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1. Generalities

The following operation instructions are valid for Fromme - Ball Valves of figure no.

**740,741,744,745,751,752,754,755,761,
762,764,765**

which serve to shut the flow of liquids, gases and steams in pipelines, and of course to let it through, whenever they are in OPEN status.

The Fromme ball valves are used in industrial systems such as steam, water, gasses and corrosive media. The valves are designed for standard operating conditions. For the use of extreme conditions e.g. aggressive or abrasive media, it is recommended to mention this at the ordering stage, to verify whether the valve is suitable. The installation designer is responsible for the valve selection, suitable for the working conditions. The valves are unsuitable, without written permission of Fromme company, to apply for hazardous media as referred into Regulation (PED)

Fromme Valves are subjected to the rules according to DIN EN standards as well as the technical regulations AD2000 A4 and PED 2014/68/EU in their development and construction.

By a correct assembling, maintenance or repair we guarantee an activity free of troubles.

The manufacturer carries no responsibility for efficiency and safety of the valves, whenever these operating instructions are not observed and followed accurately.

The valves are marked, according to DIN/EN 19 (ISO 5209) as follows: nominal diameter (DN), nominal pressure (PN), body material, heat-no or specimen-no, manufacturer brand and factory number, and if necessary, flow direction arrow, admissible operating temperature and admissible operating pressure (bar).

By affixing the CE mark to the fittings, we also declare conformity according to DRGL 2014/68 / EU

ATTENTION! The valves must not be activated beyond the limits and rules indicated in the different documents (such as operation rules, purchase documents, type sheets). Operations beyond the indicated limits lead to overstrain which cannot be sustained by the valves.



A non-observance of this warning can cause injuries to persons and defects of the machines, such as:

- Injuries caused by escaped medium (cold/hot, toxic, under pressure),
- Affect in activity or damage of the valve.

The descriptions and rules included in this operation instruction refer to standard types but are also valid for alternatives.

These operation instructions do not take into consideration:

- Any accident and incident which can arise by assembling, operation or commissioning of the valves.
- Any safety rule in relation with the place where the valve is installed. The operator is responsible for the observation of the safety rules, - also by the assembling staff.

The connected loads prescribed for driven valves, as well as the instructions for assembling, commissioning and operation have absolutely to be observed.

ATTENTION! It is essential that the valves are handled by skilled staff that must be aware of the interactions between the valves and the system in which they are installed.

An incorrect use of a valve may cause strong consequences to the complete system, such as:

- Escape of medium
- Stop of the unit
- Affects, decreases or increases of operation or work of a system or unit.

For any further inquiries or in case of damage, please contact FROMME Armaturen.

In case of local inquiries or orders, especially for spare parts, please indicate the production or factory serial number, the type, the model version and possibly also the year of construction.

The technical data referring to the valves can be found in their technical documentations (paragraph 4).

In case of a return transport it must be proceeded as explained in paragraph 3 <Transport>.

2. Safety

These operation instructions contain essential information that has to be observed by assembling, operation and commissioning of the valves.

For this reason, they have to be read by the assembling staff, by the skilled staff and by the operator before the valve is assembled and put into operation and they should always be kept in the proximity of the valve.

Not only the general safety rules indicated in this main paragraph have to be observed, but also the other ones indicated in other paragraphs.

2.1 Indication of notes in the operation instructions

The safety warnings contained in this operation instruction, which have to be observed in order to avoid injuries to persons, are indicated by the following general and particular pictographs:

Warning!



Security signal acc. to DIN 4844 W 9

Beware of the electrical tension!



Security signal acc. to DIN 4844 - W 8

In order to avoid defects of valve efficiency and of its accessories the following warning mark has to be observed:

ATTENTION!

The signs marked directly on the valve (such as DN) have absolutely to be considered and kept in a readable condition.

2.2 Dangers that can result if safety instructions are not observed.

If the safety instructions are not observed injuries to persons, environment and valve, or system can arise, and the indemnity rights get lost.

