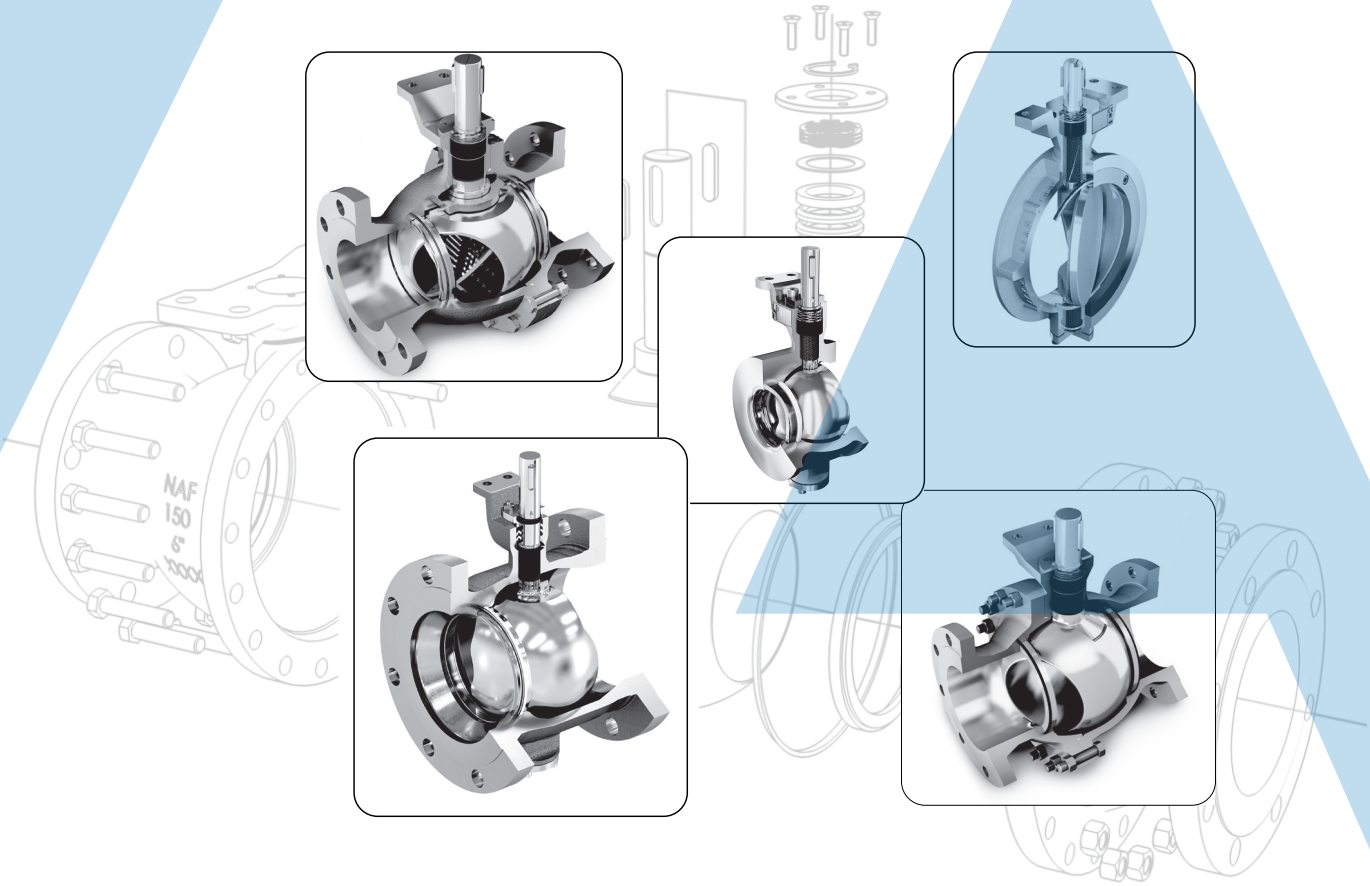
NAF ROTARY VALVES

USER INSTRUCTIONS

INSTALLATION OPERATION MAINTENANCE



ANDRITZ

CONTENTS

SAFETY

THESE INSTRUCTIONS MUST BE READ PRIOR TO INSTALLING AND OPERATING THIS EQUIPMENT.

