

Operating Manual

DELTA MF4

Membrane Valve with Bellow Unit



Read and understand this manual prior to operating or servicing this product.



Declaration of Conformity for Valves and Valve Manifolds

APV Rosista GmbH, Zechenstr. 49, D-59425 Unna-Königsborn
as manufacturer with sole responsibility declares that the

**double seat valves of the series D2, SD4, SDT4, SDM4, SWcip4, DSV,
DA3, DE3, DEU3, DET3, DKR2, DKRT2, DKRH2**
in the nominal diameters DN 25 - 150, 1" - 6" and 1 Sh5 - 6 Sh5

butterfly valves of the series SV1 and SVS 1 F
in the nominal diameters DN 25 - 100, DN 125 - 250 and 1" - 4"

ball cocks of the series KH, KHV
in the nominal diameters DN 15 - 100

**single seat, diaphragm and spring loaded valves of the series
S2, SW4, SWmini4, SWT4, M3, MF3, M4, MF4, MP4, MS4, AP1, APT1, CPV, RG4,
RGM4, RGE4, RGEM4, PR2, PR3, PR4, SI2, UF3, VRA, VRAH**
in the nominal diameters DN 10 - 150, 1/2" - 4" and 1 Sh5 - 6 Sh5


and the valve manifolds installed thereof

meet the requirements of the Directives 89/392/EEC (amendment 93/44/EEC),
replaced by 98/37/EC and GSG - 9.GSGV.

For official inspections, APV Rosista GmbH presents
a technical documentation according to appendix V of the Machinery Directive,
this documentation consisting of documents of the development and construction,
description of measures taken to meet the conformity and to correspond with
the basic requirements on safety and health, incl. an analysis of the remaining risks
as well as an operating manual with safety instructions.

The conformity of the valves and valve manifolds is guaranteed.

D-59425 Unna-Königsborn, June 04, 2008
APV Rosista GmbH



Manager Research and Development

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1. General Terms

This operating manual should be read carefully by the competent operating and maintenance personnel.

We point out that we will not accept any liability for damage or malfunctions resulting from the non-compliance with this operating manual.

Descriptions and data given herein are subject to technical changes.

2. Safety Instructions



Danger !

- The technical safety symbol draws your attention to important directions for operating safety. You will find it wherever the activities described are bearing risks of personal injury.
- Electric and pneumatic connections must be separated.
- Before any maintenance of the valve, the line and cleaning system must be depressurized and discharged if possible.



- **Do not reach into the open valve.**
Risk of injury.

- Observe service instructions to ensure safe maintenance of the valve. The valve must only be assembled, disassembled and reassembled by persons who have been trained in APV valves or by APV service team members. If necessary, contact your local APV representative.
- If the bellow unit is damaged, leakages drain off the leakage bore in the yoke area.
- **Attention!**
With valve design NC (normally closed): control the actuator with air before releasing the housing screws.



- **Attention!**
Welded actuators are preloaded by spring force.
Opening of the actuators is strictly forbidden.
Danger to life!

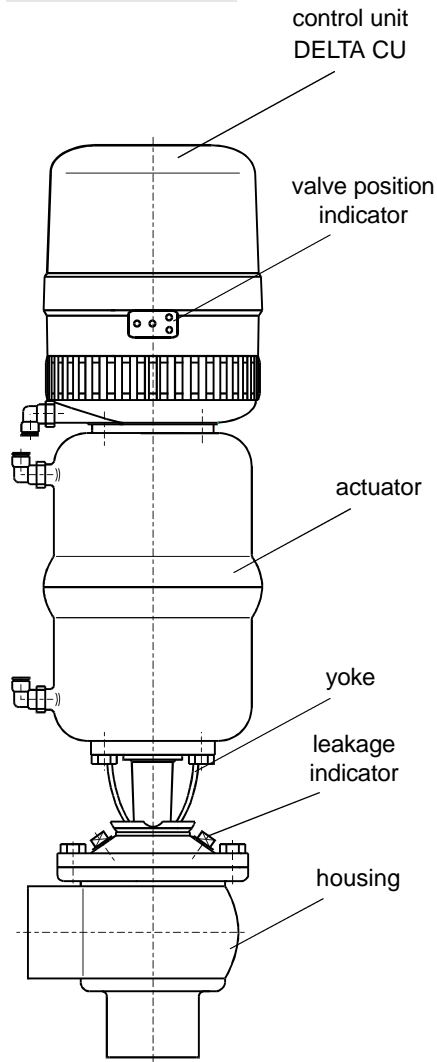
Actuators which are no longer used and / or defective must be disposed in professional manner.

Defective actuators must be returned to your APV Solutions & Services company for their professional disposal and free of charge for you.

Please address to your local APV representative.

3. Mode of Operation

DELTA MF4



The membrane valves with bellow unit DELTA MF4 have been developed for use in the brewing and beverage industries, dairy and food applications as well as in the chemical and pharmaceutical industries.

The function of the DELTA MF4 valve is to shut off line sections.

