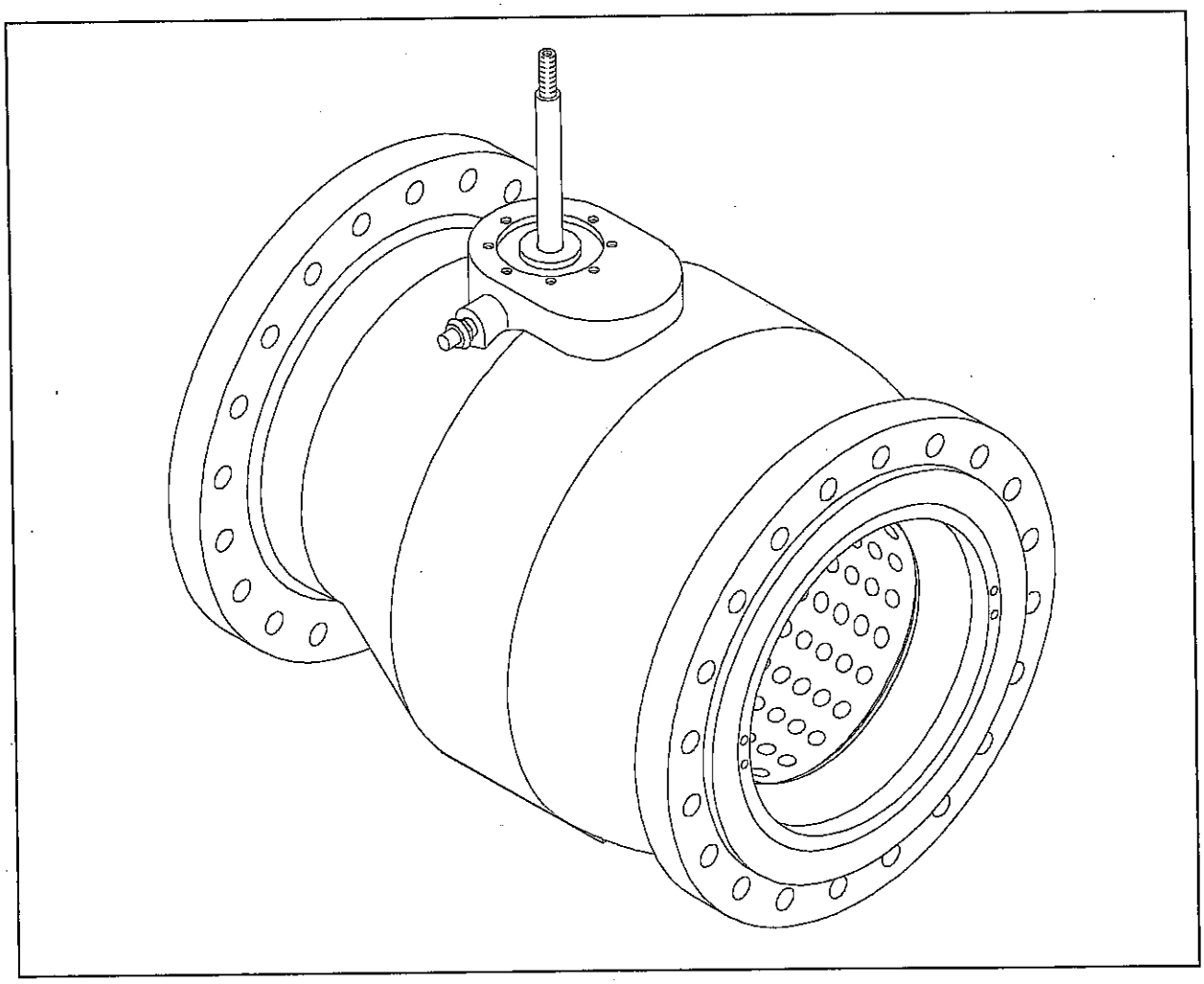
Mokveld S94

User's Manual
RZD
Control valve



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June 1997

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1. INTRODUCTION

1.1 General

This manual describes the installation, use and maintenance procedures for Mokveld R ZD control valve.

