

Maschinen-Elemente und Druck-Antriebe



Operating Instructions PL/PLF/DUO series Page 1

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1 General introduction

With these instructions the cylinder manufacturer offers assistance with using the supplied products.

The aim is to prevent a lack of knowledge on the part of the user resulting in avoidable damage to the product or its environment. Shortening of the achievable service life is also considered as damage here.

It is essential—and the responsibility of the user—to ensure that these instructions are understood in all points. In case of doubt the manufacturer should be contacted. The responsibility in this regard lies with the user, and not with the manufacturer.

2 **Explanation of symbols**

The following instructions contain a number of symbols intended to attract the attention of the reader. Their meaning is explained below.

	Warning about disregarding the safety information in these operating instructions
	Explanations requiring attention
	Risk of explosion
	Risk of cutting
	Risk of crushing
	Safety goggles necessary
	Safety gloves necessary
Z	Safety shoes necessary
	Risk of fire
	Available accessories

3 Product description

The cylinder belongs to the product family of "rodless cylinders".

It consists of 1 barrel (2 barrels [series DUO 96]) with an axial slot running the entire length, two cylinder end caps with air supply bores, 1 (2) pistons, steel sealing bands and an additional number of internal components.

The outer surface of the cylinder is made almost entirely of aluminium. Only a very small area consists of synthetic material (plastic/rubber) and steel/brass (screws).

The external parts and their characteristics are shown in the following figure.



4 Rating plate / Labels

Every cylinder is provided with three labels, which must be carefully observed and maintained in a legible condition!

a) Rating plate





c) Warning plate



5 Functional description

The application of compressed air causes a piston to move in the cylinder barrel. The piston is equipped with a nose-piece which extends outwards (see above). The design allows the user to attach a load here. This load is moved when the piston is actuated.

Each end of the barrel(s) terminates with a cylinder end cap (in parallel with DUO 96).

The cylinder end caps are equipped with suitable connection devices which allow pressure- and volume-regulated air to be supplied to the interior of the cylinder. Additional connection devices for mounting the unit can also be found on the end caps.

The barrel slot is sealed with precision-ground metal bands made of stainless steel.

Pressure differentials on the piston side cause the piston to always move to the low pressure range. Piston force and speed increase in proportion to the change in pressure differentials between the two piston surfaces.

 Control diagrams corresponding to user needs are available from the cylinder manufacturer for a fee.

Every cylinder has been permanently lubricated with grease on delivery in all cases!

The following information in this regard should be observed without fail! (Section 12 Operation)

6 Safety classification / Safety information

Based on engineering and manufacture, the following safety classification results for this cylinder

ATEXImage: Second systemImage: Second system $-10^{\circ}C \le Ta \le +80^{\circ}C$ ATEXImage: Second systemImage: Second system $-10^{\circ}C \le Ta \le +80^{\circ}C$ ATEXImage: Second systemImage: Second system $-10^{\circ}C \le Ta \le +80^{\circ}C$

- ▲ Where the cylinder is used for its proper / intended purpose, it may be operated in an explosive atmosphere subject to compliance with the ATEX specifications according to Directive 2014/34/EU.
- The unit is used for its proper / intended purpose where the cylinder is only operated in line with the manufacturer's technical data for the drive of loads. Only compressed air with a maximum pressure of 8 bar should be used as the drive medium!
- ▲ Where the moved loads are subject to strong pneumatic braking, this pressure (8 bar) should not be exceeded under any circumstances in the cylinder chamber on the brake side. Appropriate precautions must be taken in terms of control. Assistance is available from the manufacturer in this regard (Section 5/√).
- To ensure the unit is always used in the proper manner, see also Section 12 of these instructions.
- Failure to use the cylinder for its proper / intended purpose may result in personal injury and/or material damage. The operator bears sole responsibility for such damage, and any liability on the part of the manufacturer is excluded here.
- The staff responsible for operation of the unit or system in which the cylinder is installed must be qualified technicians who comply with the regulations such as those governing explosion protection. It is the responsibility of the cylinder operator to ensure such compliance. Assistance is once again available from the manufacturer on application.
- No modifications may be made to the cylinder unless authorised in writing by the manufacturer. This will otherwise invalidate the manufacturer's warranty and possibly cause serious harm to persons or property. In such case the entire risk shall pass to the operator of the system.
- ▲ The cylinder must be used in its original state: even adjustment of the screws on the outside of the unit is not permitted here. This will greatly impair the operational safety of the cylinder!