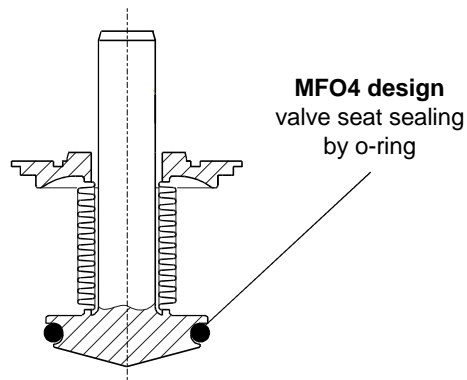
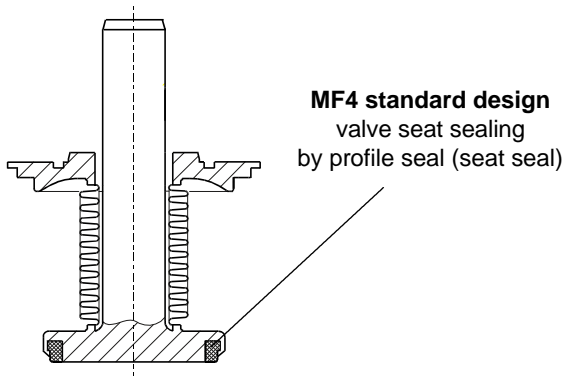
The membrane valves with bellow unit offer optimum protection of the product in hygienic and aseptic applications. Product safety is provided by the hermetic separation of the product chamber from the environment (atmosphere) by a metal bellow.

- Operation by pneumatic actuator with air connection, reset by spring force.
- By different assembly of the actuator, the following designs can be realized:

NC: actuator normally closed
("fail-down": air-to-raise, spring-to-lower)

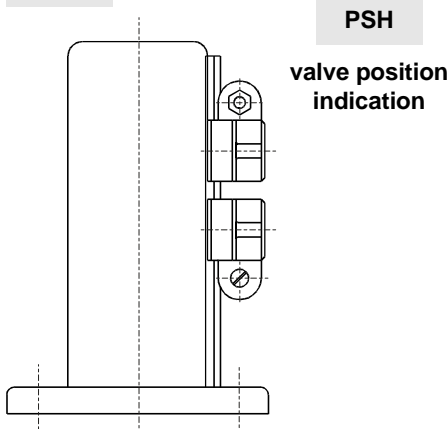
NO: actuator normally open
("fail-up": air-to-lower, spring-to-raise)

- The inner parts of the actuator are maintenance-free.
- The cleaning of the inner area of the valve is undertaken during CIP cleaning of the line system.
- Leakages at the bellow unit are indicated at the leakage drain in the yoke area.
- For the pneumatic control of the valve, a control unit is installed on top of the actuator.
- The yellow luminous diodes installed in the control unit indicate the position of the valve rod.



4. Auxiliary Equipment

fig. 4.1



4.1 Valve position indication (fig. 4.1)

For the valve position indication, a proximity switch holder (PSH) can be installed direct on the actuator.

To signal the limit position of the valve seat, proximity switches can be mounted to the holder if required.

We recommend our APV standard types:

operating distance: 5 mm / diameter: 11 mm.

If the user decides to apply valve position indicators other than APV type, we cannot take over the liability for any malfunctions resulting therefrom.

4.2 Control Unit (fig. 4.2)

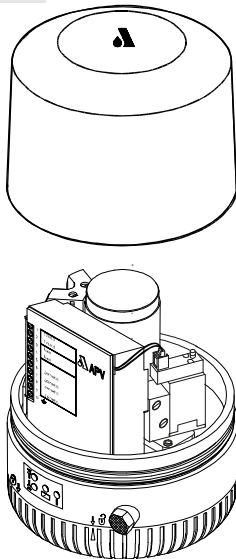
The assembly of a control unit on the MF4 valve is possible.

The following designs are available:

solenoid valve (SV)	
Direct Connect ref.-No.:	CU31 Direct Connect 16 - 31 - 232/93
Profibus ref.-No.:	CU21V 16 - 31 - 237/93
Device Net ref.-No.:	CU31 Device Net 16 - 31 - 240/93
AS-Interface ref.-No.:	CU31 AS-interface 16 - 31 - 244/93

- For the assembly of the control unit on the MF4 valve an adapter is required.

fig. 4.2



adapter	
designation: ref.-No.:	CU2 - adapter SW4 / SD4 / M4 08-48-415/93

4.3 Connections:

Beside the housings with weld ends, the following connections are alternatively available:

- threaded port according to DIN 11851
- threaded port IDF / ISS according to ISO 2853
- threaded port RJT according to BS 4825-5
- threaded port SMS
- threaded port according to DS 722
- flange connection FGN1 DIN
- flange connection FGN1 Inch
- clamp connection according to DIN 32676
- clamp connection according to ISO 2852

