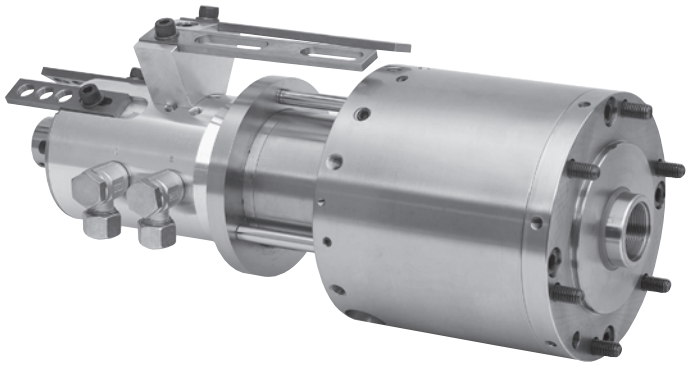
COPY OF THE ORIGINAL

INSTRUCTION MANUAL

HYDRAULIC DOUBLE PISTON CYLINDER

Type ZHVD-SZ



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SMW® AUTOBLOK

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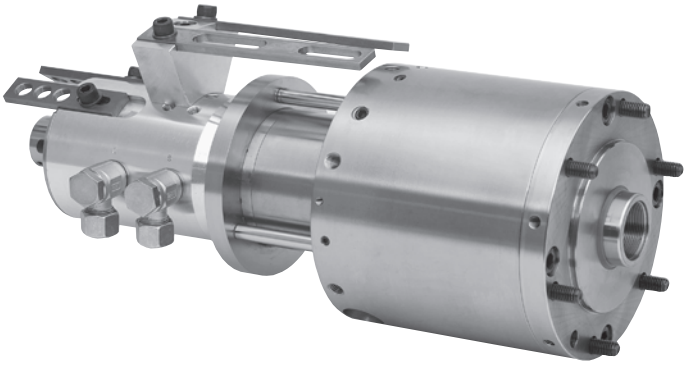


INSTRUCTION MANUAL
Hydraulic Double Piston Cylinder Type ZHVD-SZ

Thank you for purchasing an Original-SMW-AUTOBLOK cylinder type ZHVD-SZ.

This **instruction manual** contains the installation, the use and the maintenance instructions of the work holding **„ZHVD-SZ"**.

SMW-AUTOBLOK reserves the right to make **changes without notice**.

This **instruction manual is a part of the work holding** and must be passed to the new owner in case of sale.

This **instruction manual may not be** -in whole or in part- **copied** without our written agreement.

Please read the instruction manual carefully before installation and use and always follow the regulations.

Please note especially the sections which are marked with the following signs:

- **Danger of injury or danger to life if instructions are not followed.**
- **Danger of damage to the work holding, the machine or the components.**

Declaration of incorporation

for an incomplete machine
Machinery Directive 2006/42/EC, Annex II, B

The manufacturer:	SMW-AUTOBLOK Spannsysteme GmbH Wiesentalstrasse 28 88074 Meckenbeuren Deutschland / Germany

herby declares, that the following product:

Product description:	Hydraulic double piston cylinder
Application range:	Installation in machine tool
Type:	ZHVD-SZ

is intended to be installed into a completed machine. It must not be put into service until the final machine into which the partly completed machinery it is to be incorporated has been declared in conformity with the provisions of the EU machine directive (2006/42/EC) Annex II, B.

Applied harmonized norms:

- DIN ISO 12100 (2011)
- DIN ISO 13857 (2008)

The following basic requirements of Annex I, 2006/42/EC are complied with:

- No. 1, 1.1, 1.1.1, 1.1.2, 1.1.3
- No. 1.3.2, 1.3.3, 1.3.4, 1.3.7, 1.3.8
- No. 1.5, 1.6.1
- No. 1.7.1, 1.7.3, 1.7.4

The special technical documents have been created in accordance with Annex VII, Part B. These documents will be made available electronically on a reasoned request by the national authorities.

Responsible for documentation:	Schilling Rainer Chief designer
Place:	Meckenbeuren (Germany)
Date:	29.12.2009

Eckhard Maurer
President

General safety instructions

1. Correct use
SMW-AUTOBLOK cylinders are designed to actuate chucks on lathes or grinding machines. Any other use is dangerous and is prohibited by the manufacturer, no other use of this product is intended nor should any other use be attempted. SMW-AUTOBLOK refuses any responsibility caused by misuse of the cylinder.

2. Demands on operators
SMW-AUTOBLOK cylinders must be installed, operated and maintained by qualified and trained personal only.

3. Visual inspection
Please check the product for visible damage prior to use!

4. Transport
Please use suitable lifting gear for product heavier than 16 kg!

5. Safety requirements for the machine
- Operate only with safety guards installed. Without safety guards no persons must stay in the endangered area.
- SMW-Autoblok double piston cylinders are double-acting cylinders on which cylinder 1 is equipped with a safety non-return valve. At sudden loss of pressure during operation, the pressure in the cylinder will remain until the spindle has stopped. Never use cylinder without non-return valve. Cylinder 2 is not equipped with a safety non-return valve.
- The operation / monitoring of the cylinder by machine CNC must be according to the relevant safety regulations.
- All maintenance and operation must be carried out at safe stand still of the machine spindle only.
- In case of a sudden drop of pressure during machining the pressure in the cylinder is maintained, until the machine spindle has come to a standstill. Never operate the cylinder without safety valves.