In particular the non-observance of the safety notes can cause dangers such as:

- Break down of important functions of the valve or unit
- Failure of prescribed methods of commissioning and handling
- Danger to persons caused by electrical, mechanical and chemical impacts.
- Environmental injuries caused by a leakage of dangerous materials.

2.3 Working with safety consciousness

The safety instructions included in this paper, the national regulations for prevention of accidents, as well as the internal regulations referring to work, operation and safety have to be observed by the operator.

2.4 Safety instructions for the operator / user

- When ever some hot or cold valve parts (f. ex. Casing parts or handwheel) may cause any danger, these parts have to be constructed in a way that they are protected from contacts.
- The contact protection for moving parts (such as coupling) must not be taken away while the machine is working.
- Leakages (f. ex. in spindle gaskets) of dangerous conveyed materials (explosive, toxic, hot) have to be removed in a way that no danger to persons or environment can arise. Legal determinations must be respected.
- Injuries by electrical energy have to be excluded (please find details to this point in the VDE and local power supply enterprise regulations).

2.5 Safety instructions for commissioning, inspection and assembly works.

It must be provided that all commissioning, inspection and assembly works are executed by skilled staff, who must have previously studied these operation instructions.

Basically, when any kind of work on a valve is executed, the valve has to be cooled down and free of pressure and the evaporation temperature of the medium must be lower than the temperature of all parts it gets in contact with.

Also, basically, works on a valve have to be executed when it is stopped. The procedure to stop a valve operation is described in this paper and has absolutely to be observed.

Valves which get in touch with health injuring media have to be decontaminated.

Immediately after the work is done, all safety and protection devices have to be put into position or operation again. Before putting the valve into operation again, the points referring to paragraph 6 <putting into operation> have to be observed.

2.6 Arbitrary reconstruction and manufacture of spare parts

Reconstructions or modifications of the valve are only acceptable under agreement with the manufacturer. The use of original spare parts and by the manufacturer authorized accessories promotes safety. If any damage is caused by using other parts the liability for the consequences can be cancelled.

2.7 Inadmissible operation modes

A safe operation is only guaranteed if the valve is used according to the determinations included in the „generalities“ of this operation instruction. The limits included in the technical documentation must not be exceeded.

3. Protection, Transport and storage

3.1 Corrosion protection

3.1.1 Carbon steel valves

Valves made out of unalloyed or low alloyed cast steel are painted with a hard-sticking primer made of a 2-components color based on epoxy resin paint. The minimum film thickness is 70 µm. The inner surfaces are free of paint and only coated with a temporary corrosion protection (e.g. oil). Machined flange facings are protected against outside influences with a strippable vanish.

3.1.2 Stainless steel valves

Valves made out of stainless steel will be delivered without coating.

3.2 Transport

The valves are delivered in a closed condition and its connecting holes are shut up by cover caps.

Valves will be supplied as ready for operation.

ATTENTION! During transportation and storage valve have to be closed. Connecting holes have to be shut up by suitable means (cover caps, foils) in order to avoid any damage to the valve seats.

ATTENTION! In order to avoid damages the valves must not be hanging on the handwheel, or on a possible connected motor or on any other accessory.

Valve weights are indicated in the corresponding manufacturer documents (type sheets ↗ paragraph 4.1 <corresponding documents> acknowledgement)

After delivery, respectively before assembly the valves have to be inspected in order to exclude any transportation damage.

3.3 Storage

The storage has to be effected in a way that it can work perfectly even after a longer storage period.

For this purpose, it is necessary

- To keep the valve closed (in order to protect the seat facings)
- To take measures against soiling (dust, sand, mortar, respectively building materials), frost and corrosion using plastic foils.