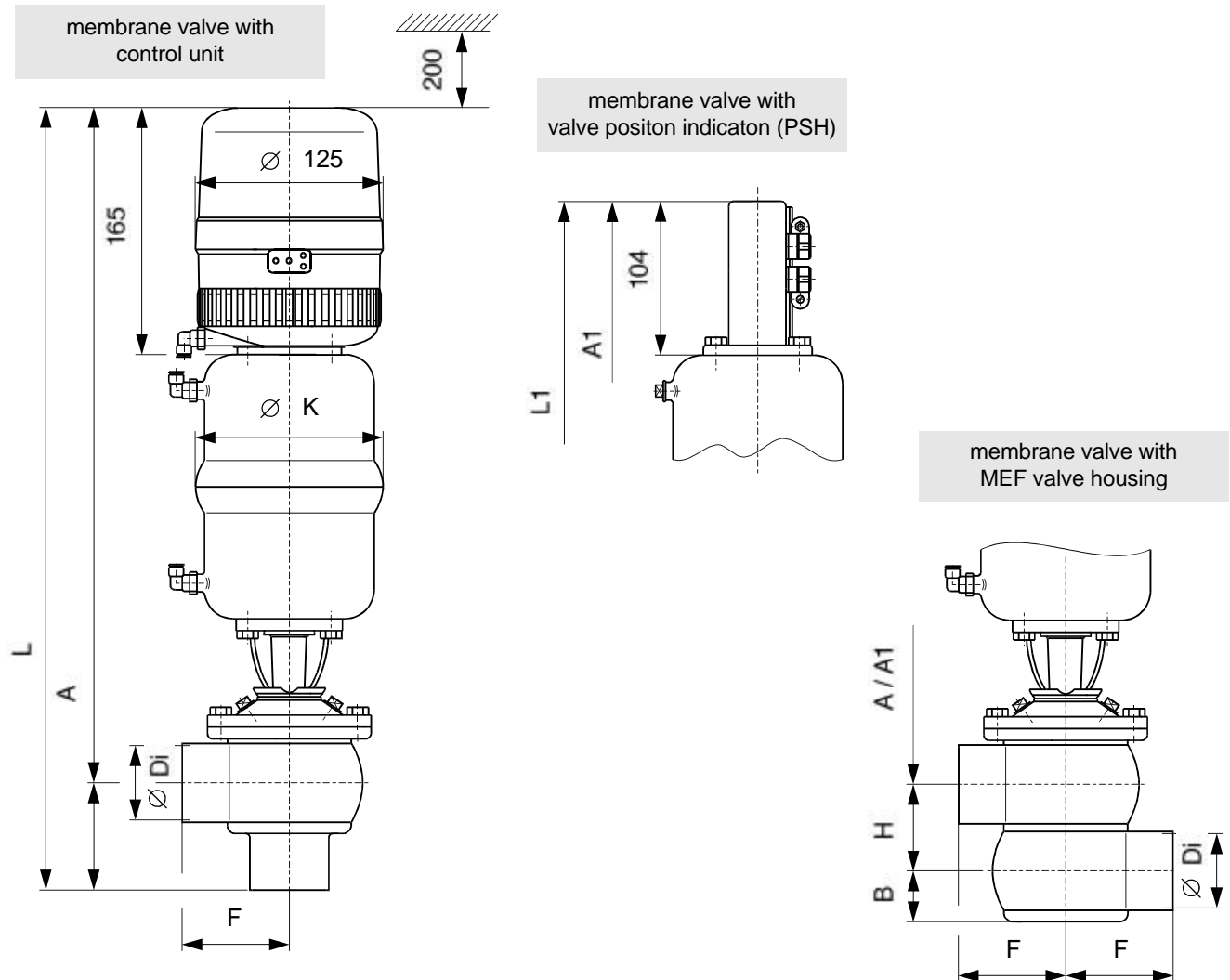
5. Installation

- The installation of the valve must be undertaken in such a manner that fluids can drain off the valve housing and should be provided preferably in vertical position.
- The valve housing can be welded direct into the pipeline (completely dismantable valve insert).
- **Attention:** Observe welding instructions.

5.1 Welding Instructions

- Before welding of the valve, the valve insert must be dismantled from the housing. Careful handling to avoid damage to the parts is necessary.
- Welding should only be carried out by certified welders (EN 287-1). (Seam quality EN 25817 "B").
- The welding of the valve housings must be undertaken in such a way that the valve body is not deformed.
- The preparation of the weld seam up to 3 mm thickness must be carried out as a square butt joint without air. (Consider shrinkage!)
- TIG orbital welding is best!
- After welding of the valve housings or of the mating flanges and after work at the pipelines, the corresponding parts of the installation or pipelines must be cleaned from welding residues and soiling. If these cleaning instructions are not observed, welding residues and dirt particles can settle in the valve and cause damage.
- Any damage resulting from the non-observance of these welding instructions is not subject to our guarantee.

6. Dimensions / Weights



DN	A	A1	B	Ø Di	F	H	Ø K	L	L1	weight in kg
25	409	348	19	26	50	32	86	459	398	4,2
40	448	387	28	38	67	44	126	515	454	7,1
50	499	438	34	50	72	56	126	526	465	7,1
65	508	447	42	66	85	74	189	593	532	7,9
80	519	458	49,5	81	98	91	189	617	556	14,2
100	531	470	59	100	111	110	189	642	581	15,2
inch										
1"	409	348	17,3	22,2	50	28,6	86	459	398	4,2
1,5"	448	387	26,5	35,1	67	41,1	126	515	454	7,1
2"	499	438	32,9	47,6	72	53,8	126	526	465	7,1
2,5"	508	447	39,1	60,3	85	68,3	189	593	532	
3"	509	448	45,0	72,9	90	80,1	189	619	538	
4"	531	470	57,8	97,6	111	107,6	189	642	581	15,3

7. Technical Data

Product - wetted parts :	316 L, 1.4404
Other parts :	1.4301
Seals :	standard : EPDM
	Optional : HNBR, VMQ, FPM
Bellow unit :	1.4404 /1.4571
Actuator :	1.4301
Max. line pressure :	10bar
Max. operating temperature :	135 °C EPDM, HNBR *FPM, *VMQ
short-term steam load :	140 °C EPDM, HNBR *FPM, *VMQ *(no steam)
Air connection (for hose) :	6x1mm
max. pneumatic air pressure :	8 bar
min. pneumatic air pressure :	6 bar

(Use dry and clean pneumatic air, only)

7.1 The opening and closing times
of the valves equipped with a control unit DELTA CU can be fixed by adjusting the throttle at the solenoid valve.

closing times in sec.
control pressure 6 bar
hose length 1m and 10m.

