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1 General

1.1 General information

The proportional dosing valve has a modular construction.
Various modules can be connected by means of a Try-clamp connection.

This has many advantages;

- Quick change of modules
- minimal tools required
- Different flow rates possible
- Dosing by means of metal to metal cone
- Dosage by means of PTFE Seat flat
- Dosing by means of PTFE Seat hollow
- Dosage through Seat and Spout
- Customer specific dosage
- Customer specific Seat materials possible
- Suitable for liquid and slurries
- Standard body product parts grade 316, various grades possible.
- Body available with heating jacket

1.2 Manual

This manual contains dosing type;

PM-050-312-BF-P2-HJ

- Modular Proportional Dosing
- Dosing outlet 50 mm
- Body type 3 1/2" with actuator type 025
- Inlet with Thread connection DN50
- Outlet Try-clamp connection
- PTFE Seat type 2
- Body equipped with Heating Jacket.

2 Safety

*Unsafe practices and other important information are emphasized in this manual.
Warnings are emphasized by means of special signs.*

2.1. Important information

Always read the manual before using the valve!

Expressions used in this manual;

PAY ATTENTION!

Displays important information

WARNING!

Indicates that special procedures must be followed to avoid serious personal injury.

CAUTION!

Indicates that special procedures must be followed to avoid damage to the valve.

NOTE!

Indicates important information to simplify or clarify procedures.

Symbols used in this manual;



General warning



Caustic agents



Cutting danger

2.3. Safety precautions

Installation:

Before installing always read the technical data thoroughly (see chapter 6 Technical data)



Never install the valve with connected compressed air
With a connected airline there is a chance that the actuator will be activated during installation and risk of injury.

During operation:



Never touch the valve or the pipes while processing hot liquids.
Never put your hands under or near the outlet during operation, there is a risk of injury if the product consists of aggressive or hot liquid.
Never remove the air line during operation, if a loose airline is activated, there is a risk of injury from a swishing line.

Performing maintenance:



Before starting maintenance, check that the valve with pipe lines are still hot.
Do not perform any maintenance on the hot valve.
Before starting , maintenance, disconnect compressed air line.
If present, disconnect wiring from status report.
Never pressurize the valve when servicing the valve.
Always apply the seals correctly and with care.
The warranty for TMG Holland products depends on the use of original TMG Holland spare parts.

During transport:



Always ensure that all connections are removed before you remove the valve from the installation.
Check the weight of the valve before removing it from the installation.
Always ensure that the valve is properly secured during transport if specially designed packaging material is available, it must be used.



Residual fluid that flows out of valve and pipe lines can contain acid or lye.
Dispose of spilled liquid according to the rules.

3 Installation

*The instruction manual is part of the delivery.
Study the instructions carefully.*

3.1. Unpacking / intermediate storage

PAY ATTENTION!

TMG Holland cannot be held responsible for incorrect unpacking.

Check the delivery for:

1. Complete valve
2. Instruction manual
3. Valve for damage
4. Delivery note

Step 1

Remove packaging material

Use the right tools to remove staples and / or straps.

Step 2

Please note weight of the valve

Carefully lift the valve out of the package, use lifting equipment if necessary.

Step 3

Remove possible packing materials from the valve ports.

Step 4

Inspect the valve for any transport damage.

Step 5

The valve is assembled complete with a module.

If several modules are supplied with it, select the correct module and install it according to the guidelines in Chapter 4.

3.2. Recycling information

Unpacking

- Packing material consists of wood, plastics, cardboard boxes and in some cases metal straps
- Wood and cardboard boxes can be re-used, 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 wearing 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 disposed off in agreement with local regulations.

Scrapping

- At end of use, the equipment must be recycled according to the relevant, local regulations.
- Besides the equipment itself, any hazardous residues from the process liquid must be considered and dealt with in a proper manner.

3.3. Installation

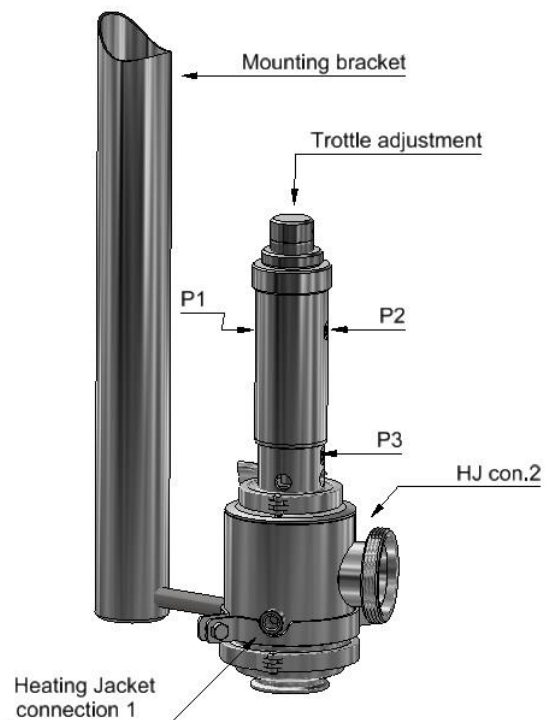
3.3.1 Connecting the dosing valve to the system.

The valve must be mounted securely and without vibration at the filling location. Use a sturdy mounting bracket to fix the valve to the filling location as shown on the illustration opposite.

The inlet of the valve is equipped with a DN50 threaded piece according to DIN 11851 as standard.



Be convinced that the pipeline will be mounted to the valve without tension.



3.3.2 Connecting the airline system.

P1 – Valve in throttle position.

P2 – Valve Closed signal.

P3 – Valve open signal

To open the disc it is advisable to control both P1 and P3 for a quick and correct opening of the outlet.

(See chapter 4.2.1)

3.3.3 Setting of the throttle position.

To set the throttle position, the valve must first be controlled in closed position by port P2 as shown.

The throttle position can be adjusted with the adjustment screw (100)

Step 1

- Unlock the locking nut (115) by turning counterclockwise.
- Turn the adjustment screw (100) clockwise as far as possible into the cylinder head as shown.

Step 2

- disconnect port P2
- Now set air pressure to P1
the upper piston will lift up to the adjustment screw (100)

The adjustment can be set exactly when product is fed into the valve
When the adjustment screw is fully screwed in, the valve will normally still be closed.

Step 3

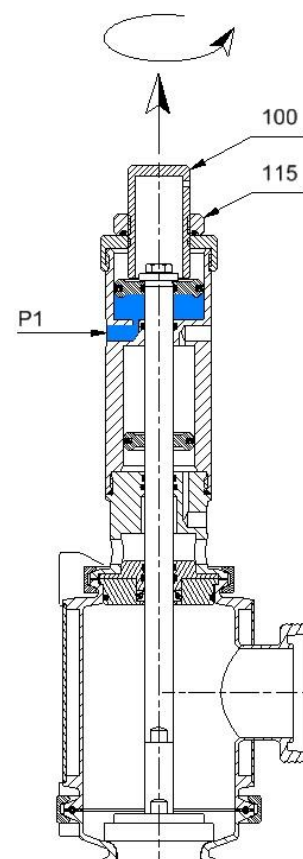
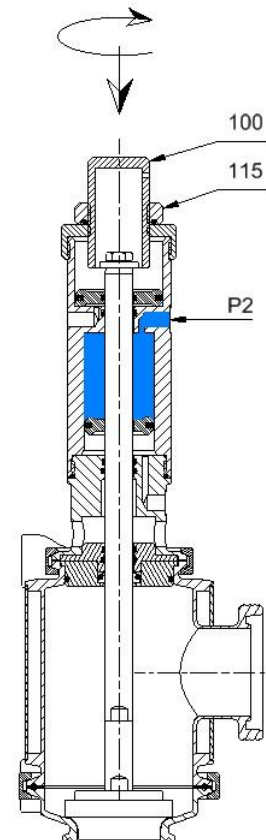
- Now gradually turn the adjustment screw (100) counterclockwise, the upper piston will follow the adjustment screw and slowly lift the disc.
The flow of product will gradually increase.

