

# ITT RICHTER CHEMIE-TECHNIK

**The Answer to Corrosion**

**Series MV/MVP**

## Operating Manual for Diaphragm Valves

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Total No. of pages: 7

### Local agent:

See order

Reprinting is generally permitted  
indicating the source.  
However, our prior written consent  
must be obtained in all cases.

### Note:

This operating manual must be strictly observed  
before transport, installation, commissioning etc.

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Richter



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## 1 General

RICHTER valves correspond to the technical delivery conditions for valves as per DIN 3230.  
The operating manuals enclosed for the accessories must also be carefully read and observed.

### 1.1 Application

The corrosion-resistant fluoroplastic lining of the valves makes them ideally suited for aggressive media.

Information concerning the operational conditions of the valve is contained in **Section 9**.

If the valve is to be used for operational data other than those intended, the customer has to carefully consider whether the valve, accessories and materials are suitable for the new application.

### 1.2 Product data

Type code

Diaphragm valve,  
hand-operated : MV/...

Diaphragm valve,  
remote actuation : MVP/...

with lining

PFA/PTFE : ...../F DN 15 - 100 PFA  
DN 125 - 200 PTFE

PVDF : ...../V DN 15-50  
PP : ...../P DN 15-50

Nominal sizes : 15, 20, 25, 32, 40, 50, 65, 80, 100, 125,  
150, 200

## 2 Safety



People may be at risk if this general hazard symbol is not observed.

**CAUTION !**

If this safety sign is not observed, the valve may be damaged and its function impaired.

### 2.1 Staff qualifications and training

The staff for installation, operation and maintenance must have the appropriate qualifications for this work.

The area of responsibility, authority and supervision of the staff must be regulated precisely by the customer.

If the staff do not have the necessary know-how, they are to be trained and instructed.

This can, if necessary, be performed by the manufacturer / supplier on behalf of the valve customer.

Furthermore, the customer must ensure that the contents of the operating manual are fully understood by the staff.

### 2.2 Risks if safety notes are not observed

The non-observance of the notes on safety can result in the loss of any rights to claims for damages.

Non-observance may, for example, result in the following hazards:

- Failure of important functions of the valve / plant.
- Endangering personnel by electrical, mechanical and chemical influences.
- Endangering the environment through leakage of hazardous media.

### 2.3 Safety-conscious working

The following are to be observed:

- The notes on safety in this operating manual.
- The national accident prevention regulations.
- The work, operating and safety regulations of the customer.

### 2.4 Notes on safety for the customer/operator

- If hot or cold components of the valve are a source of danger, the customer must protect these components from being touched.
- No protective facilities may be removed when the valve is in operation.

### 2.5 Notes on safety for maintenance

Work on remotely actuated valves is only to be carried out when they are at a standstill.

Valves which deliver harmful media must be decontaminated.

On completion of work, all safety and protective equipment must be immediately refitted or re-activated.

Before re-starting, attention has to be paid to the instructions in the section "Initial commissioning".

### 2.6 Conversion work and production of spare parts by the customer

Conversion of or changes to the valve are only admissible after consultation with the manufacturer.

Original spare parts and accessories authorised by the manufacturer serve to enhance safety.

The use of other parts may annul the liability for any resultant consequences.

### 2.8 Inadmissible modes of operation

The operational reliability of the valve supplied is only guaranteed when used in accordance with **Section 1** of this operating manual.

### 3 Transport and storage



It is imperative for all transport work to observe generally accepted engineering practice and the accident prevention regulations.

#### 3.1 Unpacking

Immediately after unpacking, the consignment is to be checked for completeness and any in-transit damage.

#### 3.2 Transport

The goods have to be handled with care to prevent damage. Flange covers serve as transport protection and must not be removed.

#### 3.3 Storage

If the valve is not to be installed immediately on delivery, it must be properly stored.

It should be stored in a dry room at as constant a temperature as possible.