6. Max. speed
Never exceed the max allowed speed (see technical data).

7. Residual risks
The system machine tool/ chuck/ cylinder is affected by the characteristic of the work piece (shape, unbalance, material and so on) as well as by the cutting details which can cause a residual risk.
This residual risk must be taken into consideration by the operator and has to be eliminated by suitable actions.

8. Maintenance
SMW-Autoblok cylinders in general are maintenance free. The maintenance is limited to cleaning, inspection and changing the oil and the filters on the hydraulic power unit. Use original SMW-Autoblok spare parts and accessories only. Insufficient and incorrect maintenance make any warranty from SMW-Autoblok void.

9. Environment protection
Danger for environment when handling incorrect!
Incorrect handling of environment hazardous materials, especially the disposal, may result in environmental damage.
- Always follow below instructions.
- In case environmentally hazardous material polluted the environment always take suitable actions immediately. If in doubt, inform the local authority about the pollution.

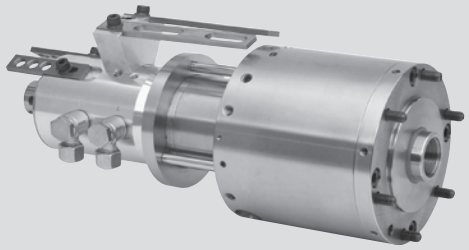
The following hazardous materials are used: Lubricants such as oil and grease can contain poisonous agents. They must not pollute the environment. The disposal must be carried out by a suitable waste management company.
For a proper function of the work holding, use original SMW-AUTOBLOK lubricant only.

In case of doubts or questions please ask SMW-AUTOBLOK or one of our authorized offices.

ZHVD-SZ

Rotating hydraulic cylinder with 2 independent pistons

- **up to 80 bar**
- **central bore for air/coolant/oil**
- **stroke control via proximity switch or linear positioning system**



Application/customer benefits

- Actuation of retractable jaw chuck with power operated face drivers
- Actuation of power chuck with part-ejector
- Actuation of power chucks with retractable axial stop/finger chucks with power operated centering fixture

Technical features

- Double piston cylinder with 4 way oil manifold for separate actuation of the cylinders
- Horizontal or vertical installation
- Stroke control on each cylinder, safety valves on the big cylinder
- Central bore for coolant, oil or air with thread for rotary union
- Mounting from the rear side with bolts
- A 10 µm filter in pressure line is requested. Use oil HM32 ISO 3448
- Pressure range 8-70 bar

Standard equipment

Double piston cylinder
Mounting screws
Stroke control on each cylinder
Proximity bracket (without proximity switch)

Ordering example

Double piston cylinder ZHVD-SZ 068-17
or
Double piston cylinder ZHVD-SZ 068-17 with rotary union (optional)

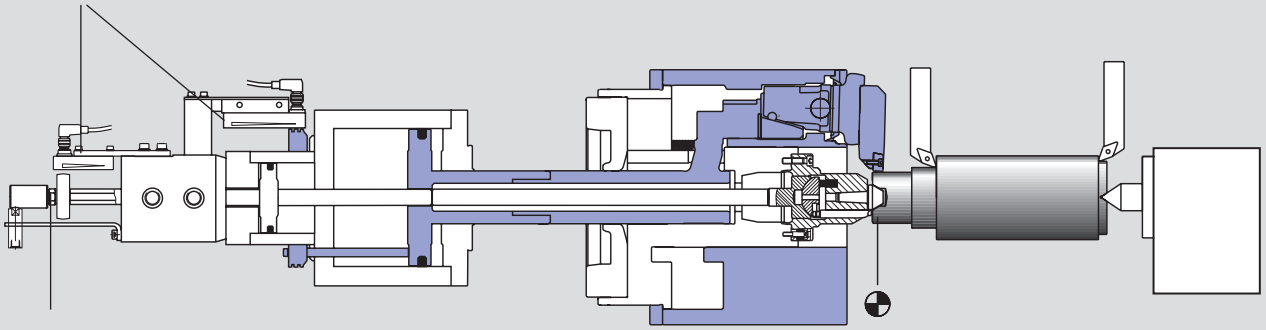
Technical data

SMW-AUTOBLOK Type **Id. No.**		**ZHVD-SZ 068-17** **044429**	**ZHVD-SZ 110-25** **044577**	**ZHVD-SZ 240-40** **045220**
Piston stroke	mm	70/15	90/15	105/20
Piston area A/piston force max.	cm^2/kN	68/54	110/88	241/144
Piston area B/piston force max.	cm^2/kN	60/48	92/73	222/133
Piston area C/piston force max.	cm^2/kN	16/12	25/20	40/24
Piston area D/piston force max.	cm^2/kN	14/11	21/16	36/21.6
Speed max.	r.p.m.	5000	4000	4000
Weight	kg	26	37	68
Moment of inertia	$kg \cdot m^2$	0.065	0.125	0.42
Operating pressure max.	bar	80	80	60
Operating pressure min.	bar	8-10	8-10	8-10
Oil leakage (*)	dm^3/min	3	3	3