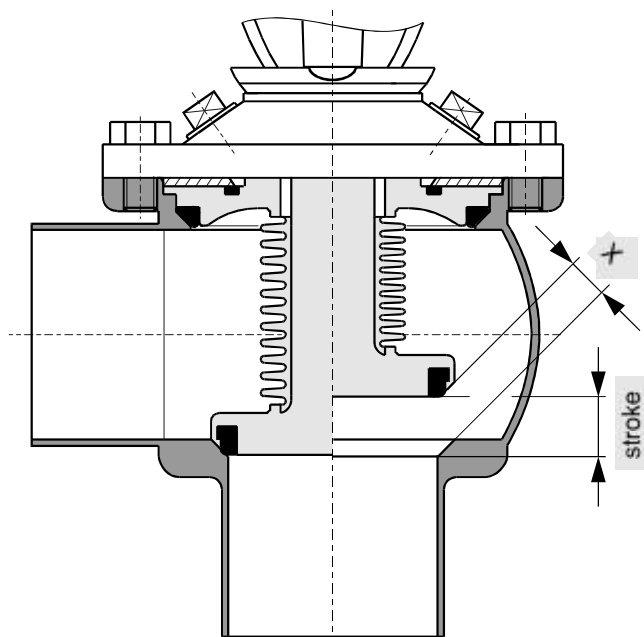
DN	inch	1m	10m
25	1"	1	2
	1,5"	1	2
40		3	4
50	2"	3	4
65	2,5"	3	4
80	3"	5	6
100	4"	5	6

7. Technical Data

7.2

DELTA MF4
Kvs - values in m³ / h

DN	inch			
25	1"	22	22	
40	1,5"	42	38	
50	2"	73	70	
65	2,5"	130	112	
80	3"			
100	4"	342	276	



7.3 valve stroke / opening section (X)

dimensions in mm		
DN	stroke	X
25	6	4
40	11	8,5
50	13,5	11
65	17,5	15
80	22	19,5
100	28	25
inch		
1"	5	3
1,5"	8	5,5
2"	11	8,5
2,5"	12	9,5
3"	20	17,5
4"	25,5	21,5

8. Maintenance



- The maintenance intervals depend on the application and should be determined by the operator carrying out temporary checks.
 - The valve must not be cleaned with products containing abrasive or polishing substances. Especially the valve shafts must not be cleaned with such agents under any circumstances. Damage at the valve shaft can produce leakages.
 - Replacement of seals according to Service Instructions. The customer is recommended to hold spare seals on stock. For valve maintenance APV supplies complete seal kits including seal grease (pl. see spare parts lists).
 - Tools required:
 - 1 x spanner SW13
 - 1 x spanner SW17
 - 1 x spanner SW19
 - 1 x spanner SW30
 - 1 x strap wrench
 - Cleaning rag as well as low solution of a suitable cleaning agent (observe safety data sheets of cleaning agent manufacturer)
 - Slightly grease all seals before their installation !!!!!
- Recommendation:**
APV food-grade-grease for EPDM, HNBR, FPM and NBR
 (0,75 kg/tin - ref.-No. 000 70-01-019/93)
 (60 g/tube - ref.-No. 000 70-01-018/93)
 or
APV food-grade-grease for VMQ
 (0,6 kg/tin - ref.-No. 000 70-01-017/93)
 (60 g/tube - ref.-No. 000 70-01-016/93)
- ! Do not use grease basing on mineral oil for EPDM seals!
 - ! Do not use grease basing on Silicone for VMQ seals!

Recommendation for screw retention

Type: **Loctite 243 semi-solid**
 (5 ml - ref.-No. 00070-01-110/93)
 (50 ml - ref.-No. 00070-01-111/93)

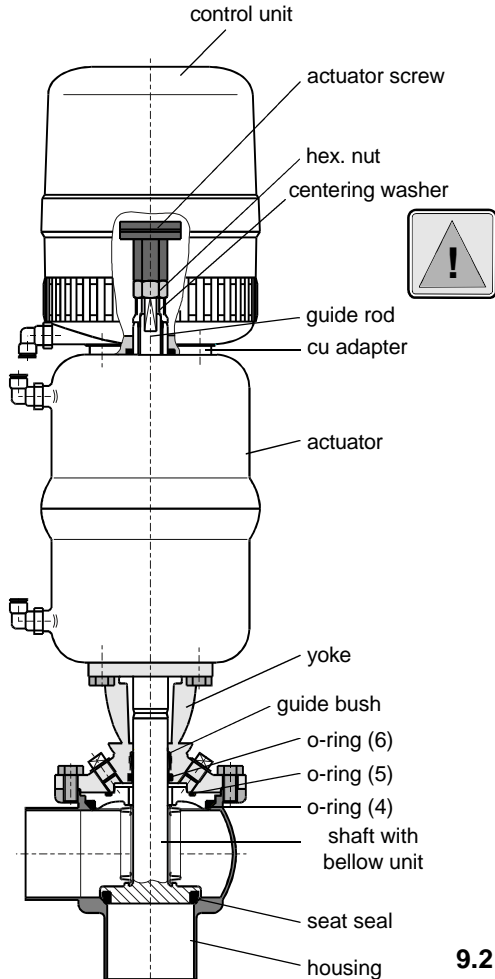
9. Service Instructions

9.1 Dismantling from the line system MF4 / MEF4

The item numbers refer to the spare parts drawings

MF4, MEF4: DN design: RN 01.064.6

Inch design: RN 01.064.7



a. Shut off line pressure and discharge lines and tanks if possible.

b. Valve design NC: control actuator with air.

