armatec

TYPE 3050 / 3051 (A-SERIES)

INSTALLATION AND MAINTENANCE INSTRUCTION MANUAL

PURPOSE AND SCOPE

This document describes the installation, operation and maintenance instructions for A series unidirectional knife gate valves. A series knife gate valves are designed to handle various liquids with up to 4% suspended solids, controlling their flow, isolation and passage in pipelines within the specified pressure and temperature range; if used for gravity discharge of dry solids, it is recommended to install the valve with the body arrow pointing opposite to fluid direction. In all these applications, it is advised to install the valve after filtering the fluid to remove solids or large particles, as this is its designated use. Any other uses must be consulted and approved in writing by ARMATEC. ARMATEC shall not be liable for any damage resulting from applications deviating from the intended use or due to improper installation, commissioning or operation of the valve.

The manual describes general and generic instructions for A series knife gate valves; this documentation is supplemented by the technical information generated for the valve sales order (approval drawings, technical descriptions, specifications, etc.).

As part of its ongoing product and service improvement process, ARMATEC reserves the right to alter the data and content of this document at its discretion at any time without notice.

SAFETY ASPECTS

This manual provides essential information on installing, commissioning and maintaining A-series knife gate valves. It is essential to follow all the indicated recommendations, codes of good practice, standards, applicable legislation, and directives related to work safety, risk prevention and technical aspects.

Individuals operating this equipment must possess technical training and be well acquainted with all warnings and cautions outlined in these instructions. Failure to observe the warnings and cautions may result in personal injury and damage to property. Be sure to read and fully understand this manual before installing, operating or maintaining the gate.

Altering or modifying this product without written consent from ARMATEC may lead to incorrect operation, critical failures or damage, thereby voiding the warranty.

APPLICATION OF EUROPEAN DIRECTIVES

Information on the directives for A series knife gate valves can be found on the website specifically in the product section for A series knife gate valves.

Upon request, A series can comply with the directive on equipment and protective systems for use in potentially explosive atmospheres (ATEX). In these cases, the butterfly valve will be identified and marked with a nameplate for use in such zones according to the ATEX directive. This label indicates the exact classification of the zone and the parameters under which the gate can be used. The user shall be responsible for any other use in other conditions or areas.

Supplementary information is provided for such applications (ATEX) concerning the risks associated with environments that have potentially explosive atmospheres (ignition hazards).

TRANSPORT AND HANDLING

When handling the equipment please pay special attention to the following points:

- **SAFETY WARNING:** Before handling the knife gate valve or its parts, ensure the lifting and handling equipment (e.g. cranes) are appropriately sized to manage its weight and the weight of the components.
- Do not lift the valve or hold it by the drive. Lifting the valve by the actuator can lead to damage to the equipment as the drives are not designed to withstand the valve's weight.
- The valve can be equipped with drives and accessories and must be handled carefully to prevent damage due to improper use.
- Do not lift the valve by holding/handling it in the fluid passage area. The valve's sealing joint is located in this area. If the valve is held/handled and lifted by this area, it can damage the surface and the sealing joint and lead to leakage problems while the valve is operating.
- To prevent damage, especially to the anticorrosive protection, it is recommended to use soft straps or belts when lifting A**CMO valves** knife gate valves. These straps must be fi tted around the top of body.
- If the equipment is packed in wooden boxes, these must be provided with clearly marked holding areas where the slings will be placed when securing them. If two or more gates are packed together, separation and securing elements must be provided between them to prevent any movements, knocks and friction during transport. When storing two or more gates in the same box, ensure they are correctly supported in order to prevent any deformations. For sea transport, we recommend using vacuum bags inside the wooden boxes to protect the equipment from contact with sea water.
- Special attention should be paid to maintaining the correct levelling of the gates during loading and unloading, as well as during transport and storage, to prevent any mechanical deformations in the equipment. We therefore recommend using mounts or trestles.

STORAGE

To ensure the knife gate valve is in optimum conditions of use after long periods of storage, it should be stored in a well-ventilated place at temperatures below 30ºC.

While not advised, if stored outside, the knife gate valve must be covered to protect it from heat and direct sunlight, with good ventilation to prevent humidity and condensation.

