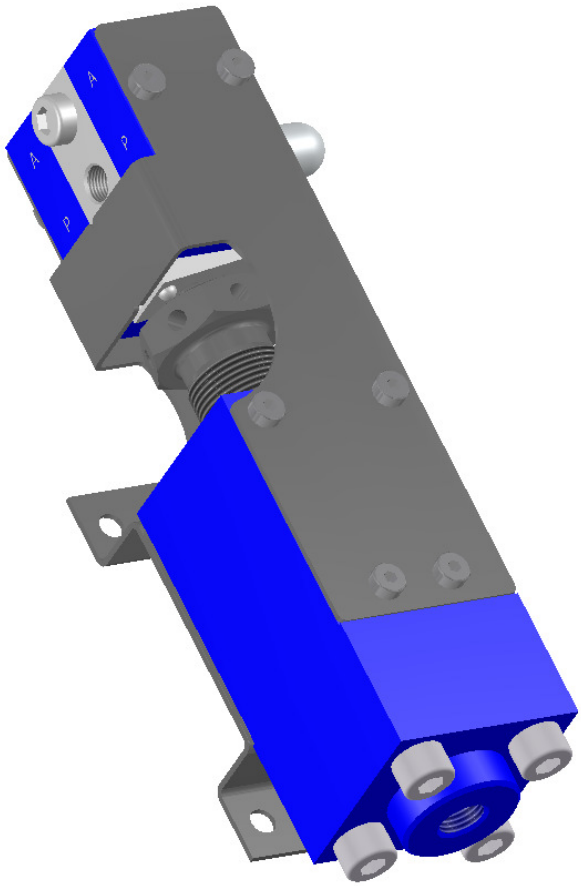
MAXIMATOR®
Maximum Pressure.

Pressure Switch with Pneumatic Outlet

User Manual



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09.2012

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1 General

1.1 User Manual Information

This user manual describes safe and appropriate handling of the pressure switch. Compliance with all specified safety notes and instructions and all local accident prevention regulations and general safety provisions that are valid in the operational area of the machine is imperative.

Before beginning all work on the pressure switch, this user manual and particularly the chapter on "Safety" and the corresponding safety notes must be fully read. The contents must be understood.

1.2 Explanation of Symbols

Important safety-related notes are marked with symbols in this user manual.

It is compulsory that the notes provided on work safety are complied with and followed. Take particular care in these cases in order to avoid accidents, personal damage and damage to property.

 **WARNING! Danger of injury or death!**

This symbol identifies notes that may result in an impairment of health, injuries, permanent bodily harm or even death if they are not observed.

 **CAUTION! Damage to property!**

This symbol identifies advice, non-compliance with which may result in damages, malfunctions and / or failure of the pressure switch.

 *NOTE!*

This symbol provides tips and information that shall be observed for efficient and failure-free handling of the pressure switch.

1.3 Liability and Warranty

All details and notes in this user manual have been compiled under consideration of the valid regulations, current state of technology and our years of knowledge and experience.

This user manual must be carefully read before beginning **all** work on and with pressure switches. The manufacturer cannot be held liable for any damage or failures resulting from non-observance of these operating instructions.

The text and visual presentations do not necessarily correspond with the scope of supply. Illustrations and graphics do not correspond with a scale of 1:1.

In the case of special designs, use of additional order options or due to the latest technological modifications, the actual scope of supply may differ from the details and information as well as the visual presentations described or shown here. Please contact the manufacturer in case of any questions.

We reserve technical modifications of our product as part of enhancing its usage properties and further development.

1.4 Copyrights

This user manual should be treated confidentially. It is exclusively intended for persons deployed to work on and with the pressure switches.

All contained data, texts, drawings, pictures and other images are protected under applicable copyright law and are subject to further industrial property rights. Any misuse is liable to prosecution.

Distribution to third parties as well as reproduction in any kind and form, also in extracts, as well as exploitation and/or notification of the contents are not permitted without prior written approval of the manufacturer. Contraventions shall obligate the perpetrator to payment of damages. The originator reserves the right to make further claims.

We reserve all rights to exercise our industrial property rights.

1.5 Spare Parts

Only use the manufacturer's original spare parts.

! CAUTION!

Wrong or faulty spare parts may result in damages, malfunctions or total failure of the pressure switch.

In the case of use of any unapproved spare parts, all guarantee, service, compensation for damages and liability claims against the manufacturer, his agents, traders or representatives are not applicable.

1.6 Disposal

Unless no other return or disposal agreement has been arranged, the individual components shall be recycled after having been properly disassembled.

- Scrapping of metallic material
- Recycling of plastic components
- Sorting and disposing of other components in accordance with material type.

! CAUTION!