Should there be problems regarding this manual, please contact Mokveld. In all correspondence always state the details provided on the nameplate. The nameplate is located on the body of the control valve.

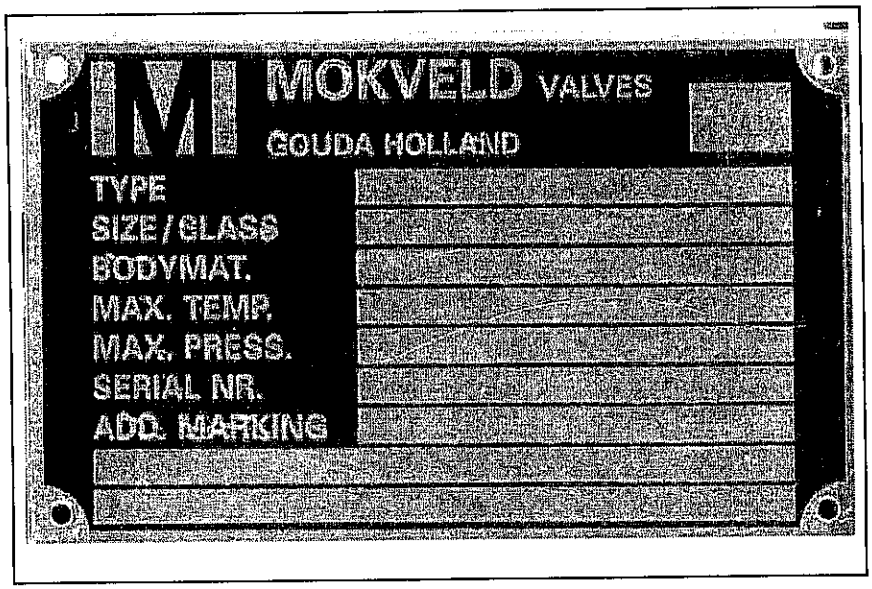

Fig. 1.1 Nameplate

Address:

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1.2 Product description

The RZD control valve is an axial closing piston valve. This control valve is especially constructed to throttle the streaming fluid. Important characteristics of the control valve are:

- A good stream-flow of the fluid
  The shape of the body of the control valve ensures that the fluid can flow through easily. This shape also ensures that the fluid stream-flow is equal, whatever position the control valve is in. This way, turbulence and noise level is at a minimum.

- Leak proof sealing
  The sealing consists of a trapeze shaped ring made of soft sealing material. A special construction ensures that the sealing is pressed by the prevailing pressure of the fluid. This way the sealing is leak proof

- Controlling the fluid flow
  The closing mechanism of the control valve consists of a perforated cylinder (the cage) in which a hollow piston can move up and down. The position of the piston with regard to the cage and the shape of the perforation of the cage determines how much fluid is allowed to flow through the control valve.

- Fast closing time
  The closing mechanism is constructed in such a way that the piston hardly undergoes any resistance following the pressure differences in the control valve. This way the control valve can be operated by a relatively light and fast actuator.

- Actuation
  A rod is mounted to the piston. The rod has a toothing under a 45° angle. This piston rod is operated by a driving shaft, which has a similar indenting and fits onto the toothing on the piston rod. Whenever the driving shaft is moved up the piston moves backward and the control valve is opened.

1.3 Guarantee and liability

Mokveld Valves BV provides, unless otherwise stated in the contract, a guarantee on the control valve as laid down in the general conditions of the sale. The conditions of sale are registered with the Gouda Chamber of Commerce (20-01-82).

1.4 Warning signs

The following signs are used in this manual

Warning regarding a dangerous procedure or situation that could lead to bodily harm or damage to the control valve.