CAUTION: The valve should only be installed, operated and maintained by qualified personnel. Qualified personnel personnel are people who on account of their education, experience, training and knowledge of relevant standards, specifications, accident prevention and operating conditions have been authorized by those responsible for the safety of the plant to perform the necessary work, and recognize and avoid possible dangers.

CAUTION: Do not exceed the performance limitations of the valve! Exceeding the limitations marked on the valve, may cause damage and lead to unintentional and sudden pressure release. This may lead to personal injury or damage to the equipment.

CAUTION: Assess all risks to eliminate the possibility of personal injury and material damage. Read these instructions thoroughly.

CAUTION: Always use the necessary protective equipment and comply with applicable safety directives when working with hazardous or hot/ cold media.

CAUTION: Never operate a valve without first ensuring there is no risk of crush injuries. The risk is highest with automated valves. Take necessary safety precautions to avoid unintentional stroking of the actuator / valve.

CAUTION: Never decommission and dismantle a valve, or part of a valve, without ensuring the line is free of pressure and media. This also includes not removing an actuator from the valve while the valve is still under pressure. Failure to comply with this may cause free-flowing fluid to cause accidents.

CAUTION: Ball valves must always be dismantled in a semi-open position to prevent trapping of pressure and media.

CAUTION: Always check that the valve type and material is suitable for its intended use. This applies especially to highly oxidizing and corrosive media. Also observe the risk of erosion or explosion, as well as decaying medium. If in doubt, always request a written recommendation from NAF.

IN CASE OF AN ACCIDENT

Always follow local emergency response plans in case of an accident. Follow first aid recommendations in Safety Data Sheet (SDS) if a person has been flushed with process fluid.

NOTE: If you are in any doubt of the correct use and handling of a specific product, please contact your NAF representative.

1. GENERAL

This manual provides important information about the safe installation and operation of NAF rotary valves. For detailed information about each product, please refer to individual technical bulletins and manuals for installation, operation and maintenance.

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NOTE: Every application is specific. Several factors must be taken into consideration when selecting the correct valve for that specific application. Some situations may fall outside the scope of this manual. For such situations, or when you are uncertain about the suitabilty of a specific NAF valve for your application, please always contact NAF or your NAF representative.

1.1 INTENDED USE

The NAF rotary valves are designed to stop or control the flow in a pipeline. The valves are intended to be installed between pipeline flanges.

1.2 DESIGN, OPERATING PRINCIPLES AND CHARACTERISTICS OF THE EQUIPMENT

The NAF rotary valves consist of several products with their own design, operating principles and characteristics. In Table 1 below, you will find an explation for each of these products.
The valves can be delivered together with devices for manual operation, automated on/off operation or for modulating control. For manual operation the valve is normally equipped with a hand lever or a gear actuator. For automated on/off or modulating control, a pneumatic or an electric actuator is mounted directly to the valve. For information about this additional equipment, please refer to their individual manuals.