* Total at 30 bar / 50 °C
** At max. speed/ oil HM32 ISO 3448
Important: On higher pressure the leakage increases proportionally. On higher oil temperature the leakage increases over proportionally (the use of an oil cooler is recommended). When designing/checking the hydraulic unit please ask for our data sheets

ZHVD-SZ cylinder with retractable jaw chuck and power operated face driver

Linear stroke control
LPS-XS/LPS-NT (option)



Rotary union
(option)

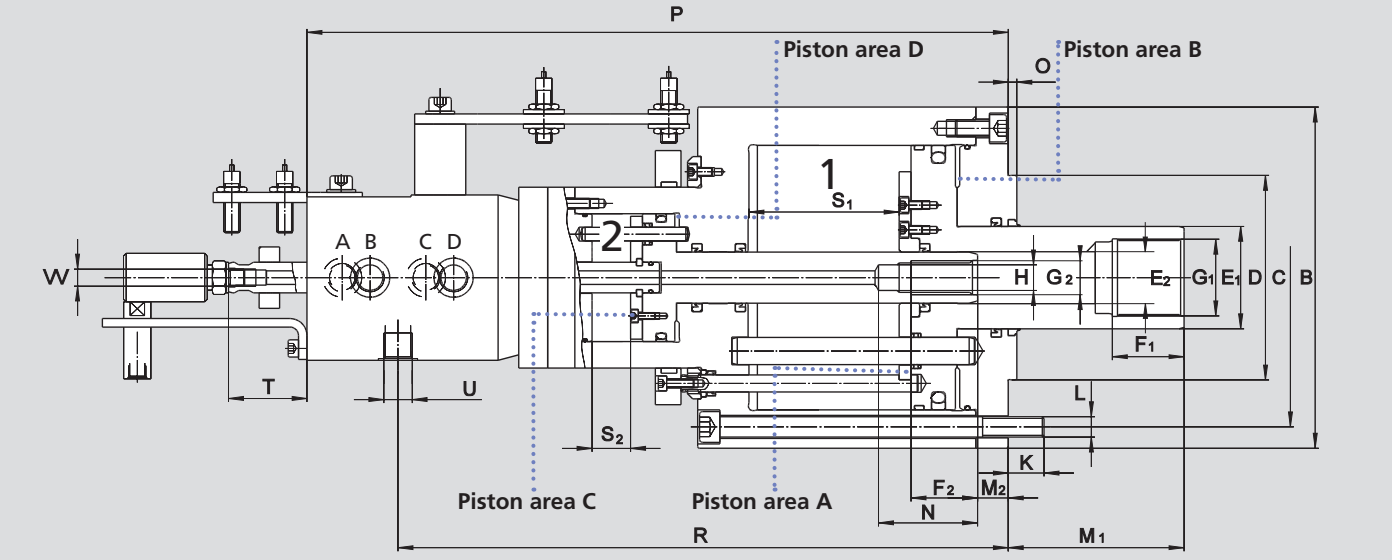
Piston 2
for actuation of the driving pins in the face driver

Piston 1
for actuation of the chuck and clamping jaws

ZHVD-SZ

- up to 80 bar
- central bore for air/coolant/oil
- stroke control via proximity switch or linear positioning system

Rotating hydraulic cylinder with 2 independent pistons



Subject to technical changes.
For more detailed information please ask for customer drawing.

SMW-AUTOBLOK Type Id. No.			ZHVD-SZ 068-17 044429	ZHVD-SZ 110-25 044577	ZHVD-SZ 240-40 045220
	B	mm	165	198	230
Fixing bolts circle	**C**	mm	145	175	205
Centering rim	**D** h6	mm	105	120	160
	E1	mm	45	60	60
	E2	mm	25	30	30
	F1	mm	33	42	42
	F2	mm	28	41	39
Piston rod thread 1	**G1**	mm	M36 x 1.5	M45 x 1.5	M50 x 1.5
Piston rod thread 2	**G2**	mm	M16	M20	M20
	H	mm	13.5	15	15
	K	mm	15	15	21
Fixing bolts/number	**L**	mm	M10 / 6x	M12 / 6x	M12 / 6x
max./min.	**M1**	mm	82/12	105/15	106/1
max./min.	**M2**	mm	33/18	33/18	67/47
	N	mm	50	58	58
	O	mm	5	5	5
	P	mm	381	400	442
	R	mm	329	348	389
Stroke Piston 1	**S1**	mm	70	90	105
Stroke Piston 2	**S2**	mm	15	15	20
max./min.	**T**	mm	48/33	52/37	77/57
	U	mm	G3/8"	G3/8"	G3/8"
	W	mm	M10 x 1	M10 x 1	M10 x 1

Option: LPS-NT Linear stroke control
Rotary union for oil/coolant/air

- Double piston cylinders have 2 independent cylinder chambers (for piston 1 and piston 2).