General warning sign regarding dangerous materials.

Point of attention.

Caution with regard to lifting.

Caution with regard to lifting.

2. SAFETY

Safety precautions are essential in order to avoid accidents, injury to people and damage to the equipment.
Safety precautions must always be observed to ensure a safe working environment.

2.1 Safety measures

Before carrying out any maintenance on the control valve, the following safety measures must be taken:

1) De-pressurising

Before the control valve is disassembled, the control valve must be de-pressurised. Do this according to local regulations

2) Dangerous materials

Pipes can contain dangerous liquid or gas residues. These materials can be explosive, inflammable, toxic or radioactive; for example H_2S-containing gas, mercury or radioactive deposits..

1) Determine which product was previously used in the pipeline.
2) Make sure the pipeline has been cleaned.
3) Make sure the flange gaskets are asbestos free.
4) If necessary, use the protective clothing and tools specified by local regulations.

3) Oils and greases and cleaning agents

Avoid extended skin exposure to oils and greases. A lot of these materials are hazardous for the health of the operator

Always use gloves and always wash your hands after using oils and/or grease

4) Cleansing agents

Always use cleansing agents according to the supplier's instructions.

5) Working environment

Always make sure that the environment in which maintenance is being carried out on the control valve is clean and free of obstacles. Never leave tools lying about and clean up any spilled grease and oil immediately. Always wear protective headgear

On many work floors, wearing of protective headgear is mandatory.

6) Crane

The lifting equipment used must be of sufficient capacity to carry the weight of the whole control valve including the valve parts. The weight is stated on the dimensional drawing of the control valve in the documentation package of the control valve. The weights of the individual parts are on the parts list. All lifting aids such as chains, cables, belts, hooks and lifting eyes must be capable of lifting the valve including the valve parts.
The crane must not be damaged.
The crane must recently have undergone inspection and certified by a certified body.

Only lift the control valve using the lifting eyes.

7) Electrical safety

If the control valve is operated electrically or is connected in any other way to an electrical mains supply, there is a danger of electrical shock. Always follow local regulations in regard to installing, grounding and use of electrical apparatus. Follow the I.E.E. and the I.E.E.E. regulations whenever local regulations are not applicable.

8) Specific safety measures

For safety measures regarding the actuator, see the actuator manual

2.2 Environment

A replaced valve and/or spare parts must be recycled or processed ecologically . If in doubt, contact Mokveld Valves BV for advice.

3. TRANSPORTATION AND STORAGE

3.1 Transport and moving

The control valve is usually packed in a crate. The total weight of the crate including the contents is stated on the crate. Keep in mind the weight stated on the crate when transporting and moving the crate.

Use a sound and reliable crane or forklift able to cope with the weight of the crates and contents. Always lift the control valve using the lifting eyes.

Strictly follow the instructions on the crate

3.2 Checking the delivery

The control valve is delivered so that it can be assembled and used immediately. Check if you have received all the parts by checking the supplied parts list. Also check to see if any parts are damaged. Immediately contact Mokveld Valves BV. if parts are missing or the delivery is damaged in any way.

3.3 Storage of the control valve and parts

Follow these guidelines if the control valve is not immediately assembled and subsequently stored elsewhere.

3.3.1 Storage of the control valve up to 1 year maximum

The control valve can be stored for a maximum of 1 year without undertaking extra precautions. In this case, the control valve, lids and plugs must not be removed from the crate.