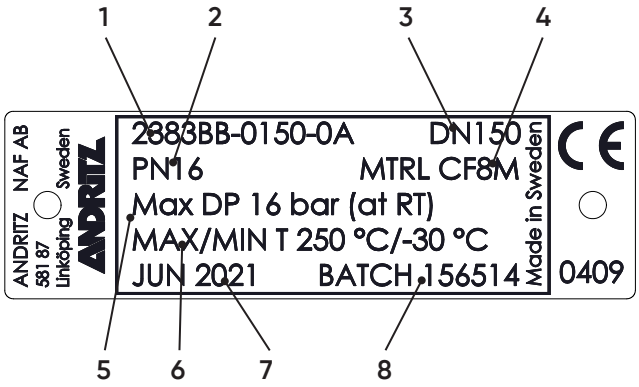
TABLE 1 - OPERATING PRINCIPLES

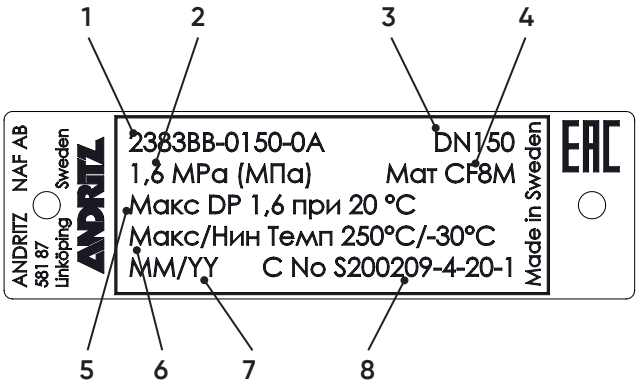
Product	Design	Operating Principles	Flow Characteristics	Primary Mode of Operation
Duball DL	Ball valve, floating	The spherical obturator (ball), mounted in a 2 pcs valve body, is turned by a valve stem between 0° and 90°. The ball is mounted between two seat rings and seals against the down stream seat by the pressure differential. Bi-directional tightness.	Equal percentage	Manual Automated on/off Modulating control
Trunnball DL	Ball valve, trunnion mounted	The spherical obturator (ball), mounted in a 2 pcs valve body, is turned by a valve stem between 0° and 90°. The ball is trunnion mounted and seals against the spring loaded seat on the upstream side.	Equal percentage	Manual Automated on/off Modulating control
Triball	Ball valve, floating	The spherical obturator (ball), mounted in a 3 pcs valve body, is turned by a valve stem between 0° and 90°. The ball is mounted between two seat rings and seals against the down stream seat by the pressure differential. Bi-directional tightness.	Equal percentage	Manual Automated on/off
Setball, Setball SF	Ball sector valve	The obturator (ball sector), mounted in a one piece valve body, is turned by a valve stem between 0° and 90°. The sector is trunnion mounted and seals against a spring loaded seat ring on the up-stream side. Uni-directional tightness.	Equal percentage	Modulating control
Torex, Torex DL, Unex	Butterfly valve	The obturator (disc), mounted in a one piece valve body, is turned by a valve stem between 0° and 90°. The disc is trunnion mounted and seals against a seat ring through an eccentric movement. Bi-directional tightness, but with a preferred flow direction.	Modified equal percentage	Manual Automated on/off Modulating control
ProCap	Capping valve	The obturator (ball sector), mounted in a one piece body, is turned between 0° and 90° by an upper stem and loaded against a seat by the eccentrically mounted lower stem.	Quick Opening	Automated on/off

1.3 VALVE MARKINGS

Each valve has an identification plate mounted onto the valve body. This plate contains the most important design data for a safe operation of the valve, i.e. the pressure class, maximum and minimum temperature and maximum allowed differential pressure over a closed valve. Please see the corresponding Technical Bulletin for additional information.

CAUTION: Do not exceed the performance limitations of the valve! Exceeding the limitations marked on the valve identification plate, may cause damage and lead to unintentional and sudden pressure release. This may lead to personal injury or damage to the equipment.





1. Valve code
2. Pressure class
3. DN/Size
4. Valve body material
5. Maximum allowed differential pressure at room temperature
6. Maximum/minimum allowed temperature
7. Month and year of manufacturing
8. Manufacturing batch/series number

2. TRANSPORTATION, LIFTING, RECEIVING INSPECTION AND STORAGE

2.1 TRANSPORTATION

The product must be well packed and protected during transportation. This includes means to prevent damages caused by mechanical or environmental impact.

2.2 LIFTING

CAUTION: When lifting the valve package, be aware of its weight and center of gravity!