Waste from electronic and electrical equipment, electronic components, lubricants and other auxiliary materials are subject to hazardous waste treatment and must be disposed of by specialised companies only!

2 Safety

2.1 General Information

The pressure switch has been built in accordance with the generally accepted engineering standards valid at the time of development and manufacture and is deemed to be operationally safe.

The pressure switch may be the source of hazards if it is used by staff who have not been professionally trained, or are used incorrectly or abnormally.

The chapter "Safety" provides an overview of all significant safety aspects for optimum protection of persons as well as safe and failure-free operation of the pressure switch.

Furthermore, the following chapters of this user manual contain specific safety notes, marked with symbols, for the avoidance of hazards. The pictograms, signs and labelling on the pressure switch must be observed. They have to be kept in a legible condition and must not be removed.

2.2 Intended Use

The MAXIMATOR pressure switches are exclusively intended for switching compressed air depending on the pressure applied to the high pressure connection.

! CAUTION!

Any usage beyond the intended use and/or any different type of use of the pressure switch is forbidden and is not valid as the intended use.

All types of claims against the manufacturer and/or his authorised representative due to damages caused by unintended use of the pressure switch are excluded.

Damage resulting from unintended use is the sole responsibility of the operator.

Intended use also refers to correct compliance with the operating conditions, as well as the details and instructions in this user manual.

The pressure switch may only be operated with the parts listed in the scope of supply.

2.3 Predictable Improper Use

– Never use other fluids than those authorised.
– Never perform any unauthorized conversions or technical changes to the pressure switch.
– Never use the pressure switch in any other way than described in this operating manual.
– Never exceed the technical limits or pressures stated in this operating manual.
– The pressure switch may only be operated when in perfect technical condition.
– The pressure switch may not be directly used for pharmaceutical or sanitary purposes with foods.
– Always pay attention to all information on installation, maintenance or troubleshooting in this operating manual.
– The pressure switches are not suitable for use in safety-relevant controls.
– It may not be used as protection against overpressure.

2.4 User Manual Contents

Each and any person commissioned with performing work on or with the pressure switch must have read and understood the user manual prior to commencing work on the pressure switch. This also applies if the person in question has already operated on this type of pressure switch or a similar type, or received training from the manufacturer.

Familiarity with the content of the user manual is one of the prerequisites for protecting personnel against hazards and for avoiding faults and hence for operating the pressure switch safely and without failures.

We recommend that the operating company should obtain written confirmation from staff that they are familiar with the user manual.

2.5 Changes and Modifications to the Pressure Switch

To avoid hazards and to ensure optimal performance, no modifications, additions or conversions may be made to the pressure switch which have not been explicitly authorised by the manufacturer.

All pictograms, signs and labelling found on the pressure switch must be kept in a legible condition and must not be removed. Damaged or illegible pictograms, signs and labelling must be replaced immediately.

2.6 Responsibility of the Operating Company

This user manual has to be kept in the immediate vicinity of the pressure switch and has to be accessible at any time for persons working on or with the pressure switch.

The pressure switch may only be operated in a technically appropriate and operationally safe state. The pressure switch must be checked for intactness prior to each and any start.

All user manual instructions shall be observed fully and without limitation!

Along with the specified safety notes and instructions in this user manual, the local accident prevention regulations and general safety provisions that are valid in the operational area of the pressure switch, as well as valid environmental protection regulations, must be observed and complied with.

The operating company and the company's authorised personnel are responsible for failure-free operation of the pressure switch as well as for clear specifications on areas of responsibility for installation, operation, maintenance and cleaning of the pressure switch.

2.7 Requirements on Staff

Only authorised and instructed skilled personnel may work on and with the pressure switch. Members of personnel must have received an induction on possible risks.

The term **specialised personnel** refers to persons who are capable of assessing their work and recognising the possible risks involved due to their specialist training, knowledge and experience, as well as knowledge of the relevant regulations.

If members of personnel do not have the necessary knowledge, training must be provided accordingly.

The areas of responsibility for work on and with the pressure switch (installation, operation, maintenance, repair) must be clearly specified and complied with so that areas of competency are clear from a safety point of view.

Only such persons may work on and with the pressure switch who can be expected to perform their duties reliably. Please refrain from any working processes which impair personal safety, environmental safety or have a negative impact on the technical equipment.

People who are under the influence of drugs, alcohol or medication that may affect their reactions strictly may not work with the pressure switch.

The valid age and specific job regulations for the site where the pressure switch is used must be observed when choosing personnel.

The operator must ensure that unauthorised persons are kept at a sufficient distance from the pressure switch.

Any changes to the pressure switch that affect safety must be immediately reported by staff to the operating company.