Step 4

- When the desired adjustment is reached, secure the adjusting screw (100) with the locknut (115)
- Stop the product supply
- shut off the air supply to P1.

The valve is now ready for operation.

Refer to the function diagram in chapter 4.2.4 for automatic control of the throttle position.



4 Operation

The valve is tested before delivery.

Study the instructions carefully and pay special attention to the warnings!

Pay attention to possible faults.

The items refer to the parts list and maintenance kits section.

4.1. General



Always read the technical data thoroughly before starting process.



- Never loosen or tighten the Tri-clamp during the process.
- Never touch the valve or the pipe lines during the processing of hot liquids or during cleaning.

4.2 Operation principle

4.2.1 Filling position.

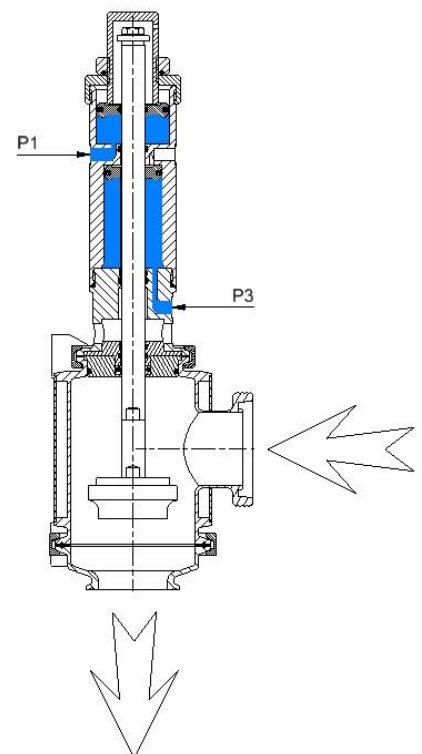
For quick opening it is recommended to operate both pistons during filling.

Input;

- P1 activated.
- P3 activated.

Output;

- Upper piston lift to adjustment screw.
- Lower piston lift completely.
- Disc opens for 100% pass.



4.2.2. Throttle position.

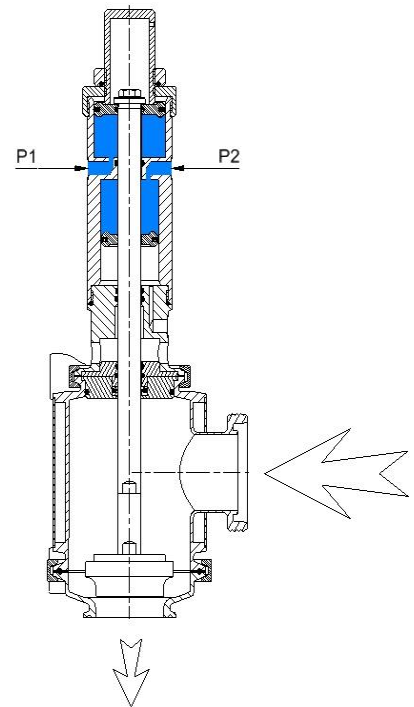
To obtain a precision filling,
a throttle setting can be set for a controlled refill.

Input;

- P1 activated
- P2 activated

Output;

- Upper piston lift to adjustment screw.
- Lower piston is steered down until the upper piston blocks the stem.



4.2.3. Closed position.

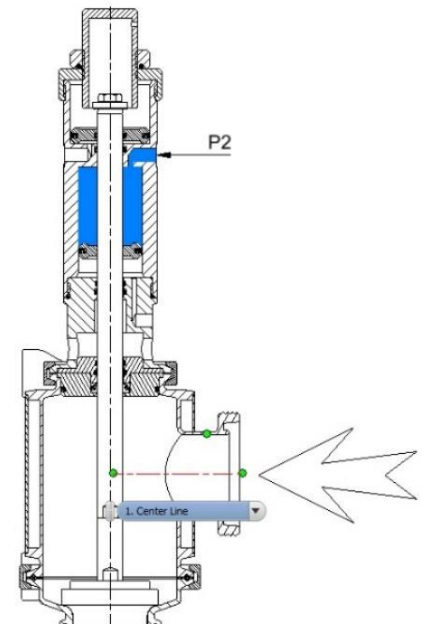
For a quick closing of the valve when the filling quantity is reached, it is recommended that P1 has a quick vent.

Input;

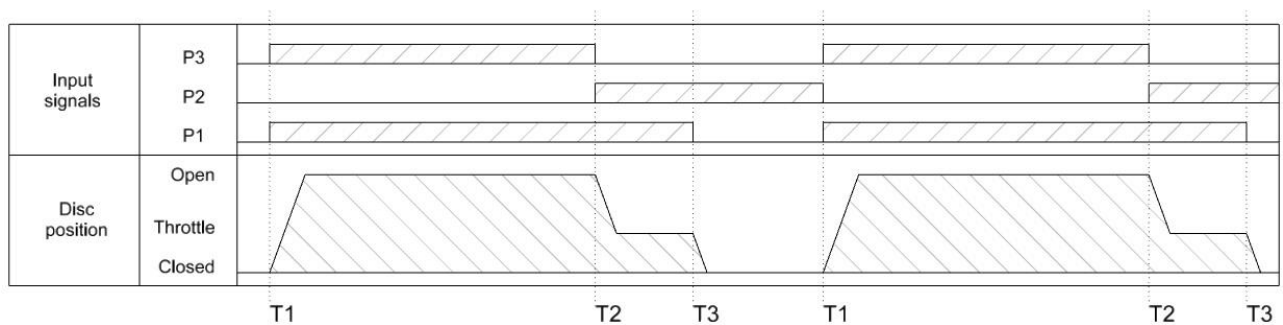
- P2 activated.

