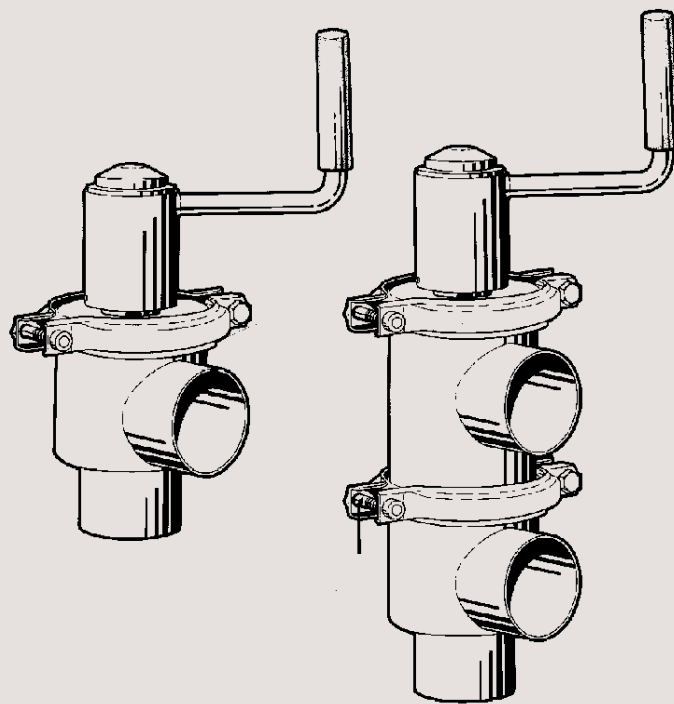




# Instruction Manual

## SMO Sanitary Manual Valve



IM70156-EN5 2010-03

Original Instructions



# 1 EC Declaration of Conformity

The designating company

Alfa Laval

Company Name

Albuen 31, DK-6000 Kolding, Denmark

Address

+45 79 32 22 00

Phone No.

hereby declare that

Sanitary Manual Valve

Denomination

SMO

Type

Year

is in conformity with the following directives:

- Machinery Directive 2006/42/EC
- Pressure Equipment Directive 97/23/EC category 1 and subjected to assessment procedure Module A.

Manager, Product Centres, Compact  
Heat Exchangers & Fluid Handling

Title

Bjarne Søndergaard

Name

Alfa Laval Kolding  
Company

Signature



Designation





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Pressure drop diagrams .....3  
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Dismantling and assembly .....6  
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## SMO Sanitary Manual Operated Valve

### General

The SMO valve is a manual version of the remote controlled SRC valve.

The SMO valve is also available in an aseptic version with a diaphragm type stem seal or a steel-bellow type stem seal.

### Valve body parts

The valve body part is designed as a stop valve or as a change-over valve and can have 2 to 5 ports.

The stop valve can have 2 or 3 ports and the change-over valve 3 to 5 ports.

The ports can be fitted with the required type of fittings for food tubing.

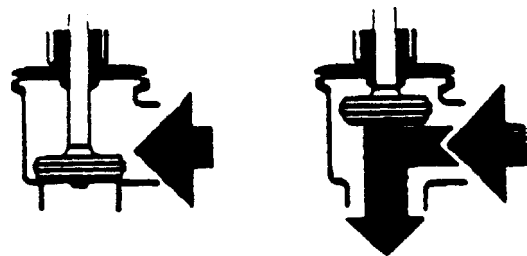
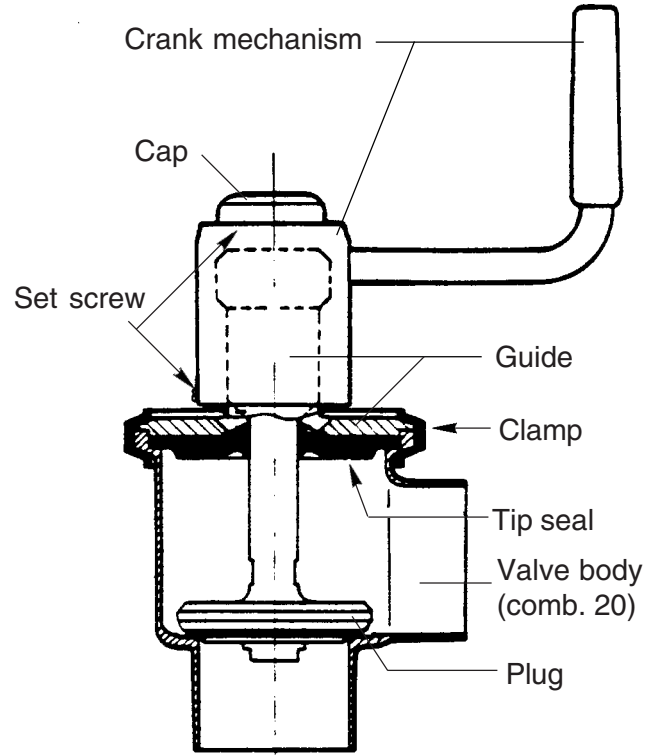
Clamp, lip seal and valve plug are included in the valve body part.

### Crank mechanism

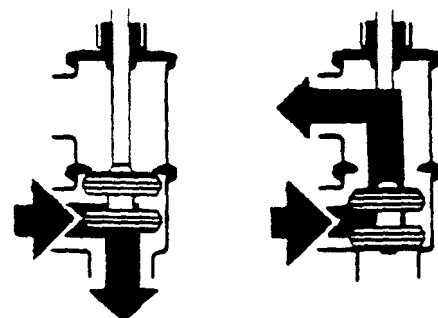
The valve is operated by means of a crank mechanism. about seven turns of the crank result in full stroke of the valve plug.