- Piston 1 is used for the chuck actuation piston 2 for the face driver or movable centers.
  Piston 1 has a built in safety valve for both functions open and close.

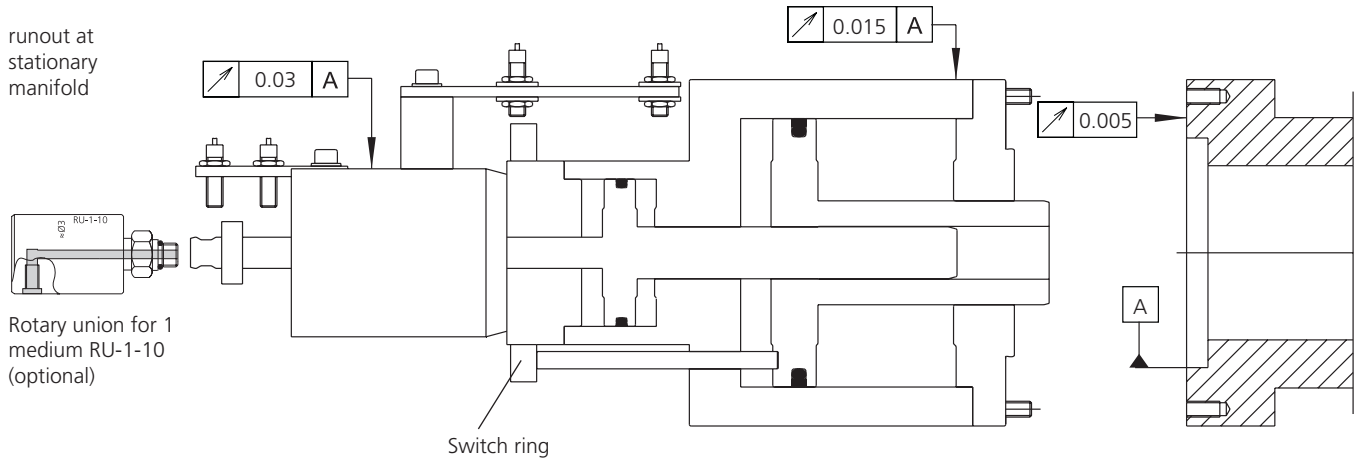
- Piston 2 has no safety valves.
  The hydraulic operation of cylinder 1 and cylinder 2 must be carried out with 2 individual hydraulic circuits.

- Both pistons of the cylinder can be monitored by proximity switches or a linear stroke control.

- A manifold for 1 media can be installed to the cylinder as an option.

Installation to the machine spindle

Pic. 1



Do not expose the cylinder to any shocks during or after unpacking or during installation!

Do not put the cylinder onto the switch ring or switch rods of the stroke control and never use it to lift the cylinder. The switch ring will get damaged!

Clean the cylinder.

Check the cylinder flange of the machine for face and radial run out as well as for flatness. (Pic. 1).

Screw in the draw tube/bar and pressure bar into the cylinder using Loctite lite. Never apply force.

Mount the cylinder and adjust it for run out according to pic. 1. Tighten the mounting bolts with a torque wrench accoding to below table.

The anti rotation bracket and the flexible hoses must not apply any force onto the cylinders oil manifold. Use cylindrical fi tting of correct lenght only.

Before connecting the hoses to the cylinder bleed and flush the hoses to remove any contamination. Check all fittings for sealnes. Connct the cylinder according to pic. 2.

All pressure lines must have filters with 10 micron (mm). Oil type 3° E (HLP-32) at 50 ° C oil temperature. Max oil temperature 55°C.

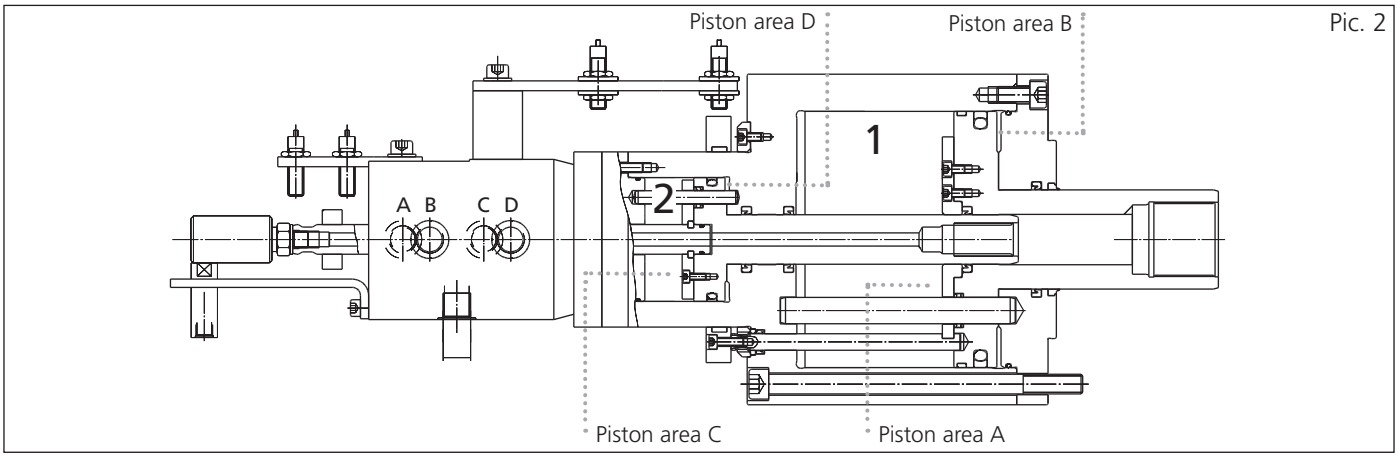
No additional parts must be attached to the oil manifold or the coolant collector. Connect the manifold if mounted.