The following aspects must be considered for storage purposes:

- The storage place must be dry and undercover.
- It is not recommended to store the equipment outdoors with direct exposure to adverse weather conditions, such as rain, wind, etc. This is particularly important if the equipment is not protected with suitable packaging.
- This recommendation is even more important in areas with high humidity and saline environments. Wind can carry dust and particles that may come into contact with the valve's moving areas, leading to operating problems in the future; likewise, the drive system can be damaged due to the ingress of particles.
- The equipment must be stored on a fl at surface to avoid loss of shape.
- If the equipment is stored without suitable packaging, it is important to keep the valve's mobile parts lubricated; for this reason, it is recommended to carry out regular checks and lubrication.
- Likewise, if there are any machined surfaces without surface protection, it is important for some form of protection to be applied to prevent the appearance of corrosion.
- For drives (pneumatic cylinders, hydraulic cylinders, electric actuators, etc.) and associated components, consult the installation and maintenance manuals for these devices.

INSTALLATION

In order to avoid personal harm and/or material damage (to the facilities, the valve, drive, etc.) please follow these instructions:

- Before installing, inspect the knife gate valve for any damage during transport or storage.
- All staff responsible for installing or operating the equipment must be qualifi ed and trained.
- Use suitable personal protective equipment (PPE) (gloves, safety boots, goggles, etc.).
- Shut off all lines that affect the valve and put up a warning sign about the work.
- Completely isolate the valve from the whole process. Depressurise the process.
- Drain all the line fl uid through the valve.
- For **A series** knife gate valves to be used in potentially explosive atmospheres (ATEX), 'Ex' approved hand tools must be used during installation and maintenance, according to current regulations.
- Make sure that the inside of the valve body and, in particular, the seal area are clean. Inspect the pipe and the flanges to make sure they are clean and free of impurities, foreign bodies, etc.

Before installing, inspect the valve body and components for any damage during transport or storage.

Make sure the valve body's inside cavities are clean. Inspect the pipes and the fl anges to make sure they contain no foreign material and are clean.

The A Series valve is unidirectional, with a fl ow direction arrow marked on the valve body. The word 'SEAT' is also marked on one side of the body (near the packing gland) to indicate the side where the sealing joint is located.

The A series knife gate valve's design, with knife gate support guides, allows 30% of the working pressure to be applied in the opposite direction to the arrow without causing any damage. The valve is not watertight in these circumstances. Achieving watertight integrity under these conditions requires additional brackets.

Fig. 1

ADVANTAGE

ASPECTS TO BE CONSIDERED DURING ASSEMBLY

As a rule, when the valve operates with clean liquids or with low solid content it is recommended to install it so that the pressure pushes the gate against the seat. That way, the fluid direction will be the same as the direction indicated by the arrow on the body (fig. 2).

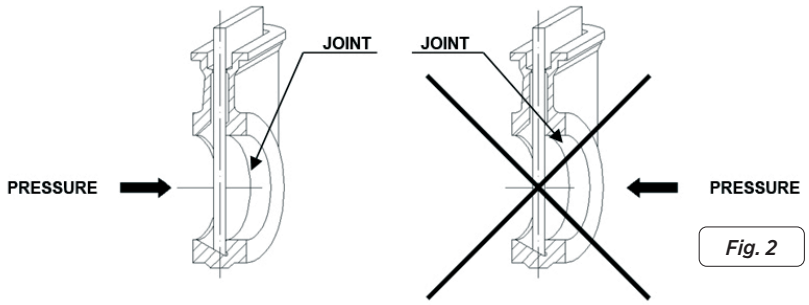

Fig. 2

Please note that the direction of the fl uid and the pressure do not always coincide (fig. 3).

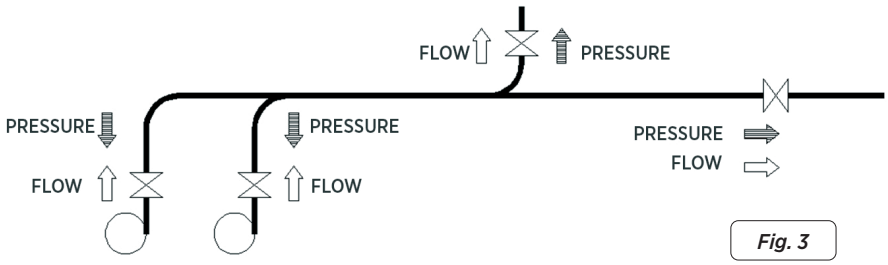

Fig. 3

It is very important to ensure that the knife gate valve is correctly aligned and parallel to the flanges of the pipeline to prevent external leaks caused by mechanical deformations, problems with the flange seals, etc. (fig.4)