Do not touch movable parts!

Risk of injury.

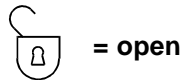
c. Remove housing screws (11) and lift complete valve insert including actuator out of the housing.

d. Valve design NC: cut off compressed air and remove compressed air supply.

e. CU design:

Remove the control unit.

(Turn safety ring in anticlockwise direction, see symbol on the control unit.)



= open



= closed

- Design with valve position indicator:

Remove the proximity switches. Detach the indicator housing (proximity switch holder) from the actuator.

9.2 Dismantling of wear parts (product-wetted parts)

a. With CU design and valve position indicator:

First of all, release the actuator screw. Release the hexagon nut (21), while holding up the centering washer (16). Remove the centering washer.

b. Pull the shaft with bellow unit (3) and guide rod (9) out of the actuator (13). Remove the seat seal (2) and o-rings (4, 5).

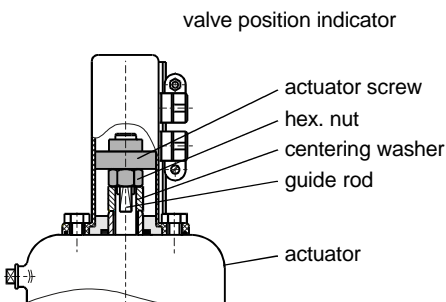
c. Remove the yoke (8) from the actuator (13).

The actuator is maintainable.

(see 10. Service Instructions, Actuator)

d. Detach the o-ring (6) and the guide bush (7) from the yoke (8).

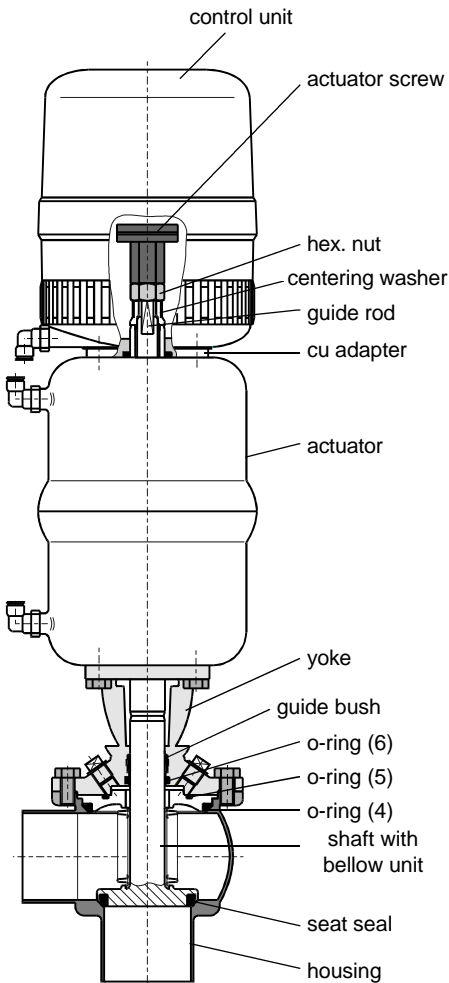
e. Clean the valve housing, the yoke and the shaft with a low solution of a cleaning agent. Never use cleaning agents containing abrasive or polishing substances.



9. Service Instructions

9.3 Installation of seals and assembly of valve

Provide all seals with a thin layer of grease before their installation.



- a. Insert the guide bush (7) and o-ring (6) into the yoke (8). Fasten the yoke (8) at the actuator (13).
- b. Install the seat seal (2) in the lower valve shaft (3). (see Service Instructions 11.)
- c. Insert the o-rings (4, 5) into the shaft grooves.
- d. Slide the protective pipe over the thread of the guid rod. Place the shaft with bellow unit (3) and guide rod (9) through the yoke (8) and actuator (13).
 - **The shaft must be led smoothly through the guide bush in the yoke. If the shaft stiff, check the right fit of the guide bush.**
- e. **CU design and valve position indicator:**

Place the centering washer (16). Apply a drop of a screw locker (e.g. type: Loctite - semi-solid) on the thread of the guide rod. Screw on the hexagon nut (21) and fasten it with a **tightening torque of MD = 40 Nm**. Hold up the centering washer during this process.

 - **CU:** **Tighten the plastic actuator screw.**
 - **Valve position indicator:**

Screw on the metal actuator screw and fasten it with a tightening torque of **Md = 40 Nm**.

9. Service Instructions

9.4 Installation of the valve MF4, MEF4

a. CU design:

Fix the adapter at the actuator.

Place the control unit (20) on the adapter (22) and secure it with the ring.

Valve position indicator: Fasten the indicator housing (18).

b. To assemble the valve insert in the NC design, proceed as follows:

Place the valve insert carefully in the valve housing. The o-ring (4) must not be damaged during the installation in the housing.

Actuator in NC design: control actuator with min. 6 bar pneumatic air.