3.3.2 Storage of the control valve longer than 1 year

If the control valve is stored for more than 1 year, for example as a spare control valve, special measures must be taken regarding the storage of the control valve. Comply with the following recommendations:

- The control valve and spare parts must be stored in a building, which is not exposed to adverse weather conditions.
- Keep the control valve in its original crates.
- Place the control valve on a stable floor.
- Do not stack control valves on top of each other or on top of another object. Keep the top end of the crates free of obstacles, do not stack anything on the crates.
- The temperature in the area must be between -10°C and 40°C.
- The relative humidity in the warehouse area must not exceed 55%.
- Check the control valve every year as follows :

  1) Remove the packaging from the control valve. The lids and plugs that protect the openings of the control valve must **not** be removed.
  2) Check the outside of the control valve for dirt, corrosion or damages.
  3) If necessary, clean the outside of the control valve.
  4) Repair any damages found.
  5) Return the control valve back to the way it was originally packaged.

3.3.3 Storage of spare parts

Comply with the following recommendations when storing the delivered spare parts.

Storage of steel parts

1) Spray corrosion sensitive parts with an anti corrosion fluid.
2) After 4 months in storage, these parts need to be treated with water repelling grease.
3) Replace the grease every 6 months.

Storage of O-rings, seals and gaskets

When storing O-rings and seals, comply with the following recommendations:

- Do not store the o-rings and seals longer than 5 years.
- Do not store the gaskets longer than 7 years
- Store o-rings, seals and gaskets lying flat on a flat surface.
- Store o-rings, seals and gaskets in a dark place.
- Protect store o-rings, seals against exposure to ozone
- The temperature in the warehouse area must be between 15°c and 30°c and the relative humidity in the warehouse must be below 55%.

4. PREPARATION AND COMMISSIONING

4.1 Tools and materials needed

In order to assemble the control valve into the pipeline, the following tools are needed.

- A standard tool box.
- Flange gaskets.
- If necessary, a anti corrosion fluid for the flange bolts.
- A reliable crane with sufficient hoisting capacity that has recently been inspected by a certified inspector.
- A torque wrench with accompanying socket set.

4.2 Preparation

1) Check if the block valve is situated in the inlet pipeline main. Close this block valve or make sure that the flow of the fluid normally found in the pipeline is blocked.

2) Make sure that the pipeline in which the control valve is to be installed is rinsed clean and that no foreign objects are left lying around

3) Check if the pipeline is able to carry the weight of the control valve being installed. Ensure that the large valves rest on a foundation (lined with PTFE). This foundation must be capable to carry the weight of the control valve and the enclosed fluid (see the technical specifications in the supplement for the weight and the dimension of the control valve).

4.3 Unpacking

4) Carefully remove the crate in which the control valve is packaged.

5) Check if all necessary parts are present.

6) Check all parts for damage and corrosion. Immediately contact Mokveld Valves BV. if parts are damaged in anyway.

4.4 Assembly in the pipeline

7) Check if the following recommendations have been complied with:
   - The control valve must not be submitted to excessive force by attached mains or apparatus.
   - The pipeline into which the control valve is installed must be able to expand and contract without putting excessive force on the body of the control valve.
   - The arrow on the control valve indicating the direction of flow must correspond with the flow direction of the fluid.

Do not use excessive force when assembling the control valve.

8) Mount the crane onto a steadfast surface. Test the crane.

9) Remove protective lids and plugs from the control valve.

10) Clean the flanges.

11) Check the flanges for any damage. Contact Mokveld Valves BV. if damage is found.

Use a suitable crane, capable of lifting the weight of the control valve.

12) Lift the control valve into the correct position.

13) Check if the direction of flow is the same as the direction of the arrow on the body of the control valve.

14) Mount the flange gasket.

15) Attach the control valve to the pipeline with the flange bolts. Protect the corrosion sensitive bolts with an anti corrosive substance.

16) Apply a layer of paint if necessary.

4.5 Preparation for commissioning

17) Check if the control valve is mounted correctly and if the control valve is closed.

18) Check if the protective layer of the control valve and all other parts has not been damaged during assembly. If necessary, repair any damage found.

19) Check if all nuts and bolts are in place. Check if all bolts, nuts and washers made of carbon steel or any other corrosion sensitive material are treated with an anti corrosive coating.

