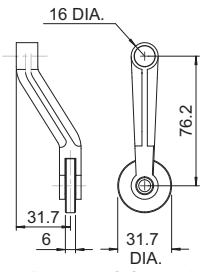
Pt. no. 440S-S540081
Pack Size 1



Pt. no. 440S-S540104
Pack Size 1



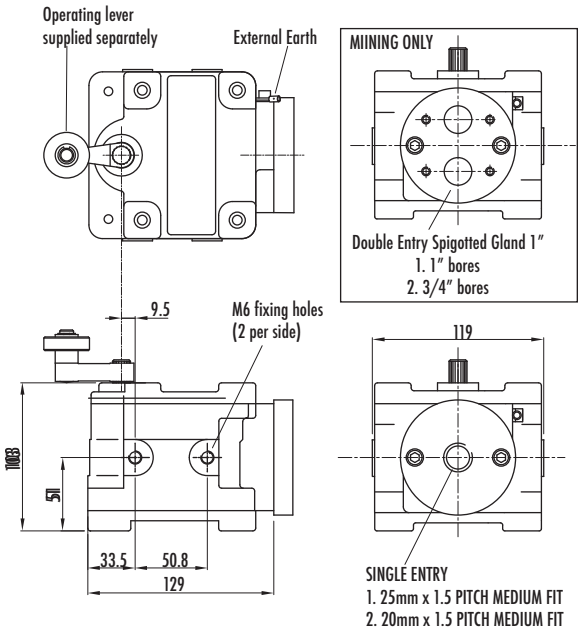
Pt. no. 440S-S540097
Pack Size 1



Pt. no. 440S-S540096-10
Pack Size 10

II 2 G - I M2
Baseefa 03ATEX 0139X
Baseefa 03ATEX 0140X

dimensions



technical specifications

Contact arrangement	See ordering details
Contact material	Silver (other materials available)
Case material	Cast iron
Protection	IP65 (IP66 with Hylomar compound applied to mating faces)
Operating temperature	-20°C to +40°C
Mechanical life	10 x 10^6 typical
Electrical life	Subject to switched load
Weight	6Kg
Conforms to standards	
Groups I & II	EN 60079, EN 61241, EN 60204-1
Certification	
Group I	Baseefa 03ATEX 0139X
Group II	Baseefa 03ATEX 0140X

Ex Limit Switches

Series 615 (continued)

electrical ratings

Table 1 - Types 'SL' & 'SLNP'

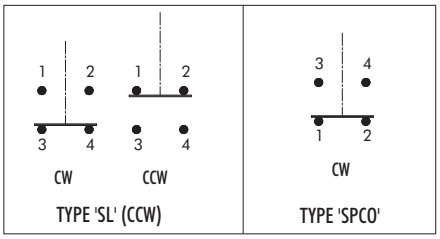
CURRENT RATINGS	Ampere Ratings AC Circuit						Ampere Ratings DC Circuit					
	240V		440V		550V		115V		330V		550V	
	Single Circuit	Double Circuit	Single Circuit	Double Circuit	Single Circuit	Double Circuit	Single Circuit	Double Circuit	Single Circuit	Double Circuit	Single Circuit	Double Circuit
INRUSH	20	20	20	20	20	20	-	-	-	-	-	-
CONTINUOUS CAPACITY	10	10	10	10	10	10	10	10	10	10	10	10
RUPTURING CAPACITY (NON INDUCTIVE)	10	10	7.5	7.5	5	5	5	5	2	1	0.5	0.25
RUPTURING CAPACITY (INDUCTIVE)	10	10	7.5	7.5	5	5	5	1	1	0.5	0.25	0.13

Table 3 - Types 'SPCO' - Group II Gases

CURRENT RATINGS								
AC	120V		240V		480V		VA	
	Make	Break	Make	Brake	Make	Break	Make	Brake
	60A	6A	30A	3A	15	15A	7200	720
	Continuous carrying current 10A							
DC	Make or Break Ratings							
	125V		250V		480V		VA<300V	
	0.55A		0.27A		0.10A		69	
	Continuous carrying current 2.5A							

Table 4 - Types 'SPCO' - Mining

CURRENT RATINGS				
AC	120V		240V	
	Make	Break	Make	Brake
	60A	6A	30A	3A
	Continuous carrying current 10A			
DC	Make or Break Ratings			
	125V		250V	
	0.55A		0.27A	
	Continuous carrying current 2.5A			



ordering details

GROUP	DESCRIPTION	PART NUMBER
I	SL TYPE SP 1N.C. 1N.O. SINGLE ENTRY 20MM	443S-S561061
	SL TYPE SP 1N.C. 1N.O. DOUBLE ENTRY SPIGOTTED GLAND 1"	443S-S561151
II	SL TYPE SP 1N.C. 1N.O. SINGLE ENTRY 20MM	443S-S561500
	SPCO TYPE SINGLE ENTRY 20MM	443S-S561508

Ex Proximity Switches

Ex Proximity Switches
MPS 24D/DH, MPS 26D/DH
MPS 34D/DH, MPS 36D/DH

- BASEEFA certified
- Magnetically actuated
  – See page 37 for actuators (supplied separately)
- Stainless steel housing
- Water, oil and dustproof to IP68
- MPS 24's & 34's for resistive or solid state circuits
- MPS 26's & 36's for direct switching of inductive circuits

Special conditions for use relevant to certification No. Baseefa 02ATEX 0183X

Must comply with the installation requirements as specified in EN60079-14.

The remote end of the integral cable must be terminated in a connection facility suitable for the conditions of use.

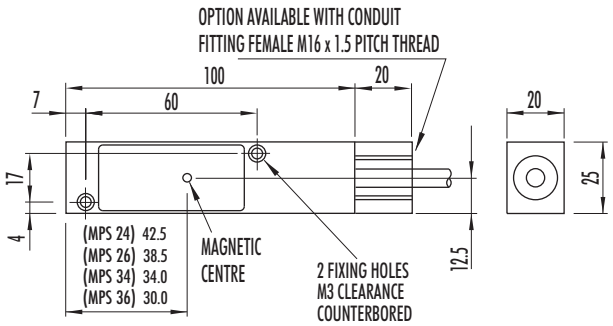
MPS34D/DH and **MPS36D/DH**. Earthing should be provided by connection of a braid of the cable or by the mounting to adjacent metal work.

Consideration shall be given to the need for mechanical protection of the flexible cable integral with the apparatus.

MPS24D/DH and **MPS26D/DH.** Earthing should be made to the sheath of the MICC or by the mounting to adjacent metal work.