When storing valves with soft gaskets (of elastomer) the storage regulations for elastomer (DIN 7716) have to be observed:

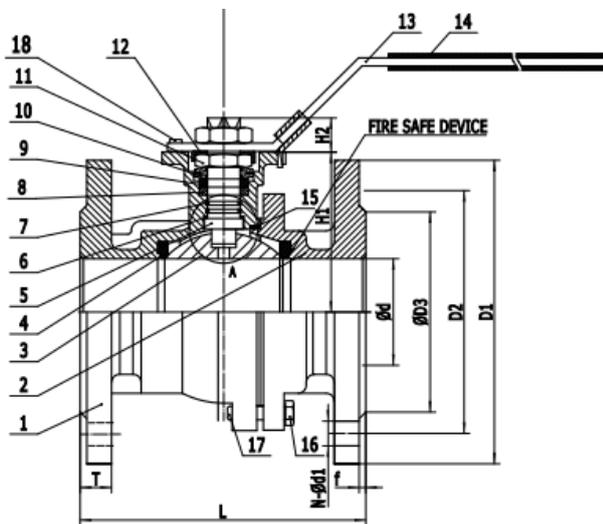
- The store must be dry, free of dust and moderately ventilated. Store temperature should not go over 25°C.,
- stocks on hand have to be used up in order to avoid long storage periods,
- As already mentioned above, the valves have to be in "closed" position during the storage. However, the soft closure elements should be shut with little power, in order to avoid a rush aging of the elastomer.

4. Description / documents

The following pictures represent some examples for the principle valve construction. Pictures and information referring to particular construction series can be found in the corresponding type sheets.

4.1 General view: documents

4.1.1 Ball valve with floating ball



18	STOP PIN	1	SUS304	
17	BOLT	4(6)	SUS304	
16	NUT	4(6)	SUS304	
15	BODY GASKET	1	GRAPHITE	
14	PLASTIC COVER	1	PLASTIC	
13	HANDLE	1	SUS304	
12	STOP WASHER	1	SUS304	
11	Stem NUT	2	SUS301	
10	Belleville Washer	2	SUS301	
9	Packing follower	1	SUS304	
8	STEM SEAL	1	GRAPHITE	
7	O-RING	2	VITON	
6	Thrust washer	1	RTFE(PTFE+15% C)	
5	STEM	1	SUS304	
4	BALL SEAT	2	RTFE(PTFE+15% C)	
3	BALL	1	1.4308	
2	CAP	1	1.0619	
1	BODY	1	1.0619	
No.	Name	Qty	Material	

4.2 Function mode

Ball valves consist of the pressure leading parts: body (1+2) and working unit (Ball and seat).

Body (1+2) are connected by the stud bolts (16) and hex. nuts (17) and are sealed up outside by the gasket (15).

The closure unit consist essentially of:

- in ball valves with one single ball (3), stem (5), seat ring and the driving element lever (13).

The passage of the stem (5) through the body (a) is sealed up by a packing ring (8+9) and O-rings (7) which is tighten by nuts (11) with the disk springs (10). The seal seats of ball (3), are of PTFE or TFM1600 materials.

4.3 Applications limits

ATTENTION! Depending on the materials the pressure temperature graduations (rating tables) of the respective materials are to be taken in consideration. Moreover, application is limited depending on the choice of the seal material and it is influenced by the material combination of the connecting elements (bolts and nuts).

4.4 Alternatives / accessories

Alternatives / accessories

- Pressure relief device (hole ins the Ball)
- Hole in body or on one side of the closing device
- Extended shaft
- Position Indicator
- metal seat

5. Installation

5.1 Generalities

ATTENTION! The pipeline has to be installed in a way that injurious shearing and bending forces during installation and activity are kept away from the valve bodies (1). This is to avoid leakiness and destruction of the body.

ATTENTION! Before installation the cover caps have to be removed from the connecting holes.

The flange facings must be clean and undamaged.

The flange gaskets must be well centralized.

Only bolts and gaskets of admissible materials may be used. For the flange connection all flange drill holes have to be used.

When varnishing the pipelines, no bolts and nuts, stems, stuffing boxes and accessories must be painted (function affects). During any construction work the valves have to be protected from dust,

sand and any other construction material. (Please cover with suitable means).

Ball Valve lever and all other adjacent parts must not be used as steps.