2.8 Work Safety

Personal damages and damages to property when working with and on the pressure switch can be avoided by following the specified safety notes and instructions in this user manual.

Non-observance of these notes may result in hazards for persons and damage or destruction of the pressure switch.

In the case of failure to comply with all specified safety notes and instructions in this user manual and all local accident prevention regulations and general safety provisions that are valid in the operational area, all liability claims and claims for compensation for damages against the manufacturer or a commissioned agent are excluded.

2.9 Personal Protection Equipment

When working on or with the pressure switch, the following shall be worn:

(To be supplemented by customers' internal regulations or may deviate due to these directives)

Protective clothing
Closely fitting work clothes (low tearing strength, no loose sleeves, no rings and other jewellery etc.)

Safety shoes to protect feet against heavy falling parts and slipping on flooring that is not skid resistant.

Additional requirement for cleaning work:

– **Working gloves**
to protect against friction, abrasion, puncture and severe injuries of the hands as well as against contact with hot surfaces and substances hazardous to health.

– **Protective goggles**
to protect eyes from flying parts and fluids.

2.10 Hazards Originating from the Pressure Switch

The pressure switch has been subjected to a risk assessment. The resulting construction and design of the pressure switch corresponds with the current state of technology.

The pressure switch is operationally safe when used as intended. However, a residual risk always remains!

The pressure switch is equipped with pneumatic components and high pressure is applied during use in the pressure switch case.

WARNING!

Pneumatic or hydraulic energy can cause major injuries. In the case of damage to individual components, highly pressurised mediums can escape and lead to physical and/or property damages! Therefore:

- Depressurise the pressure switch before beginning any work
- Do not remove, modify or put safety installations out of operation.
- Pressure settings may not be changed beyond the values and tolerance ranges specified in the user manual.

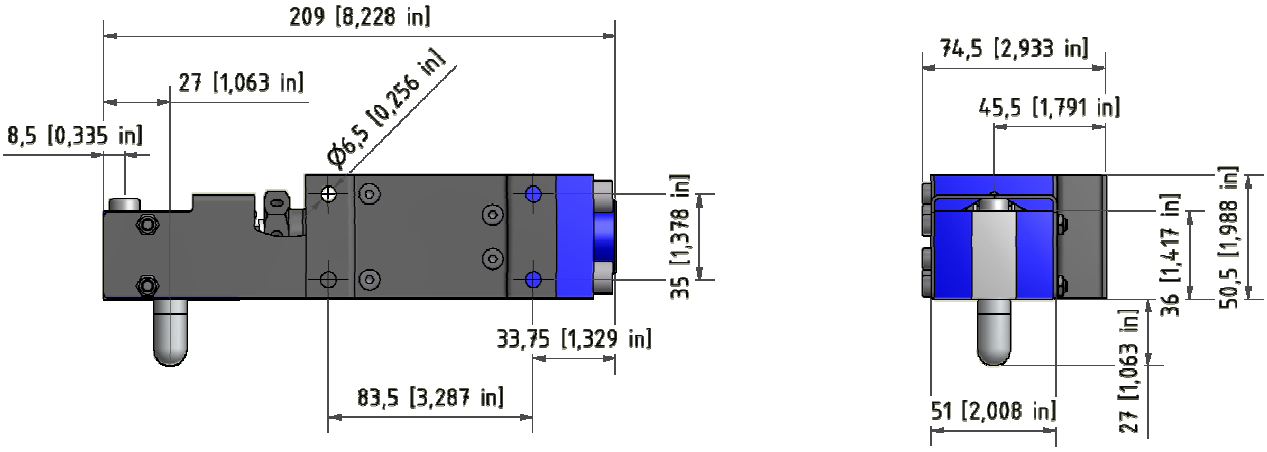
WARNING! Hazard of flying particles!

Pneumatic pressures are switched using the pressure switch.

Therefore, it is mandatory to maintain a proper safety distance, follow adequate safety precautions and to use suitable lines. The compressed air with strain relief through the pressure switch must be able to be channeled without counterpressure so that no danger is caused.