Output;

- The upper piston drops freely
- The bottom piston is pushed down until the valve is closed



4.2.4. Function diagram.

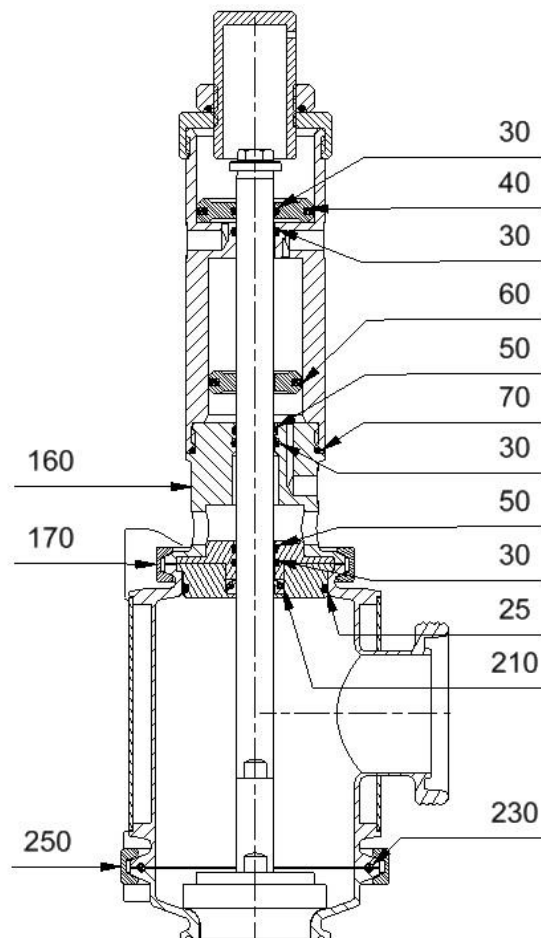


- P1 - Filling and Throttle signal.
- P2 - Throttle and closing signal
- P3 - Open signal.

- T1 - Starting time for filling
- T2 - Time point for throttle filling
- T3 - Time point for closing position

4.3. Fault finding and repair

Air leakage due to leak detection during filling	Seals (30, 50) in adapter (160) cause leakage	Install new set of seals
Air leakage due to adjustment sleeve during filling and throttle position	Upper piston seal or O-ring (40) (30) damaged or worn.	Install new set of seals
Outlet port does not open when fill signal is present.	No or insufficient air pressure in the system	Check if air pressure in the system according data sheet
	Defect in actuator (50)	Consider revision actuator



5 Maintenance

Maintain the valve/actuator regularly.

Study the instructions carefully and pay special attention to the warnings!

Always keep spare rubber seals and guide rings in stock.

Store seals in closed bag.

The items numbers refer to the parts list and maintenance kits section.

5.1. General maintenance

Recommended spare parts: Maintenance kits (see 6 Technical data)

Order service kits from the service kits section (see 6 Technical data)

Ordering spare parts: Contact the Sales Department.

5.1.1 Maintenance schedule

	<i>Valve rubber seals</i>	<i>Actuator seals</i>
Preventive maintenance	Replace after 12 months (*)	Replace after 24 months (*)
Maintenance after leakage (leakage normally starts slowly)	Replace after production cycle	Replace after production cycle
Planned maintenance	Regular inspection for leakage and smooth operation. Keep a record of the valve. Use the statistics for planning of inspections	Regular inspection for leakage and smooth operation. Keep a record of the valve. Use the statistics for planning of inspections
Lubrication	When assembling Klüber Paraliq GTE 703 or similar USDA H1 approved oil/grease (**) (suitable for EPDM) Do not lubricate the seat (70)	When assembling, Molykote Longterm 2 (black)

(*) depending on operating conditions

(**) All parts in contact with liquid

Mentioned brands and types are intended as examples, equivalent products are allowed

5.2. Valve maintenance



Maintain the valve in a dust-free place on the workbench !
Always use the correct and proper tools.
Always use TMG Holland bv parts for maintenance.

5.2.1. Required tools

Needed tools are:

- Wrench 10 mm
- Wrench 13 mm (2x)
- Wrench 14 mm
- Wrench 19 mm
- O-ring remover
- Grease for threaded ends ; Never Seize pasta - Weicon ASW 040 P or equal
- Grease for cilinder surface; Teflon cilinder grease - Magnalube G MGL 4 or equal



5.2.2 Disassembly the actuator from body

Step 1

Place the valve vertically on a clean workbench, or place it in a vice.

Remove the clamp (170) from the body (190).

Carefully lift the entire actuator (150) with disc and stem (90, 140),

Be aware that the valve guides (180, 185) are loosely mounted around the Stem, sometimes these stick in the Body (190), pull them carefully out of the Body by pulling up the actuator with Disc.

Place the actuator horizontally on the workbench.

Step 2

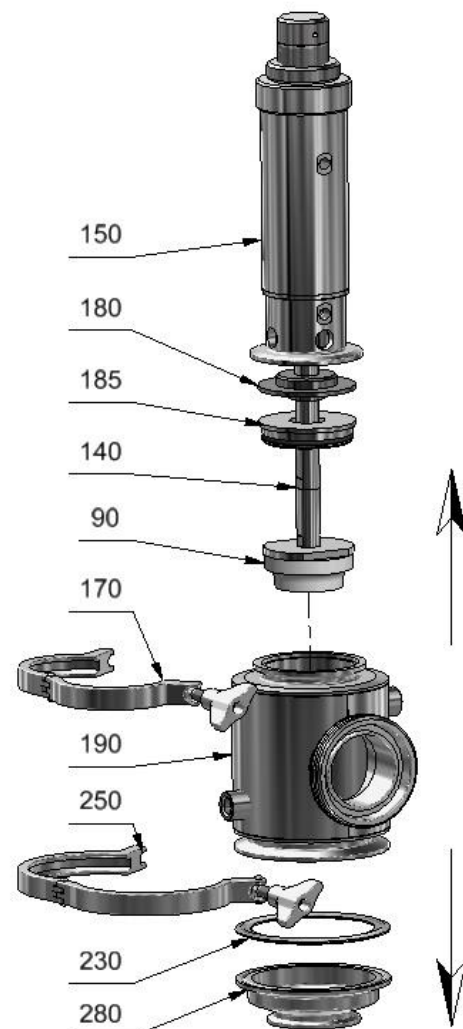
Remove the clamp (250) from the body (190).

Remove the module body (280) and gasket (230)

Clean both bodies (190, 280) and inspect them for damage.

Points of attention are;

- The round sealing surface for disc (90) in module body.
- Sealing surface for valve guide in top of body (190).
- Sealing surface for gasket (230).



5.2.3. Disassembly the disc

Use wrench 13 to block the stem (140).

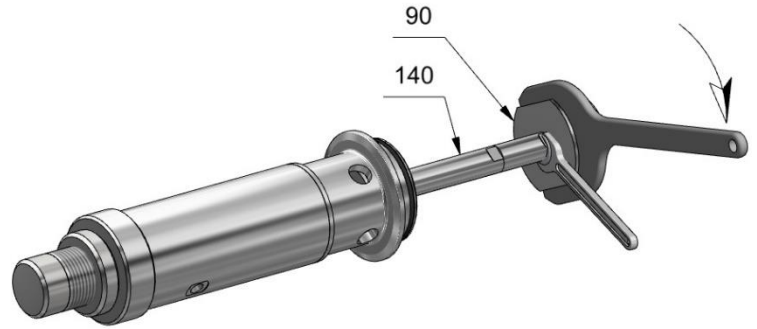
Turn the seat (90) counterclockwise with wrench 50.

Remove the seat and check the seat for damage.

If the round sealing surface or edges of the Disc are damaged, this can affect the dosage.

The seat (90) is not part of the maintenance kit, If the disc is damaged or scratched, it can be ordered as a separate part from TMG Holland bv. For Disc type, see technical drawing in this manual (Item 90)

The type of used disc depends on the chosen module that is supplied with the valve.