20) Check if the actuator is installed correctly (see the actuator manual).

21) Check the power supply of the actuator.

22) Check the operation of the actuator using local control.

23) Check the operation of the actuator using the remote control.

24) When the control valve has undergone all the above check points (17 - 23) successfully, it may be commissioned.

4.6 Commissioning

25) Check if the control valve is completely closed. If this is not the case, close the control valve (also see the actuator manual).

⚠ **The test pressure in the control valve, in closed position, must not exceed 1,1 times the maximum permitted pressure. In an opened valve the test pressure must not exceed 1,5 times the maximum permitted pressure.**

26) Pressurised the pipeline.

27) Open the block valve of the inlet pipeline.

28) Close the block valve of the inlet pipeline.

29) Open the block valve all the way (also see the actuator manual).

30) Close the block valve completely (also see the actuator manual).

31) Open the block valve of the supply main.

5. OPERATION

The control valve is operated by the actuator. Follow the directions in the operating manual of the actuator in order to operate the control valve.

Actuators can vary from a simple hand wheel to hydraulic, pneumatic and electrically driven types. Advanced systems for controlling the actuator can also be supplied where required. It is also possible to change the type of actuator or controls for a valve that has already been installed.

Handwheel operated valve:
A valve with a handwheel can be opened by turning the handwheel anti-clock-wise and can be closed by turning the handwheel clockwise.

Hydraulic, Pneumatic and electronic operated Valve:
For operating a hydraulic & Pneumatic operated valve please regard the schematic instrumentation drawing for this valve.
For hydraulic, pneumatic and electronic operated Valves: the valve is operated using the actuator. To operate the valve, follow the instructions in the operator manual for the actuator.

6. MAINTENANCE AND INSPECTION

Regular maintenance prolongs the life span of the control valve.
Therefore always carry out:

- an external inspection every month (see paragraph 6.1).
- a full maintenance overhaul every 5 years or more frequently if necessary (see paragraph 6.2).

6.1 Monthly inspection

An external inspection must be carried out every month. Proceed as follows.

1) Check the paint layer or the protective coating on the body of the control valve for damages. If necessary, carry out repairs if the paint layer or the coating is damaged (see the attached technical details in the supplement for information on which paint type or coating must be used).

2) Check the retainer ring of the mounting bolts and all other bolts of the actuator. If necessary, tighten them again.

3) Check the flange joint of the control valve and the pipeline for leakage. If necessary, replace the flange gasket. In order to change the flange gasket, the control valve must be removed from the pipeline (see paragraph 6.2).