All lifting must be carried out on the valve itself and not on the actuator. The mounting connection between the valve and the actuator is designed principally for carrying the operating torque and the deadweight of the actuator and is not designed to support the weight of the valve. See Figure 1

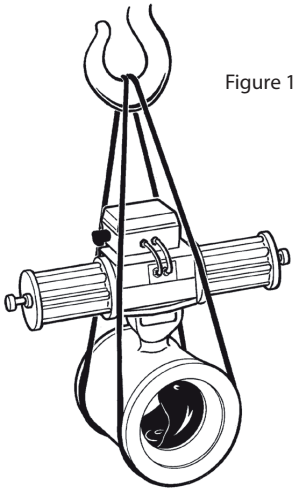


Figure 1 – Lifting of the valve

2.3 RECEIVING INSPECTION

All products leaving our workshop are inspected and tested in accordance with the relevant requirements or in accordance with the special provisions specified by the purchaser. Valves equipped with actuators are subjected to functional testing and are adjusted in such a manner that every unit is completely ready for direct installation in the pipework. However, in view of damage that may have occurred during transport, it is advisable that receiving inspection be carried out, if possible.

We would suggest the following inspection procedure:

- Check that the products are delivered correctly in terms of type, size, equipment, etc.
- Examine the valve, actuator and valve positioner regarding possible damages.

2.4 STORAGE

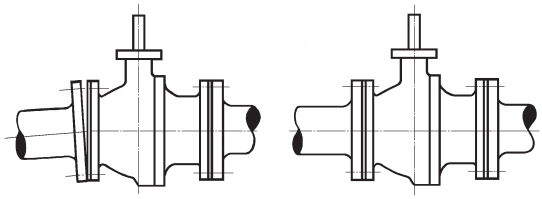
- Store the products carefully until installation. Preferable they should be stored indoors in a dry room. Keep away from rain and dust.
- Do not take the valve to the intended location and do not remove the protective end caps of the valve until the time of installation
- Valves intended for use on highly oxidizing media are often delivered in a degreased version. Any valve marked with “Degreased” or “Degreased for oxygen service” must be handled with the greatest care and be protected from being contaminated with grease, dust or anything else that can jeopardize its’ safe use.
- All cable glands (actuators, positioners and limit switch boxes) should also be kept plugged until installation.
- Valves are normally delivered in the closed position. Valves with a spring return actuator are delivered in the position determined by the spring.
- In humid environments, and when valve positioners have been installed outdoors, but are not yet commissioned, we recommend pressurizing them by attaching them to the instrument supply air. This will prevent potential build-up of condensing water inside the positioner.
- Storage longer than six (6) months of complete packages (valve, actuator and positioner/limit switches) should be avoided. If stored longer, a re-calibration shall be performed prior to installation.
- Assigned storage time of a bare stem valve is 5 years. If stored longer, a pressure test shall be performed prior to installation. See section 4.4.

3. INSTALLATION, COMMISSIONING AND ADJUSTMENT

3.1 INSTALLATION

Before installing the valve, ensure the pipework is free from impurities, that the pipe end connectors between which the valve is to be installed are parallel and are correctly aligned, and that the distance between the pipe ends correspond to the valve length, including gaskets. The valve must not be used for drawing together or aligning incorrectly run pipes as this will cause improper loads on the valve and pipe which could lead to problems during operation. See Figure 2.

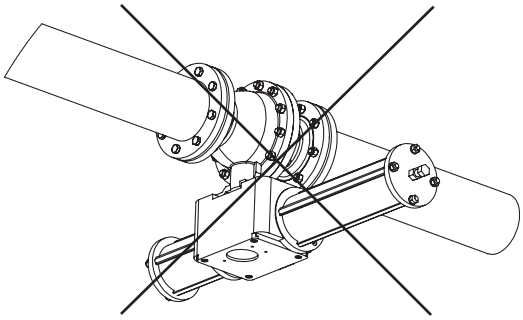
Figure 2 – Ensure that the pipe ends align and have the correct gap



Incorrect installation Correct installation

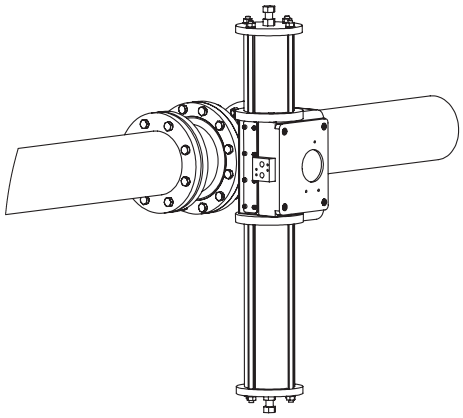
The valve may be installed in any position. The only position we do not recommend is to install the valve with the valve stem and actuator facing downwards. In this position, dirt in the pipeline may end up in the stem seal arrangement and compromise the stem tightness over time. Any potential leakage, i.e. from the flange packings, may also damage the actuator. See fig 3.