Ex II 2 GD
Baseefa 02ATEX 0183X

dimensions



ordering details

Switch	Contact material	Max. volts	Max. current	Power	Cable	Part No.	Pack size
MPS 24D/DH	Tungsten	250V ac/dc	1.5A ac/dc	40W/VA (3W/VA min)	3M MICC	443S-M566001	1
	Tungsten	250V ac/dc	1.5A ac/dc	40W/VA (3W/VA min)	10M MICC	443S-M566033	1
	Rhodium	250V ac/dc	0.5A ac/dc	15W/VA	3M MICC	443S-M566011	1
MPS 26D/DH	Silver alloy	250V ac/dc	2A ac 0.5A dc	500VA ac 125W dc	3M MICC	443S-M566051	1
MPS 34D/DH	Tungsten	250V ac/dc	1.5A ac/dc	40W/VA (3W/VA min)	3M Polyolefin	443S-M566101	1
	Tungsten	250V ac/dc	1.5A ac/dc	40W/VA (3W/VA min)	3M GSWB	443S-M566107-10	10
	Rhodium	250V ac/dc	0.5A ac/dc	15W/VA	3M Polyolefin	443S-M566111	1
MPS 36D/DH	Silver alloy	250V ac/dc	2A ac 0.5A dc	500VA ac 125W dc	3M Polyolefin	443S-M566151	1

These switches require a magnetic actuator. Refer to page 37.

technical specifications

Contact arrangement	
(MPS 24D/DH, 34D/DH)	C/O single pole (change over)
(MPS 26D/DH, 36D/DH)	N/C single pole (power reed)
Contact material	
(MPS 24D/DH, 34D/DH)	Tungsten or Rhodium
(MPS 26D/DH, 36D/DH)	Silver alloy
Case material	Stainless steel
Protection	IP 68 (water/oil/dust)
Operating temperature	-40°C to +125°C
Fixings	2 x M3
Contact operating distance	See page 37
Mechanical life	500 x 10^6 typical
Electrical life	Subject to switched load
Cable	
(MPS 24D/DH)	3m MICC 3L1.5 (optional PVC sheath)
(MPS 26D/DH)	3m MICC 2L2.5 (optional PVC sheath)
(MPS 34D/DH)	3m Polyolefin 3 core copper braided
(MPS 36D/DH)	3m Polyolefin 2 core copper braided
Connections	
(MPS 24D, 24DH)	Cores unmarked. Use circuit tester.
(MPS 34D, 34DH)	N/O black & white, N/C red & white.
Weight	MPS 34 & 36 - 0.8Kg, MPS 24 & 26 - 1Kg
Conforms to standards	EN 60204-1, EN 60079-1
Certification	Exd IIC T6 (Ta= -40+60°C), Exd II T3 (Ta= -40+125°C)
	Certification No. Baseefa 02ATEX 0183X

Ex Proximity Switches

Ex End Sensors
ES34T/TH

- BASEEFA certified
- End sensing
- Magnetically actuated
  – See page 36 for actuators (supplied separately)
- Stainless steel housing
- Water, oil and dustproof to IP68
- For resistive or solid state circuits

Special conditions for use relevant to certification No. Baseefa 02ATEX 0183X

Must comply with the installation requirements as specified in EN60079-14.

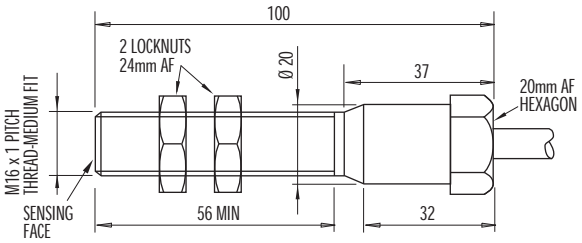
The remote end of the integral cable must be terminated in a connection facility suitable for the conditions of use.

Earthing should be provided by connection of a braid of the cable or by the mounting to adjacent metal work.

Consideration shall be given to the need for mechanical protection of the flexible cable integral with the apparatus.

Ex II 2 GD
Baseefa 02ATEX 0183X

dimensions



ordering details

Switch	Contact material	Max. volts	Max. current	Power	Part No.
ES 34T/TH	Tungsten	250V ac/dc	1.5A ac/dc	40W/VA (3W/VA min)	443S-M566221
	Rhodium	250V ac/dc	0.5A ac/dc	15W/VA	443S-M566231

These switches require a magnetic actuator. Refer to page 36.

technical specifications

Contact arrangement	C/O single pole (change over)
Contact material	Tungsten or Rhodium
Case material	Stainless steel
Protection	IP 68 (water/oil/dust)
Operating temperature	-40°C to +125°C
Fixings	M16 threaded housing
Contact operating distance	See page 36
Mechanical life	500 x 10^6 typical
Electrical life	Subject to switched load
Cable	3m Polyolefin 3 core copper braided Braid bonded to housing.
Connections	N/O black & white, N/C red & white.
Weight	0.35Kg approx.
Conforms to standards	EN 60204-1, EN 60079
Certification	Exd IIC T6 (Ta= -40+60°C), Exd II T3 (Ta= -40+125°C) Certification No. Baseefa 02ATEX 0183X

Ex Proximity Switches

Ex proximity switches
Intrinsically Safe MPS 44

- BASEEFA certified
- Intrinsically Safe
- Magnetically actuated
  – See page 37 for actuators (supplied separately)
- Stainless steel housing
- Water, oil and dustproof to IP68
- External M16 x 1.5 pitch threaded gland to accept conduit protection

The electrical circuit in the hazardous area must be capable of withstanding an a.c. test voltage of 500 volts rms to earth or frame of the apparatus for one minute.

The installation must comply with the installation requirements as specified in EN60079-14.

The power source must be certified by an EEC approved body to Exia or Exib, whichever is applicable with:

Ui max out 30V

Ii max out 250mA

Pi max out 1.3W

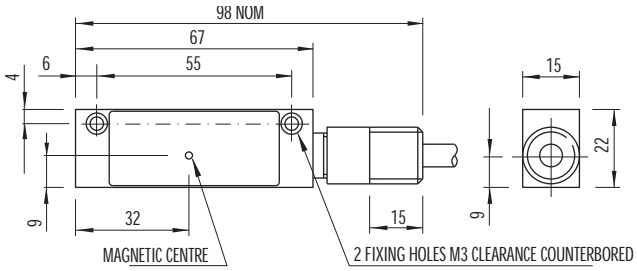
The capacitance and inductance, or inductance to resistance (L/R) ratio of the hazardous area cables must not exceed the values of the power source in use.

Safe area apparatus is unspecified except that it must not be supplied from, nor contain under normal or abnormal conditions, a source of potential with respect to earth in excess of 250 volts rms or 250 volts d.c.

Special conditions of use - the cable must be terminated in an enclosure that provides a degree of protection of at least IP 20 for the connections.

Ex II 1 G
Baseefa 02ATEX 0120X

dimensions



ordering details

Switch	Max. volts	Max. current	Power	Part No.
MPS 44 (Polyolefin cable)	250Vdc, 150Vac	0.5A ac/dc	10Wdc, 10VAac	443S-M565253
MPS 44 (MICC cable)	250Vdc, 150Vac	0.5A ac/dc	10Wdc, 10VAac	443S-M565267

These switches require a magnetic actuator. Refer to page 37.