5.2.4. Remove the valve guides.

Step 1

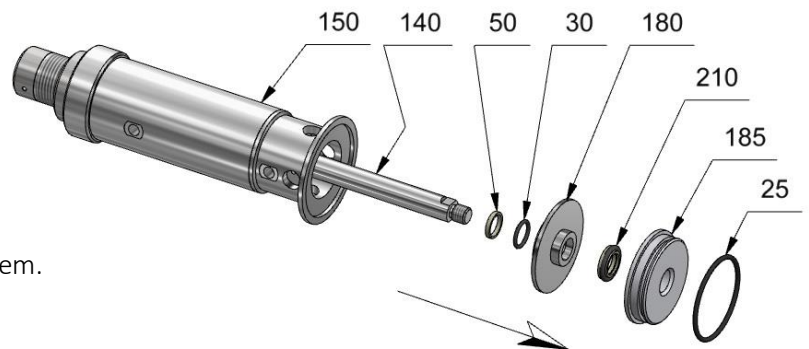
Gently slide the valve guide (185) off the Stem.

Remove the O-ring (25) from valve guide (185), then carefully remove the wiper seal from the valve guide (185).

Gently slide the valve guide (180) off the Stem.

Remove the guide ring (50) and O-ring (30) from the valve guide (180).

Use an O-ring remover if necessary.



Step 2

Thoroughly clean the valve guides (180 and 185).

Check the sealing surfaces for damage.

Refer to chapter 5.4.1 for mounting the new O-rings and seals from the maintenance kit.

Keep the parts in a clean place during further maintenance of actuator.

5.3. Actuator maintenance

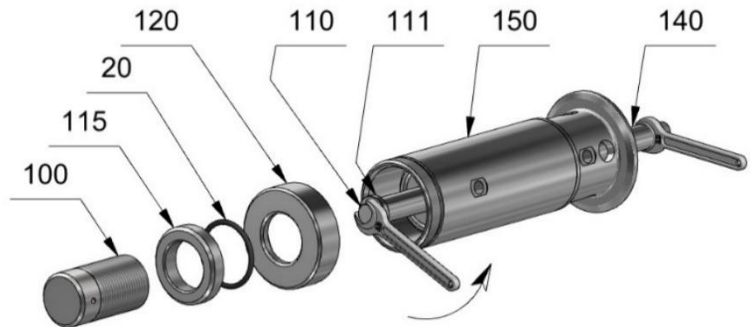


Maintain the valve in a dust-free place on the workbench !
Always use the correct and proper tools.
Always use TMG Holland bv parts for maintenance.

5.3.1 Disassembling of actuator parts.

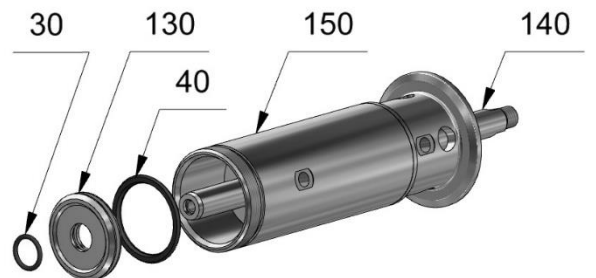
Step 1

Loosen locking nut (115) counterclockwise.
Remove adjustment sleeve (100) and locking nut (115)
Remove O-ring (20) from locking nut. and clean adjustment sleeve and locking nut.
Place new O-ring (20) from maintenance kit in the locking nut (115).
Keep the parts in a clean place during further maintenance.
Unscrew cap (120) counterclockwise.
Loosen the bolt (110) while blocking the stem (140) with another wrench 13
Remove the bolt (110) and washer (111).



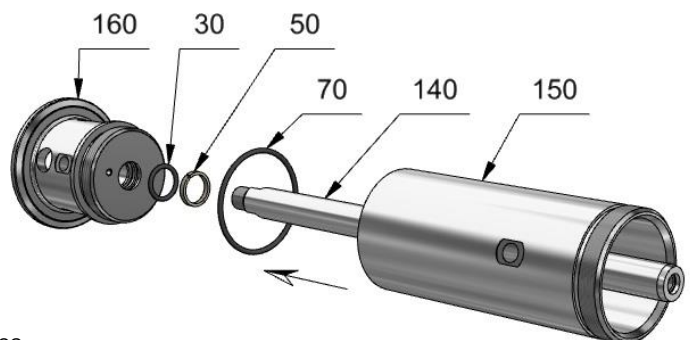
Step 2

Pull the upper piston (130) out of the actuator.
Remove the O-ring (30) and the piston seal (40) from the piston (130)
Thoroughly clean the piston sealing surfaces,



Step 3

Turn adapter (160) counter-clockwise from the cylinder (150).
Remove O-ring (70) from adapter (160).
Remove the O-ring (30), guide ring (50) from adapter (160) Use an O-ring remover.
Carefully pull the stem with piston (140) out of the cylinder (150)
Thoroughly clean the adapter and check the sealing surfaces for damage.
Keep it in a clean place during further maintenance.

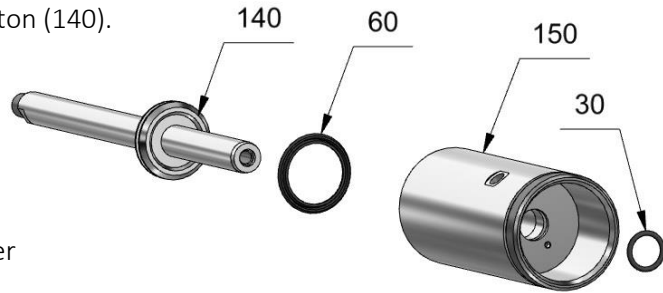


Step 4

Remove the piston seal (60) from the piston (140).

Thoroughly clean the stem with piston (140) and check the stem with piston (140) for damage.

Remove the O-ring (30) from the cylinder (150). Clean the cylinder thoroughly and check it for damage.



5.3.2. Mounting actuator parts.

Step 1

Place the new O-ring (30) from the maintenance kit in the cylinder (150).

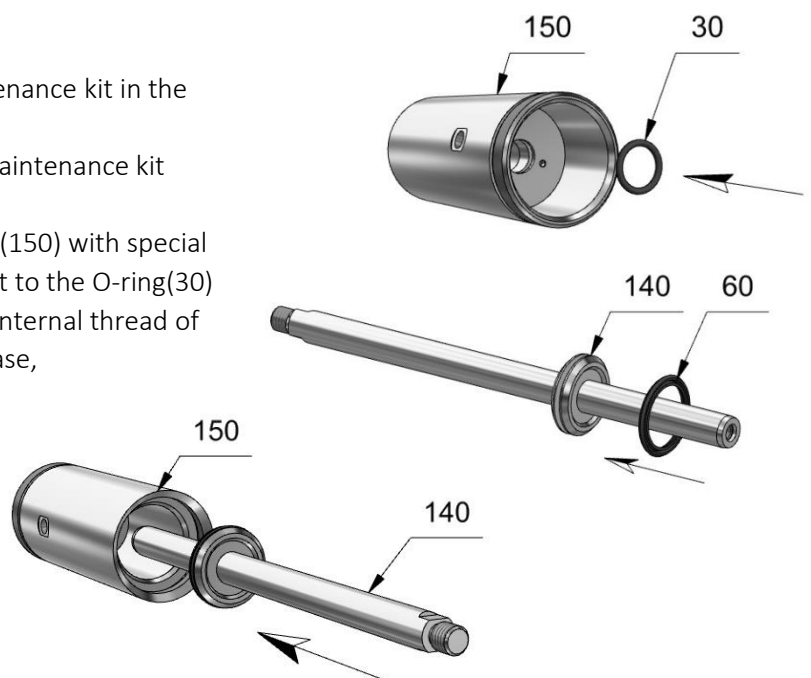
Place the new piston seal (60) from the maintenance kit on the piston (140).