3 Technical Data

3.1 Dimensions and Weight



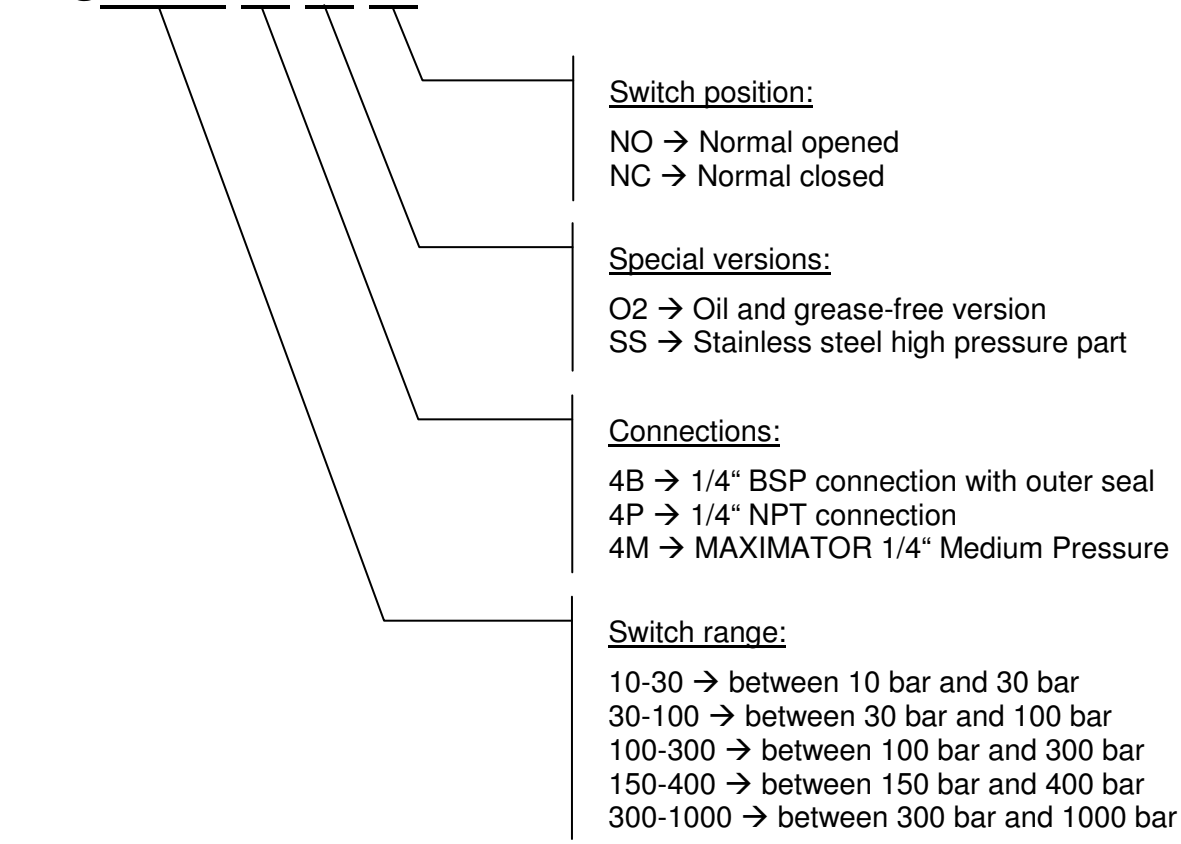
Illus. 1: Dimensions

MAXIMATOR pressure switch		
Width	mm	209
Depth	mm	50.5*
Height	mm	74.5
Mass	kg	1.4

*An additional approx. 27mm are added for the dampener.

3.2 Type Overview

APS…-….-…-…-…



Example:

APS30-100-4B-NO

Pressure switch, 30-100 bar setting range with G1/4" connection (made of aluminium) open in the rest position.