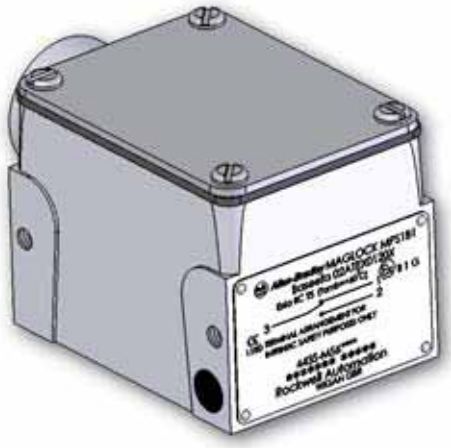
technical specifications

Contact arrangement	C/O single pole (change over)
Contact material	Rhodium
Case material	Stainless steel
Protection	IP 68 (water/oil/dust)
Operating temperature	-20°C to +40°C
Fixings	2 x M3
Contact operating distance	See page 37
Mechanical life	500 x 10^6 typical
Electrical life	Subject to switched load
Cable	3m Polyolefin (braided) or 3m MICC
Connections	
(Polyolefin cable)	N/O black & white, N/C red & white.
(MICC cable)	Cores unmarked. Use circuit tester
Weight	0.5Kg approx.
Conforms to standards	EN 60204-1, EN 60079
Certification	Exd IIC T6
	Certification No. Baseefa 02ATEX 0120X

Ex Proximity Switches

Ex proximity switches
Intrinsically Safe MPS 1

- BASEEFA certified
- Intrinsically Safe
- Magnetically actuated
  – See page 37 for actuators (supplied separately)
- Mazak housing
- Water, oil and dustproof to IP65
- Choice of reed positions



The electrical circuit in the hazardous area must be capable of withstanding an a.c. test voltage of 500 volts rms to earth or frame of the apparatus for one minute.

The installation must comply with the installation requirements as specified in EN 60079-14.

The power source must be certified by an EEC approved body to Exia or Exib, whichever is applicable with:

Ui max out 30V

Ii max out 250mA

Pi max out 1.3W

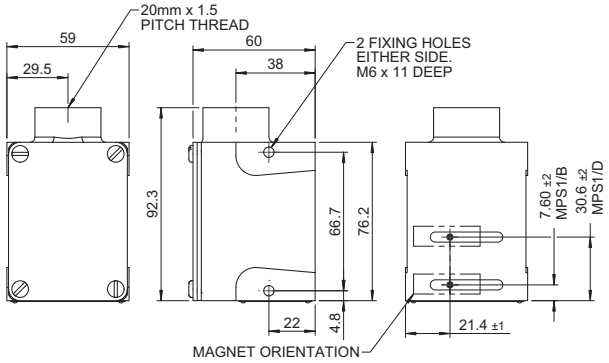
The capacitance and inductance, or inductance to resistance (L/R) ratio of the hazardous area cables must not exceed the values of the power source in use.

Safe area apparatus is unspecified except that it must not be supplied from, nor contain under normal or abnormal conditions, a source of potential with respect to earth in excess of 250 volts rms or 250 volts d.c.

Special conditions of use - the cable must be terminated in an enclosure that provides a degree of protection of at least IP 20 for the connections.

Ex II 1 G
Baseefa 02ATEX 0120X

dimensions



ordering details

Switch	Max. volts	Max. current	Power	Part No.
MPS 1/B/1	600V peak	1.25A ac/ dc	20VAac 20Wdc	443S-M565035
MPS 1/D/1	600V peak	1.25A ac/ dc	20VAac 20Wdc	443S-M565037

These switches require a magnetic actuator. Refer to page 37.

technical specifications

Contact arrangement	C/O single pole (change over)
Contact material	Tungsten
Case material	Mazak
Protection	IP 65 (water/oil/dust)
Operating temperature	-10°C to +50°C
Fixings	4 x M6
Contact operating distance	See page 37
Mechanical life	500 x 10^6 typical
Electrical life	Subject to switched load
Cable entry	20mm conduit entry
Weight	1Kg
Conforms to standards	EN 60204-1, EN 60079
Certification	Exd IIC T5
	Certification No. Baseefa 02ATEX 0120X

Ex Proximity Switches

proximity switch & end sensors
ES3i

- Magnetically actuated
  – See page 36 for actuators (supplied separately)
- Stainless Steel housing
- Water, oil and dustproof to IP68

The electrical circuit in the hazardous area must be capable of withstanding an a.c. test voltage of 500 volts rms to earth or frame of the apparatus for one minute.

The installation must comply with the installation requirements as specified in EN 60079-14.

The power source must be certified by an EEC approved body to Exia or Exib, whichever is applicable with:

Ui max out 30V

Ii max out 250mA

Pi max out 1.3W

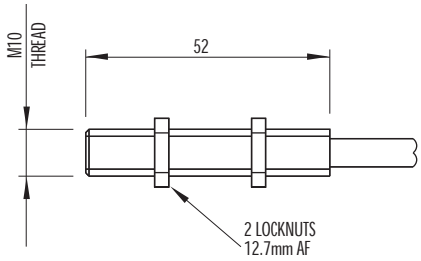
The capacitance and inductance, or inductance to resistance (L/R) ratio of the hazardous area cables must not exceed the values of the power source in use.

Safe area apparatus is unspecified except that it must not be supplied from, nor contain under normal or abnormal conditions, a source of potential with respect to earth in excess of 250 volts rms or 250 volts d.c.

Special conditions of use - the cable must be terminated in an enclosure that provides a degree of protection of at least IP 20 for the connections.

Ex II 1 G
Baseefa 02ATEX 0120X

dimensions



ordering details

Switch	Contacts	Max. volts	Max. current	Power	Part No.
ES3i	N/O	250V ac/dc	1A ac/dc	15VA/W	443S-M566351

These switches require a magnetic actuator. Refer to page 36.

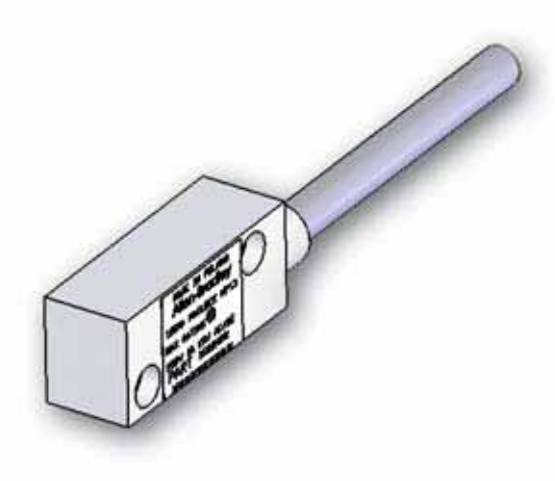
technical specifications

Contact arrangement	N/O
Contact material	Rhodium
Case material	Stainless Steel
Protection	IP 68 (water/oil/dust)
Operating temperature	-10°C to +60°C
Fixings	2 x M3
Contact operating distance	See page 36
Mechanical life	500 x 10^6 typical
Electrical life	Subject to switched load
Cable	2m flexible PVC
Weight	0.2Kg
Conforms to standards	EN 60204-1, EN 60079

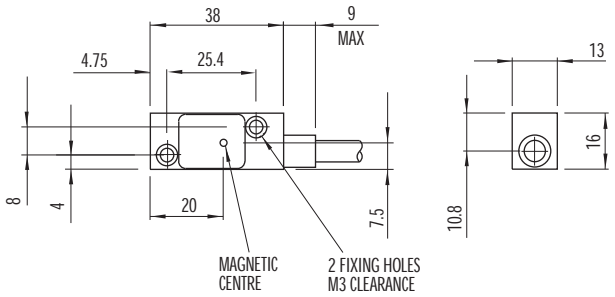
Industrial Proximity Switches

proximity switch
MPS3

- Magnetically actuated
  – See page 37 for actuators (supplied separately)
- Stainless Steel housing
- Water, oil and dustproof to IP68
- For resistive loads



dimensions



ordering details

Switch	Max. volts	Max. current	Power	Part No.
MPS 3	250V ac/dc	1 A ac/ dc	15VAac 15Wdc	440S-M565055

These switches require a magnetic actuator. Refer to page 37.