Lightly lubricate the inside of the cylinder (150) with special cylinder grease, also apply a little lubricant to the O-ring (30) and piston seal (60). Lightly lubricate the internal thread of the cylinder (150) with special thread grease, see chapter 5.3. for type of grease.

Carefully slide the stem (140) through the seal (30) in the cylinder.

Make sure that the seal (30) in the cylinder are not damaged.

Slide the Stem (140) back and forth a few times to check that the stem (140) slides smoothly into the cylinder (150).



Step 2

Insert new O-ring (30), and guide rings (50) from the maintenance kit into the adaptor (160)

Place the O-ring (70) on the adaptor.

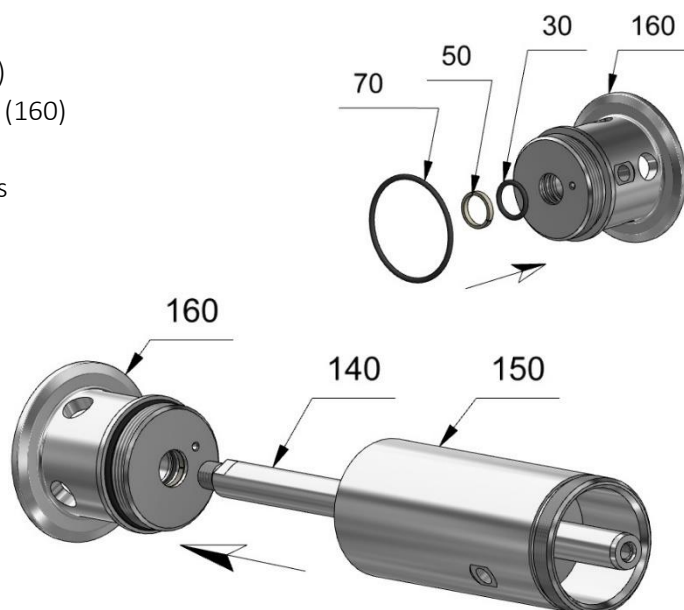
Use a little grease for mounting the O-rings

Carefully slide the adaptor (160)

over the stem (140) into the cylinder (150).

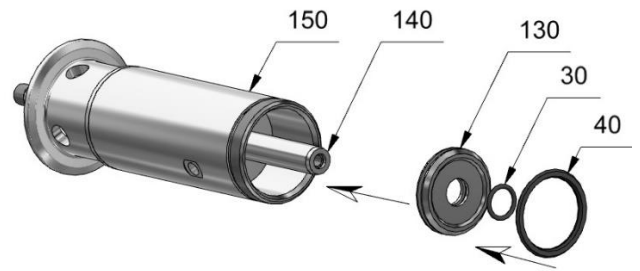
Make sure that the Stem (140) does not damage the seals (30) and (50)

Tighten the adaptor onto the cylinder and then slide the stem back and forth several times to check that the stem slides smoothly into the cylinder.



Step 3

Insert new O-ring (30) and piston seal (40) from the maintenance kit into the piston (130). Use a little grease for mounting pos 30 and 40. Carefully slide the piston (130) over the stem (140) . Make sure that the Stem (140) does not damage the O-ring (30)



Slide the piston (130) into the cylinder (150)

Make sure that the cylinder edge does not damage the seal (40)

Slide the piston (130) back and forth a few times to check that the piston (130) slides smoothly into the cylinder (150).

Secure the piston by turning the washer (111) and bolt (110) on the stem (140).

Block the stem (140) with wrench 13.



Step 4

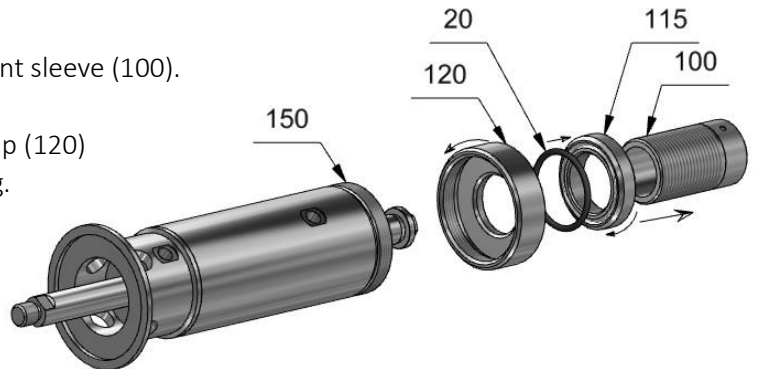
Insert new O-ring (20) from the maintenance kit into the locking nut (115).

Turn the locking nut (115) onto the adjustment sleeve (100).

Turn the cap (120) onto the cylinder (150).

Turn the adjustment sleeve (100) onto the cap (120)

The actuator is now ready for valve mounting.

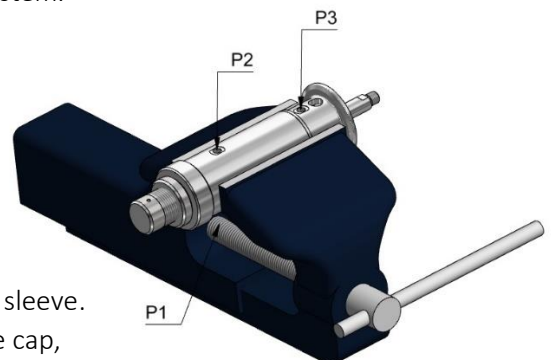


5.3.3. Testing the actuator

Before the actuator is placed on the valve, it can be tested by connecting connections P1, P2 and P3 one by one to an airline system.



Be sure the valve is positioned securely, and do not put hands or fingers to the stem during testing.



Port P1 - The top piston (130) is driven up to the adjusting sleeve. When the adjusting sleeve is unscrewed from the cap, the top piston must be driven up to the cap.

Port P2 - The stem is driven out of the cylinder. The stem is smoothly driven out. The stem should not be driven out with jerking movements.

Port P3 - The stem is driven in the cylinder. The stem is smoothly driven in. The stem should not be driven in with jerking movements.

5.4. Install the actuator.

In this manual, a dosing valve with stainless steel conical disc has been chosen as an example, depending on the module chosen, there are various versions. See chapter 8 for the various modules. The mounting sequence will almost always be the same.

5.4.1 Installing new seals in the valve guides

Take the O-ring (30) and guide ring (50) from the maintenance kit and place it in the valve guide (180). Make sure that the O-rings get into the groove properly and undamaged.

Guide ring 50 will need to be pre-bent a little before mounting.