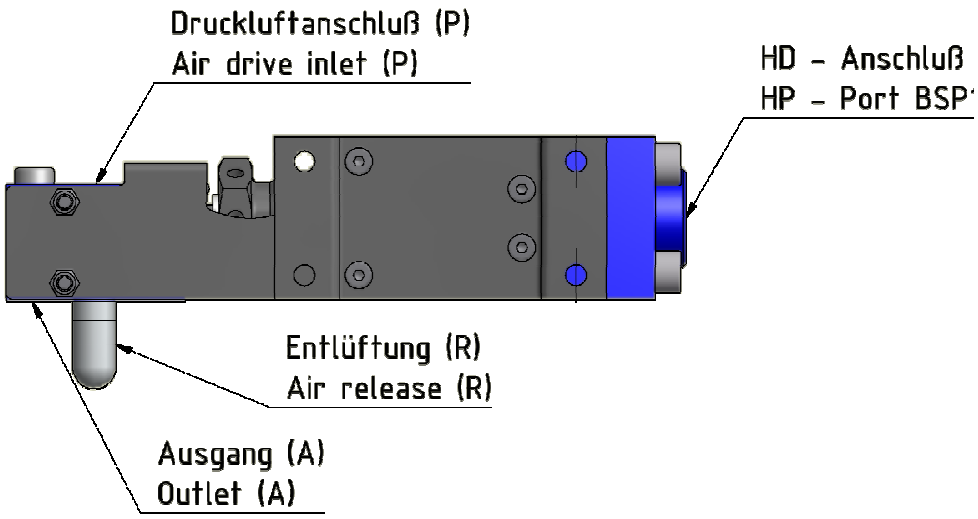
3.3 Characteristics

MAXIMATOR pressure switch		Setting range				
		10bar – 30 bar	30bar – 100bar	100bar – 300bar	150bar – 400bar	300bar – 1000bar
Max. control pressure	bar	8	8	8	8	8
Min. control pressure	bar	3.5	3.5	3.5	3.5	3.5
Switch hysteresis	bar	approx. 3	approx. 10	approx. 30	approx. 40	approx. 100
Max. working pressure	bar	350	1050	1050*	1050*	1050*
Fluid temperature	°C	-10 - 60				
Environmental temperature	°C	-10 - 60				
Connections						
High pressure connection		4B → 1/4“ BSP connection with outer seal 4P → 1/4“ NPT connection 4M → MAXIMATOR 1/4“ Medium Pressure				
Inlet (P) Compressed air connection		1/8“ BSP				
Outlet (A)		1/8“ BSP				
Ventilation connection (R)		1/8“ BSP (for dampener)				

**With 4M connection the max. operating pressure is 1500 bar.*

NOTE!

4M are special high pressure connections from the company MAXIMATOR. Further information on the production and processing of these high pressure connections and the corresponding screw connections can be found in the MAXIMATOR catalogue "Valves-Fitting-Tubing" and in the "Cone and thread-cutting tools operating instructions". These documents can be found on the homepage www.maximator.de or can be requested from MAXIMATOR.



Illus. 2: Connections

Requirements on compressed air quality (control air):

- Solid matter
  Maximum particle size 5 µm
  Maximum particle concentration 5 mg/m³
- Dew point
  Up to +10 °C, water content of 9.4 g/m³
  Up to + 2 °C, water content of 5.6 g/m³

Requirements of the high pressure fluid:

Required cleanliness class:

21/18/13 according to ISO 4406 or better; particles larger than or equal to 50µm are not permitted.

Authorised high pressure fluids:

Drinking water
Hydraulic oil
Maxifluid
Nitrogen
Carbon dioxide
Air
Oxygen only for "O2" version

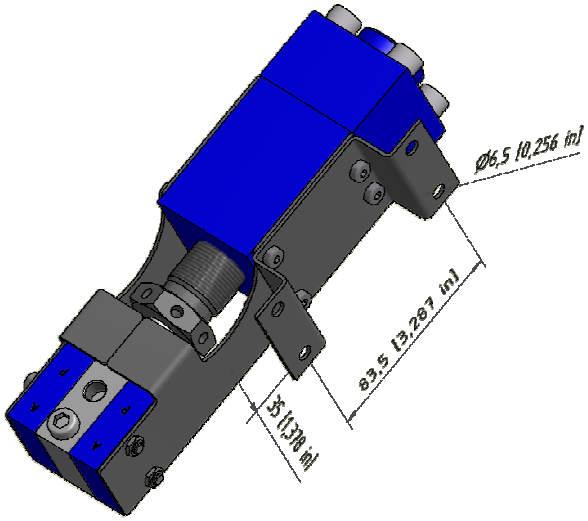
4 Layout and Function

4.1 General Information

The pressure switch dealt with in this user manual is intended to switch compressed air or nitrogen depending on the pressure applied to the pressure switch in machines. The pressure switches are equipped with a high pressure piston. The piston activates a pneumatic valve when applying the corresponding pressure to the piston. The pneumatic valve switches the connected compressed air. Depending on the design, the path for compressed air is opened (NC) or the compressed air is stopped and released (NO).

4.2 Mounting and Connection of the Pressure Switch

The pressure switch is to be fixed using 4 fixing screws in the fixing retainer. Suitable screws are to be selected for this.



Illus. 3: Fixing

4.3 Type Label

The type label is fixed to the drive part.

The type label (adhesive label) shows the following information

Illustrated example:

Serial number

Year of construction

Max. control pressure

Article number

Min. switch pressure

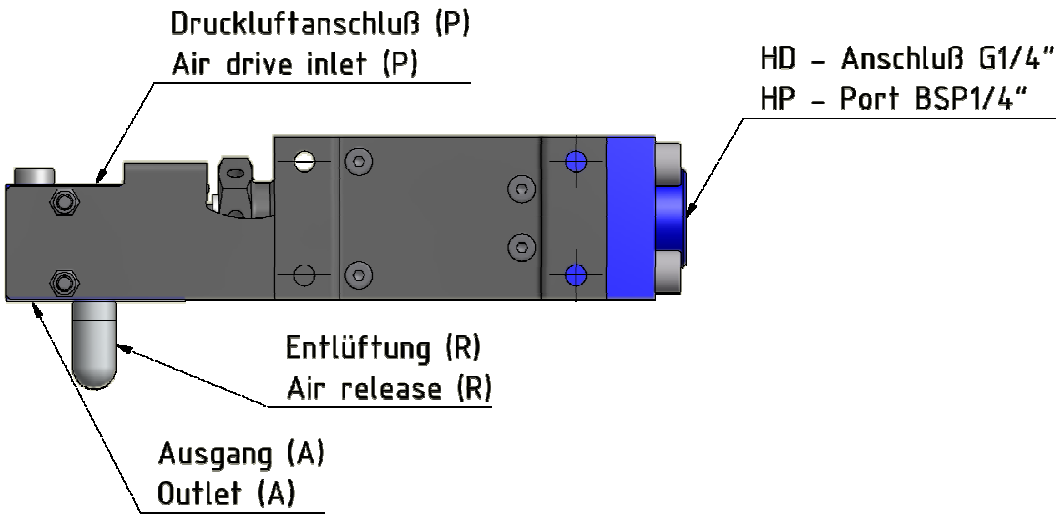
Max. switch pressure

Operating pressure

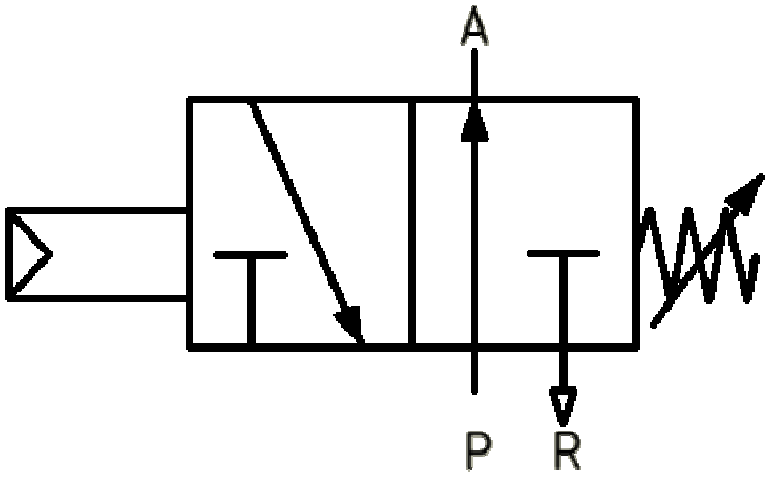
Manufacturer

Illus. 4Type Label

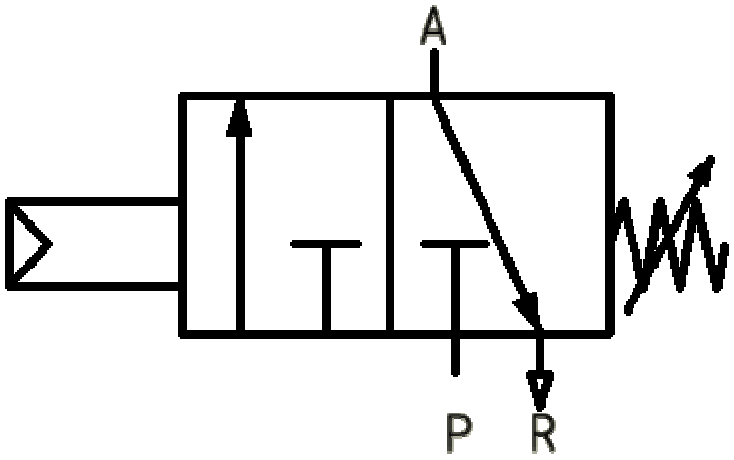
4.4 Supply Line Connections



Illus. 5: Connections



Illus. 6: Graphic symbol NO



Illus. 7: Graphic symbol NC

Illus. 6: Connections

Item	**Denomination**	Connector APS…-….-…-…-…		
		4B	4P	4M
A	Outlet	G1/8“		
R	Ventilation	G1/8“		
P	Compressed air connection	G1/8“		
HP	High pressure connection	G1/4“	1/4“ NPT	1/4" Medium pressure connection

NOTE!

4M are special high pressure connections from the company MAXIMATOR. Further information on the production and processing of these high pressure connections and the corresponding screw connections can be found in the MAXIMATOR catalogue "Valves-Fitting-Tubing" and in the "Cone and thread-cutting tools operating instructions". These documents can be found on the homepage www.maximator.de or can be requested from MAXIMATOR.

5 Transport, Packaging and Storage

5.1 Safety Instructions

WARNING! Injury hazard!

Transport, loading and unloading operations involve a risk of injury by falling objects.