Rings on the outside of the guide show 4 mm of the stroke. One turn of the crank corresponds to 4 mm of the stroke.

All parts with the exception of the guide are common for all valve sizes and versions. There are two guide sizes, one for 38-63.5 mm (1½"-2½") and one for 70-101.6 mm (3"-4").

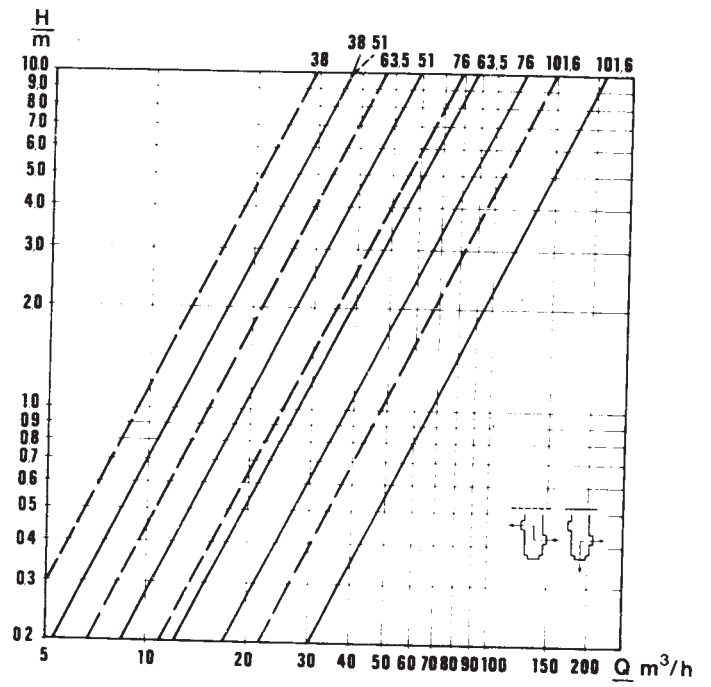
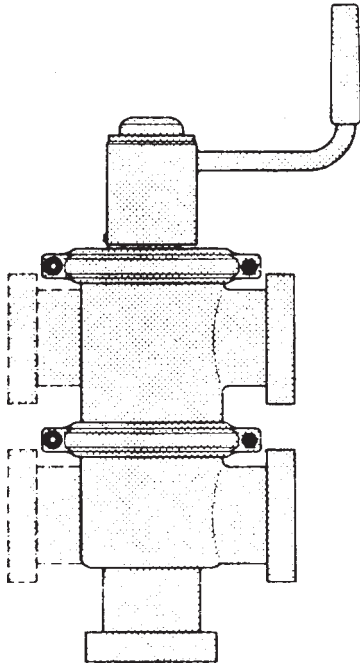


Change-over valve

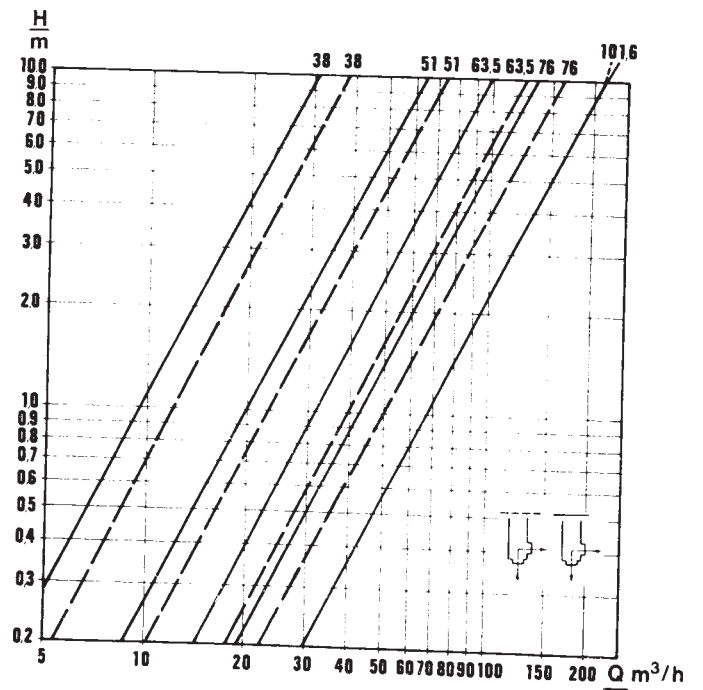
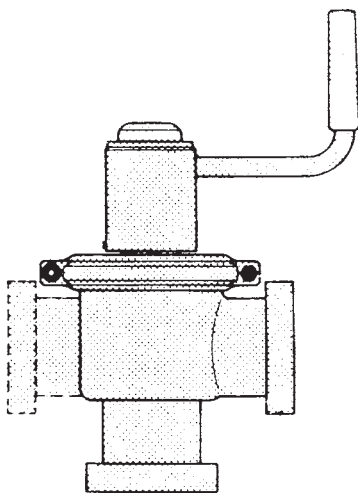


Stop valve

Change-over valve



Stop valve



## Rubber grades, application

Rubber seals in contact with the liquid are available in three grades:

1. EPDM rubber (standard)  
This grade is temperature resistant up to 140°C but is sensitive to oil and fat. The lip seal must not be lubricated!
2. NBR rubber  
This grade is oil resistant and should replace EPDM rubber when the valves are used for margarine and butter-oil production for example and for other products containing oil and fat in high concentrations.  
At high temperatures the rubber ages rapidly and become brittle. Max. temperature should be approx. 90-95°C in order that the life of the rubber does not become too short.
3. FPM rubber  
FPM is resistant to aggressive liquids. The rubber grades above can be used for many liquids, both in the food industry and in other industries.  
Contact us in doubtful cases.