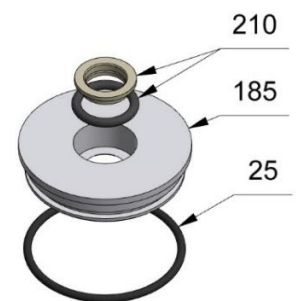
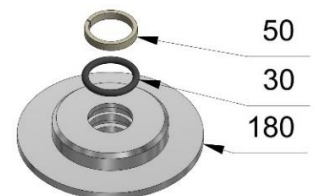
Take the new wiper seal (210) (O-ring and seat) from the maintenance kit and place it in the valve guide (185).

Make sure the wiper seal (210) is properly pressed in the correct position on the bottom of the valve guide (185)

Take the new O-ring (25) from the maintenance kit and place it in the valve guide (185)



Always replace both parts of the wiper seal (210)
Always use original TMG Holland parts!



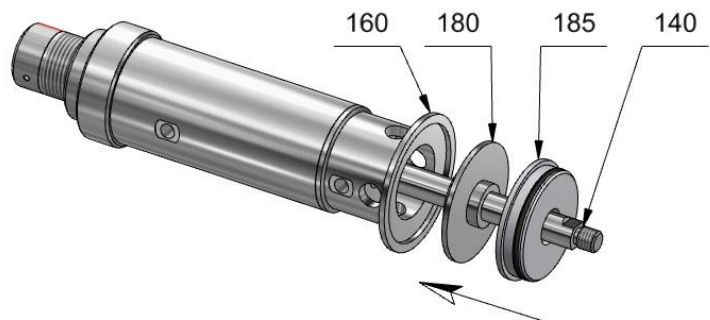
5.4.2. Mounting the valve guides.

Slide valve guide (180) over the stem (140) against the adapter (160).

Be careful not to damage the inserted O-ring (30) and guide ring (50) by the edge of the stem (140).

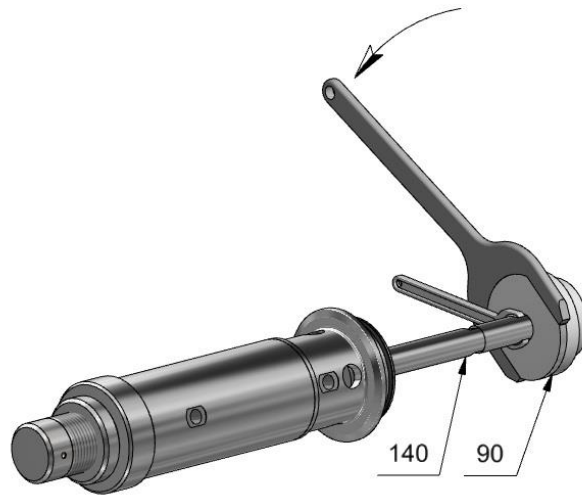
Slide valve guide (185) over the stem (140) against the valve guide (180).

Be careful not to damage the inserted Wiper seal (210) by the edge of the stem (140).



5.4.3 Mounting the disc

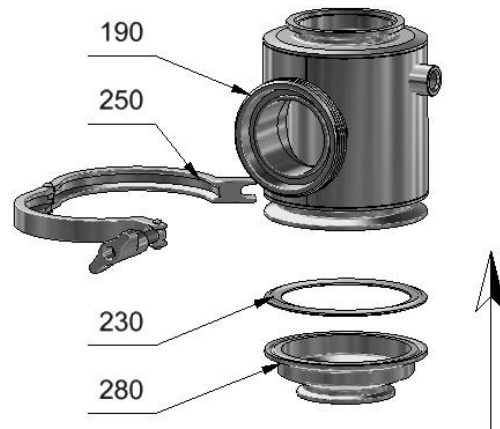
Mount the seat (90) with wrench 50
Block the stem (140) with wrench 13.
Be careful not to damage
the PTFE edges of the seat.



5.4.4. Mounting the module body.

Mount the module body (280)
to the body (190)
with gasket and clamp (230, 250)

Do not install damaged gasket (230).
The gasket is not part of the maintenance kit
and will have to be ordered separately
from TMG Holland BV.



5.4.5. Mounting the actuator on the valve body.

Push the disc (90) up into the actuator as far as it will go.
Make sure the valve guide (185) is pushed against the actuator.

Carefully slide the actuator into the body (190).

Be careful not to damage the O-ring (25) on the edge of the body.

Press the actuator firmly onto the flange of the body (190).
There will be approximately 0.5 mm space between flange actuator and flange body.

Install the clamp (170)

5.4.6. Testing.

Connect port P2 to reduced air pressure.

Let the disc go down slowly for the first time.

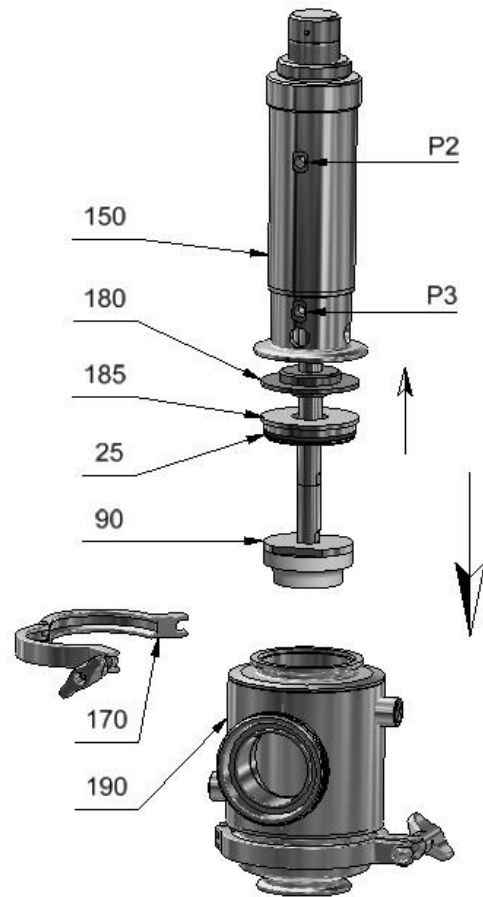
Check if the disc closes accurately in the module outlet.

Connect port P3, and let disc go up slowly.

Then run the disc up and down a few more times with the pressure used in the process.

The throttle setting is best set in the process, see chapter 3.3.3.

The valve is now ready for production.



6 Technical data

It is important to observe the technical data during installation, operation and maintenance.

6.1. Technical data

Technische gegevens				
	<i>min.</i>	<i>max.</i>		
Product pressure	atm.	4 bar		
Temperature range	-5 °C	125 °C		
Air pressure	6 bar	8 bar		
Materialen				
Product wetted steel parts	AISI 316L			
Other steel parts	AISI 304	or equal		
Product wetted seals	PTFE, EPDM			
Other seals	EPDM			
Surface finish				
Inside product side	Ra<0,8			
outside	Polish			

6.2. Noise

The noise level of a valve actuator will be approximately 77db(A) without noise damper and approximately 72 db(A) with damper.

- Measured at 6 bar air-pressure.
- Measured at 1 meter distance and 1.6 meter height.