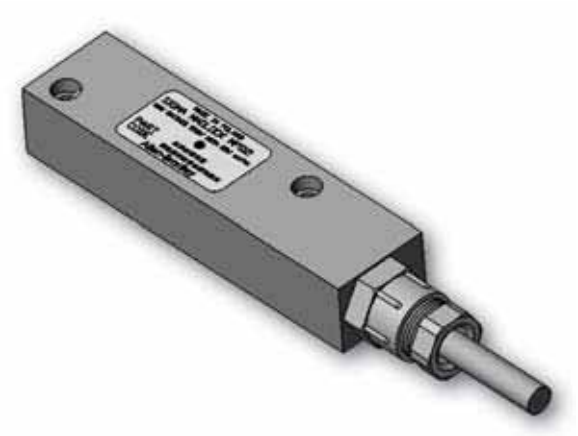
technical specifications

Contact arrangement	N/O single pole For resistive loads as supplied or inductive loads with an external surge suppressor
Contact material	Rhodium
Case material	Stainless Steel
Protection	IP 68 (water/oil/dust)
Operating temperature	-10°C to +70°C
Fixings	2 x M3
Contact operating distance	See page 37
Mechanical life	500 x 10^6 typical
Electrical life	Subject to switched load
Cable	2m flexible PVC
Weight	0.2Kg
Conforms to standards	EN 60204-1

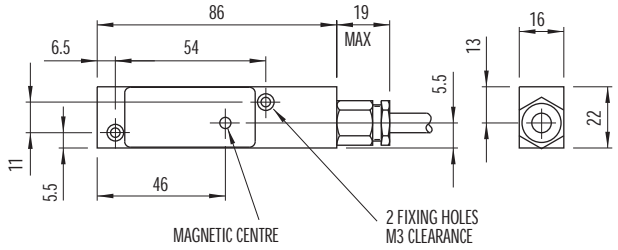
Industrial Proximity Switches

proximity switch
MPS 16

- Magnetically actuated
  – See page 37 for actuators (supplied separately)
- Stainless Steel housing or Black ABS
- Water, oil and dustproof to IP68
- For inductive ac circuits



dimensions



ordering details

Switch	Max electrical ratings	Housing	Part No.
MPS 16	0.75A resistive / 0.2A inductive at 110V dc , 3A resistive / 1A inductive at 28V dc , 3A at 110Vac (max inrush 15A), 2A at 250Vac (max inrush 10A)	Stainless Steel Black ABS	440S-M565073 440S-M565218

These switches require a magnetic actuator. Refer to page 37.

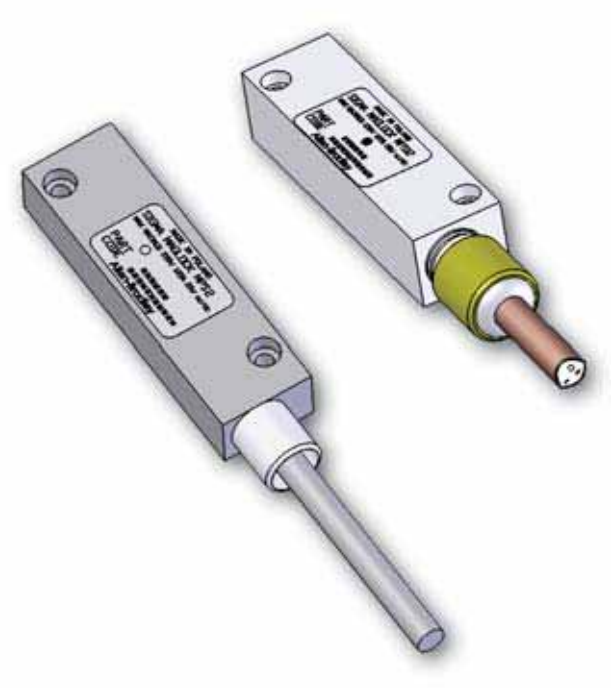
technical specifications

Contact arrangement	N/O single pole
Contact material	Gold Plated Silver
Initial contact resistance	0.015 ohm max.
Case material	Stainless Steel or Black ABS
Protection	IP 68 (water/oil/dust)
Operating temperature	-10°C to +70°C
Fixings	2 x M3
Contact operating distance	See page 37
Mechanical life	500 x 10^6 typical
Electrical life	Subject to switched load
Cable	2m flexible PVC
Weight	0.35Kg
Conforms to standards	EN 60204-1

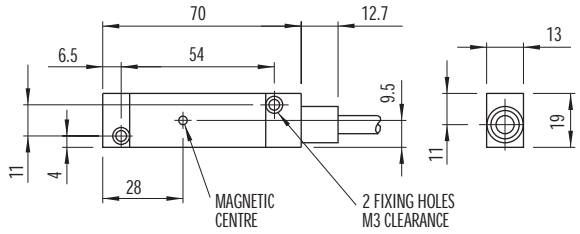
Industrial Proximity Switches

proximity switch
MPS 2, 14

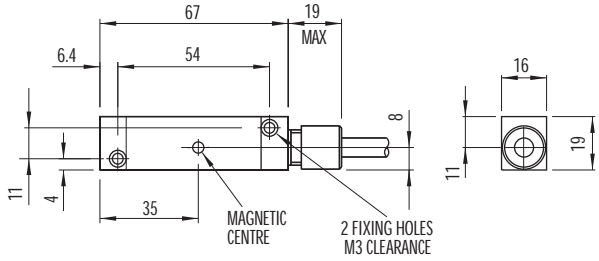
- Magnetically actuated
  – See page 37 for actuators (supplied separately)
- Stainless Steel housing
- Water, oil and dustproof to IP68
- For resistive loads or inductive loads with an external surge suppressor.



dimensions



MPS 2



MPS 14

ordering details

Switch	Max. volts	Max. current	Power	Part No.
MPS 2	250V ac/dc	1.25A ac/ dc	20W/VA max, 3W/VA min	440S-M565052
MPS 14	250V ac/dc	1.25A ac/ dc	20W/VA max, 3W/VA min	440S-M565065

These switches require a magnetic actuator. Refer to page 37.

technical specifications

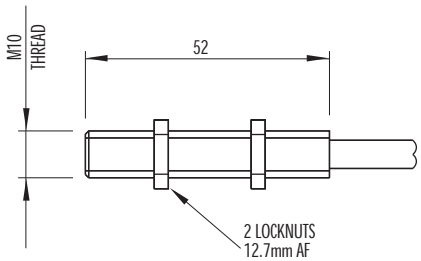
Contact arrangement	C/O single pole (changeover) For resistive loads as supplied or inductive loads with an external surge suppressor
Contact material	Tungsten
Case material	Stainless Steel
Protection	IP 68 (water/oil/dust)
Operating temperature	-10°C to +80°C
Fixings	2 x M3
Contact operating distance	See page 37
Mechanical life	500 x 10^6 typical
Electrical life	Subject to switched load
Cable	2m flexible PVC
Connections	N/O - blue & black, N/C - brown & black
Weight	MPS 2 - 0.25Kg MPS 14 - 0.3Kg
Conforms to standards	EN 60204-1

Industrial Proximity Switches

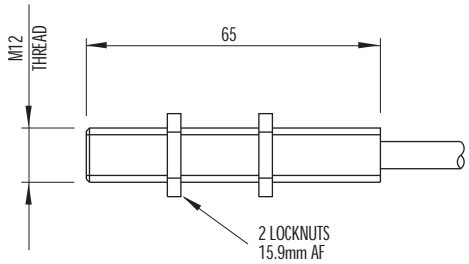
end sensors
ES1, ES2

- End sensing
- Magnetically actuated
  – See page 36 for actuators (supplied separately)
- Stainless steel housing
- Water, oil and dustproof to IP68

dimensions



ES 1



ES 2

ordering details

Switch	Max. volts	Max. current	Power	Part No.
ES 1	250Vdc 300Vac	1A ac/ dc	15W/VA	440S-M565095
ES 2	250V ac/dc	3A ac/ dc	20W/VA	440S-M565096

These switches require a magnetic actuator. Refer to page 36.