Storage over **a prolonged period** may necessitate moisture-proof packaging. A decision on this must be taken on the basis of the local conditions.

#### 3.4 Return consignments



The customer must ensure that the valves have been well flushed and cleaned before being passed on to the maintenance staff. This is of particular importance when the goods are returned to the manufacturer.

##### 3.4.1 GRAS certificate

A GRAS certificate according to EUROPUMP on the field of application is to be enclosed with the returned goods.

If necessary, safety precautions and decontamination measures are to be mentioned.

Pre-printed forms can be requested from ITT Richter.

### 4 Product description

The entire diaphragm valve is of a simple design. In comparison to conventional full-bore valves, it has the advantage that, apart from the diaphragm, the one-piece body is the only "wetted" part.

The valves are protected against aggressive atmospheres on the outside with an epoxy paint.

Richter diaphragm valves consist of the assemblies:

- Body
- Upper part

### 4.1 Body

The metallic body bears the following cast data as per DIN EN 19:

- nominal diameter
- nominal pressure
- body material
- manufacturer's code
- melt number / foundry number
- lining material

### 4.2 Upper part

The upper part of the diaphragm valve consists of the bonnet, compressor, diaphragm, stem/valve stem, threaded bushing, (stroke index), travel stop (DN 15 - 80), position indicator (DN 100 - 200) and handwheel.

### 4.3 Nameplate

A nameplate on the body contains the following details :

- Richter production No.
- Any customer-specific data

Example of production No.: 99 4875/2/1

Please indicate the production number on all correspondence.

### 5 Installation

#### CAUTION !

To protect the sealing surfaces against contamination and damage, the yellow protective caps must remain on the flanges until just before installation.

The plant must be flushed and free of loose solid matter.

The installation space must correspond to the face to face dimension.

We recommend gaskets to protect the sensitive plastic sealing surfaces against damage by the mating flange.

Gaskets with a PTFE jacket and a stainless steel inlay must be used if a flange is endangered by hard pipe flanges, e.g. made of metal or ceramic.

The size of the gaskets must correspond to the nominal diameter of the valve.

#### 5.1 Direction of flow

The direction of flow is not prescribed for diaphragm valves. The direction can be determined as required.

#### 5.2 Earthing

If the valve has to be earthed, this can also be performed using the pipe screws.

A tooth lock washer is placed under one nut of each valve flange. This penetrates the paint film and thus creates the electric contact with the screw.

#### 5.3 Tightening torques of the screw fittings

#### CAUTION !

Tighten the connection screws between the bonnet and body with a torque wrench.

For recommended torques for the screws, see **Section 9.6**.

## 6 Operation

### 6.1 Initial commissioning



Normally the valves are tested for leaks with water and air. Unless other agreements have been made, there may still be residual amounts of water in the bore of the valve. Beware of a possible reaction with the operating medium.

After initial loading of the valve with operating pressure and temperature, the torques of all connection screws must be checked.

### 6.2 Shutdown



If the valve is to be dismantled, the local regulations are to be observed.

Always make sure that the pipe and the vessel have been depressurised and emptied.

Suitable protective action is to be taken to avert any risk to people and the environment through

any aggressive or toxic media leaking.

If the dismantled valve is to be returned to the company's own workshop or to the manufacturer, it must be thoroughly cleaned.

See also [Section 3.4](#).

After dismantling, immediately protect the plastic flanges of the valve against mechanical damage using flange caps.

### 6.3 Re-starting

When re-starting the valve, make sure that, depending on the progress of shutdown, all the appropriate steps as described in [Section 5](#) and [Section 6.1](#) are repeated.

### 6.4 Inadmissible modes of operation and their consequences

#### CAUTION !

When operating in the range of below-zero temperatures, the national regulations are to be observed.