The drain hose has to have a constant decline towards the tank of the power unit. It must not create any back pressure.

Boltsize	F (kN)	M (Nm)
M8	16	23
M10	26	45
M12	38	77
M16	72	190
M20	100	370

Ports	Description
A	chuck clamp
B	chuck open
C	face driver clamp
D	face driver open
L	leakage oil delivery

Pic. 2



Installation of hydraulic double piston cylinder

Important:
Never allow the cylinder to rotate without oil pressure.
This will damage the bearings, cause seizure of the distribution ring and the body.

Never rotate the cylinder at high speed with cold oil!
This could damage the bearings and the manifold ring.
We recommend making a few movements (opening/ closing) at a low speed before starting.

The ZHVD-SZ cylinders consit of two parts:
one is fixed and one rotates at high speed.
As a consequence, there is the possibility of a seizure between the two parts in case of non-compliance with the correct installation and maintenance instructions.

When the cylinder is rotated for the first time, be careful that all personnel stand well clear of the cylinder.

Start up:

- Actuate the cylinder approx 10 times at stopped spindle and check if the oil is flowing.
- Stroke control via proximity switch or linear positioning system LPS-LPS-X or LPS-XS).
- Rotate the spindle at 500 rpm. while applying the max. allowed hydraulic pressure, and actuate the cylinder several times.
- No the cylinder is ready for operation.

The max speed n_{max} must only be used when the oil temperature has reached min. 30 ° C!

Danger of injury!
Never touch the cylinder when operating the cylinder or the machine. Danger of squeezing in the switch ring area and also the complete cylinder is rotating!

Only operate the machine with the safety covers of the machine closed. No persons must stay in the hazardous area!

Observe all safety instruction for the stroke and pressure control.

Always observe all data on the cylinders label.

Operation

The operating pressure for the pistons 1 and 2 has to be according to the technical data of the corresponding chuck (W or GSA).

The pressures and the resulting actuating forces are indicated on the drawings of the corresponding top tooling drawings.

Never exceed these values!

Maintenance

Cylinders need only little maintenance.

The maintenance needed is regular cleaning of the cylinder and inspection for leakage and physical damages. The hydraulic oil of the power unit of the machine must be refilled and changed regularly. All filters need to be changed regularly.

The first oil change must be carried out after 1200 to 1500 operating hours, after that 1 time per year. Always use the correct oil according the cylinders label.

Indirect risks

Indirect risks are the risks that can derive from improper working or driving of the ZHVD-SZ-cylinder, when clamping components with power chucks.

The machine must be allowed to rotate only under the following conditions:

a) After having checked with a pressure gauge that the feeding circuit has reached the requested pressure.
b) After the proximity switches (2 pcs or more) have confirmed the position of "component clamped".

The electric and hydraulic circuits of the machine must guarantee that the component cannot move during the spindle rotation (safety agaist an accidental opening / closing of the workholding system).

It is necessary to use double-solenoid valves with detented positions, to ensure that the position is kept in the case of lack of current (to prevent the opening of the jaws of the chuck).

Annual:
Inspection of the safety valves of the cylinder.

For testing a grip force meter is clamped in a set of test jaws (do not come with the chuck as a standard).

After switching off the pressure the grip force must not drop by more than 1/3 within 4 minutes.

Hydraulic power unit and recommended oils

The unit's tank capacity must be at least 4 times the nominal output of the pump measured in litres/min. (eg; with a 12 l/min pump the power unit tank must have a capacity of at least 45-50 litres). Should this be impossible, we recommend using oil-cooling systems. The best operating temperature for hydraulic rotating cylinders is between 35° and 60° C (even 70° C will not cause any problem).

The hydraulic system must have an aspiration filter with links of 50-60 µ and a 10 µ feeding filter (we suggest to use filter efficiency control systems). The delivery filter must be replaced every 6-8 months.

ZHVD-SZ-cylinders have large oil feeding holes; in order to take advantage of this and achieve good piston speed, the pump of the hydraulic power unit must have adequate delivery capacity.
The feeding circuit must have the shortest pipes possible, without constrictions and the electrovalves must have a large cross section for the oil flow.