CAUTION! Damage to property!

The pressure switch may be damaged or destroyed by incorrect transportation.

Therefore, the following safety instructions must strictly be observed:

- Never raise a load above a person's head.

  Always move the pressure switch with the utmost care and caution.
- Pay attention to the centre of gravity when transporting (danger of tipping).
- Carry out the transport as smoothly as possible in order to avoid transport damage.
- Avoid mechanical shocks.
- In the event of overseas transport, the pressure switch must be tightly packaged and protected against corrosion (drying agents).

5.2 Transport

The pressure switch is supplied ready to connect.

No aids are necessary for transport (it can be carried). A carriage can be used for longer transport distances. The pressure switch should be protected against slipping. The pressure switch may not be clamped in place without packaging.

5.3 Transport Inspection

Check the delivery for completeness and damage during transit immediately upon reception.

Do not accept a delivery or only conditionally if any transport damages are visible. Note the damage on the transport documents/shipper's delivery note. Make a complaint immediately.

File a complaint on hidden defects immediately upon discovery because claims for replacement of damages can only be made during the valid period.

5.4 Packaging

If no agreement for the recovery of the packaging has been made, separate materials according to type and size and reuse or recycle.

! CAUTION!

Always dispose of the packaging materials in an environmentally compatible manner and in accordance with the applicable local disposal regulations. If necessary, commission recycling companies.

NOTE! Good for environmental protection!

Packaging materials are valuable raw materials and in many cases they can be reused or reconditioned and recycled.

5.5 Storage

Keep packages closed up until assembly and store them observing the positioning and storage marks.

If no other information is provided, only store packages under the following conditions:

- Do not store outdoors.
- Store the equipment in a dry and dust-free environment.
- Do not expose to aggressive substances.
- Protect against sunlight.
- Avoid mechanical shocks.
- Storage temperature. 15 to 25°C
- Relative air humidity: max. 60%
- In case the equipment is stored for extended periods (longer than 3 months), the general condition of assembly groups and packaging shall be inspected regularly. If necessary, conservation must be topped up or renewed.

6 Installation

6.1 Safety Instructions

WARNING! Injury hazard!

Improper installation or assembly may cause serious personal or property damage. This work may therefore only be carried out by authorised, inducted personnel members who are familiar with working with the pressure switch, under observation of all safety regulations.

- Ensure that there is sufficient space for movement.
- Make sure that the workplace is orderly and clean. Components and tools that are loose or lying around are sources of accidents!
- Install protection equipment in accordance with the regulations and check its functionality.

Before positioning and installing the pressure switch, the components must be checked for completeness and perfect technological condition.

WARNING! Injury hazard!

An incomplete, faulty or damaged pressure switch can lead to major personal injury or damage to property. Only install a fully intact pressure switch.

6.2 Setup Instructions

6.2.1 Place of Installation

The pressure switch can be installed both indoors and outdoors (protected from rain and under compliance with the environmental temperatures). Always ensure that there is sufficient ventilation.

6.2.2 Minimum Distances

For installation and servicing, the pressure switch must be mounted with sufficient clearance from walls, ceilings and other devices.

We recommend at least a 300 mm clearance.

6.2.3 Supply Line Connections

Lay the necessary supply lines to operate the pressure switch in accordance with the valid regulations and safety conditions.

If possible, use a flexible hose for the connection to the compressed-air supply.

6.2.4 Waste Disposal

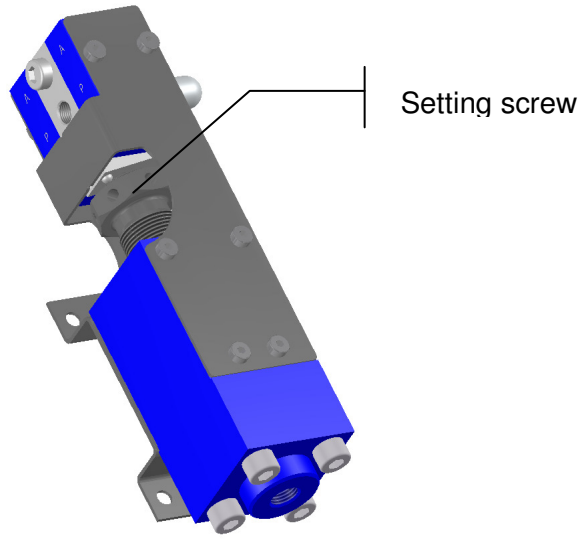
Used working materials as well as grease, oil and other residues (including cleaning cloths) must be collected in accordance with the valid local regulations. Use only authorized specialist companies for disposal.

6.3 Transport

Transport the pressure switch in accordance with the information in the "Transport" chapter to the place of installation.