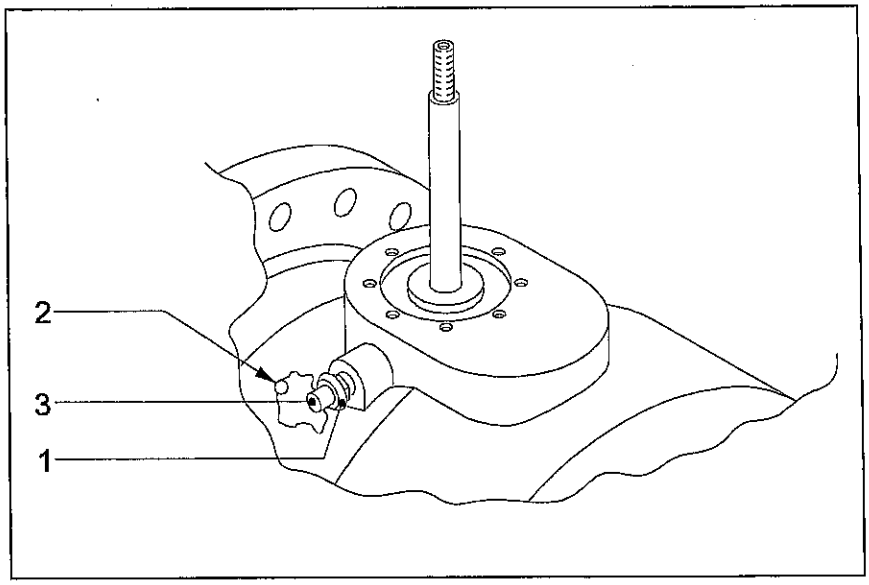


Fig. 6.1 Checking the pressure relief valve

1. *Pressure relief valve*
2. *Lead seal*
3. *Screw in plug to close valve.*

4) Check if liquid, gas or grease is leaking from the pressure relief valve (see 1, fig. 6.1). If liquid, gas or grease is leaking from the pressure relief valve, then a piston rod sealing is broken. Replacing this sealing is a specialist' job and must only be carried out by a Mokveld Valves BV service engineer or by service personnel trained by Mokveld.

5) In case of emergency, a leak in the pressure relief valve can be dealt with as follows.
   - Break the lead seal on the pressure relief valve.
   - Close the pressure relief valve by tightening the screw.

⚠ **The inner body is now pressurised and the valve will no longer function according to its specifications.**
The valve must be repaired as soon as possible.
Be aware that the valve with a closed relief valve may not fully close any more.
To fully close a valve with a closed relief valve, open the relief valve temporarily.

6) Check the electrical wiring of the actuator is still in good condition. Also, check if the turnbuckles are still tightened. If necessary, tighten the turnbuckles.

6.2 5 – year inspection

Carry out internal maintenance on the control valve at least every 5 years, or regularly if specific local directions and circumstances require. When carrying out an internal inspection, the control valve must be removed from the pipeline.

6.2.1 Disassembly from the pipeline

Make sure that the valve and pipeline are completely de-pressurised. Check if the lead seal of the pressure relief valve is in place (see fig 6.1). This means that the pressure relief valve is not closed.

Take the necessary safety measures if the pipeline has recently contained dangerous materials.

Use a reliable crane with sufficient capacity to lift the control valve.

1) De-pressurise the supply lines of the actuator make sure the electrical connections of the actuator have no voltage.
2) Disconnect the supply lines from the actuator and all other lines connection to the actuator (see the operating manual of the actuator).
3) Make sure the crane is situated on a good, solid base. Test the crane.
4) Connect the crane hook to the lifting eyes on the valve body.
5) Ensure that the lifting cable is under sufficient tension to prevent the control valve from slipping when disconnected from the pipeline.
6) Loosen all flange screws and remove them. If RTJ-flanges have been used, ensure that there is sufficient space in the longitudinal direction of the pipeline before removing the control valve.
7) Lift the control valve up vertically.
8) Remove the flange gaskets.

Do not re-use the flange gaskets. Dispose of old flange gaskets in an environmentally friendly manner.

9) Place the control valve on a good, solid base or means of transportation.
10) Secure the control valve so it cannot roll away.
11) Place the valve so that the direction of flow is in the horizontal position.
12) Uncouple the control valve from the crane.

6.2.2 Internal cleaning and inspection

Caution! If relevant, be sure not to damage the internal coating of the control valve.

Dispose of the waste products in an environmentally friendly manner.

13) Lift, pump or blow the fluid residue from the control valve.

14) Carefully clean the inside of the control valve. Remove remaining residue.

15) Thoroughly inspect the surfaces on the inside of the control valve. Ensure that the inside of the control valve or the interior coating hasn't been damaged by loose debris.

16) Check all visual parts for damages and/or corrosion.

17) Contact Mokveld Valves BV if any interior damage to the control valve is found.

6.3 Assembly in the pipeline

When the control valve is ready for operation, after internal inspection, cleansing and if necessary, repairs, it can be installed back into the pipeline. For this, follow the procedure described in paragraph 4.4.

7. MALFUNCTIONS

Take note of the following diagram, should the control valve show any signs of malfunction.