Screw the hex. screws (11) in the housing flange and tighten them crosswise.



Do not touch movable parts!
Risk of injury.

! NC design: cut off air.

c. Check the basic adjustment of the valve position indicator.

- By turning the positioning screws in the control unit, the shift points can be adjusted.

d. Design with valve position indicator:

Plug in and fasten the proximity switches.

- Readjust the proximity switches if necessary.

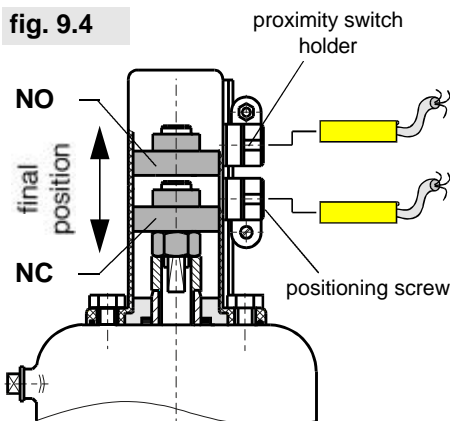
e. Adjustment of proximity switches: (fig. 9.4)

- Move the actuator into one final position.
- Move the corresponding proximity switch into the corresponding position. For this purpose, release the positioning screw and move the holder until the corresponding signal is indicated. Then, continue to slide by 2 to 3 mm to secure the indication. Tighten the positioning screw.
- Place the actuator in the other final position and position the second proximity switch.

- **Upper valve position indication:**
valve "normally open" **NO**

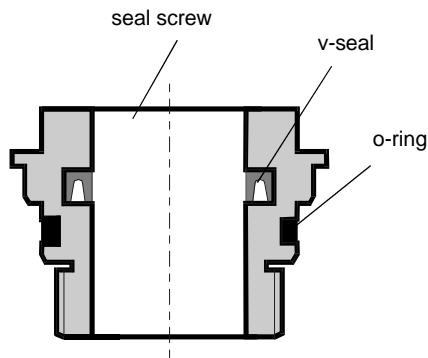
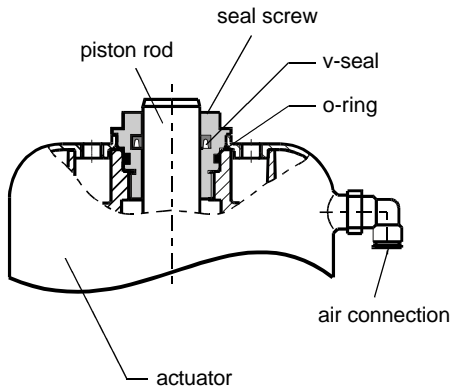
- **Lower valve position indication:**
valve "normally closed" **NC**

fig. 9.4



10. Service Instructions Actuator

fig. 10.3



10.1 Maintenance of Actuator

- a. Remove the air hoses from the actuator.
- b. Remove the inner hex. screws from the adapter of the control unit.
 - Remove the adapter.

10.2 Dismantling of seals

- a. Unscrew the two seal screws with a wrench SW30 by holding up the actuator with a strap wrench.
- b. Remove the o-rings and v-seals.

10.3 Installation of seals and assembly of the actuator

- a. Install the greased o-rings and v-seals in the seal screw (fig. 10.3).
See to the right direction of installation of the v-seal.
- b. On both sides of the actuator, push the seal screws over the piston rod and tighten them.
- c. Fasten the adapter for the control unit and the yoke on the actuator.

Attention: Observe the position of the adapter.

Attention: Consider the required design NC or NO for the assembly of the adapter and yoke.

NC = normally closed

NO = normally open

- d. Fasten the air hoses.

10.4 Reconstruction of the valve design from NC "normally closed" to NO "normally open" design

By turning the actuator by **180°**, the required design NC or NO can be adjusted.