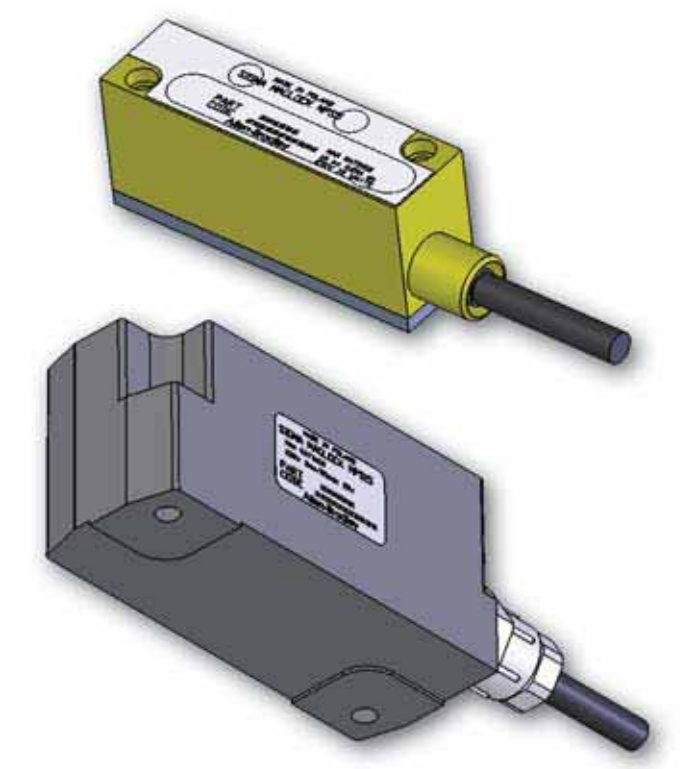
technical specifications

Contact arrangement	ES 1 - N/O single pole ES 2 - C/O single pole (changeover)
Contact material	ES 1 - Rhodium ES 2 - Tungsten (Rhodium available to special order)
Case material	Stainless Steel
Protection	IP 68 (water/oil/dust)
Operating temperature	-18°C to +80°C
Fixings	2 locknuts provided
Contact operating distance	See page 36
Mechanical life	500 x 10^6 typical
Electrical life	Subject to switched load
Cable	2m high temperature flexible PVC
Connections	ES 2 - N/O - blue & black, N/C - brown & black
Weight	0.2Kg
Conforms to standards	EN 60204-1

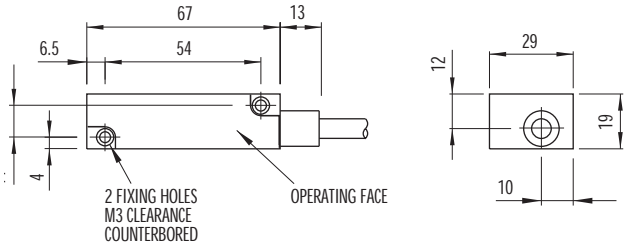
Industrial Proximity Switches

proximity switches
MPS 5, 15

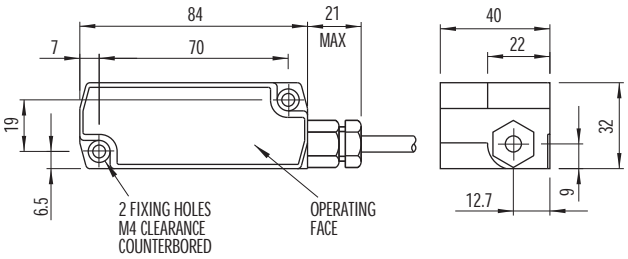
- Ferro-actuated – Senses ferrous material e.g. mild steel
- MPS 5 Brass housing
- MPS 15 Glass filled Nylon housing
- Water, oil and dustproof to IP68



dimensions



MPS 5



MPS 15

ordering details

Switch	Max. volts	Max. current	Power	Part No.
MPS 5	250V ac/dc	1A ac/ 0.25A dc	15VA ac, 15W dc	440S-M565056
MPS 15	250V ac/dc	2A ac/ dc	40VA ac, 40W dc, 3W/VA min	440S-M565066

This switch is actuated by ferrous metal such as mild steel.

technical specifications

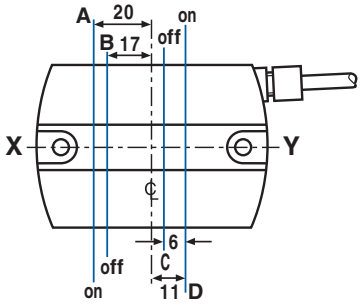
Contact arrangement	N/O single pole
Contact material	MPS 5 - Rhodium
	MPS 15 - Tungsten
Case material	MPS 5 - Brass
	MPS 15 - Glass reinforced Nylon
Protection	IP 68 (water/oil/dust)
Operating temperature	-10°C to +50°C
Fixings	MPS 5 - 2 x M3
	MPS 15 - 2 x M4
Mechanical life	500 x 10^6 typical
Electrical life	Subject to switched load
Cable	2m flexible PVC
Weight	0.5Kg
Conforms to standards	EN 60204-1

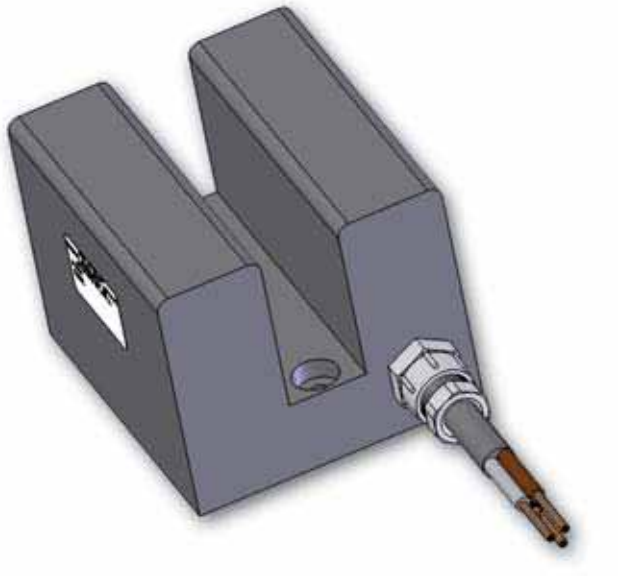
Industrial Proximity Switches

proximity switches
MPS V1, V4

- Ferro-actuated vane switch
- Senses ferrous material e.g. mild steel
- MPS V1 for inductive loads
- MPS V4 for resistive loads only
- Glass filled Nylon housing
- Water, oil and dustproof to IP68

The ferrous vane must pass through the switch slot within 19mm of the slot base and must not touch the switch case itself. A vane size 76 x 51 x 3.2mm should be used. A vane of these dimensions passing through the slot at a distance of 9.5mm from the slot base will provide the following typical switching characteristics.