PROBLEM	POSSIBLE CAUSE	SOLUTION
A) The control valve does not open and close.	Actuator control malfunction.	1) Check the actuator's energy supply (mains and compressed air). Repair the power supply if necessary. 2) Check if the power supply of the actuator's operating system is functioning (see the actuator manual). If necessary, repair the actuator.
	Actuator malfunction	1) Test the actuator as described in the accompanying manual. 2) Go on to problem C in this table if, after testing the actuator, no fault is found.
B) The control valve does not open and close completely.	Actuator is not installed correctly.	1) Check the installation of the actuator (see the actuator manual). If necessary, re-install the actuator.
	Actuator's operating system malfunctions.	1) Check the actuator's energy supply (mains and compressed air). Repair the power supply if necessary. 2) Check if the power supply of the actuator's operating system is functioning (see the actuator manual). If necessary, repair the actuator.
	Actuator malfunction.	1) Test the actuator as described in the accompanying manual. 2) Go on to problem C in this table if, after testing the actuator, no fault is found.
C) The control valve does not open or close and the actuator isn't malfunctioning	The piston is blocked or the control valve is damaged on the inside	1) Remove the control valve from the pipeline and check if the piston is blocked (see paragraph 6.2.) If necessary remove the object blocking the piston. 2) Check the control valve for internal damages. Contact Mokveld Valves BV if any interior damage to the control valve is found.
D) The control valve shows signs of minor fluid leakage in the closed position.	The sealing is (slightly) damaged.	1) Open and close the control valve a few times. 2) Check if the control valve is still leaking. 3) If the control valve is still leaking then the sealing needs to be replaced. For this, contact Mokveld Valves BV.
E) The control valve shows signs of major fluid leakage in the closed position.	The control valve is not fully shut.	1) Check the actuator's functioning (see problems B and D in this table).
	The control valve is damaged internally by loose debris.	1) Remove the control valve from the pipeline and check if the piston is blocked (see paragraph 6.2). If necessary remove the object blocking the piston. 2) Check the control valve for internal damages. Contact Mokveld Valves BV if any interior damage to the control valve is found.

8. ORDERING SPARE PARTS

Spare parts can be ordered from Mokveld Valves BV

It is recommended to keep a complete set of sealings in stock.

A complete parts list is attached in the supplement of the operating manual of this valve (assembly drawing and parts list).

Provide the following details when ordering spare parts:

- the serial number (as stated on the name plate)
- the position number of the part on the assembly drawing
- the quantity required.

Order address:

Mokveld Valves BV.
P.O. Box 227
2800 AE Gouda
Holland
Tel. 31 (0)182 597500
Fax. 31 (0)182 517977
Telex 20631

9. SUPPLEMENTS

The following details relative to specific orders are a part of this manual.

- Drawing with dimensions
- Assembly drawing
- Information relevant to the lubrication of the valve
- Adjustment instructions.
- User's Manual Actuator.