### Marking

1. EPDM rubber  
Marked "1" (corresponds with the last figure in the part No).
2. NBR rubber  
Marked "2" (corresponds with the last figure in the part No).
3. FPM rubber  
Marked "3" (corresponds with the last figure in the part No).

### Storing

The rubber parts should be stored indoors and the max temperature should not exceed 30°C. (Low temperature does not damage the parts if they are warmed to room temperature before being used.)

The air humidity should not be so high that condensate is formed on the parts and packages.

The rubber parts should be protected from sunlight and the ozone in the air, particularly in rooms with electric motors, fluorescent lamps or if welding is carried out in the vicinity. Cardboard boxes or black plastic bags are suitable packaging materials. The above is particularly important for nitrile rubber.

Store the parts so that they do not become deformed. Permanent deformation may occur if seal rings hang on nails or if a lip seal is provided with a tag so that the lip becomes deformed.

Rubber materials should not be stored for more than five years without being checked before being fitted.



## Rubber materials

The table below indicates the ranges of application for the packing materials.

Concentration, temperature etc. can affect the rubber considerably. The table only states guide values.

When in doubt, contact us.

Rubber-grade	Weather ozon	Milk cream	Hot water steam, weak acids, alkali	Strong and oxidizing	Petrol oil, fats, (not milk and cream)	Solvent
NBR. std.	Not satisfactory	Good	Good	Not Satisfactory	Good	Bad
EPDM	Excellent	Good	Excellent	Good	Bad	Bad
FPM	Excellent	-	Excellent	Good	Bad	Good (EPDM for acetone & alcohols)
PTFE (teflon)	Excellent	Excellent	Excellent*	Excellent	Excellent	Excellent

\* not steam and sodium hydroxide (NaOH)

## Stop valve

The entire crank mechanism together with the plug and lip seal can be removed when clamp 9 is loosened.

1. Pry off cap 3. Remove upper set screw 7a and washer 4. Remove the washer by sliding it side ways.
2. Unscrew set screw 7b and then the crank until it comes off completely.
3. Push up the plug so that stem holder 5 comes up above the thread. Slide off the stem holder sideways.
4. Remove clamp 9.
5. Lift off guide 6, lip seal 8 and the plug.
6. Remove the screw at the bottom of the plug if the latter is to be dismantled.

When assembling the plug: **Tighten the screw so that the parts have metallic contact.** This is simplified by applying a thin layer of silicone oil on the packing. Use a cloth or a spray bottle. Wipe off any silicone oil from visible surfaces after assembly. Lock the screw with Loctite, Pliobond or something similar.

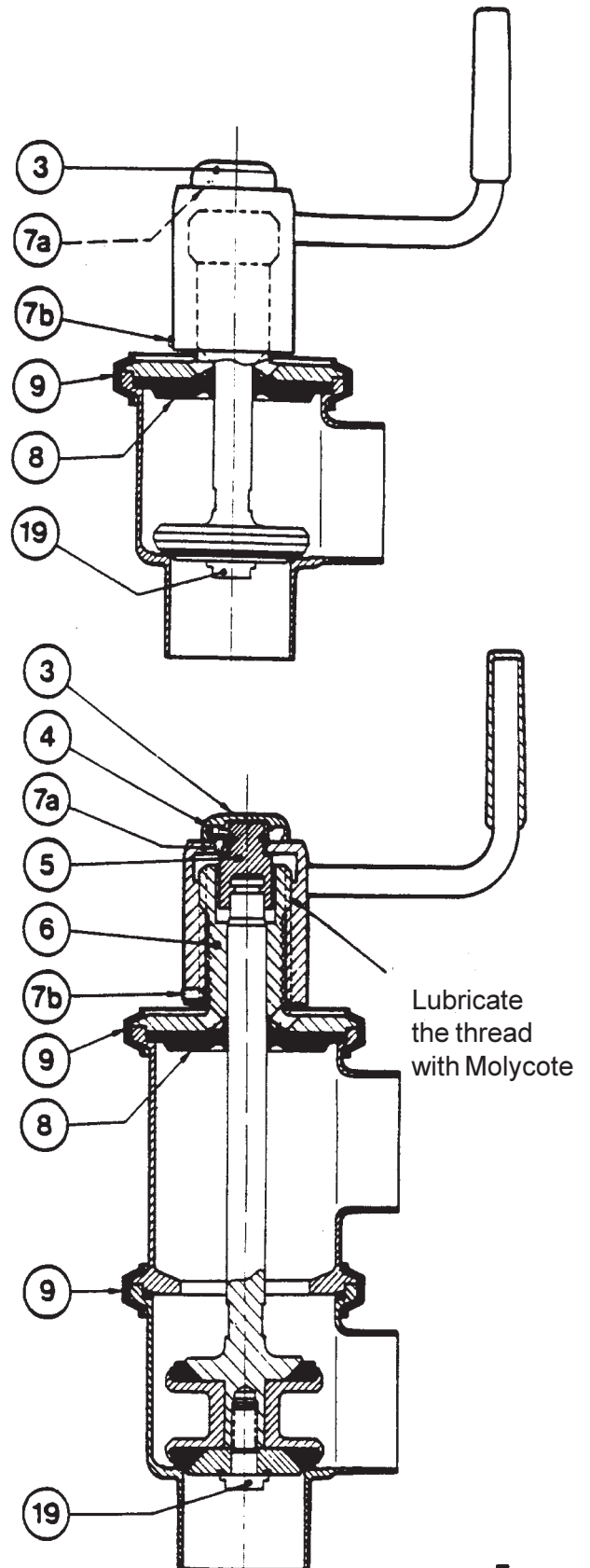
Assembly takes place in reverse order.