## 7 Maintenance

- Check all connection screws of the valve in accordance with [Section 5.3](#).
- Check the working order of all other equipment in accordance with the plant standards in the operating area:
  - body screws
  - safety stuffing box
  - air connections
  - control equipment
  - protective devices
  - etc.

The exact arrangement and designation of all single parts belonging to the valve including the item numbers mentioned in the following instructions are contained in the arrangement drawing in [Section 9.9](#).

All maintenance work is to be performed with appropriate tools by qualified staff. The working practice applicable in the general mechanical engineering sector is to be observed.

## 7.1 Screw connections

Periodical checks of the tightening torques in line with the operational requirements at the following points:

- Connection screws between body and bonnet.
- Pipe screws .

For tightening torques, see [Section 9.6](#).

## 7.2 Cleaning



The valve is to be cleaned thoroughly before the start of repair work. Even if the valve has been properly drained and flushed, there could still be residual amounts of medium in the valve, e.g. between the sealing surfaces.

Moreover, the plastic components may have absorbed medium which emerges gradually from the material after cleaning.

Protective clothing should therefore be worn.

See also [Section 3.4](#).

## 7.3 Dismantling

### 7.3.1 MV (with handwheel)

- Undo cover screws and remove upper part.
- Turn stem into the threaded bushing until the compressor with the diaphragm is exposed.
- Turn diaphragm through 90° and lift off (bayonet catch).



Observe safety regulations when working with the medium.

#### CAUTION !

When cleaning, do not treat mechanically but only use soft and/or liquid cleaning materials.

### 7.3.2 MVP (with actuator)

- Open coupling and remove actuator.
- Press stem into the bushing until the compressor with the diaphragm is exposed.
- Turn diaphragm through 90° and lift off (bayonet catch).

## 7.4 Assembly

- Insert new diaphragm, turn through 90° (bayonet catch). Then perform tensile test to see whether the bayonet catch has engaged.
- Turn stem (manual activation) upwards into the threaded bushing. / Press valve stem (remote activation) upwards in the bushing.
- Mount upper part on the body and tighten screws to a torque in accordance with [Section 9.6](#) in diametrically opposite sequence.

### 7.4.1 MV (with handwheel)

The travel stop is set as follows with DN 15-80 :

- Close valve until completely tight.
- Screw travel stop onto stem until in contact with threaded bushing.
- Mount handwheel onto stem and find the best position between the stem square feature and the finger on the travel stop; if necessary, turn the stem slightly to the left or right.

- The position indicator is set as follows with DN 100-200 :
- Close valve until completely tight.
- Screw position indicator onto stem up to the end of the yellow paint on the threaded bushings.
- Mount handwheel onto the stem and find the best position between the stem square feature and the finger on the travel stop. If necessary, turn the stem slightly to the left or right.
- Mount handwheel with intermediate ring onto the stem.

#### 7.4.2 MVP (with actuator)

Mount bracket, groove nut, travel stop, protective bellows and coupling.

Mount actuator and close coupling.

Close valve until completely tight.

Turn travel stop fully tight and counterlock

Mount protective bellows and hose clip.

#### 7.5 Tests

All points cited in [Section 6.3](#) are to be observed. After assembly of the valve, a leak test must be performed.

### 8 Faults

- In case of leaks between the bonnet and body, tighten the screws in accordance with the torques in [Section 9.6](#).
- In case of leaks between the stem and threaded bushing or between the bonnet and threaded bushing, the diaphragm is defective. Replace the diaphragm in accordance with [Section 7.3](#).
- If valves have been opened for operational or other reasons, the diaphragm must always be replaced with a new one. It is possible that the sealing surface of the body has to be carefully reworked in order to prevent leaks after assembly and re-starting.