Recommended oils

The oil to be used with hydraulic rotating cylinders is specified in the ISO 3448 type HM 32 regulation. For example:

- Shell-Tellus 32
- Agip OSO 32
- ESSO NUTO H32 (or TERESSO 32)
- Mobil DTE 24 (or DTE light)

We do not recommend using higher density oils because they could create serious problems in the cylinder's rotation at high speeds and with cold oil.

Disfunctions

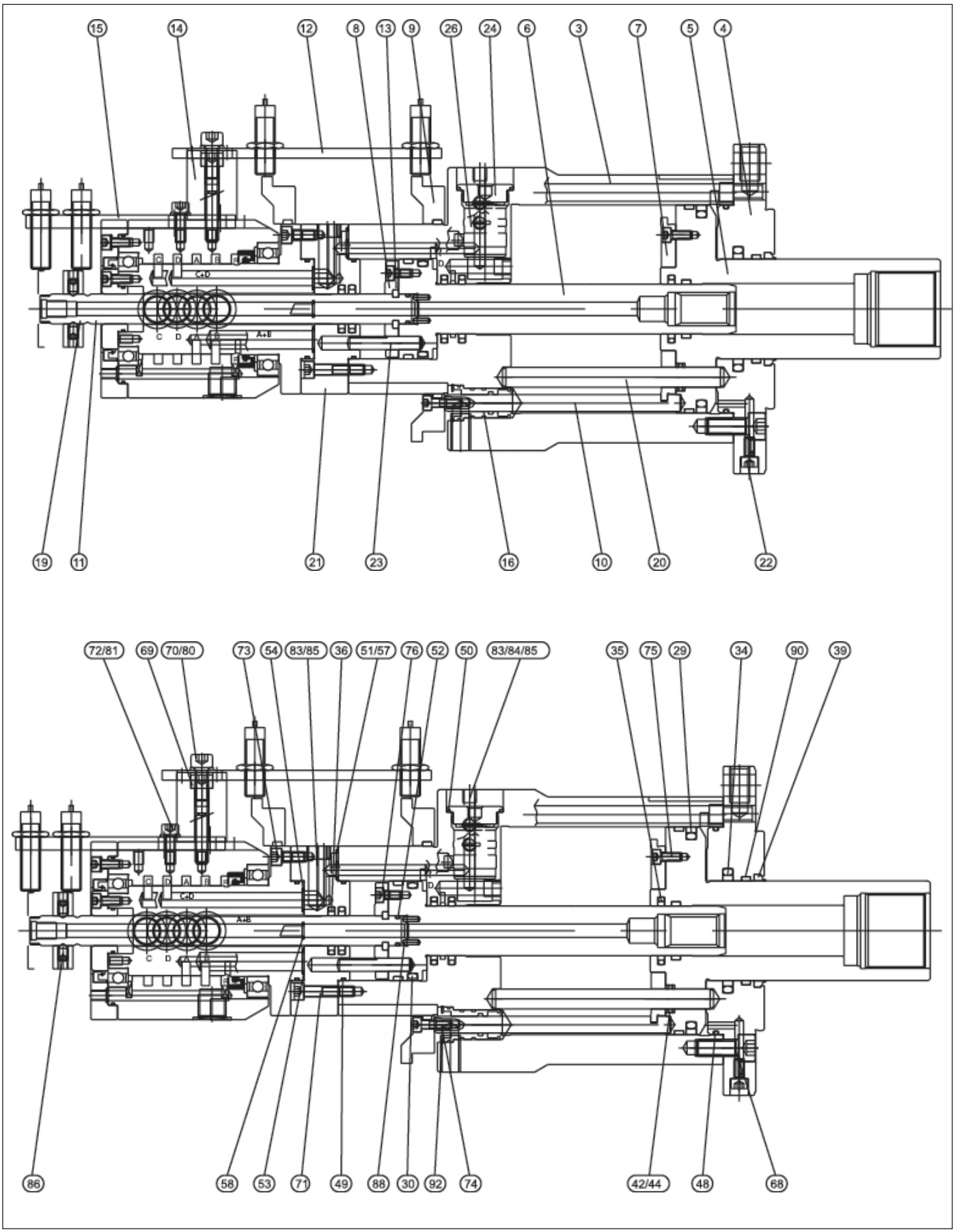
Double piston cylinders consist of 2 assembly groups:

- Oil manifold
- Cylinder part

At loss of pressure, leakage or failure of the oil manifold the complete cylinder needs to be replaced, since at a repair on site the required test-bench run and balancing is not possible and thus also safety risks exist.

Do not disassemble the oil manifold, since a correct assembling without special tools is not possible.