**Note!**

**Do not forget to screw in set screw 7b when assembling the valve. It acts as a stroke stop. Without this screw the valve can be opened so far that the crank comes off. In some valve sizes the flats on the plug stem may enter into the lip seal, which will then leak.**

**Change-over valve**

Dismantling and assembly take place nearly as for the stop valve, but the crank mechanism, together with plug and stem cannot be removed as a unit without the upper valve body also being removed.



## Water hammer

Water hammer may occur, particularly in the stop valve, if the liquid flows into the valve through the side connection and if the valve is closed quickly.

### Preventive maintenance

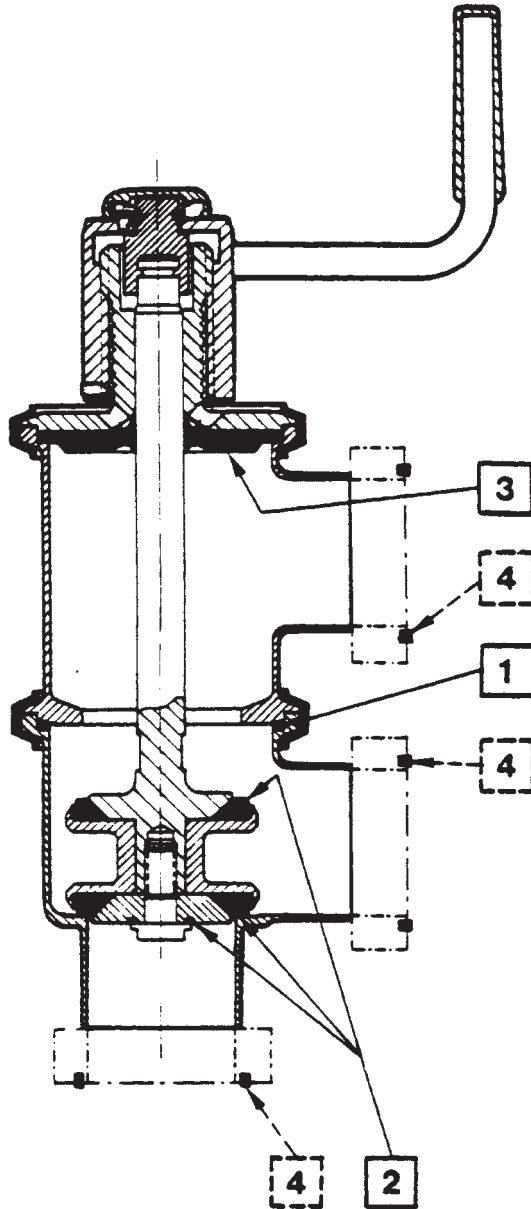
we recommend that preventive maintenance is carried out after one year's operation in one shift.

### Valve body part

The following measures should be taken when dismantling the valve body part:

1. Check the packing for the valve body (only change-over valve).  
Replace if necessary.
2. Replace packing(s) and O-ring in the valve plug.
3. Check that the lip seal is not worn or has leaked.  
Replace if necessary.
4. Check the packings in the fittings.  
Replace if necessary.

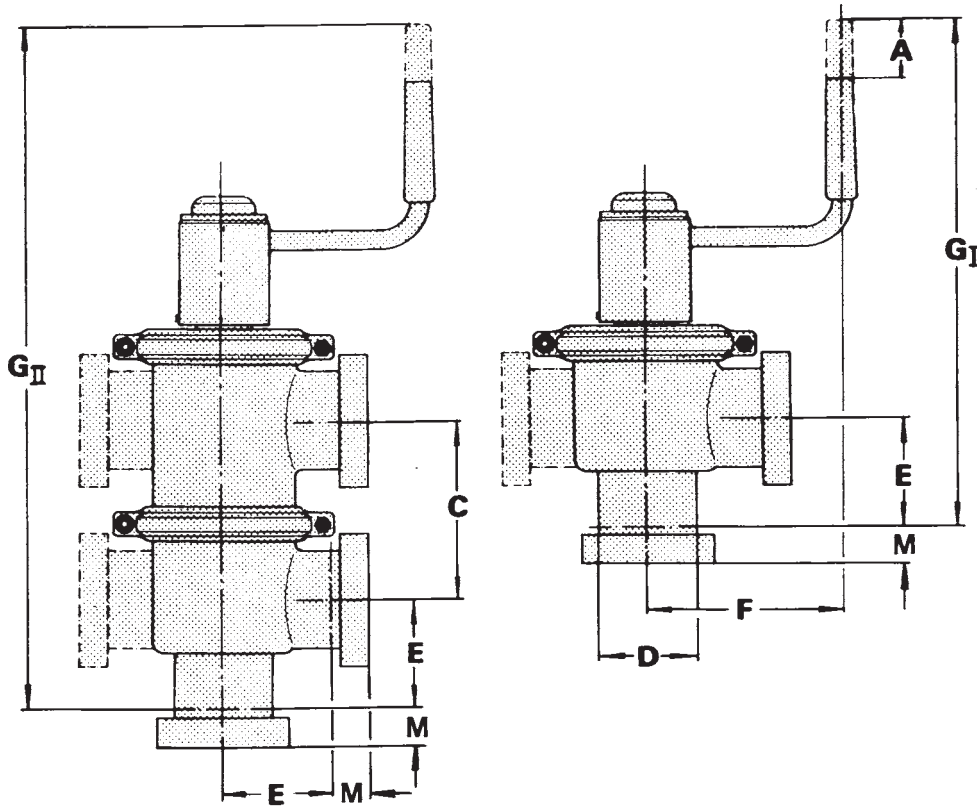
For dismantling and assembly of the valve, please refer to "**Dismantling and Assembly**".