Figure 3 – Mounting of the actuator in a position facing downwards, should be avoided



Whenever possible, it's a good practice to mount valves having an actuator in a spring returned version, with the spring return unit (longer cylinder) facing downwards. This will prevent any condensing water to be collecting inside the cylinder and instead be released through the filter mounted in the cylinder end. See fig 4.

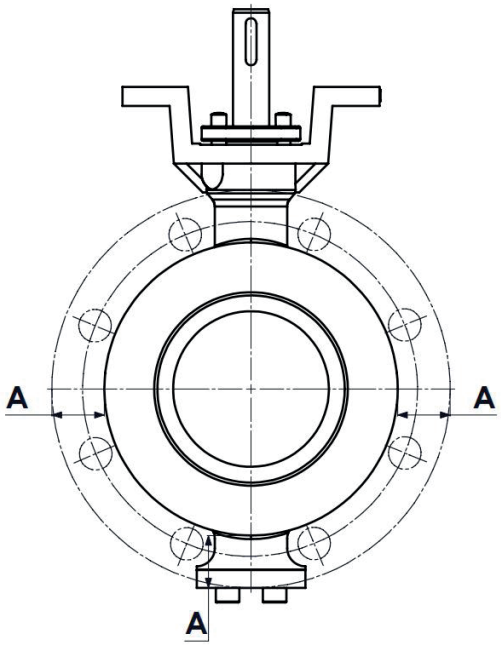
Figure 4 – Recommended mounting direction of a spring returned actuator, spring cylinder facing downwards.



Valves with a unidirectional design, or valves with a preferred flow direction, have an **arrow on the valve body**. These types of valves should be mounted **with the flow arrow coincident with the process flow direction.**

Valves with a flangeless body, so called wafer design, need to be centered between pipe flanges. In a horizontal pipeline, insert the two bottom through-bolts in the pipe flanges. Cradle the valve on these two bolts and use correctly dimensioned shims, or wedges, to center the valve. The valve is correctly centered when the distance A, shown in Fig 5, are the same all around the circumference.

Figure 5 - Centering of valves in a flangeless (wafer) design



The pipes should be supported on each side of the valve in order to relieve the valve of unnecessary loads and avoid vibrations.

Locate the valve so it will be easily accessible for inspection and service, particularly if the valve is equipped with an actuator and a valve positioner.

3.2 COMMISSIONING

CAUTION: Before commissioning, please read the safety precautions under SAFETY in the beginning of this manual.

Before commissioning, flush the pipeworks with all the valves in the open position so that any impurities that may damage the sealing surfaces of the valve, or impede its operation, will be flushed away.

Make sure that all bolts, nuts, pipe fittings and cables glands are properly fastened.

Check and, if necessary, adjust the actuator, positioner and/or switches.

3.3 ADJUSTMENT AFTER START-UP

After start-up, check for any leakage from the stem packing. Valves with a tightenable stem packing may require retightening after the process has been stabilized. Tighten the bolts/nuts for the stem packing carefully and evenly until any leak cease.

4 MAINTENANCE, DECOMMISSIONING AND REPAIR

CAUTION: Before performing any maintenance or repair, please read the safety precautions under SAFETY in the beginning of this manual. Never decommission and dismantle a valve, or part of a valve, without ensuring the line is free of pressure and media.

NOTE: When lifting the valve package, be aware of its weight and center of gravity!

4.1 MAINTENANCE

The NAF valves are designed to work under severe conditions. Due to the variety of different conditions in which the valves are used, it is important to implement a proper preventive maintenance. This will help to prevent unplanned process downtime and minimize the cost of ownership.