### 9 Tables, diagrams, sectional drawings

#### 9.1 Connection dimensions

- Face to face: see order
- Flange pattern: see order
- Actuator: see order

#### 9.2 Parts subject to wear

- Diaphragm

#### 9.3 Nominal pressure

DN 15- 50 PN 16

DN 65-200 PN 10

See [Section 9.7](#)

#### 9.4 Weights (with handwheel)

DN	kg
15	2.8
20	3.4
25	4.3
32	6.1
40	8.4
50	11.0
65	15.0
80	20.0
100	31.0
125	43.0
150	67.0
200	136.0

#### 9.5 Flow rates

DN	K <sub>v100</sub> -value m <sup>3</sup> /h
15	7.8
20	10.0
25	15.0
32	22.5
40	37.0
50	65.0
65	95.0
80	134.0
100	200.0
125	320.0
150	452.0
200	650.0

#### 9.6 Tightening torques

Lubricate screws, tighten in diametrically opposite sequence

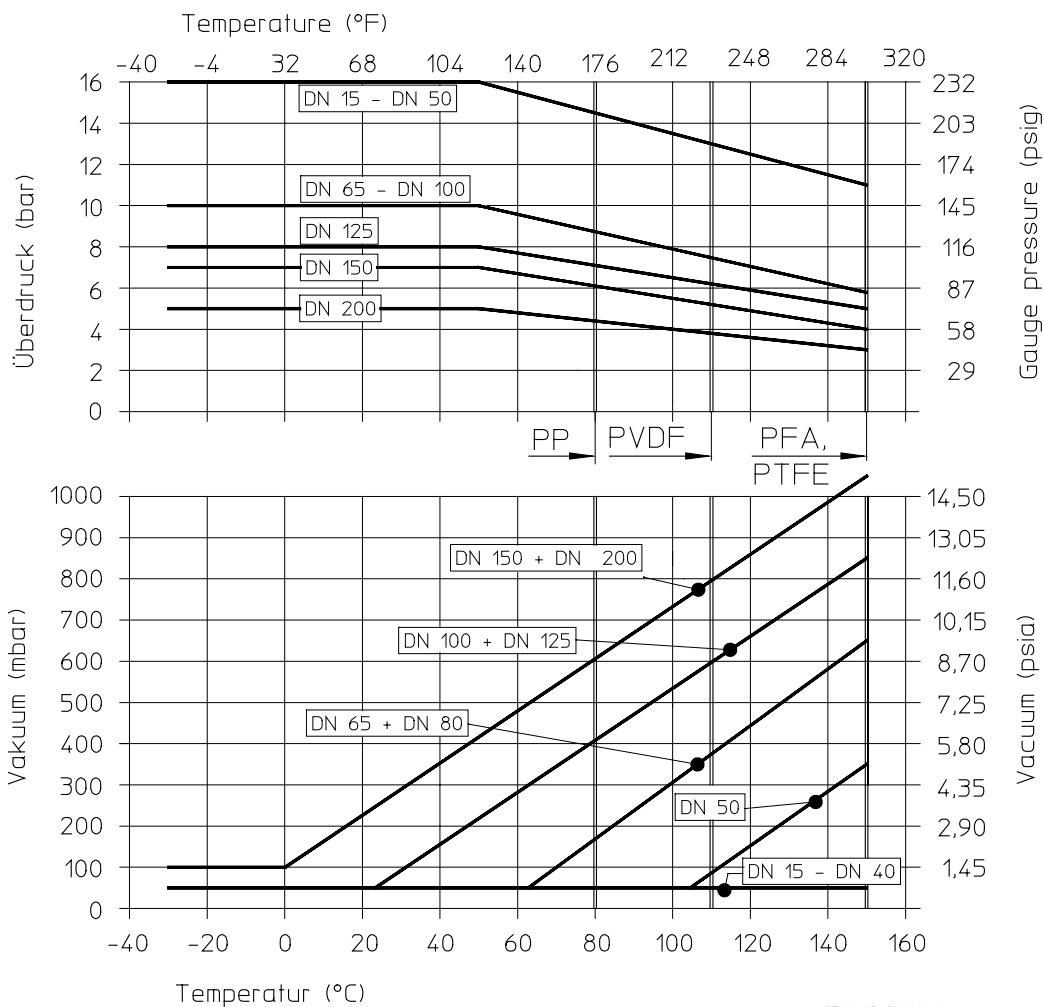
##### Pipe screws

DN	No. x size	[Nm]