# Dimensions

8

## Dimensions



D (Dim in mm)	38	51	63.5	76	101.6
A	31	31	31	31	31
C	79	94	113	129	163
E/W	50	62	82	87	134
F	105	105	105	105	105
G I	168	278	312	329	401
G II	347	372	425	458	564
M/SMS	20	20	24	24	25
M/ISO clamp	21	21	21	21	21
M/ISO male	21	21	21	21	21
M/DIN	22	22	25	30	30
M/BS	22	22	22	22	22
M/GC clamp	12	12	12	12	15
M/Bevel seat	18	19	22	23	26
M/H-line	25	25	25	25	25

**Transportation:**

**Always** secure that compressed air is released

**Always** secure that all connections is disconnected before attempt to remove the valve from the installation

**Always** drain liquid out of valves before transportation

**Always** used predesigned lifting points if defined

**Always** secure sufficient fixing of the valve during transportation - if special designed packaging material is available it must be used

**Recycling information.****• Unpacking**

- Packing material consists of wood, plastics, cardboard boxes and in some cases metal straps.
- Wood and cardboard boxes can be reused, recycled or used for energy recovery.
- Plastics should be recycled or burnt at a licensed waste incineration plant.
- Metal straps should be sent for material recycling.

**• Maintenance**

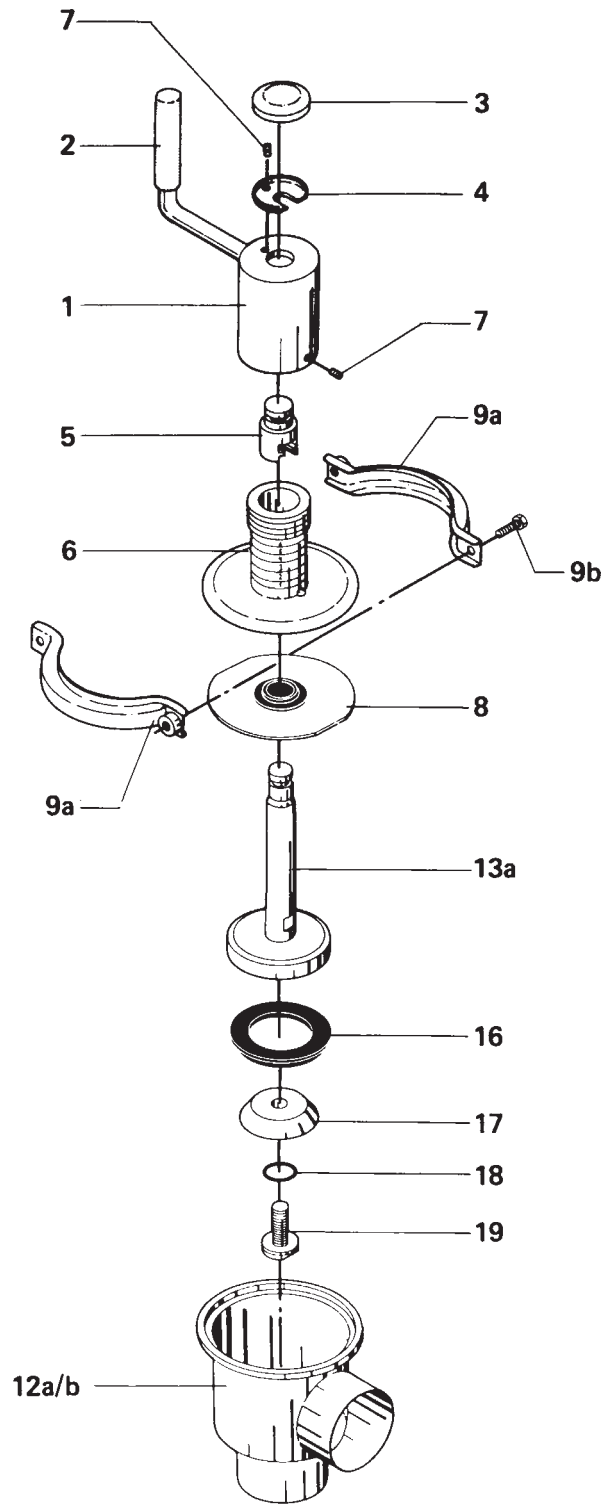
- During maintenance oil and wear parts in the machine are replaced.
- All metal parts should be sent for material recycling.
- Worn out or defective electronic parts should be sent to a licensed handler for material recycling.
- Oil and all non metal wear parts must be taken care of in agreement with local regulations.

**• Scrapping**

- At end of use, the equipment shall be recycled according to relevant, local regulations. Beside the equipment itself, any hazardous residues from the process liquid must be considered and dealt with in a proper manner. When in doubt, or in the absence of local regulations, please contact the local Alfa Laval sales company.