We recommend that the valves are thoroughly inspected latest after five (5) year after installation.

Applications with high frequency, highly corrosive

or erosive media or with special requirements, may need shorter intervals in between inspections and periodic maintenance. On the other hand, in less demanding applications, like manually operated valves, the period in between inspections may be extended, but we always recommend that a first inspection is made no later than five (5) years after installation. Based on experience from the first inspection, periodic maintenance intervals can be set. For valves equipped with valve controllers having valve diagnostic features, these can also be used for a preventive maintenance.

For valves with a pneumatic actuator mounted, we recommend that the actuator is inspected, and if necessary maintained, at the same time as the valve is maintained. This will prevent unplanned downtime.

In between maintenance inspections, the only maintenance that could be needed is that valves with a tightenable stem packing may require retightening if there is a leakage from the stem area. Tighten the bolts/nuts for the stem packing carefully and evenly until any leak cease.

4.2 DECOMMISSIONING AND REMOVING THE VALVE FROM THE PIPELINE

If a valve needs to be decommissioned, please make sure to follow all safety procedures. Follow the instructions for lifting in section 2.2 when the valve is removed from the pipeline.

⚠ **CAUTION**: Never decommission and dismantle a valve, or part of a valve, without ensuring the line is free of pressure and media. This also includes not removing an actuator from the valve while the valve is still under pressure. Failure to comply with this may cause free-flowing fluid to cause accidents.

⚠ **CAUTION**: Ball valves must always be dismantled in a semi-open position to prevent trapping of pressure and media.

4.3 REPAIR AND RETURNS

If a fault or defect occurs in a valve, we always recommend that a competent, specialized valve repair company is used for the repair. Specific repair instructions are available through product specific installation, operation and maintenance manuals (IOMs). These manuals can be obtained from NAF. These IOMs also contain exploded views, detailed bill of material as well as recommended spare parts.

! **NOTE**: If at any time, a valve needs to be sent back to the manufacturer, make sure to clean the valve thoroughly and flush the valve with the obturator (ball, disc or ball sector) in the half-open position.
Request a Return Report from NAF, complete the requested data and send it back together with a SDS (Safety Data Sheet) of the fluid used. The manufacturer will only open the returned equipment if the Return Report is present.

! **NOTE**: A valve is a pressure vessel! Always use original spare parts to ensure a safe operation.

4.4 TESTING OF THE VALVE

After a repair of a valve, the valve should be pressure tested acc to the correct pressure class found on the valve identification plate.

We recommend testing using a liquid. Make sure that the cavities of the valve are properly filled with liquid before pressure testing. This is most easily done by placing the valve with the inlet/outlet in a vertical position and filling the valve with liquid in the semi open position. Also see product specific IOMs for further details.

⚠ **CAUTION**: Always use test equipment conforming to the tested pressure class. Unless test equipment is especially designed for testing with gas, testing the valve body tightness with gaseous media is not recommended due to safety issues

4.5 SERVICE LIFE

The assigned service lifetime of a NAF Rotary valve is a minimum 25 years, provided a regular maintenance and, if needed, repair with the use of original spare parts, is provided.

The valve is considered to have reached the end of its service life if any of these criteria is met:

- The valve body can no longer hold the hydrostatic pressure and a leakage occurs.
- The valve body has been deformed by pressure shocks or pipe forces.
- The valve body has been severely damaged by corrosion or erosion which jeopardizes the integrity of the pressure vessel
- The leakage through or out of the valve, cannot be reduced to an acceptable level by replacing the internal components with new original spare parts.
- The operating torque of the valve cannot be reduced to an acceptable level by replacing the internal components with new original spare parts.

5. RECYCLING AND DISPOSAL

At the end of the equipment service life, the relevant materials and parts should be recycled or disposed using local environmental regulation methods. If any doubt about the materials used in the valve, request information from the manufacturer.

If the product contains substances which are harmful to the environment, then the disposal of the equipment must be in accordance with local/ regional regulations.

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