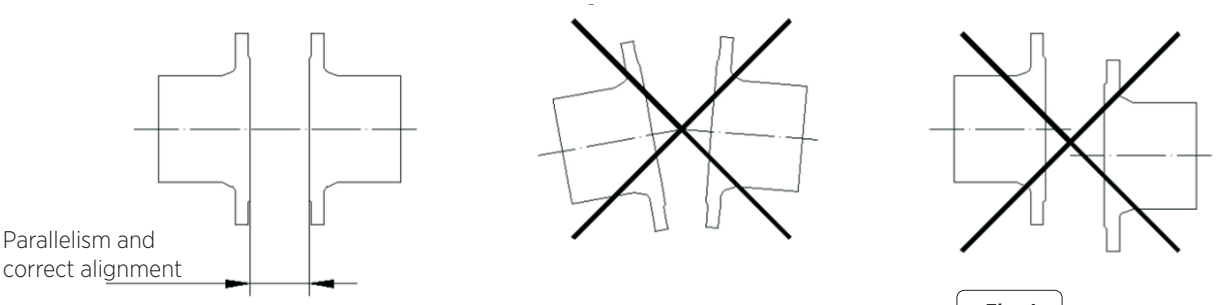

Fig. 4

In the case of blind fl anges, the bolts in the threaded boreholes will have a maximum depth (fig. 5) and will never reach the bottom of the threaded hole (Distance P).

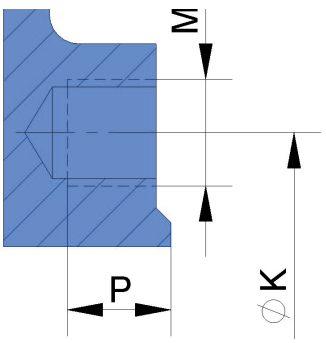

Fig. 5

A Series knife gate valves must be fi rmly installed in the duct where they are mounted.

Whenever the joint to the duct is bolted, a sealing joint must be positioned between the duct and the knife gate valve to prevent any leakages. The seal to be installed will be selected in line with the work conditions inside the duct (temperature, pressure, fluid, etc.). The nuts and bolts to be fitted must also be suitable for the operating conditions, and their size must be in accordance with the approved drawings.

The nuts and bolts should be assembled according to good practice codes, applying the tightening torque progressively and crosswise.

Once the equipment has been assembled, make sure that there are no objects inside or outside that may interfere with the movement of the knife gate.

Make the corresponding drive connections (electrical, pneumatic, etc.) following the instructions set out in the manufacturers' manuals and in the wiring/operation diagrams supplied with the drives.

Assembly of the equipment must be coordinated with the site's control and safety personnel. No modifi cations are allowed to the knife gate valve's external elements, such as limit switches, positioners, signalling boxes, etc.

Regarding scaff olding, ladders and other auxiliary elements to be used during assembly, follow the safety recommendations provided by their manufacturers, as well as the safety instructions in this manual.

ASSEMBLY POSITIONS (Horizontal Pipe)

For horizontal pipelines, it is advisable to mount valves vertically. Other mounting positions are possible, with the following considerations and warnings.

Position number 1: This is the most advisable position.