Nor is it permitted to remove or disable the protective devices fitted to the cylinder or system.

- Improper use of the cylinder must be avoided. In case of doubt the situation should always be clarified beforehand to maintain the operational safety of the unit. The load values of the application must not exceed the manufacturer's limit values under any circumstances.
- After switch-off and venting of the system, it should also be checked that the cylinder is depressurised. Any remaining pressure might present a risk from uncontrolled movements of the piston. In this regard please also see the operating instructions for the entire system or machine.
- The safety regulations of the employers' liability insurance association, TÜV, the German Association for Electrical, Electronic & Information Technologies (VDE), the German Engineering Association (VDMA) or any relevant national statutory provisions must be observed!
- Adhesive labels must be maintained in a legible condition.
- The plastic caps of the air connections should not be removed until just before installation of the cylinder to prevent the ingress of dirt.
- Quality of air needs to be according ISO-8573-1 of minimum class 5 classification (max. supply air temperature 60°C).
- If potential differences can occur due to the installation of the cylinder, a conductive connection to equipotential bonding must be created.
- The blowing off and possible suction of compressed air must not take place in Ex-Area.

7 Technical data

The following technical overview will help you assess the situation as regards use of the cylinder for its proper / intended purpose and where necessary, to ensure this with appropriate countermeasures.

Further checks, in particular based on calculations, should be carried out with the help of the information in the catalogue. In case of doubt the manufacturer should be contacted.

Cylinder type:PL•PLF•PL-DUO96Overall size:Ø16-40•Ø16-63•Ø2x16-32

<u>Design:</u>

Rodless double-action cylinder with direct load mounting and integrated cushioning

<u>Medium:</u>	Compressed air (dried + filtered [ISO 8573-1], lubricat
ed/unlubricated)	
Operating pressur	<u>e</u> 0,5 - 8.0bar

<u>Perm. operating / ambient temperature:</u> -10°... ≤ ... +80C°

Piston feed force [theor.]:

(equal forces on both sides)

Ø16- 110.00N	•	Ø2x16 – 200.00N
Ø25– 250.00N	•	Ø2x25 – 480.00N
Ø32- 420.00N	•	Ø2x32 – 820.00N
Ø40- 640.00N		
Ø50 – 1000.00N		
Ø63–1550.00N		

<u>Cushioning:</u>	Pneumatic – infinitely variable
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Installation position:

Any

If required, wiring diagrams are available here from the cylinder manufacturer for a small fee.

If installed vertically or at an angle, the piston should be moved to the lower end position in a controlled manner when the cylinder is depressurised to neutralise gravitational force.

8 Use and application

The compressed air cylinder supplied can be used wherever the ambient conditions meet the requirements of

ATEXImage: Second system $-10^{\circ}C \le Ta \le +80^{\circ}C$ ATEXImage: Second system $-10^{\circ}C \le Ta \le +80^{\circ}C$

Directive 2014/34/EU.

A The cylinder should only be used for linear load movements or application of force and NOT for conveying persons!

9 Transport and storage

▲ The cylinder may weigh up to 80 kg!

When transporting the unit with lifting gear, care must be taken to prevent accidents. Make sure that the cylinder's centre of gravity is positioned in the middle of the carrying cables / forks. The centre of gravity is halfway along the cylinder.

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Safety shoes should be worn without fail. It is also necessary to maintain a safe distance from the suspended load! The manufacturer and carrier should be notified immediately of any damage during transport. This also applies where the consignment is found to be incomplete.

▲ The cylinder must always be stored without sagging on a flat, horizontal surface in a dry, dust-free environment. The storage location must not be exposed to sunshine or continuous vibration. The room temperature should preferably be ~20°C.

10 Installation

▲ When installed in a system/machine, the cylinder should only ever be secured using the threaded holes in the cylinder end caps provided for this purpose!