15/20	4 x M12	5
25	4 x M12	6
32	4 x M16	12
40	4 x M16	17
50	4 x M16	25
65	4 x M16	40
80	8 x M16	60
100	8 x M16	40
125	8 x M16	45
150	8 x M20	50
200	8 x M20	60

##### Connection screws between body and bonnet

DN	No. x size	[Nm]
15/20	4 x M6	6.5 ± 1.5
25	4 x M8	7 ± 2.0
32	4 x M8	15 ± 2.0
40	4 x M10	21 ± 5.0
50	4 x M10	30 ± 10.0
65	4 x M12	50 ± 10.0
80	4 x M16	75 ± 10.0
100	8 x M12	50 ± 10.0
125	8 x M16	60 ± 10.0
150	10 x M16	60 ± 10.0
200	14 x M16	70 ± 10.0

### 9.7 Pressure/temperature diagram



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### 9.8 Closing forces in N

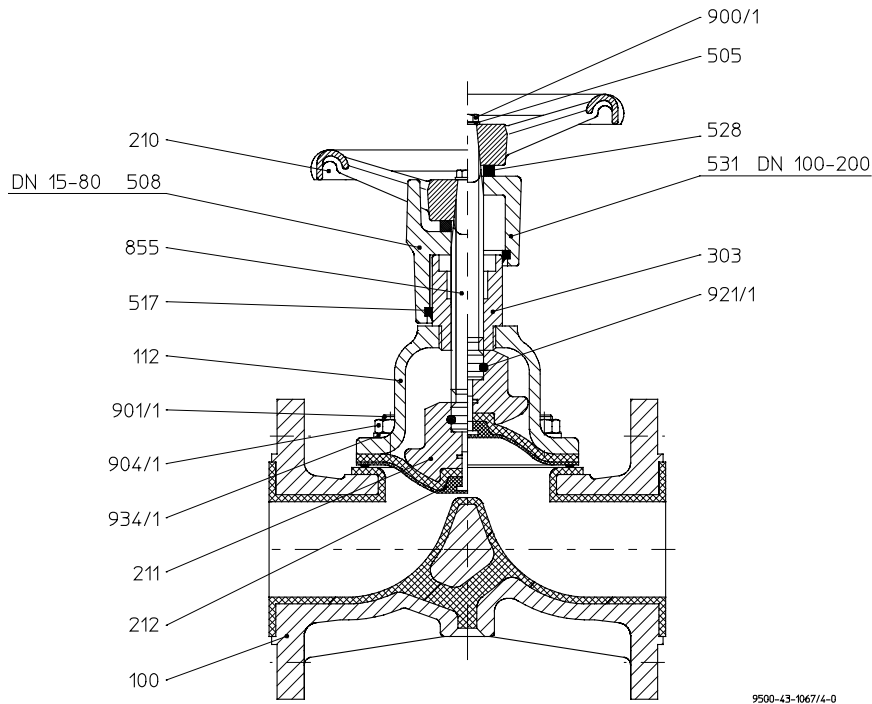
Forces apply to PFA/PTFE-lined bodies and PTFE diaphragm. Other materials for lining and diaphragms result in different forces.