In case of disfunctions our service or one of our worldwide subsidiaries will be available for at any time.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C+D
A+B
C D
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72/81
69
70/80
73
54
83/85
36
51/57
76
52
50
83/84/85
35
75
29
34
90
39
86
58
53
71
49
88
30
92
74
42/44
48
68

Spare parts

No.	Description
3	Cylinder body
4	Cylinder cover
5	Piston 1
6	Piston 2
7	Washer K1
8	Washer K2
9	Ring
10	Rod
11	Switchstick
12	Proximity switch bracket
13	Split ring
14	Proximity switch carrier
15	Short proximity switch carrier
16	Sleeve
19	Switch ring
20	Anti rotation pin
21	Intermediate flange
22	Hexagon head pipe plug
23	Cylinder pin
24	Cover
26	Valve cpl.
29	Piston seal
30	Piston seal
34	Rod seal
35	Rod seal
36	Rod seal
39	Scraper
42	Square ring
44	Support ring
48	O-ring
49	O-ring
50	O-ring
51	O-ring
52	O-ring
53	O-ring
54	O-ring
57	O-ring
58	O-ring
68	Cylinder head screw ISO 4762
69	Cylinder head screw ISO 4762
70	Cylinder head screw ISO 4762
71	Cylinder head screw ISO 4762
72	Cylinder head screw ISO 4762
73	Cylinder head screw ISO 4762
74	Cylinder head screw ISO 4762
75	Cylinder head screw ISO 4762
76	Cylinder head screw ISO 4762
80	Washer
81	Washer
83	Set screw
84	Set screw
85	Set screw
86	Set screw
88	Pin
90	Piston ring
92	Seeger ring

12 months warranty

Product: Hydraulic double piston cylinder

SMW-AUTOBLOK provides a warranty on the purchased product for 12 months from the date of purchase as stipulated in our General Terms of Sale in the following cases:

- The defect was not known to the customer at the time of purchase.
- The defect is not due to wear as a result of use.
- The customer has not been negligent by improperly operating or incorrectly maintaining of our product. Refer to the enclosed instruction manual for operation and maintenance information.
- It is not a wear part such as seals, rollers or valves.
- Especially work piece touching parts such as jaws, locators, inserts, rollers and face drivers are excluded from warranty.
- Only original SMW-Autoblok parts have been used such as spare parts, seals, rollers, valves, jaws, locators, inserts and face drivers.
- There is evidence that the maintenance intervals in the operating instructions have been followed. The customer must provide maintenance documentation for this purpose. The maintenance performed must be documented in the maintenance section of the operating instructions and signed by a properly authorized person.

Please note that, if the above requirements are not met, the warranty is only invalid if the defect already existed at the time of transfer of risk, which is usually upon delivery of the product, unless the customer was aware of the defect at the time of transfer of risk.

24-months warranty
-optional-

Product: Hydraulic double piston cylinder

Against additional fee, SMW-AUTOBLOK offers a warranty on the purchased product for 24 months from date of purchase as a modification to the 12-month limitation period stipulated in our General Terms of Sale if the following conditions are met:

- An extension of the warranty from 12 to 24 months has been agreed upon in writing with SMW-AUTOBLOK.
- There is no defect due to wear as a result of use.
- The defect was not known to the customer at the time of purchase.
- The customer has not been negligent by improperly operating or incorrectly maintaining of our product. Refer to the enclosed instruction manual for operation and maintenance information.
- It is not a wear part such as seals, rollers or valves.
- Especially work piece touching parts such as jaws, locators, inserts, rollers and face drivers are excluded from warranty.
- Only original SMW-Autoblok parts have been used such as spare parts, seals, rollers, valves, jaws, locators, inserts and face drivers.
- There is evidence that the maintenance intervals in the operating instructions have been followed. The customer must provide maintenance documentation for this purpose. The maintenance performed must be documented in the maintenance section of the operating instructions and signed by a properly authorized person.
- Paid inspection by or at SMW-AUTOBLOK is mandatory.
  Minimum interval with maintenance documentation by SMW-AUTOBLOK.

Single shift operation	once in 24 months
2- and 3-shift operation	once in 12 months

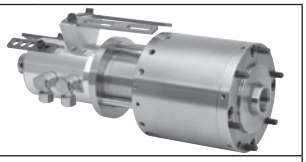
  The customer is responsible for having inspections performed on time.
- The delivery location and machine location are within Germany.

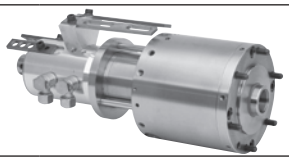
Documentation of maintenance

Product: _____

Serialno.: _____

Regular and documented maintenance conserves the value of your work holding, and ensures warranty!