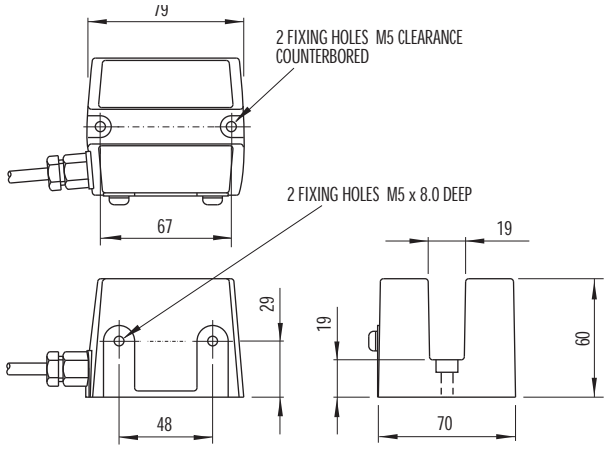




Vane movement	X to Y	Y to X	X to Y & return	Y to X & return
Switch operates when leading edge of vane is at point	D	A	D	A
Switch will reset when trailing edge of vane is at point	C	B		
Switch will reset when leading edge of vane is at point			C	B

NOTE: The maximum variation in the above operating positions due to having the vane ±9.5mm from the nominal position of 9.5mm from the base is 1.5mm.

dimensions



ordering details

Switch	Max. volts	Max. current	Power	Part No.
MPS V1	250V ac/dc	1.25A ac/dc	20Wdc, 20VAac, 3W/VA min	440S-M565090
MPS V4	250V ac/dc	1.25A ac/ dc	20Wdc, 20VAac, 3W/VA min	440S-M565093

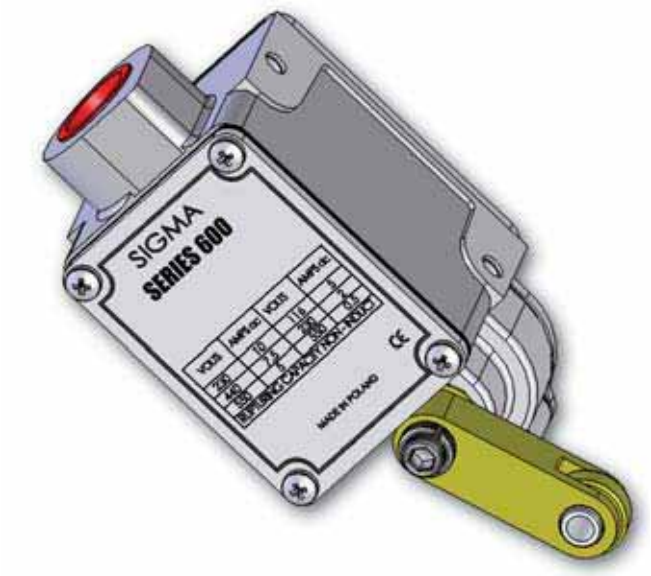
technical specifications

Contact arrangement	MPS V1 - C/O single pole (surge suppression circuit) MPS V4 - C/O single pole (resistive loads only)
Contact material	Tungsten
Case material	Glass filled Nylon
Protection	IP 68 (water/oil/dust)
Operating temperature	-10°C to +50°C
Fixings	2 x M5
Mechanical life	500 x 10^6 typical
Electrical life	Subject to switched load
Cable	3m flexible PVC, cores unmarked
Weight	0.75Kg
Conforms to standards	EN 60204-1

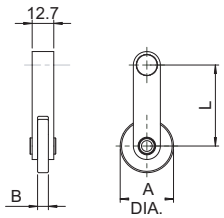
Industrial Limit Switches

limit switches
series 600

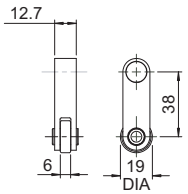
- The definitive snap acting heavy duty limit switch
- large range of levers (supplied separately) adjustable in 7.5° increments over 165°
- Die cast Aluminium
- Spring movable for clockwise (as supplied) or counter clockwise operation. Removable for maintained contact either side



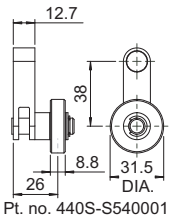
LEVERS
Switches and levers are supplied separately.



Part No	L mm	A mm	B mm	Pack Size
440S-S540014	41.3	31.7	6.4	1
440S-S540015-10	47.6	31.7	6.4	10
440S-S540016-10	50.8	19	6.4	10
440S-S540024	76.2	19	6.4	1
440S-S540039	127.0	19	6.4	1



Pt. no. 440S-S540000
Pack Size 1



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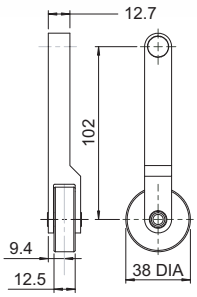
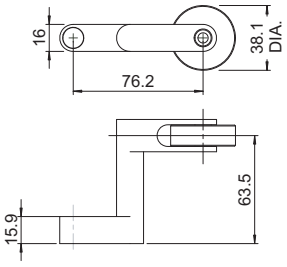
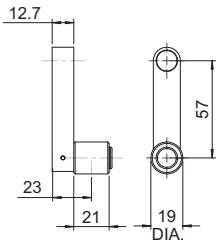
Pack Size 1



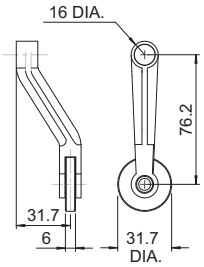
Pt. no. 440S-S540081
Pack Size 1



Pt. no. 440S-S540097
Pack Size 1

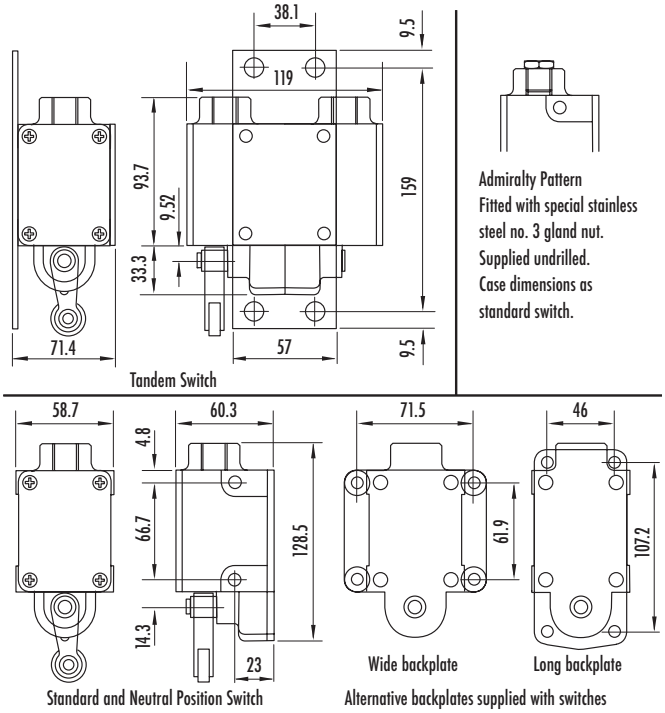


Pt. no. 440S-S540104
Pack Size 1



Pt. no. 440S-S540096-10
Pack Size 10

dimensions



ordering details

600 Switch type	Contact arrangement	Part No.
Standard switch (supplied with 2 styles of backplate)	1NO/1NC	440S-S560010
Neutral position switch (supplied with 2 styles of backplate)	1NC/2NO/1NC	440S-S560118
Centre connection switch (supplied with 2 styles of backplate)	SPCO	440S-S560226
Admiralty Gland Switch (supplied with 2 styles of backplate)	1NO/1NC	440S-S560325
Admiralty Gland Neutral Position Switch (supplied with 2 styles of backplate)	1NC/2NO/1NC	440S-S560401
High Temperature switch (supplied with 2 styles of backplate)	1NO/1NC	440S-S560451
Tandem switch (supplied with 2 styles of backplate)	2NO/2NC	440S-S560337
Tandem neutral position switch (supplied with 2 styles of backplate)	2NC/4NO/2NC	440S-S560373