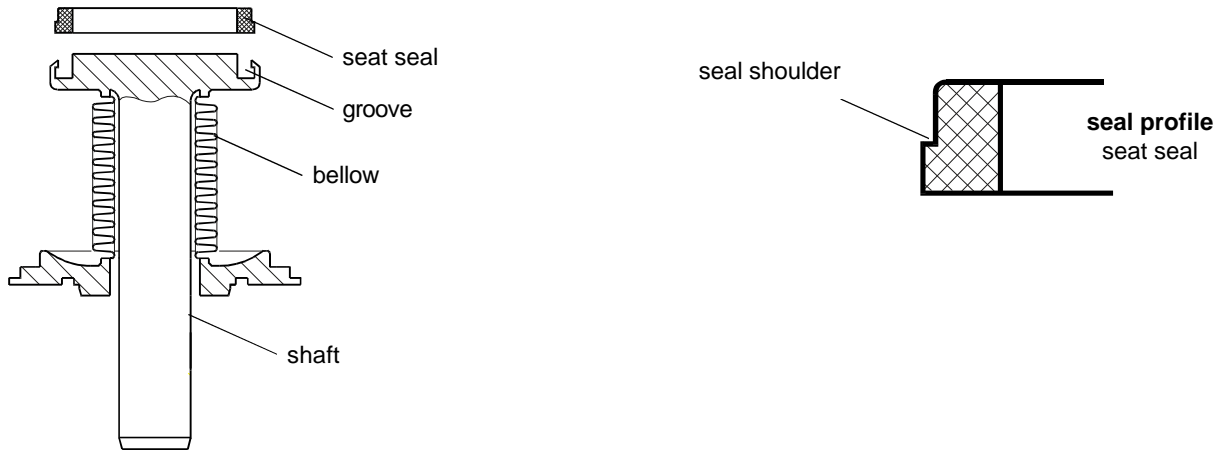
NC = normally closed

NO = normally open

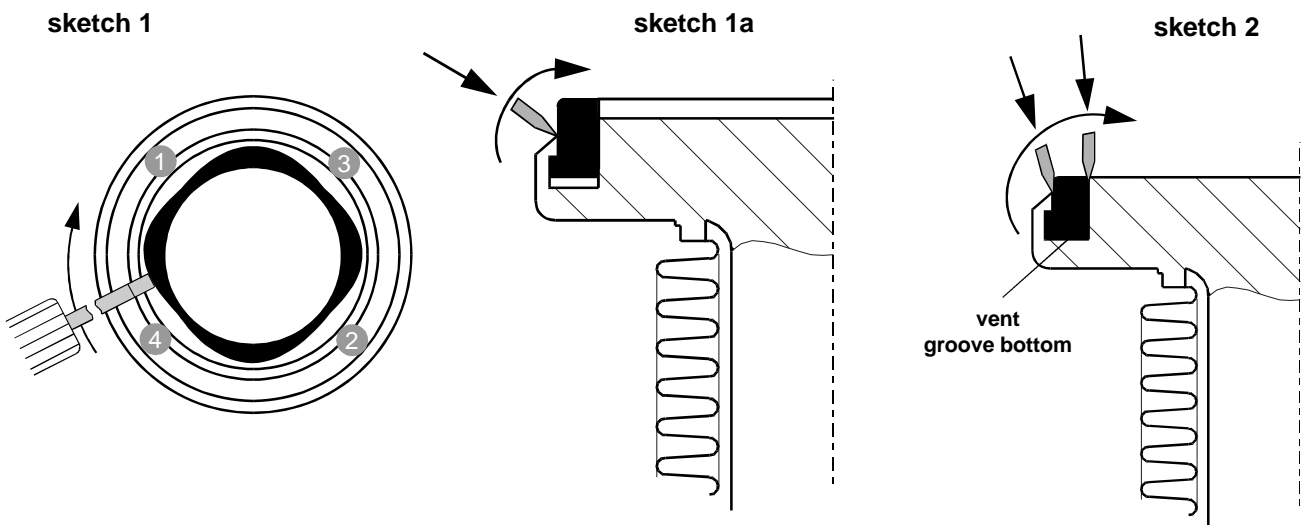
11. Service Instructions

11.1 Installation of seat seal

1. Before the assembly, provide the seat seal with a **thin layer** of grease.
The groove for the seat seal **must not** be greased.



2. **Clamp the valve shaft in a vise. Use protective jaws to avoid damage to the shaft.**
3. Press the seal with the assembly tool (or screw driver with round edges) at four opposite spots **1 - 2, 3 - 4** into the groove (**see sketch 1-1a**).
4. Proceed step by step to press the seal into the groove. Press the opposite side into the groove. See to an even fit of the seat seal.
5. Afterwards, press the assembly tool in between the seal shoulder and the groove wall and drive round completely. The groove is vented and the seal shoulder is locked in during this procedure (**see sketch 2**).



12. Trouble Shooting

Failure	Remedy
<i>Valve closed and pressure in upper housing</i>	
Valve leaks	Replace seat seal (2) Check line pressure (max. 10bar)
Leakage from the leakage bore in the yoke area	Check tightening torque of safety nut. Replace shaft with bellow unit (3) .
Leakages between housing and yoke flange	Replace o-rings (4) .
<i>Actuator</i>	
Air escapes at the actuator rod	Replace o-ring (2) at the upper side of the actuator.
Actuator does not work (air escapes permanently from the venting plug)	Replace the complete actuator.
<i>Valve position indication</i>	
No feedback	Carry out fine adjustment.

13. Spare parts Lists

(see annex)

The reference numbers of the spare parts for the different valve designs and sizes are included in the attached spare parts drawings with corresponding lists.

Please indicate the following data to place an order for spare parts:

- number of parts required
- reference number
- designation.

BA MF4 0000002
ID-No.: H 3 1 5 2 5 8
Translation of original manual



rev. 0



Your local contact:



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For more information about our worldwide locations, approvals, certifications, and local representatives, please visit www.apv.com.

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Ersatzteilliste: spare parts list:

Membranventil mit Balgeinheit MF4,MEF4 FS-CU und VSM
 Diaphragm valve with bellow unit MF4,MEF4 FS-CU and PSH

Blatt 3

Datum 06/04 Name Trytko

Gezeichnet 29.06.04 Name Trytko

Geprüft

Normgepr.

RN 01.064.7

APV Rosista GmbH
 D-58425 Unna
 Germany

Pos. item	Benennung description	1"		1,5"		2"		2,5"		3"		4"	
		WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	
16	Zentrierscheibe Centering nut	15-28-940/12	=	=	=	=	=	=	=	=	=	=	WS-Nr. ref.-no.
17	Schaltnocke Operating cam	08-52-290/97	08-52-291/97	=	=	=	=	=	=	=	=	=	WS-Nr. ref.-no.
18	VSM Gehäuse-SW4 Proximity switch holder housing SW4	15-33-932/93	=	=	=	=	=	=	=	=	=	=	WS-Nr. ref.-no.
19	Skt. Schraube Hex. screw	DIN EN 24017-M8x16-A2-70											
20	Control-Unit Control-Unit	16-31-232/93	=	=	=	=	=	=	=	=	=	=	WS-Nr. ref.-no.
21	Skt. Mutter Hex. nut	DIN EN ISO 10511-M12-A2											
22	CU-Adapter CU-adapter	08-48-415/93	=	=	=	=	=	=	=	=	=	=	WS-Nr. ref.-no.