# Stop Valve type SMO

10



Reg. 4.1.12 - SP70156/1 9202

Intro. 8301

## OPERATING MECHANISM

Pos.	Qty	Denomination	NW 40 38 mm	NW 50 51 mm	NW 65 63.5 mm	76 mm	NW 80	NW 100 101.6 mm
	1	Crank mechanism compl .....	31353-0530-1	31353-0530-1	31353-0530-1	31353-0530-2	31353-0530-2	31353-0530-2
1	1	Crank .....	31353-0462-1	31353-0462-1	31353-0462-1	31353-0462-1	31353-0462-1	31353-0462-1
2	1	Handle .....	31353-0495-1	31353-0495-1	31353-0495-1	31353-0495-1	31353-0495-1	31353-0495-1
3	1	Cap .....	31353-0468-1	31353-0468-1	31353-0468-1	31353-0468-1	31353-0468-1	31353-0468-1
4	1	Washer .....	31353-0467-1	31353-0467-1	31353-0467-1	31353-0467-1	31353-0467-1	31353-0467-1
5	1	Stem holder .....	31353-0466-1	31353-0466-1	31353-0466-1	31353-0466-1	31353-0466-1	31353-0466-1
6	1	Guide .....	31353-0459-1	31353-0459-1	31353-0459-1	31353-0460-1	31353-0460-1	31353-0460-1
7	2	Set screw .....	221581-92	221581-92	221581-92	221581-92	221581-92	221581-92

## Valve Body Part

Pos.	Qty	Denomination	NW 40 38 mm	NW 50 51 mm	NW 65 63.5 mm	76 mm	NW 80	NW 100 101.6 mm
<b>Stem Seal</b>								
8 <sup>Δ</sup>	1	Lip seal, EPDM .....	31353-0155-1	31353-0155-1	31353-0155-1	31353-0188-1	31353-0188-1	31353-0188-1
	1	Lip seal, NBR .....	31353-0155-2	31353-0155-2	31353-0155-2	31353-0188-2	31353-0188-2	31353-0188-2
	1	Lip seal, FPM .....	31353-0155-3	31353-0155-3	31353-0155-3	31353-0188-3	31353-0188-3	31353-0188-3
<b>Clamp</b>								
9a	2	Clamp half .....	31320-0022-1	31320-0022-1	31320-0022-1	31320-0021-1	31320-0021-1	31320-0021-1
9b	2	Screw .....	2210936-18	2210936-18	2210936-18	2210936-18	2210936-18	2210936-18

## Valve Body

12a	1	Valve body, 2 ports ISO .....	31353-0375-1	31353-0376-1	31353-0380-1	31353-0381-1		31353-0026-1
	1	Valve body, 2 ports NW .....	9612-0940-01	9612-0941-01	9612-0942-01		9612-0943-01	9612-0944-01
12b	1	Valve body, 3 ports ISO .....	31353-0375-6	31353-0376-6	31353-0380-6	31353-0381-6		31353-0026-6
	1	Valve body, 3 ports NW .....	9612-0940-02	9612-0941-02	9612-0942-02		9612-0943-02	9612-0944-02

## Valve Plug

	1	Plug, single, compl. EPDM .....	31353-0330-1	31353-0331-1	31353-0332-1	31353-0333-1	31353-0333-4	31353-0334-1
	1	Plug, single, compl. NBR .....	31353-0330-2	31353-0331-2	31353-0332-2	31353-0333-2	31353-0333-5	31353-0334-2
	1	Plug, single, compl. FPM .....	31353-0330-3	31353-0331-3	31353-0332-3	31353-0333-3	31353-0333-6	31353-0334-3
13a	1	Stem .....	31353-0340-1	31353-0377-1	31353-0378-1	31353-0341-1	31353-0341-2	31353-0379-1
16 <sup>Δ</sup>	1	Packing, EPDM .....	31353-0320-1	31353-0321-1	31353-0322-1	31353-0324-1	9612-0950-01	31353-0325-1
	1	Packing, NBR .....	31353-0320-2	31353-0321-2	31353-0322-2	31353-0324-2	9612-0950-02	31353-0325-2
	1	Packing, FPM .....	31353-0320-3	31353-0321-3	31353-0322-3	31353-0324-3	9612-0950-03	31353-0325-3
17	1	Washer .....	31353-0357-1	31353-0358-1	31353-0359-1	31353-0360-1	31353-0360-2	31353-0361-1
18 <sup>Δ</sup>	1	O-ring, EPDM .....	990034-01	990034-01	990034-01	990034-01	990034-01	990034-01
	1	O-ring, NBR .....	223404-21	223404-21	223404-21	223404-21	223404-21	223404-21
	1	O-ring, FPM .....	223404-35	223404-35	223404-35	223404-35	223404-35	223404-35
19	1	Screw .....	31353-0362-1	31353-0362-1	31353-0362-1	31353-0362-1	31353-0362-1	31353-0362-1
Δ		Service Kit EPDM .....	9611-92-0010	9611-92-0013	9611-92-0016	9611-92-0019	9611-92-0105	9611-92-0022
Δ		Service Kit NBR .....	9611-92-0011	9611-92-0014	9611-92-0017	9611-92-0020	9611-92-0106	9611-92-0023
Δ		Service Kit FPM .....	9611-92-0012	9611-92-0015	9611-92-0018	9611-92-0021	9611-92-0107	9611-92-0024