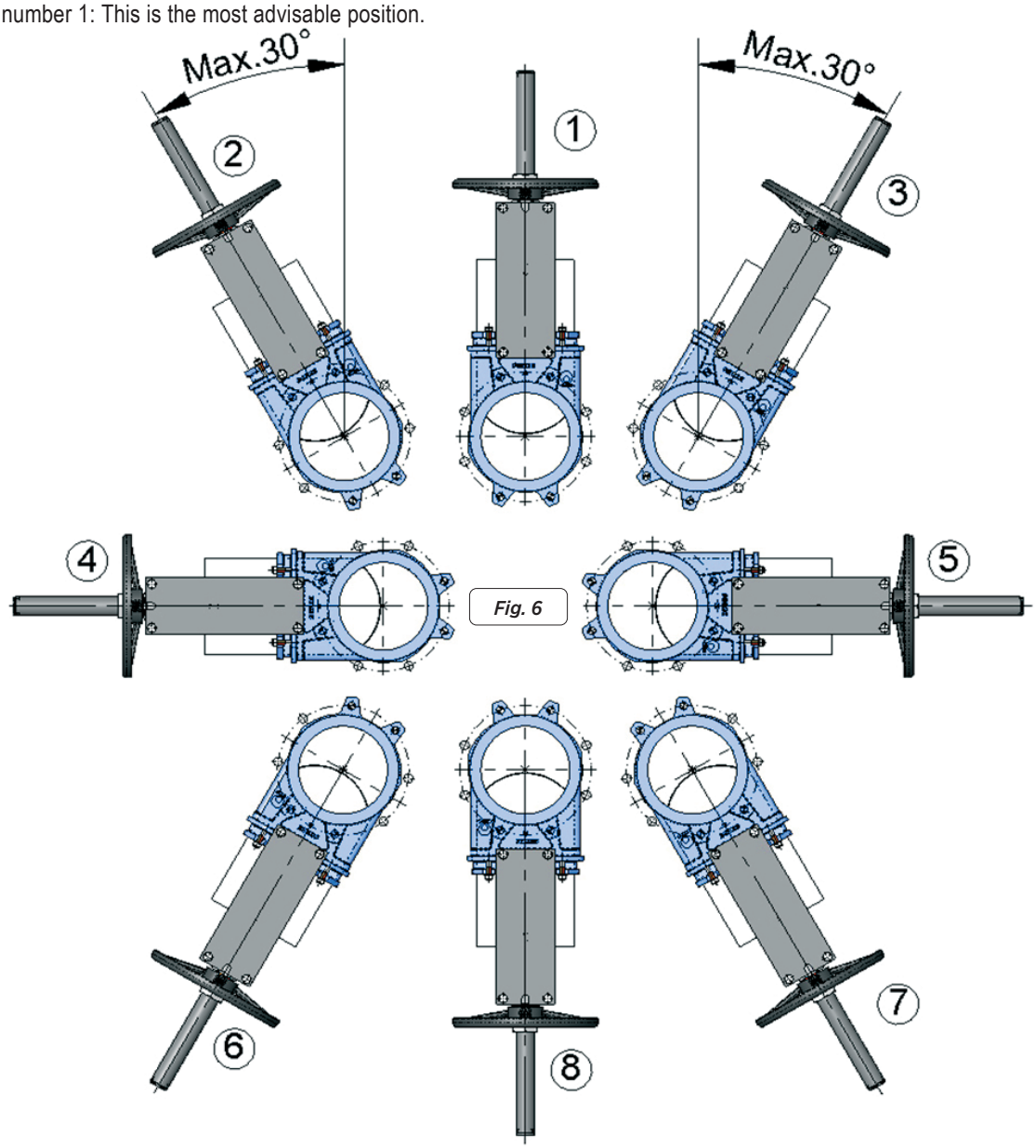

Fig. 6

Position number 8: The valve can be installed in this position, but it is recommended to consult ARMATEC for any specifi c guidelines or instructions regarding the valve's size, type of drive, and similar factors.

Positions 2, 3, 6 and 7: For large valves (over DN300), the maximum installation angle with the vertical is 30º. The angle can be increased up to 90º (positions no. 4 and 5) for smaller sizes.

Positions 4 and 5: Installing valves in these positions is allowed for small valves (up to DN200). For valves larger than DN200, consult ARMATEC; in such cases, appropriate support must be provided for the actuator or drive weight in order to prevent any deformation or operational issues with the valves.

IMPORTANT (Positions 2, 3, 4, 5, 6 and 7):

- The A Series unidirectional knife gate valve does not have guides for the gate on the sides, and the larger the valve, the heavier the knife gate. In these positions, the knife gate can rub against the body during operation and stop it. For this reason it is a very important point to consider. It is recommended to check with ARMATEC whenever it is necessary to install valves larger than DN200 in any of these positions.

- In these positions it is recommended to secure it to prevent the stem from bending due to the weight of the actuator. Failure to do this could lead to operating problems.