6.4 Setting the Pressure Switch

The switch pressure in the pressure switch is adjusted with the help of the setting screw. The primary spring tension is changed by the setting screw with a suitable pin (Ø 5 mm). A turn to the right increases the switch pressure; a turn to the left reduces the switch pressure.



Illus. 8: Pressure setting

7 Maintenance

7.1 Safety Instructions

WARNING! Injury hazard!

Improper maintenance work may cause serious personal or property damage! This work may therefore only be carried out by authorised, inducted personnel members who are familiar with working with the pressure switch, under observation of all safety regulations.

- Before beginning work, the pressure switch must be pressure relieved and secured against pressure being applied.
- Ensure that there is sufficient space for movement.
- Make sure that the workplace is orderly and clean. Components and tools that are loose or lying around are sources of accidents!
- Install protection equipment in accordance with the regulations and check its functionality after maintenance work.

7.2 Maintenance Plan Maintenance Intervals

The pressure switch is maintenance-free. However, the pressure switch must still be checked regularly to guarantee operating safety.

Action to be performed	Interval
1. Check tightness of screw connections	As required depending on the conditions of use
2. Check tightness of pressure switch	As required depending on the conditions of use

WARNING! Injury hazard!

Never carry out maintenance or repair work on pressurised piping or reservoirs. Before dismantling the pressure switch, the setting screw for the switch pressure must be unscrewed far enough so that there is no more counterpressure.

8 Failures

8.1 Safety Instructions

WARNING! Injury hazard!

Improper addressing of failures may cause serious personal or property damage. Failures may therefore only be addressed by authorised, inducted personnel members who are familiar with working with the pressure switch, under observation of all safety regulations.

8.2 Reaction in the Event of Failures

Generally applicable:

1. Immediately shut off the system in case of failures posing an imminent danger to persons, property and/or operational safety!
2. In addition, disconnect the system from the mains and protect against re-start!
3. Inform the responsible person on site of the failure!
4. Allow the type and extent of the failure to be established by an authorised specialist, and allow him to detect the cause and address the failure.

8.3 What To Do after Addressing Failures

WARNING! Injury hazard!

Unexpected start-up of the pressure switch after addressing failures can lead to serious personal injury. Before reconnection, check that:

- Any failures and the cause of the failures have been professionally addressed
- All safety equipment has been mounted in accordance with the regulations and is in perfect technical and functional condition
- No persons are within the danger zone of the pressure switch.

9 Spare Parts

Only use the manufacturer's original spare parts.

! CAUTION!

Wrong or faulty spare parts and components from external manufacturers may result in major damages to the pressure switch.

All guarantee and service claims become void without previous notification if unapproved spare parts are used.

9.1 Ordering Spare Parts

The following information is compulsory for ordering spare parts:

- Type number
- Year of construction
- Parts number
- Quantity
- Description
- Requested shipment method (post, freight, sea, air, express)
- Shipping address

Orders for spare parts without the above information cannot be processed. If the shipping method is not provided, the manufacturer/supplier will select the shipping at his own discretion.

9.2 List of Spare Parts

See parts list on the sectional drawing of the pressure switch

10 Appendix

10.1 Declaration of Conformity

MAXIMATOR®
Maximum Pressure.

EG-Konformitätserklärung
(EC Declaration of Conformity)
[Déclaration de conformité CE]

Im Sinne der EG-Richtlinie Druckgeräte 97/23/EG
(As defined by the regulations of the EC Pressure Equipment Directive 97/23/EC)
[Au sens de la directive CE d´équipements sous pression 97/23/CE]

Hiermit erklären wir, dass die Bauart von
(Herewith, we declare that the type and design of)
[Nous certifions que le modèle de]

Bezeichnung: (designation)	Druckschalter (Air pilot switch) [Pressostat]
Typ: (type)	APS...

in der gelieferten Ausführung folgenden einschlägigen Bestimmungen entspricht:
(as supplied are in conformity with the following relevant regulations:)
[est conforme, à sa livraison, aux spécifications applicables suivantes:]

EG-Richtlinie Druckgeräte 97/23/EG
(EC Pressure Equipment Directive 97/23/EC)
[Directive CE d´équipements sous pression 97/23/CE]

Angewendete Konformitätsbewertungsverfahren:
(Conformity assessment procedures applied:)
[Procédures d'évaluation de la conformité appliquées:]

Modul A
(Module A)
[Module A]

Nordhausen, den 29.10.2012 (Nordhausen, 29 October 2012) [Nordhausen, le 29 octobre 2012]

i.V. .....
Jochen Diemer (Technischer Leiter) (Chief Technical Officer) [Directeur technique]

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