It can be secured either directly or with the manufacturer's mounting parts from the range of accessories listed in the catalogue.

▲ The cylinder must not sag on installation!

In the case of very long cylinders, a centre support is necessary to bear the weight of moving loads! Answers to queries regarding number and positioning can be found in the manufacturer's catalogue.

▲ Rough handling (e.g. using a hammer) is not permitted.

- ▲ Where the unit is not installed horizontally, the information in Section 7 "Installation position" should be observed without fail.
- ▲ When installing the cylinder, make absolutely sure that the unit is not subjected to twisting! The line of installation between the individual screw connections of the cylinder end caps must be straight. If the line of installation is not straight, internal torsion of the cylinder will damage the unit. This may also cause ejection of the sealing bands (outer / inner band)!
- ▲ During operation the cylinder must be protected from overheating through heat radiation or the application of heat from an ambient medium! This is the responsibility of the user of the unit. ▲ ▲
- ▲ Once the cylinder has been installed, electro-welding must not be carried out on the system/machine. Should such work be necessary, the cylinder must be removed beforehand or provided with full electrical insulation. Any failure to comply with this requirement will irreparably damage the cylinder sealing system. If the barrel, seals and sealing bands are damaged in this manner, the equipment will become mere scrap!

Due to the extreme importance of this requirement, the manufacturer provides every cylinder with a **yellow warning label**. This must not be removed and should be maintained in an easily legible condition.

- ▲ The transport load should only be affixed to the dog provided for this purpose on the cylinder side - see also the description in Section 3! The resulting forces and torques must always comply with the data given in the catalogue in this regard.
- ▲ When fitting side-pieces, make absolutely sure that the external piston dog and the load to be moved have sufficient clearance.
- ▲ If an external guide system is used with the cylinder drive, restricted guidance of the piston, which has its own guide in the slotted barrel, should be avoided without fail. Any resulting forces in terms of a "shear effect" will soon damage the piston guide irreparably—and with it the slide characteristics of the piston. This cylinder will no longer be functional!
- The difficulty of ensuring that any external guide and the cylinder's own guide are aligned absolutely parallel can be reliably overcome by using the special load mounting system offered by the manufacturer.

11 Start-up

▲ Safety checks prior to start-up should be carried out without fail! This includes the following:

Check that there is sufficient clearance in the operating range of the drive (external piston range), i.e. that the piston cannot collide with any objects or persons in this area —accidental intervention in the clearance area must also be avoided. This area should only be accessible with complete stoppage of the moving parts. This applies to both initial start-up and repeated / continuous operation.



Check that all connections and mountings are securely tightened and that all input data complies with the specifications.

The following applies to initial start-up:

On delivery cushioning in the end positions is set to no-load operation with a working pressure of 6bar for each cylinder.

Cushioning should therefore be optimised by the user according to the operating conditions.

To do so, the compressed air is throttled on the exhaust side and the piston slowly moved to one of the end positions with the planned payload while observing the quality of the cushioning.

Depending on the cushioning quality observed, this can then be optimised by rotating the cushioning screw (right-hand thread) to open or close. The correct setting has been obtained when the piston gently strikes the stop at the end position with a cushioned movement.

The correctness of this setting should then be checked by moving the piston with the payload backwards and forwards several times at operating speed. The setting should be optimised as necessary by adjusting the position of the cushioning screw.

▲ The cushioning system is subject to wear and should therefore be checked regularly and adjusted as required.

12 Operation

- ▲ Any downtimes (weekends) lasting more than three days constitute a break in continuous operation. To resume continuous operation, proceed as described in Section 11.
- ▲ Downtimes which do not constitute a break in continuous operation according to the above allow further operation to resume straight away, provided that the piston is moved in both directions to check all functions.