Valves and pipelines working in high temperatures (>50°C) or low (<0°C) must be protect from touch by insulating. Alternatively, the danger must be indicated by warning boards on the valve side.

ATTENTION! If in air-conditioning, cooling and refrigerating systems any condensation water, respectively danger of icing appears, a specialistic and diffusion-tight insulation of the whole valve, if necessary has to be provided.

Icing causes a blocking of the valve operation capabilities. If a ball valve is mounted in a pipeline as an end valve it has to be secured by convenient measures from an unauthorized or unintended opening. It can also be shut by a blind flange on the exit side, in order to prevent any injury to parts and / or persons.

5.2 Installation position

Ball valves can install in all positions with a vertical or horizontal position of spindle. Deviating installation positions must be agreed with Fromme Armaturen.

The direction of flow is not prescribed for ball valves. They can also be used with changing flow directions.

Exception: If pressure relief devices are installed, the direction of flow is prescribed and marked accordingly with a flow direction arrow.

5.3 Avoiding excessive pressures

FROMME Armaturen are generally only suitable for operating conditions that are shown in the associated pressure / temperature tables according to the existing seat material. Appropriate measures must be taken to ensure that there are no impermissible loads on the fittings, the arrangement in the pipelines or unfavorable operating conditions.

Should it e.g. in terms of system technology or because of the mode of operation, that the heated medium enclosed in the third valve room when the valve is closed causes an impermissibly high pressure, the system planner or operator must provide appropriate safety devices such as provide a pressure relief hole or the like..

5.4 Valves with electrical motors / pneumatic actuators.



5.5 The rules according to VDE 0100 and VDE 0165 (ex-protection) have to be observed. All electric devices such as adjusters, switch boxes, magnetic valves, end switches, etc., have to be installed in dry rooms and safe from overflow. Tension and frequency have to correspond to the data on the factory label.

6. Operation/putting into and out of operation

(see also indications in paragraph 5 <installation>)

6.1 Operation / putting into operation

6.1.1 Generalities

Before putting the valve into operation its material, pressure and temperature data have to be compared with the operation terms of the pipeline.

Eventually appearing shock pressures (water hammer) should not exceed the maximal admissible pressure. Protective measures have to be provided.

The line system of new plants and especially after repair works has to be flushed in order to remove harmful solid matters, respectively bead of weld.

6.1.2 Operation

Looked at from above the ball valves can be open/closed by of the lever by turning it 90°. Relative symbols are to be seen on the lever top.

ATTENTION! The use of any auxiliary lever to sway the valve lever is not admitted. Too big forces could be injurious especially for soft seal ball valves because their seat seals could be squeezed.

Ball valves are applied in a way that they are either completely open or completely closed.

ATTENTION! When throttling it can happen that a too high noise grows, and an unwanted wear or destruction of the valve is caused by cavitation's.

6.1.3 Function check up

The following functions have to be checked up:

The shutting function of the installed ball valve must be checked up opening and closing it several times.

The stuffing box packing efficiency has to be checked up before the first loading by full operation pressure and temperature. If necessary, the nuts on the stuffing box gland (pos.11), respectively the lever nuts have to be evenly tightened.

The sealing efficiency of the bolted bonnet connections with the flat seal must be examined after the first loading/warming up of the valve. (Maintenance-free valves too!) If necessary, the bolts connections have to be gently, crosswise and evenly tightened.

6.1.4 Valves with motor

The regulating ways and forces of ball valves with electric / pneumatic / hydraulic motors have to be limited.

Electric switches must be:

- Valve position "CLOSED": away-dependent
- Valve position "OPEN": away-dependent

6.2 Putting out of operation

During longer standstill periods liquids whose form can change in concentration due to polymerization, crystallization, solidification or the like, have to be let out of the line system. If necessary, the line system has to be rinsed by completely open valve.

7. Commissioning / maintenance

7.1 Safety notes

During all commissioning and maintenance works on the valves the following safety notes as well as the general indications under paragraph 2 <safety> must be observed.

ATTENTION! In any case, also in emergency, only suitable spare parts and tools have to be used, otherwise a perfect function is not guaranteed.