Dichtungssatz / seal kit MF4, MEF4

Pos. 2, 4, 6, 7, 21 nur im kompletten Dichtungssatz erhältlich
 Item. 2, 4, 6, 7, 21 available es complete seal kits only

1	Dichtungssatz Seal kit	FPM	58-34-393/00	58-34-394/00	58-34-395/00	58-34-396/00	58-34-398/00	58-34-399/00
1	Dichtungssatz Seal kit	EPDM	58-34-393/01	58-34-394/01	58-34-395/01	58-34-396/01	58-34-398/01	58-34-399/01
1	Dichtungssatz Seal kit	VMQ	58-34-393/02	58-34-394/02	58-34-395/02	58-34-396/02	58-34-398/02	58-34-399/02
1	Dichtungssatz Seal kit	HNBR	58-34-393/06	58-34-394/06	58-34-395/06	58-34-396/06	58-34-398/06	58-34-399/06

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02/194

Ersatzteilliste: spare parts list:

Steuerkopf SW4

Actuator SW4

Besteht aus 1 Blatt Blatt 1

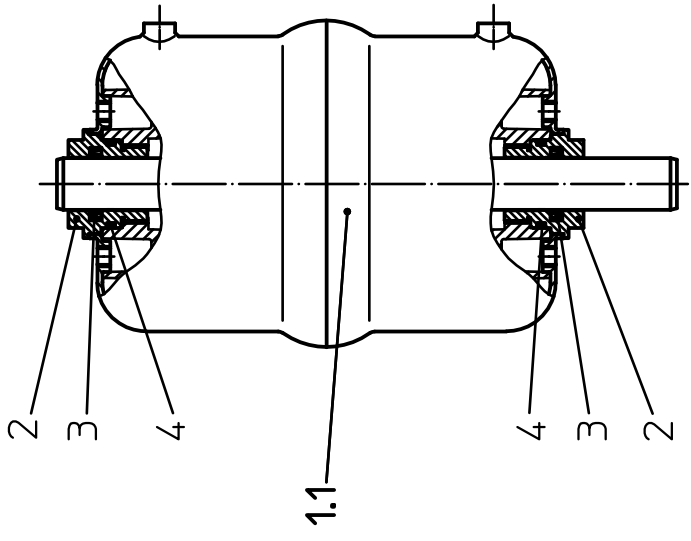
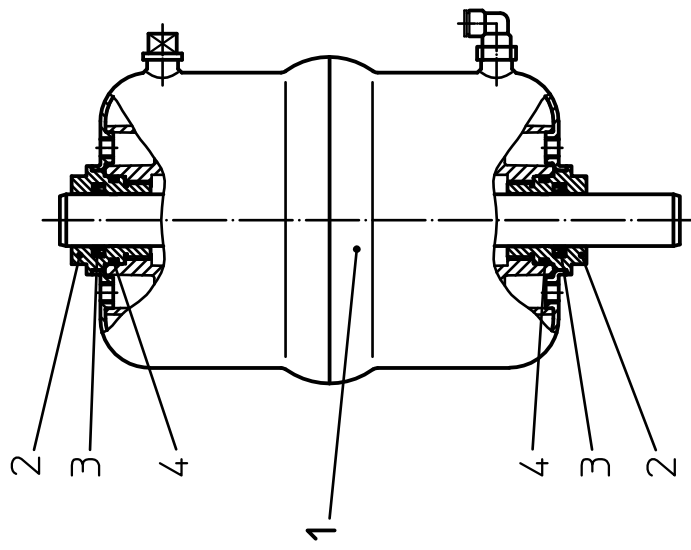
Datum	1/98	12/03	01/06	06/08
Name	Trytko	Trytko	Trytko	Trytko

Gezeichnet	15.1.98	Name	Trytko
Geprüft	15.1.98		Spliethoff
Normgepr.	19.1.98		Pümper



APV Rosista GmbH
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Germany

RN 01.054.86



Pos. / Item	Quantität / Menge	Benennung / description	Ø74 WS-Nr. ref.-no.	Ø110 WS-Nr. ref.-no.	Ø165 WS-Nr. ref.-no.
1		Steuerkopf kpl Feder/Luft Ausf. matt-gl. Actuator complete spring/air design satin fin.	15-32-050/17	15-32-051/17	15-32-052/17
		Ausf. matt-gl. design satin fin.	15-32-085/17	15-32-086/17	15-32-087/17
1.1		Steuerkopf kpl Feder/Luft Ausf. 3A-blank Actuator complete spring/air design 3A-bright fin.	3A0 15-32-059/13	3A0 15-32-060/13	3A0 15-32-061/13
		Ausf. 3A-blank design 3A-bright fin.	3A0 15-32-057/13	3A0 15-32-065/13	3A0 15-32-066/13
2	2	Dichtungsschraube Seal screw	15-28-840/93	=	=
3	2	V-Dichtung O-ring	58-32-010/83	=	=
4	2	O-Ring O-ring	58-06-124/83	=	=