DN	p1 for p2 = 0 bar															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
15	1148	1224	1301	1390	1467	1543	1620	1696	1773	1862	1938	2015	2091	2168	2245	2321
20	1390	1492	1594	1696	1798	1913	2015	2117	2219	2321	2436	2538	2640	2742	2844	2959
25	1620	1760	1887	2028	2168	2308	2436	2576	2716	2857	2984	3124	3264	3405	3545	3673
32	1938	2104	2283	2449	2614	2793	2959	3124	3303	3469	3635	3813	3979	4145	4323	4489
40	2334	2550	2755	2971	3175	3392	3596	3813	4017	4234	4438*	4655*	4859*	5076*	5292*	5497*
50	2755	3086	3405	3724	4043	4362	4680	4999	5318	5650	5969*	6288*	6607*	6926*	7245*	7564*
65	3188	3890	4655	5356	6121	6823	7588	8289	9055	9756						
80	3635	4719	5866	7014	8098	9246	10394	11541	12625	13773*						
100	4081	5803	7524	9246	10968	12689	14411	16132*	17790*	19512*						
125	5420	8098	10776	13454	16196	18774	21552	24231*								
150	7907	13646	19385	24996	30735	36474	42212									
200	19130	28057	36984	45911	54838											

\* larger handwheel required

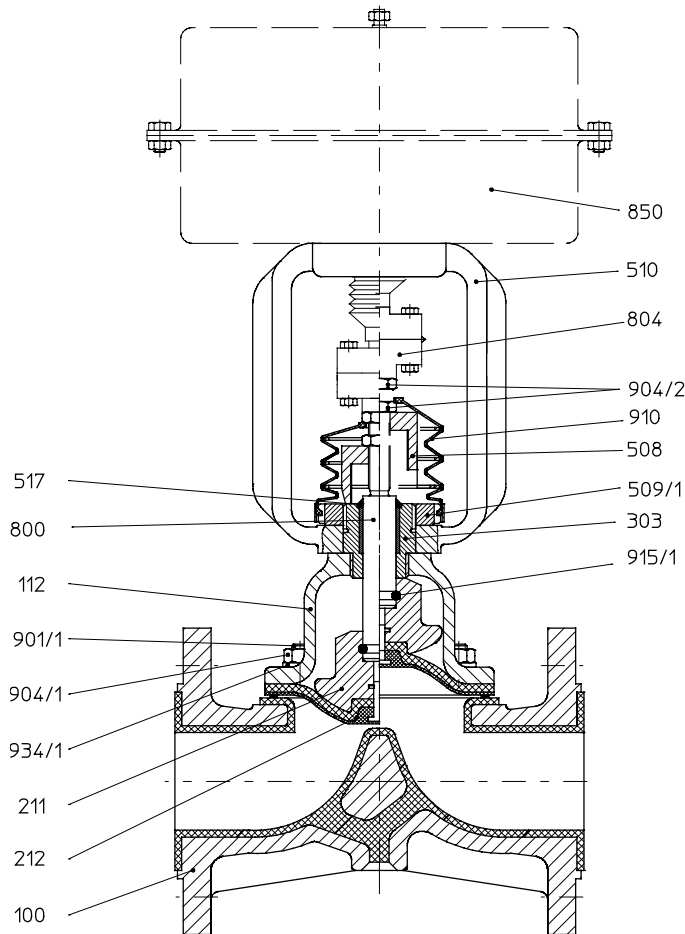
## 9.9 Sectional drawings

### Diaphragm valve (hand-operated)



100	Body
112	Bonnet
210	Handwheel
211	Connector
212	Diaphragm
303	Threaded bushing
505	Disc
508	Travel stop
517	Scraper ring
528	Intermediate ring
531	Position indicator
855	Stem
900/1	Hex. screw
901/1	Stud screw
904/1	Hex. nut
910	Protective bellows
921/1	Grooved pin
934/1	Lock washer

### Diaphragm valve (remote actuation)



100	Body
112	Bonnet
211	Connector
212	Diaphragm
508	Travel stop
510	Bracket
800	Valve stem
804	Coupling
850	Actuator
901/1	Stud screw
904/X	Hex. nut
910	Protective bellows
915/1	Spring-type slotted pin
934/1	Lock washer

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