7.1.1 Valve disassembly

Before dismantling from the pipeline or before commissioning and repair works are made directly on the valve, more precisely:

- before closing the bolted body (1+2)
- before closing the gland nut,
- before dismantling the bonnet, respectively the yoke
- before disassembling a directly on the body (ISO flange) connected actuators

the valve has to be completely discharged from pressure and has to be cooled up until the evaporation temperature of the medium is lower than all the chambers getting in contact with it. Then any scald can be excluded.



Opening a valve under pressure is a lethal danger!

In case those toxic or easily inflammable mediums are conveyed, or mediums the residues of which in contact with humidity of the air can lead to corrosion damages, the valve has to be drained and flushed, respectively ventilated.

If necessary protecting clothes and protective masks have to be worn.

Due to the installation position the residual liquid possibly remained in the valve have to be drained off and correctly disposed.

Before a possible transportation, the valves have to be carefully emptied and flushed.

7.1.2 Motor dismounting

In case that stray supplied motors (electric, pneumatic, hydraulic) have to be dismantled from the valves, the stray energy supply must be switched out at first and the warnings under paragraphs 2, 7.1.1 as well as the motor operation instructions have to be observed.



Actuators with an integrated spring load cannot be

dismounted. Attention: prestressed springs! For any further information please contact Fromme Armaturen

7.2 Maintenance

The valves are constructed in almost all their parts maintenance free. Materials for sliding parts are chosen which cause a very minimal wear. In order to improve operation safety and to minimize repair costs, all valves, specially those ones which are seldom put into operation or are hard to get to, should be regularly tested, that means, put into operation (OPEN – CLOSED) at least once or twice a year.

The operator is responsible to determine the convenient test and maintenance intervals depending on the application of the valve.

The durability of maintenance-free valves and not can be extended if:

- the stem and stuffing chamber surfaces are kept clean and undamaged;
- the mobile parts, such as stems and stuffing box bolts are greased (except oxygen valves) by using standard lubricants acc. to DIN 51825;
- the stuffing box is punctually additionally packed or the packing is renewed;
- the gasket is punctually renewed;

The safety warnings in par. 2, 7.1 and in par. 8 must be observed.

7.3 Valve mounting

After reassembling and before putting into operation the valves have to be subjected to a strength- and tightness-test acc. to EN 12266

8. Troubles and their elimination

8.1 Generalities

All repair and maintenance works have to be done with suitable tools and original spare parts.

The safety notes in par. 2 and 7 have to be observed.

8.2 Troubles / Elimination

Porosity of closing device

- In soft sealing ball valves: renew the soft seat rings.
- Metal seat ball valves can only be repaired by the manufacturer.

Leakage of gasket

- Tighten up the cover bolts
- Renew the gasket after the bolts have been dismantled.



Before inserting a new sealing and packing ring, respectively a new gasket the facings of body (1+2) must be carefully flushed.

ATTENTION! No additional auxiliary sealing means have to be used for sealing rings free of asbestos. For non-sticking coating only means explicitly recommended by the seal manufacturer have to be used. Before inserting a new packing ring, respectively a new gasket the facings of bonnet and body must be carefully flushed.

ATTENTION! No additional auxiliary sealing means have to be used for sealing rings free of asbestos. For non-sticking coating only means explicitly recommended by the seal manufacturer have to be used.

For any further information please contact Fromme Armaturen.

Leakage of stuffing box packing

- Tighten the stuffing box packing with the nuts to the stuffing box glands, respectively with the stuffing box connections or stem nuts. Hereby it has to be taken care that the disc springs are tensioned (block pull)
- Additionally, packing the stuffing box: loosen the stem nut and lift the stuffing box glands, respectively loosen the stuffing box connections or stem box.

Before repacking, the stuffing box chamber has to be carefully cleaned.

Slotted packing rings have to be inserted with the cut located in opposite position between one ring and the other, precisely 120°-180°.

Re-tighten packing

Should a leakage occur at the gland packing, retighten the stem(gland) nut (14).