9.1 Information relevant to the lubrication of the valve

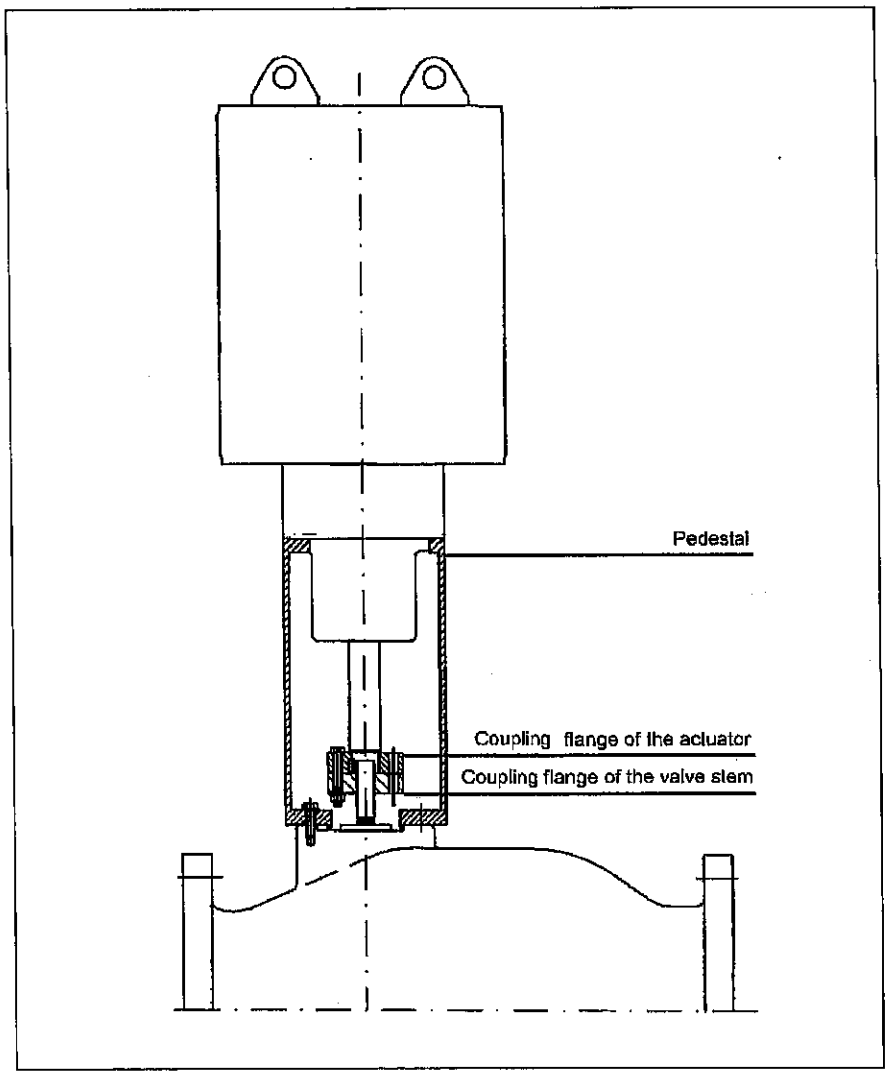
Applicable lubricants

The following lubricants are needed to assemble the valve. The use of compatible lubricants is allowed.

Number and designation as referred to in the text	Lubricant	Application
Grease No. 1	Lubcon ALN 4602	Seal rings Toothing stem/piston
Grease No. 3	DowCorning Molykote Rapid G	Thread of bolts and parts
Locking agent No. 2	Loctite Screwlock (no. 222)	Thread of locking screws and parts

9.2 Instructions for adjusting the (linear) actuator on the valve.

- Install the actuator with the holder on the valve.
- Tighten the coupling flange of the stem all the way down.
- Put the valve into its closed position (do not put on a heavy load, the piston will stop against the seat retainer bushing).
- Make sure that the actuator is fully closed (the coupling flange of the actuator does not contact the coupling flange of the stem).
- Twist the coupling flange of the stem until it loosens and reaches the coupling flange of the actuator.
- Rotate the connection flange of the stem down through one revolution (= 360 degrees ± 90 degrees).
- Connect the flanges using the bolts (the piston will come loose from the seat retainer bushing).
- Install the other parts of the actuator.



9.3 Instruction for adjusting the (rotation) actuator on the valve

- Install the holder for the actuator onto the valve.
- Put the valve into its closed position (do not put on a heavy load, the piston will stop against the seat retainer bushing).
- Twist the stand piece onto the stem so that it touches the stem bushing.
- Continue to twist it through one revolution (= 360 degrees ± 90 degrees) so that the position indicator pin can be mounted via the slot in the holder (the piston is loose from the seat retainer bushing).
- Install the other parts of the actuator.