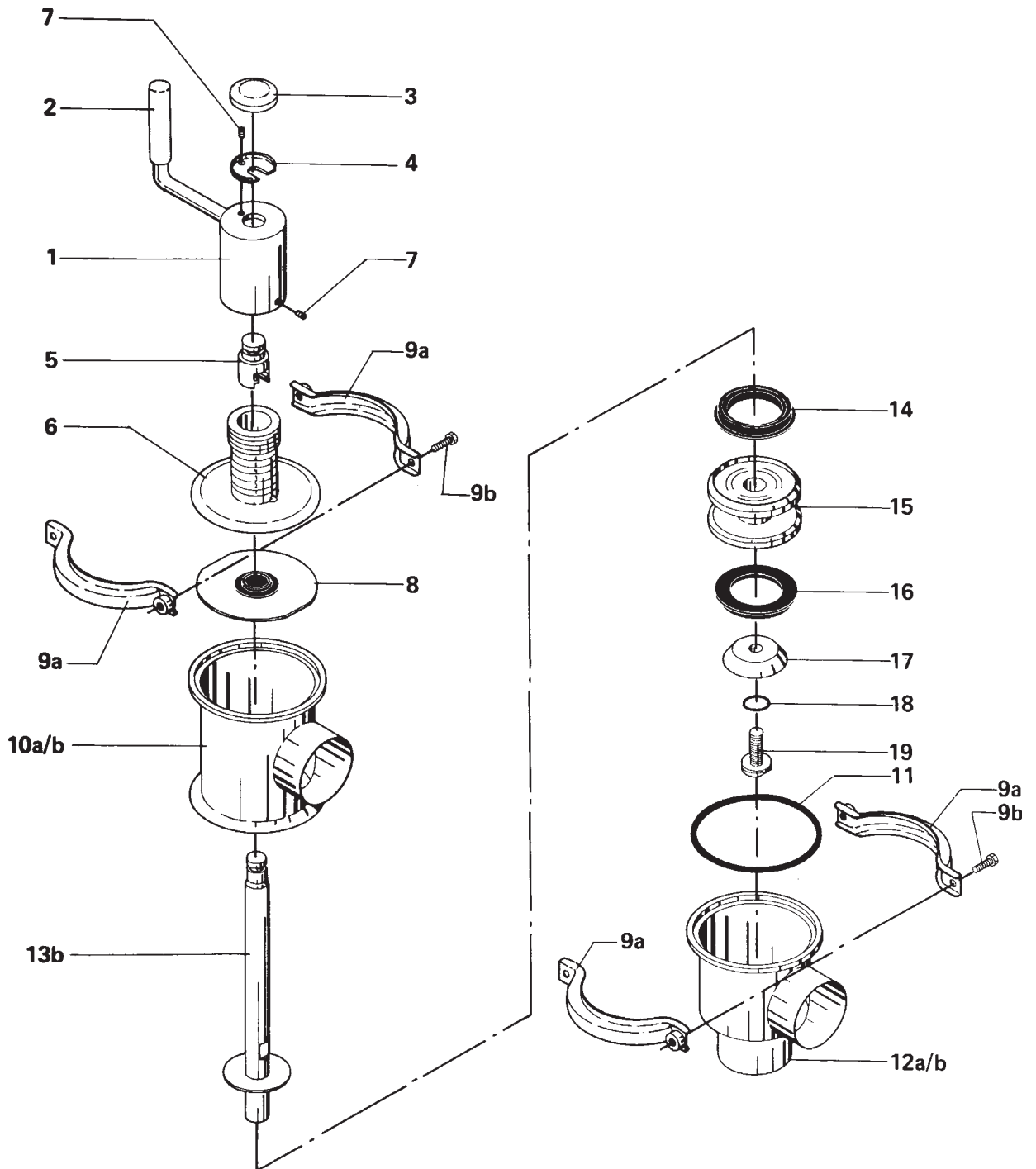
Parts marked with <sup>Δ</sup> are included in the service kits.

Recommended spare parts: Pos. 3,7 and Service Kit.

Reg. 4.1.12 - SP70156/1	9202
Intro.	8301

# Change-over Valve type SMO

12



Reg. 4.1.13 - SP70156/2	9202
Intro.	8301



## OPERATING MECHANISM

Pos.	Qty	Denomination	NW 40 38 mm	NW 50 51 mm	NW 65 63.5 mm	76 mm	NW80	NW 100 101.6 mm
	1	Crank mechanism compl .....	31353-0530-1	31353-0530-1	31353-0530-1	31353-0530-2	31353-0530-2	31353-0530-2
1	1	Crank .....	31353-0462-1	31353-0462-1	31353-0462-1	31353-0462-1	31353-0462-1	31353-0462-1
2	1	Handle .....	31353-0495-1	31353-0495-1	31353-0495-1	31353-0495-1	31353-0495-1	31353-0495-1
3	1	Cap .....	31353-0468-1	31353-0468-1	31353-0468-1	31353-0468-1	31353-0468-1	31353-0468-1
4	1	Washer .....	31353-0467-1	31353-0467-1	31353-0467-1	31353-0467-1	31353-0467-1	31353-0467-1
5	1	Stem holder .....	31353-0466-1	31353-0466-1	31353-0466-1	31353-0466-1	31353-0466-1	31353-0466-1
6	1	Guide .....	31353-0459-1	31353-0459-1	31353-0459-1	31353-0460-1	31353-0460-1	31353-0460-1
7	2	Set screw .....	221581-92	221581-92	221581-92	221581-92	221581-92	221581-92