6.3. Weights

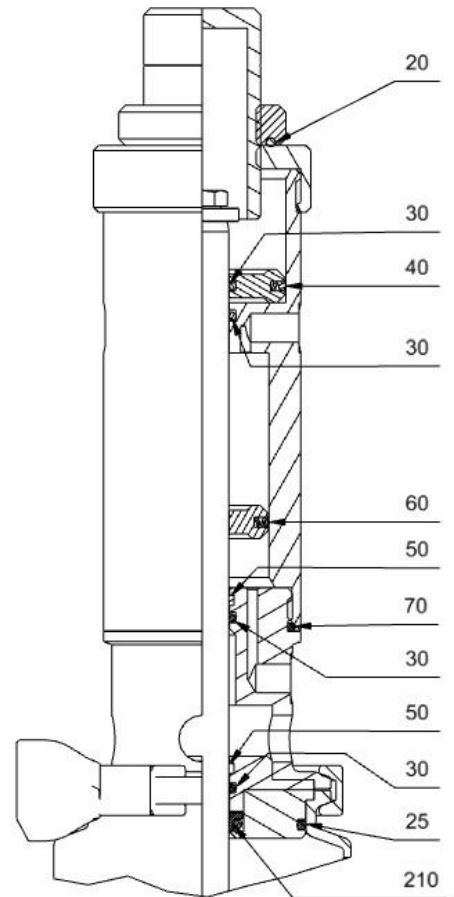
Valve weights in Kg					
	Valve	Actuator	Module		Total
			outlet	disc	Total
PM-312-BF	1,73	3,65	0,61	0,17	6,16

The module weights given are based on module M232.

7 Valve parts.

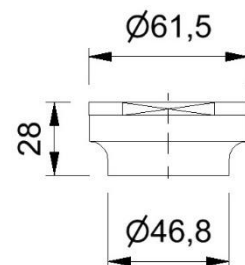
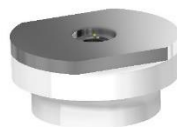
7.1. Maintenance kit PM-MK-312

Item	Qty	Part number	Description	Material	
20	1	PS-OR-050-020-N	O-ring	NBR	
25	1	N1-OR-001-100-F	O-ring	FKM	
30	4	N1-OR-001-020-N	O-ring	NBR	
40	1	MS-PS-50	Piston seal	NBR	
50	2	N1-GR-001-010-P	Guide ring	PTFE	
60	1	MS-PS-040	Piston seal	NBR	
70	1	PS-OR-025-070-N	O-ring	NBR	
210	1	PS-WS-025-210	Wiper seal	PTFE / FKM	
230	1	GA-312-E	Gasket	EPDM	



7.2 Disc type

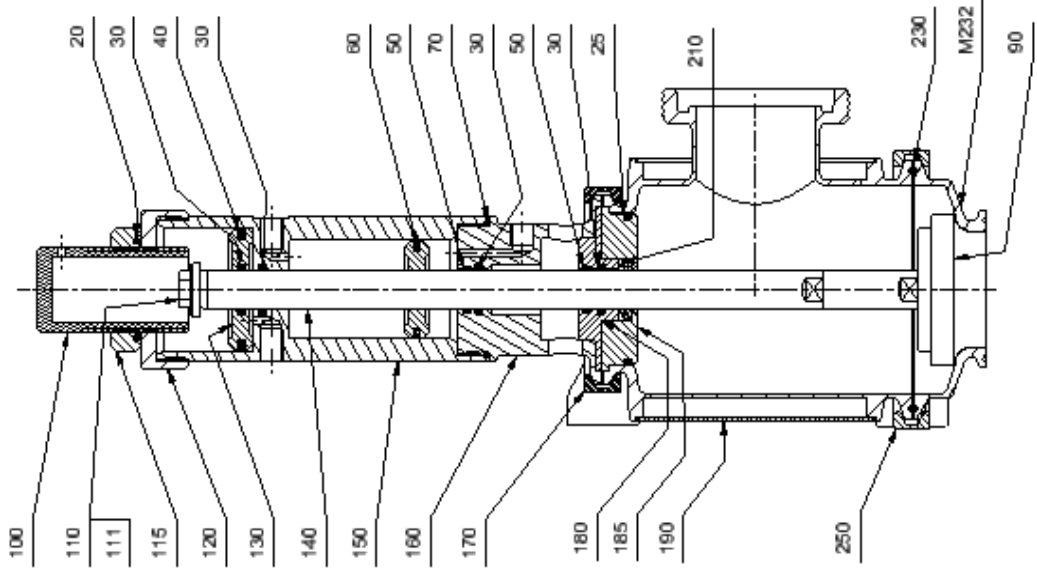
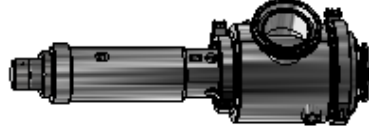
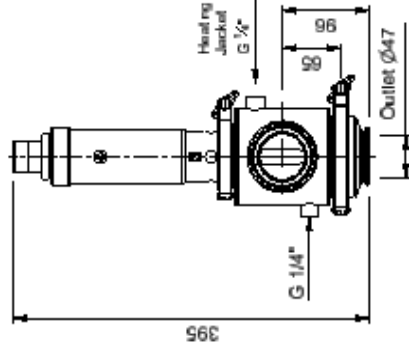
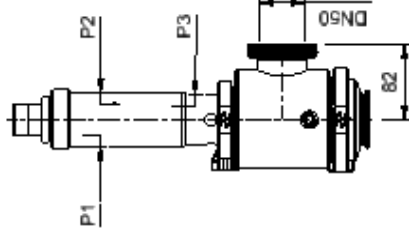
Item	Qty	Part number	material
90	1	Disc P2	PTFE



7.3 Technical drawing

Material	AISI 316L
Type	8 ACME / TC
Inlet	DN50 - DIN 11851
Standard	BS-4825
Finish	Ra 0,8µm ID / polish OD
Seat	PTFE
Seals	EPDM / PC
Max working pressure	2,5 bar
Max temperature	140 C
Actuation	Air operated solenoid - 4-6 bar - G1/8"
Heating Jacket connection	G1/4"
Heating Jacket temperature	Max. 140 C
Heating Jacket pressure	Max. 2,5 bar
Seat and seals according	3A FDA USDA USP Class VI ADI (EC) No. EC1935-2004-FDA 21 CFR 177.2600

Module	Module : PM-312-050-P2	
M232	Drawing number	PM-312-050-P2-M232
	Description	Reducing adapter 312-050



Maintenance kit : PM-MK-312

Item	Qty	Part number	Description	Material
230	1	GA-312-E	Gasket 3 1/2"	EPDM
210	1	PS-WS-025-210	Wiper seal	PTFE / NBR
70	1	PS-OR-025-070-N	O-ring	NBR
60	1	MS-PS-040	Piston seal	NBR
50	2	N1-GR-001-010-P	Guide ring	PTFE
40	1	MS-PS-050	Seal	NBR
30	4	N1-OR-001-020-N	O-ring	NBR
25	1	N1-OR-001-100-E	O-ring	EPDM pc.ec 1935/2004
20	1	PS-OR-025-020-N	O-ring	NBR

250	1	CL-312-F	Clamp 3 1/2"	AISI 304
190	1	PM-B-312-BF-HS	Body	AISI 316
185	1	PS-VG-050-B	Valve guide	AISI 316
180	1	PS-VG-050-035-T	Valve guide	AISI 303
170	1	CL-212-F	Clamp	AISI 304
160	1	PS-AD-035-02	Adapter	AISI 303
150	1	PS-C-025	Cylinder	AISI 303
140	1	PS-DS-035	Stem	AISI 316
130	1	PS-P-050	Piston	AISI 303
120	1	PS-CA-025	Cap	AISI 304
115	1	PS-LN-025	Locking nut	AISI 303
111	1	PS-MO-002-111	Washer	AISI 303
110	1	PS-MO-002-110	Bolt	AISI 304
100	1	PS-AS-025	Adjustment sleeve	AISI 303
90	1	PS-S-050-P2	Seat P2	AISI 316L / PTFE

Part number:

Modular Proportional Dosing Valve

- Modul PM-050-P2 - Heating Jacket -

PM-050-BF-P2-HJ



Drawn: A.Hoekstra
Date: 25-3-2019
Sheet: 1 of 2
Status: .