See Dimension drawings opposite for lever part numbers.

technical specifications

Contact arrangement	See ordering details
Contact material	Silver
Case material	Aluminium
Protection	IP 66
Operating temperature	-20°C to +75°C
Mechanical life	20 x 10^6 typical
Electrical life	Subject to switched load
Weight	0.8Kg
Conforms to standards	EN 60204-1
Electrical ratings	
Surge capacity	20A ac
Continuous capacity	10A ac/dc
Rupturing capacity - inductive	10A ac / 2A dc
Rupturing capacity - non-inductive	10A ac / 1A dc

Industrial Limit Switches

limit switches
microlock series 631

- Snap acting contacts
- Sealed for life aluminium bodies
- IP 65 & IP66 versions

MICROLOCK LIMIT SWITCHES ARE AVAILABLE FOR SPECIFIC APPLICATIONS ONLY IN PACK SIZES OF 10 UNITS

AVAILABLE PART NUMBERS
440S-M471758-10
440S-M471770-10
440S-M471771-10
440S-M471772-10
440S-M471775-10
440S-M471780-10
440S-M471781-10
440S-M471782-10
440S-M471804-10
440S-M471805-10
440S-M471828-10
440S-M471830-10
440S-M471882-10

technical specifications

Contact arrangement	C/O single pole (changeover)
Contact material	Silver
Max. volts	250V ac /30V dc
Max. amps	5A at 250V ac (inductive or resistive) 5A at 30V dc (resistive) 3A at 30V dc (inductive)
Case material	Die-cast aluminium
Protection	IP66 - gaitered IP65 - non-gaitered
Operating temperature	-40°C to +70°C
Mechanical life	2 x 10^6 typical
Electrical life	5 x 10^4 at 5A 250V ac resistive
Cable	1m flexible PVC. 4 core
Connections	N/O - black & blue N/C - brown & blue Earth - green/ yellow
Weight	0.2Kg
Conforms to standards	EN 60204-1

Actuators

magnetic actuators

operating distance & differential

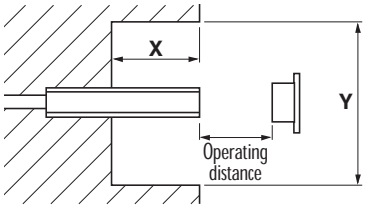
The 'operating distance' is the maximum distance at which the switch just operates, with the operating faces parallel and in line, the magnetic centres opposite each other and the actuator moving towards the switch. When the actuator is withdrawn the switch will reset itself at a distance greater than this, the difference between the two distances is termed as the differential.

Operating distances and differentials for all Maglock magnetic proximity switches are quoted below. They only apply however when both the switch and the actuator are mounted away from any ferro-magnetic materials.

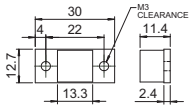
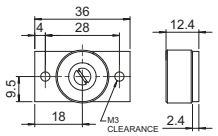
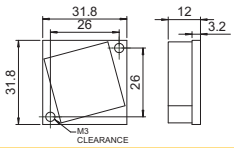
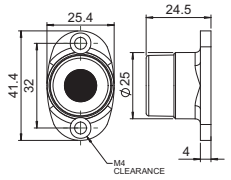
Mounting on or close to such materials will reduce these distances, but if there is no alternative then mounting the switch and the actuator on spacers will help reduce the effect.

operating distance for end sensing switches

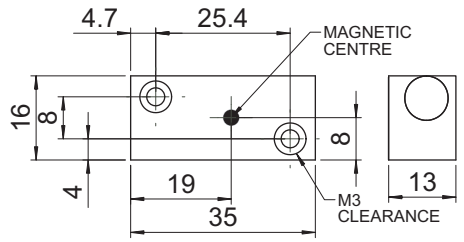
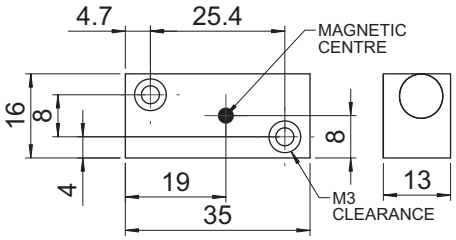
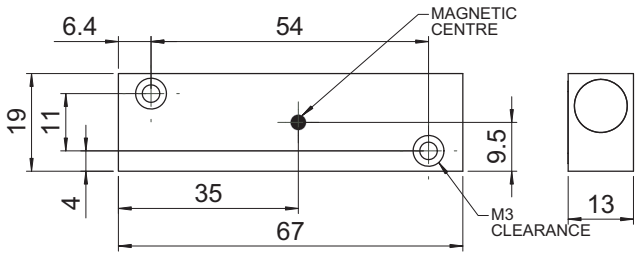
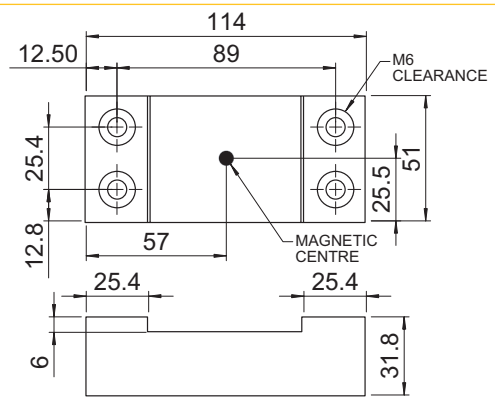
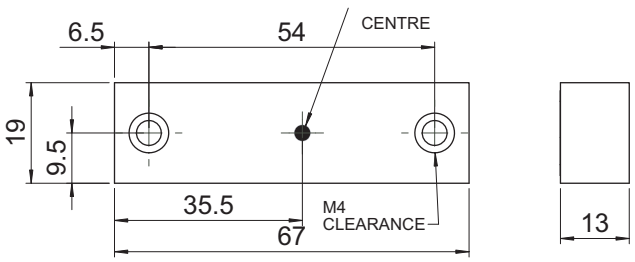
The operating information given applies for end-sensing models only if the switches are mounted away from ferro-magnetic materials by the minimum X and Y distances shown in the diagram. Reducing these clearances will reduce the operating distance and affect the differential.