13 Malfunctions and troubleshooting

<u>Malfunction</u>	Possible cause	Troubleshooting
Piston does not reach end position	Cushioning blocked!	Open cushioning screw
Piston too slow	Exhaust air insufficient	Open throttling valve fur- ther or increase exhaust air line
Piston not moving evenly	Supply air insufficient	Open throttling valve fur- ther or increase supply air line
Piston moving too slowly and unevenly	Supply and exhaust air not balanced	Proceed as described above
Piston not moving smooth- ly (see above) and high level of air noise around piston	Piston seal worn	Have cylinder repaired by Service
Piston not sufficiently cushioned on reaching end position	Incorrect setting, seals worn	Close/open cushioning screw further Have repaired by Service
Leakage noise along inner sealing band	Soiling along inner band edge	Have cleaned by Service
Leakage noise in end cap or piston range	Seal worn	Have repaired by Service

14 Maintenance and repair

The maintenance intervals of the cylinder depend on the operating conditions to which it is subject.

With optimum conditions only preventive maintenance is required at three-monthly intervals. The following however also applies here:

The more maintenance you perform, the longer wear parts will last!

When relubricating, only use the silicone-free greases specified by the manufacturer!

They can be ordered as following:

No.	12.589.0000 for standard operation in 30 gr tin
No.	00.200.1000 for standard operation in 1 kg tin
No.	12.589.0001 for slow piston action in 30 gr tin
	$(v \le 0.1 \text{m/s}^2)$
	10 500 4000 for clow mistor action in 4 km tin

No. 12.589.1000 for slow piston action in 1 kg tin $(v \le 0.1 m/s^2)$

Preventive maintenance includes inspecting the outside of the cylinder for overall appearance and the tightness of all screws, mountings and connections. The outside should also be cleaned with a dry, antistatic cloth to prevent electric charging of the unit.



▲ After the cylinder has run for approx. 2500 - 3000 km or 6 months, maintenance should be performed including a general overhaul of the cylinder. Check of wear off from seals, screws and accessories. Check of running behaviour.

This should preferably only be carried out by the manufacturer or by authorised technicians on site. The site personnel should always receive training in this regard. Such training is available at any time from the manufacturer of the unit subject to a charge.

When dismantling the cylinder into its individual components, the inner sealing band of the cylinder slot should be handled extremely carefully as the edges are very easily damaged.



▲ This same also applies to assembly of the cylinder! The inner sealing band must always be greased lightly before installing in the cylinder. For the grease to be used here, see above.

After overhaul of the cylinder, it must be inspected before being reinstalled in the system. Safety goggles should always be worn here as a preventive measure. Errors in assembly may cause the sealing bands (outer / inner band) to be ejected!



Bempflingen, Juni 2018

Christin herr

C. Neubauer / Management



Declaration of conformity

explosion protection directive

The company

MEDAN GmbH Auf dem Brühl 6 72658 Bempflingen Deutschland

declares in sole responsibility that the products:

Pneumatic linear actuator	piston diameter 16 … 63 mm		
rodless, Typ/Model PL	stroke 100 … 4400 bzw. 5700 mm,		
	depending on versions		
with series	PL/PLF/DUO		

in the version delivered by us, to which this statement relates, in accordance with the provisions of the EU-Directive

2014/34/EU Council directive on potentially explosive atmospheres

in it's current version with the following standards and normative documents in the current version:

The corresponding documents are deposited with the following notified body under the number TÜV-D 18 ATEX 2280:

TÜV Austria Deutschland GmbH Kurze Str. 40 D-70794 Filderstadt

EN 60079-36	Non-electrical devices for use in potentially explosive atmospheres,
EN 60079-37	Non-electrical devices for use in potentially explosive atmospheres,

The products have the following additional marking:

MEDAN GmbH Auf dem Brühl 6 72658 Bempflingen www.medan-gmbh-com	II 2G EX h IIB T4 Gb -10°C≤ Ta <u><</u> +80°C II 2D EX h IIIC T 130°C Db max. 8 bar	C	E
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The subject-matter of the declaration described above complies with the relevant Union harmonization legislation.

Bempflingen, im Juni 2018

Christian Neubauer

The accompanying operating instructions contain important safety instructions & regulations for the commissioning of these devices in accordance with Directive 2014/34/EU (ATEX). Modifications and repairs to the said devices are not permitted, except with express written consent of the manufacturer.

The costs associated with the installation new risks by the manufacturer of the new machine / system are said devices installed in a higher-level machine / plant must be assessed.

Medan GmbH, Bempflingen

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