Maintained according to instruction manual	**YES** ☐ 
Operating hours	
Name	
Date	
Signature	
Remarks	

Maintained according to instruction manual	**YES** ☐ 
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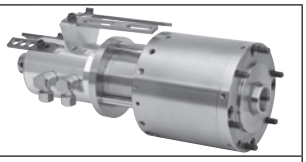
Remarks	

Maintained according to instruction manual	**YES** ☐ 
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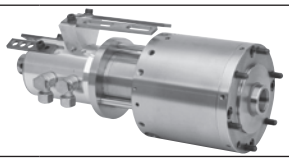
Maintained according to instruction manual	**YES** ☐ 
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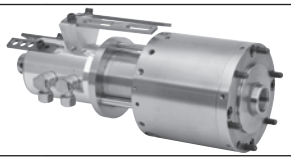
Maintained according to instruction manual	YES ☐ 
Operating hours	
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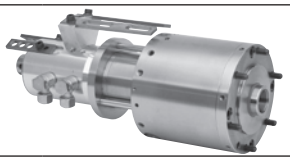
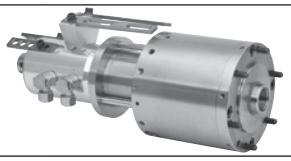
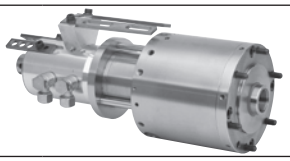
Remarks	

Maintained according to instruction manual	YES ☐ 
Operating hours	
Name	
Date	
Signature	
Remarks	

Maintained according to instruction manual	YES ☐ 
Operating hours	
Name	
Date	
Signature	
Remarks	

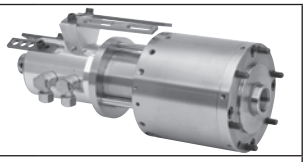
Maintained according to instruction manual	YES ☐ 
Operating hours	
Name	
Date	
Signature	
Remarks	

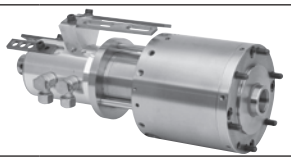
Documentation of maintenance

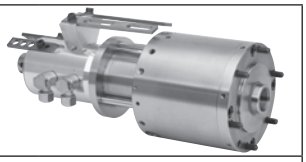
Product: _____

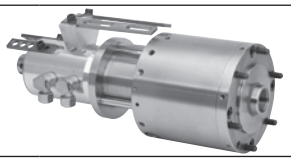
Serialno.: _____

Regular and documented maintenance conserves the value of your work holding, and ensures warranty!

Maintained according to instruction manual	**YES** ☐ 
Operating hours	
Name	
Date	
Signature	
Remarks	

Maintained according to instruction manual	**YES** ☐ 
Operating hours	
Name	
Date	
Signature	
Remarks	

Maintained according to instruction manual	**YES** ☐ 
Operating hours	
Name	
Date	
Signature	
Remarks	

Maintained according to instruction manual	**YES** ☐ 
Operating hours	
Name	
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Remarks	

Documentation of maintenance

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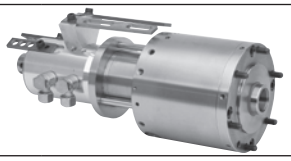
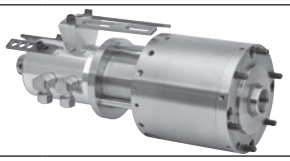
Regular and documented maintenance conserves the value of your work holding, and ensures warranty!

Maintained according to instruction manual	YES ☐ 
Operating hours	
Name	
Date	
Signature	
Remarks	

Maintained according to instruction manual	YES ☐ 
Operating hours	
Name	
Date	
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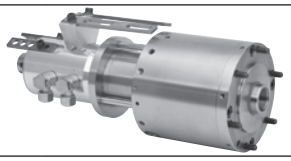
Remarks	

Maintained according to instruction manual	YES ☐ 
Operating hours	
Name	
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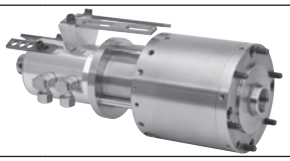
Maintained according to instruction manual	YES ☐ 
Operating hours	
Name	
Date	
Signature	
Remarks	

Empfangsbestätigung für die Betriebsanleitung
Confirmation of receipt of the instruction manual

Hiermit bestätigt die vom Betreiber/ Anwender beauftragte Person

This certifies the operator assigned by the operating company

Herr / Frau

Mr. / Mrs.

den Erhalt der Betriebsanleitung sowie deren Inhalte, insbesondere das Kapitel Sicherheit gelesen und verstanden zu haben.

hereby confirms to have received the instruction manual and to have read and understood the content, especially the chapters concerning safety.

Bediener	Datum	Operator	Date
Betreiber / Sachbeauftragter	Datum	Operating Company / Authorised person	Date

Id.Nr. / Id. No. :

Artikelbez. / Item :

Gewicht / Weight :

Seriennr. / Serialno. :

Bitte ausgefüllt zurückschicken an:

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Mail: vertrieb@smw-autoblok.de

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Id. No.	:	
Item	:	
Weight	:	
Serialno.	:	

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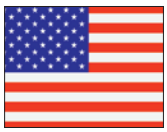

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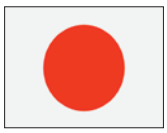

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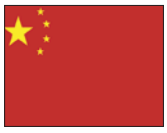

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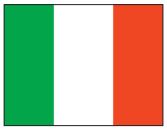

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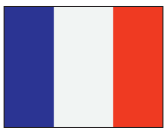

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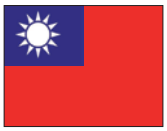

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