Revision:
-
Format: A3

8. Module options

The valve has a modular design.

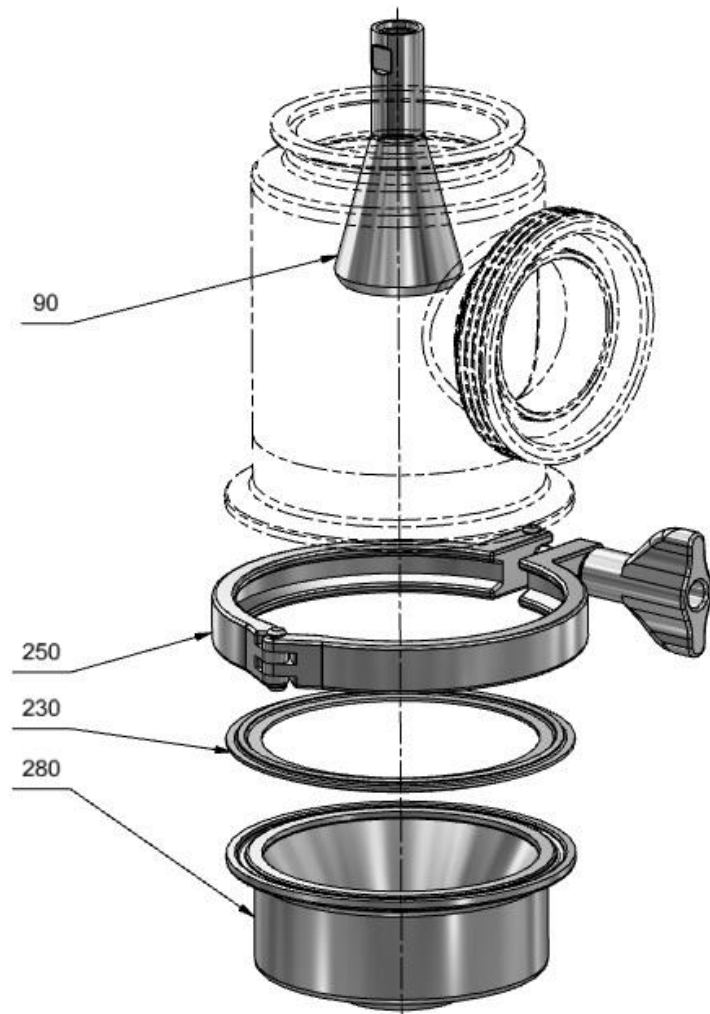
Special modules can be designed for customer-specific applications. Consult TMG Holland for special modules.

8.1. Module with Cone adapter

Basic valve body for the module;
PM-312-BF.

Conical adapter with
dosing outlet of 35 mm.
Outlet diameter and taper
depending on product.

Contact TMG-Holland for
Specific applications



PM-312-035-SS4-M323

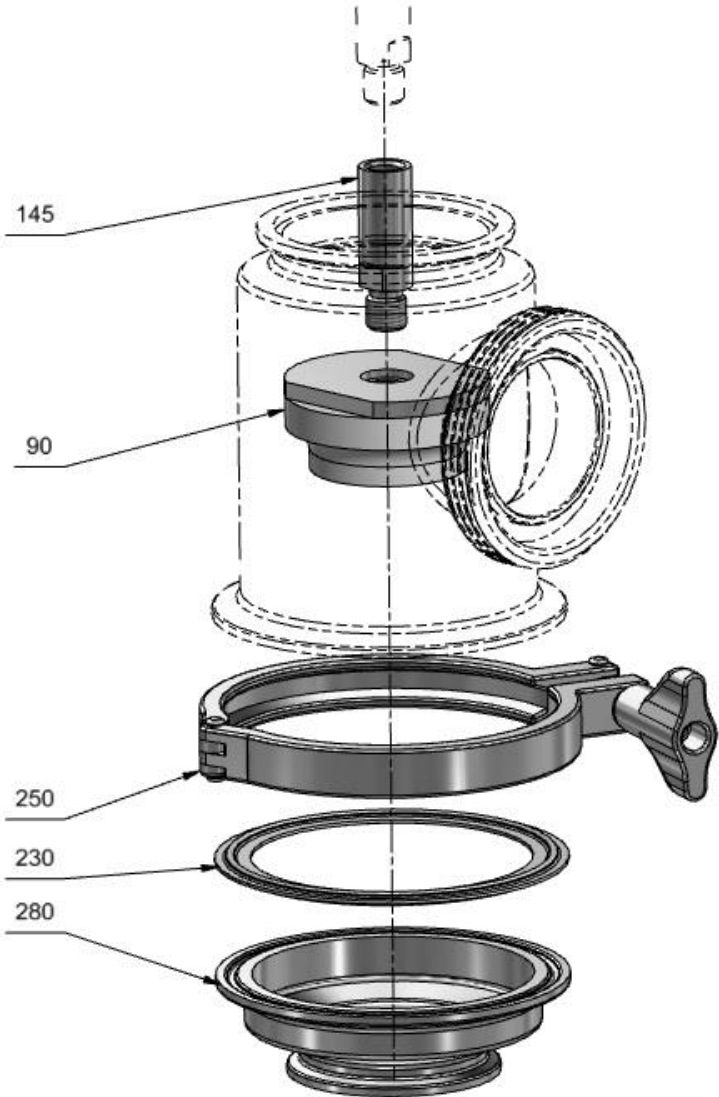
Item	Qty	Description	Material
90	1	Seat PM-DS-035-SS4	AISI 316L
230	1	Gasket GA-312-E	EPDM
280	1	Cone adapter PM-AD-312-035-SS4	AISI 316L
250	1	Clamp CL-004-F	AISI 304

8.2. Module with straight adapter.

Basic valve body for the module;
PM-312-BF.

Straight outlet adapter for
disc with curved flat seat.

Contact TMG-Holland for
Specific applications



PM-312-050-P2-M232

Item	Qty	Description	Material
90	1	Seat PS-S-050-P2	AISI 316L / PTFE
145	1	Adapter PS-DS-050-AD	AISI 316L
230	1	Gasket GA-312-E	EPDM
250	1	Clamp CL-312-F	AISI 304
280	1	PS-AD-312-050	AISI 316L

8.3. Module Body with heating jacket

Standard body can be replaced by body with heating jacket.

Body has the same installation dimensions and can be fitted with the same modules

heating jacket G1 / 4 "



PM-B-312-BF-HS

Item	Qty	Description	Material
190	1	Body PM-B-312-BF-HS	AISI 316L