## Valve Body Part

Pos.	Qty	Denomination	NW 40 38 mm	NW 50 51 mm	NW 65 63.5 mm	76 mm	NW80	NW 100 101.6 mm
<b>Stem Seal</b>								
8 <sup>Δ</sup>	1	Lip seal, EPDM .....	31353-0155-1	31353-0155-1	31353-0155-1	31353-0188-1	31353-0188-1	31353-0188-1
	1	Lip seal, NBR .....	31353-0155-2	31353-0155-2	31353-0155-2	31353-0188-2	31353-0188-2	31353-0188-2
	1	Lip seal, FPM .....	31353-0155-3	31353-0155-3	31353-0155-3	31353-0188-3	31353-0188-3	31353-0188-3
<b>Clamp</b>								
9a	4	Clamp half .....	31320-0022-1	31320-0022-1	31320-0022-1	31320-0021-1	31320-0021-1	31320-0021-1
9b	4	Screw .....	2210936-18	2210936-18	2210936-18	2210936-18	2210936-18	2210936-18

## Valve Body

10a	1	Valve body, upper, 1 port ISO...	31353-0053-1	31353-0054-1	31353-0055-1	31353-0056-1		31353-0058-1
	1	Valve body, upper, 1 port NW...	9612-0945-01	9612-0946-01	9612-0947-01		9612-0948-01	9612-0949-01
10b	1	Valve body, upper, 2 ports ISO.	31353-0053-6	31353-0054-6	31353-0055-6	31353-0056-6		31353-0058-6
	1	Valve body, upper, 2 ports NW.	9612-0945-02	9612-0946-02	9612-0947-02		9612-0948-02	9612-0949-02
11	1	Valve body packing, EPDM .....	31353-0128-1	31353-0128-1	31353-0128-1	31353-0205-1	31353-0205-1	31353-0205-1
	1	Valve body packing, NBR .....	31353-0128-2	31353-0128-2	31353-0128-2	31353-0205-2	31353-0205-2	31353-0205-2
	1	Valve body packing, FPM .....	31353-0128-3	31353-0128-3	31353-0128-3	31353-0205-3	31353-0205-3	31353-0205-3
12a	1	Valve body, lower, 2 ports ISO.	31353-0375-1	31353-0376-1	31353-0380-1	31353-0381-1		31353-0026-1
	1	Valve body, lower, 2 ports NW.	9612-0940-01	9612-0941-01	9612-0942-01		9612-0943-01	9612-0944-01
12b	1	Valve body, lower, 3 ports ISO.	31353-0375-6	31353-0376-6	31353-0380-6	31353-0381-6		31353-0026-6
	1	Valve body, lower, 3 ports NW.	9612-0940-02	9612-0941-02	9612-0942-02		9612-0943-02	9612-0944-02

## Valve Plug

	1	Plug,double, compl. EPDM .....	31353-0335-1	31353-0336-1	31353-0337-1	31353-0338-1	31353-0338-4	31353-0339-1
	1	Plug,double, compl. NBR .....	31353-0335-2	31353-0336-2	31353-0337-2	31353-0338-2	31353-0338-5	31353-0339-2
	1	Plug, double, compl. FPM .....	31353-0335-3	31353-0336-3	31353-0337-3	31353-0338-3	31353-0338-6	31353-0339-3
13a	1	Stem .....	31353-0349-1	31353-0349-2	31353-0349-3	31353-0350-1	31353-0350-3	31353-0350-2
14 <sup>Δ</sup>	1	Packing, upper, EPDM .....	31353-0321-1	31353-0321-1	31353-0323-1	31353-0324-1	31353-0324-1	31353-0325-1
	1	Packing, upper, NBR .....	31353-0321-2	31353-0321-2	31353-0323-2	31353-0324-2	31353-0324-2	31353-0325-2
	1	Packing, upper, FPM .....	31353-0321-3	31353-0321-3	31353-0323-3	31353-0324-3	31353-0324-3	31353-0325-3
15	1	Middle piece .....	31353-0363-1	31353-0364-1	31353-0365-1	31353-0366-1	9612-0984-01	31353-0367-1
16 <sup>Δ</sup>	1	Packing, lower, EPDM .....	31353-0320-1	31353-0321-1	31353-0322-1	31353-0324-1	9612-0950-01	31353-0325-1
	1	Packing, lower, NBR .....	31353-0320-2	31353-0321-2	31353-0322-2	31353-0324-2	9612-0950-02	31353-0325-2
	1	Packing, lower, FPM .....	31353-0320-3	31353-0321-3	31353-0322-3	31353-0324-3	9612-0950-03	31353-0325-3
17	1	Washer .....	31353-0357-1	31353-0358-1	31353-0359-1	31353-0360-1	31353-0360-2	31353-0361-1
18 <sup>Δ</sup>	1	O-ring, EPDM .....	990034-01	990034-01	990034-01	990034-01	990034-01	990034-01
	1	O-ring, NBR .....	223404-21	223404-21	223404-21	223404-21	223404-21	223404-21
	1	O-ring, FPM .....	223404-35	223404-35	223404-35	223404-35	223404-35	223404-35
19	1	Screw .....	31353-0362-1	31353-0362-1	31353-0362-1	31353-0362-1	31353-0362-1	31353-0362-1
Δ		Service Kit EPDM .....	9611-92-0025	9611-92-0028	9611-92-0031	9611-92-0034	9611-92-0108	9611-92-0037
Δ		Service Kit NBR .....	9611-92-0026	9611-92-0029	9611-92-0032	9611-92-0035	9611-92-0109	9611-92-0038
Δ		Service Kit FPM .....	9611-92-0027	9611-92-0030	9611-92-0033	9611-92-0036	9611-92-0110	9611-92-0039

Parts marked with <sup>Δ</sup> are included in the service kits.

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Recommended spare parts: Pos. 3,7 and Service Kit.

**How to contact Alfa Laval**

Contact details for all countries are continually updated on our website.

Please visit [www.alfalaval.com](http://www.alfalaval.com) to access the information direct.