ASSEMBLY POSITIONS (vertical/slanted pipe)

The valves can be mounted in all positions, with the following guidelines and warnings:

Positions numbers 1, 2, and 3: The actuator must be adequately supported in these positions to prevent deformation or damage to the stem and brackets, which can cause operational issues (misalignments, increased torque/push due to friction, noise, sealing problems, etc.).

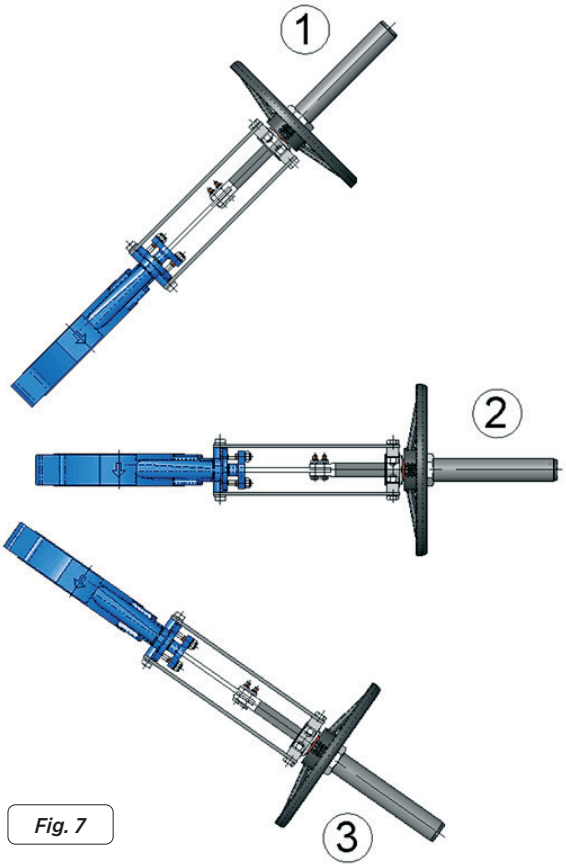

Fig. 7

START-UP

Before commissioning, the valve and its associated components (drives, optional elements, sensors, connections, etc.) must be inspected to rule out any damage caused during transport, storage, or installation and assembly.

After installing the knife gate valve, it is necessary to ensure that all nuts and bolts are properly tightened and that the entire valve drive system is correctly assembled and adjusted (electrical connections, pneumatic connections, instrumentation following the instructions in the manufacturers' manuals and the provided wiring/operating diagrams).

All valves are tested and verifi ed at our facilities; however, the nuts on the packing glands can come loose during handling and transport and must be re-tightened.

If the valve has electrical accessories or you are in an ATEX zone, earth connections must be made before operating. If you are in an ATEX zone, check the continuity between the valve and the pipe (EN 12266-2, annex B, points B.2.2.2. and B.2.3.1.). Check the pipe's earth connection and conductivity between the input and output pipes. When the valve has drives, follow the manufacturer's instructions on checking wiring and earthing.

Ensure there are no objects, either inside or outside, that could obstruct the movement of the knife gate.

It is recommended to verify proper assembly, connections and functionality by operating the valve without load. If any anomalies are detected, they must be resolved and corrected.

Once the knife gate has been installed in the pipeline and pressurized, it is very important to check the packing gland (4) for any external leakage. If a leak is detected, retighten the fl ange nuts in a crosswise pattern. Tighten the packing gland nuts gradually and progressively until the leakage stops, ensuring that there is no contact between the packing gland bushings and the stems.

For additional accessories and options integrated into the A Series knife gate valve (mechanical locking system, air injections, limit switches, electrovalves, junction boxes, etc.), check with ARMATEC.

For detailed information on commissioning and operating various drive types for unidirectional knife gate valves, see the next chapter.

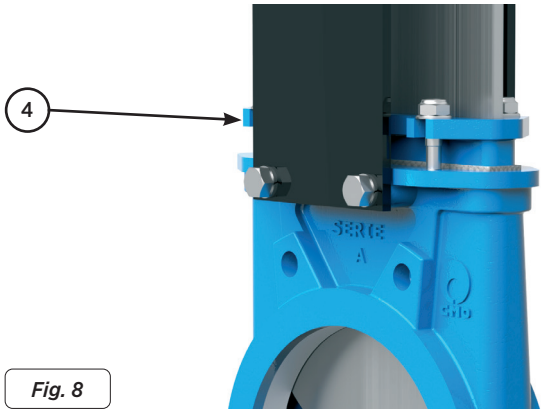

Fig. 8

DRIVE

HANDWHEEL
Turn the handwheel clockwise in order to operate (close) the knife gate. Turn the wheel anti-clockwise to open. The handwheels have an arrow on their surface showing rotation direction.