Take care that the stem nut (14) is not tighten too much, Normally the leakage can be stopped by simply turning the stem nut (14) by 300 to 600. Or use the torque as mentioned in the table.

Replacement of seats and seals.

Disassembly

Place the valve in half-open position and flush the line to remove any hazardous material from the valve body.

Place the valve in close position, remove both counter flange bolts & nuts and lift the valve out of the line.

Remove the handle nut (17), handle (19) or actuator set, stop-lock-cap (15), stem nut (14), Belleville washer (13), gland (12), bush (11) and gland packing (10).

Remove the body bolt (5) or the stud/nut to allow the end cap (2), to be separated from the body (1), remove the body gasket (21). Make sure that the ball is in "Close" position, then the ball (3) can be taken out easily from the body, then take out the ball seats (4). Push the stem (6) down into the body cavity and remove it, then remove the O-ring (9) and the stem seal-ring (8) from the body.

Caution: Use care to avoid scratching the surface of stem and packing chamber.

Reassembly

Reassembly process is reverse sequence of disassembly.

Clean and inspect all parts, full replacement of all soft parts(seats and seals)are strongly recommended.

Put the valve in the "open" position, otherwise the seats can be damaged. Tighten the body bolt (5) crosswise using the torque figure in Table 1. Tighten the stem nut (14) using the torque figures in Table 2.

Cycle the valve slowly with gentle back and forth motion to build gradually to full quarter turn.

Table 1:

Torque figures for body bolting nut tighten without

Valve Size		Bolting	A193-B7		A193-B8*	
PN10/PN16	PN25/PN40	Specification	N.m	In.lb	N.m	In.lb
DN15		5/16-18UNC-2A	12~19	106~167	12~17	106~152
DN20						
DN25		3/8-16UNC-2A	25~36	221~321	25~33	221~292
DN32						
DN40		½-13 UNC-2A	58~85	513~747	58~77	513~679
DN50						
DN65						
DN65		9/16-12UNC-2A	84~122	740~1085	84~111	740~986
DN80						
DN100						
DN125						
DN150		5/8-11UNC-2A	116~169	1024~1503	116~154	1024~1366
DN125						
DN200		3/4-10UNC-2A	209~306	1847~2708	209~278	1847~2462
DN200		7/8-9UNC-2A	339~497	3000~4400	339~452	3000~4000

lubricant.

Table 2: Torque figures for stem nut tighten

Valve Size	N.m	In.lb
DN15	8,0 ~ 9,0	71 ~ 89
DN20	8,0 ~ 9,0	71 ~ 89
DN25	10 ~ 13	89 ~ 115
DN32	10 ~ 13	89 ~ 115
DN40	16 ~ 19	142 ~ 168
DN50	16 ~ 19	142 ~ 168
DN65	22 ~ 25	195 ~ 221
DN80	22 ~ 25	195 ~ 221
DN100	29 ~ 32	257 ~ 283
DN125-DN150	40 ~ 48	354 ~ 425
DN200	62 ~ 72	550 ~ 637

Troubleshooting

It is essential that the safety regulations are observed when identifying the fault

Problem	Possible cause	Corrective measures
No flow	The ball valve is closed	Open the ball valve
	Dust caps were not removed	Remove dust caps
Little flow	Valve not completely open	Open valve completely
	Piping system clogged	Check piping system
Valve difficult to operate	Stuffing box seal too tight	Slacken nut
	Wrong direction of rotation	Turn counter clockwise to open
	Ball seat damaged by foreign particles.	Replace the ball seats
	Pressure increase of medium in the dead space between ball and valve body	Cool down the valve
Leakage along the stem	Stuffing box gland not tight enough	Tighten stuffing box gland, if necessary renew stuffing box packing
Leakage along valve seat	Valve not properly closed	Pull lever tight without tools
	Seat damaged by foreign particles	Replace the ball seats
	Medium contaminated	Clean valve and install dirt screen
Operating failure	Packing too tight	Loosen gland nut