actuators for end sensing switches

		Actuator type	Part number	Suitable for switch type	Clearance (mm) (see diagram) X	Clearance (mm) (see diagram) Y	Operating distance mm	Differential Max mm	Differential Typical mm
M3 FIXING		E1	440S-M545038	ES 1	25	60	10	6	3
M3 FIXING		E2	440S-M545039	ES 1	25	70	13	5	3
				ES 2	32	80	10	6	3
				ES 24T/TH	33	80	8	6	3
				ES 34T/TH	33	80	8	6	3
M3 FIXING		E3	440S-M545040	ES 1	25	80	30	4	3
				ES 2	32	110	25	6	4
				ES 24T/TH	33	110	23	6	4
				ES 34T/TH	33	110	23	6	4
M4 FIXING		E10	440S-M545098 Stainless steel	ES 1	25	70	16	6	4
				ES 2	32	80	10	6	3
				ES 24T/TH	33	80	8	4	2
				ES 34T/TH	33	80	8	4	2

actuators for side sensing switches

	Actuator type	Part number	Suitable for switch type	Operating distance mm	Differential Max mm	Differential Typical mm
	A1	440S-M545002 Stainless steel	MPS3	10	10	7
	A2	440S-M545005 Stainless steel	MPS1 MPS2 MPS3 MPS14 MPS24D/DH MPS34D/DH MPS44	10 10 16 6 3 3 6	16 16 13 16 16 16 16	11 11 10 11 11 11 11
	A3	440S-M45008 Stainless steel	MPS1 MPS2 MPS3 MPS14 MPS24D/DH MPS34D/DH MPS44	22 22 25 19 16 16 19	25 25 25 25 25 25 25	17 17 17 17 17 17 17
	A4	440S-M545009 Alcomax III	MPS1 MPS2 MPS3 MPS14 MPS16 MPS24D/DH MPS26D/DH MPS34D/DH MPS36D/DH MPS44	95 95 108 86 29 83 27 83 27 86	63 63 51 63 42 63 42 63 42 63	50 50 38 50 32 50 32 50 32 50
	A6	440S-M545013 Alcomax III	MPS1 MPS2 MPS3 MPS14 MPS16 MPS24D/DH MPS26D/DH MPS34D/DH MPS36D/DH MPS44	48 48 59 47 17 44 15 44 15 47	42 42 29 42 29 42 29 42 29 42	25 25 17 25 17 25 17 25 17 25

Safety Products also available:

Allen-Bradley
Guardmaster®

Also available under the Allen-Bradley Guardmaster brand is a comprehensive range of Safety Products for machinery safeguarding including:

Input devices

Interlock Switches

These devices are designed for physical interlocking of guard doors and equipment thus offering access into a potentially hazardous area only when the hazard is in a safe condition. Devices available include; Interlock switches with and without conditional guard locking, trapped key systems and safety limit switches.

Presence Sensing Devices

These devices are designed to detect the presence of a person or object in or around a hazardous area. They offer no physical barrier and therefore are ideal in applications where frequent access is required under safe conditions. Devices available include; Safety Light Curtains, Safety Laser Scanners, Pressure Sensitive Safety Mats and Edging Strips.

E-Stop & Trip Devices

These devices are designed to offer an emergency stop function on machines and are used in positions within easy reach of an operator. Devices include; Emergency Stop Push buttons, rope (cable) actuated Emergency Stop devices and enabling switches with Emergency Stop functionality.

Operator Interface

These devices are designed to offer operators safe interaction for machine control and include devices such as 3 position enabling switches and two hand control enabling devices.

Logic

Safety Relays

These devices are designed to monitor the status of a safety circuit and offer a variety of configurations. They are available as single function relays or hardware configurable multi-function relays.

Programmable Safety Controllers

These devices are designed to monitor the status of a safety circuit and can be software configured for specific functionality. They are dedicated safety controllers specifically designed for safety circuit control.

Integrated Safety Controllers

These devices are designed to offer control of both standard automation control and safety control within one platform. They are software programmable and allow configuration of standard and safety functionality in the same programming environment.

Safety I/O

These devices offer safety rated I/O solutions for application flexibility. They are available in a range of solutions communication of CIP Safety via DeviceNet or EtherNet/IP. Family ranges include; CompactBlock Guard I/O, ArmourBlock Guard I/O and POINT guard I/O.

Output devices

Safety Contactors

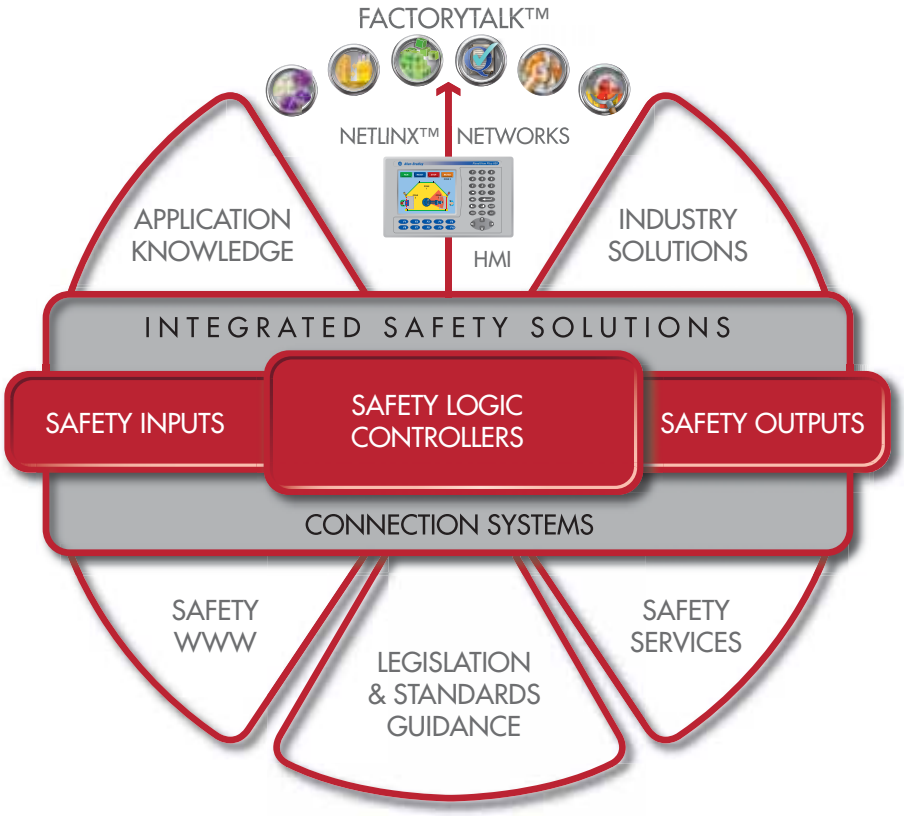
Safety contactors are used to remove power from the actuator. Special features are added to the contactors to provide the safety rating. Mechanically linked normally closed contacts are used to feed back the status of the contactors to the logic device, thus ensuring the safety function.

PowerFlex® AC Drives with integrated safety

A range of PowerFlex AC drives have optional integrated safety functionality including Safe Torque Off, Safe Speed Control and Conditional Guard Locking Control. Currently the PowerFlex 40P, 70, 700S and 700H offer Safe Torque Off while new range of 750 series PowerFlex drives offer all safety functionality mentioned above.

Kinetix® Motion Drives with integrated safety

The Kinetix 6000 Motion Drive has optional integrated safety functionality including Safe Torque Off and in the impending next release will also include Safe Speed Control and Conditional Guard Locking Control.



For more information: *www.ab.com/safety* or contact your local supplier.

www.rockwellautomation.com

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