The handwheels are sized to match the specifi cations of each valve; altering or replacing them with a diff erent size may damage the valve or its components due to excessive force.

CHAINWHEEL
To operate the knife gate valve, pull one of the chain drops, taking into account that closing is carried out when the handwheel turns clockwise.

LEVER
First loosen the position locking hand lever located on the yoke. Once it is unlocked, raise the lever to open or lower it to close. Lock the lever again to complete the operation.

MANUAL GEARED MOTOR WITH HANDWHEEL
Turn the handwheel clockwise in order to operate (close) the knife gate. Turn the wheel anti-clockwise to open.

The handwheels of the geared motors are sized based on each valve's characteristics; modifying or changing them to another size could damage the valve or its components due to excessive force.

Refer to the geared motor user manual for more information.

MANUAL GEARED MOTOR WITH CHAINWHEEL
To operate the knife gate valve, pull one of the chain drops, taking into account that closing is carried out when the handwheel turns clockwise.

PNEUMATIC ACTUATOR (double and single acting)
Pneumatic drives are designed to connect to a 6-bar pneumatic network, although these units can withstand up to 10 bar. The pressurised air used for the pneumatic drive must be correctly fi ltered and lubricated. Correctly identify the equipment's pneumatic connection ports/inlets, and use fittings and connections suitable for their type and size.

This type of drive does not require any adjustment, due to the fact that the pneumatic cylinder is designed for the exact stroke of the valve.

On request, pneumatic drives can have additional signalling and control elements, such as limit switch boxes, sensors, position transmitters, positioners, etc.

For further additional information, refer to the installation and maintenance manual or data sheet for the double-acting (D/A) and single-acting (S/A) pneumatic actuator or any optional control and signalling elements.

HYDRAULIC ACTUATOR (double and single acting)
The hydraulic drives are designed to work at a standard pressure of 135 bars. Use hydraulic oil according to the manufacturer's recommendations. Correctly identify the equipment's pneumatic connection ports/inlets, and use fittings and connections suitable for their type and size.

On request, hydraulic drives can have additional signalling elements such as limit switches, sensors, position transmitters, etc.

This type of drive does not require any adjustment, due to the fact that the hydraulic cylinder is designed for the exact stroke of the knife gate.

For further additional information, refer to the installation and maintenance manual or data sheet for the hydraulic drive or any optional signalling elements.

ELECTRIC ACTUATOR

If the knife gate valve is fi tted with a motorised drive, it will be accompanied by the electrical actuator supplier's instructions and technical documentation. Check the connections and operation diagram. Follow the electric actuator manufacturer's instructions when starting up the equipment.

- Check the equipment's electrical connections and wiring against the provided wiring and operating diagrams.
- Ensure the supply voltage matches the specifi cations on the electric actuator's nameplate.
- The electric actuators must operate by disconnecting through a stroke or travel limiter at both ends (valve open position and valve closed position); these positions have been pre-set at the factory. The electric actuators are equipped with torque or force limiters to protect the equipment from overloads in both directions (opening and closing); these have also been factory set. If the settings require any changes, please contact ARMATEC.
- Moving parts must be inspected and tested to ensure smooth operation without load in the valve. Ensure the electric actuator moves the valve from fully open to fully closed, including intermediate positions, without exceeding torque limits throughout the stroke. It is recommended to perform these operations without load to verify correct assembly and wiring before conducting load tests in the pipeline.

R/S = Rising stem
NR/S = Non-rising stem

LEVER **R/S**	HANDWHEEL NON-RISING STEM **NR/S**	HANDWHEEL RISING STEM **R/S**	CHAIN WHEEL **R/S** **NR/S**	ELECTRIC DRIVE **R/S** **NR/S**	ELECTRIC DRIVE + HANDWHEEL **R/S** **NR/S**	ELECTRIC DRIVE **R/S**	ELECTRIC DRIVE **R/S**	ELECTRIC DRIVE, SINGLE-ACTING **R/S**

Fig. 9

MAINTENANCE

Valves shall not be liable if the knife gate valve suffers damage due to incorrect or unauthorised handling or improper assembly and commissioning, thus voiding the warranty. Manipulating or modifying the knife gate valve is forbidden unless expressly authorised in writing by ARMATEC.

To prevent any personal or material damage during maintenance tasks, follow the safety instructions provided in this manual, as well as the following instructions:

- All personnel responsible for equipment maintenance or operation must be qualifi ed, trained and familiar with the equipment and processes.
- It is mandatory to use appropriate personal protective equipment (PPE) (gloves, safety footwear, goggles, etc.).
- Shut off all lines that affect the knife gate valve and put up a warning sign to inform about the work being performed.
- Completely isolate the knife gate valve from the whole process. Depressurise the line.
- Drain all the fl uid through the knife gate valve.
- For maintenance and commissioning, use tools suitable for the application and work area according to current regulations
- In order to work under ideal safety conditions, maintenance staff must be up to date with the safety regulations and work can only start under orders from the site's safety staff.
- The safety areas must be clearly marked, avoiding the use of auxiliary equipment (ladders, scaffolding, etc.) in moving parts or levers.

In an ATEX zone, electrostatic charges may be present inside the valve, causing a risk of explosion. The user shall be responsible for implementing measures and actions to minimise risks.

- Maintenance personnel must be trained and informed about the risks of explosion and work in such areas, in accordance with current directives and regulations.
- If the fluid transported constitutes an internal explosive atmosphere, the user must regularly check the installation's sealtight integrity.
- Regular cleaning of the knife gate valve to prevent any accumulation of dust.
- Avoid re-painting the products supplied.
- All instructions described in the ATEX SUPPLEMENT safety manual for the A Series knife gate valve must be followed.
- After maintenance in an ATEX zone, it is mandatory to check electrical continuity between the pipe and the rest of the valve's components, e.g. the body, knife gate, stem, etc., in accordance with Standard EN 12266-2, Annex B, Points B.2.2.2. and B.2.3.1.

The only maintenance required for this type of valve is greasing the stem and periodic inspections of the rubber seal and packing, due to wear and use.

A periodic inspection of rubber seals and packing is recommended every six months; however, this interval may change based on the valve's working conditions, such as: pressure, temperature, number of operations, type of fl uid, etc. The process for replacing the seat seal and/or packing is described in a later chapter.

IMPORTANT SAFETY ASPECTS

To work under ideal safety conditions, the drives must be in idle position and disconnected from their power source (electric, pneumatic or hydraulic) with the air tanks depressurised. Drives with fail-safe position (spring return) must be in these safety positions or locked. Moreover, the electrical control cabinets must also be out of service and locked out. Maintenance staff must be up to date with the safety of all safety rules and regulations, and work can only start under orders from the site's safety personnel, who shall be in charge of coordination.

In single-acting spring-loaded return drives, do not manipulate the drive as it contains high preload springs.

The safety areas must be clearly marked, and auxiliary equipment (ladders, scaffolding, etc.) must not be placed on levers or moving parts that could impede the movement of the valve.

In units fitted with spring return drives, the valve's stem must be mechanically locked in idle position, de-energised, and only unlocked when the drive is pressurised.

All hydraulic, pneumatic and electric drives are equipped with protection elements that isolate and safeguard the valve's moving parts from accidental contact (operators or personnel) or collisions with objects or elements; these must be in place during normal operation of the equipment.

LUBRICATION

It is recommended to lubricate the stem twice a year by removing the cap from the bonnet and fi lling it with grease up to half its volume. Use suitable high-pressure lithium grease for mechanical transmissions.

REPLACING THE SEALING JOINT (except metal/metal and PTFE)

1. Make sure there is absolutely no pressure and fl uid in the system.
2. Remove the valve from the pipeline.
3. Remove the drive and safety guards (when the valve is actuated) by unscrewing and releasing the joints between the stem-knife gate and the bracket-body plate. Carefully store all items.
4. Remove the packing gland (4).
5. Remove the packing (5), taking care not to damage the rubber strip from the packing (6).
6. Remove the knife gate (2) carefully without losing the PA6 slides (3).
7. Clean the inside surfaces of the valve.
8. Remove the ring (8) that secures the sealing joint (9). This can be done by applying a few sharp knocks to the outside with a bronze object at the base of the ring until it comes out.
9. Remove the old seal (9) and clean its housing.
10. Mount a new sealing joint (9) with the same length as the old one, or use the dimensions shown below (table 1). When assembling the joint, it is recommended to apply petroleum jelly to the sealing joint to facilitate assembly and ensure the valve operates correctly (do not use oil or grease); details of the petroleum jelly used are shown below in Table 2.
11. Insert the retaining ring (8) in its original position as indicated:
    - Mount the retaining ring (8) perfectly aligned and parallel to the sealing joint. During assembly, avoid impacts to prevent any deformation or damage.
    - Push the ring (8) as a whole towards the base of the channel.

12. Assembly will be performed in reverse order to disassembly.

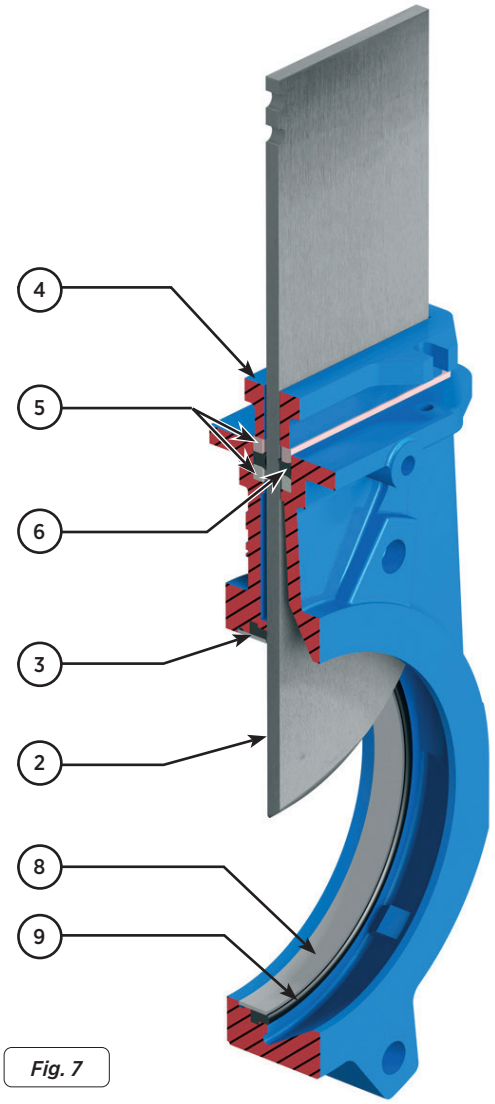

Fig. 7

DN	50	65	80	100	125	150	200	250	300	350	400	450	500	600	700	800	900	1000	1200
Length.	190	250	290	370	445	530	690	845	1005	1175	1350	1520	1710	2020	2300	2680	3030	3367	3995

Table. 1

*Note: During the assembly of the new sealing joint it is recommended to apply "Vaseline" to the seal to facilitate the assembly process and the correct operation of the valve (do not use oil or grease); table 2 below shows details of the Vaseline used.

WHITE PETROLEUM JELLY		
Saybolt colour	ASTM D-156	15
Melting point (ºC)	ASTM D-127	60
Viscosity at 100ºC	ASTM D-445	5
Penetration 25ºC mm/10	ASTM D-937	165
Silicone content	Not have	
Pharmacopeia BP	OK	

Table. 2

REPLACING THE SEALING JOINT (PTFE)

The following aspects must be considered:

- To obtain greater watertight integrity in the stainless steel bodies it is advisable to apply plastic glue to the joint housing. If the body is painted this is not necessary.
- With the rubber seal tab pointing outwards, make a circle and then form a heart shape.
- It is recommendable to insert the joint in the top part, press the arched part and insert the seal into the housing.

REPLACING THE PACKING (Fig. 11)

1. Make sure there is absolutely no pressure and fl uid in the system.
2. Place the valve in open position.
3. If the valve has safety protection elements, remove them.
4. Loosen the screws that connect the stem or spindle to the knife gate.
5. Disassemble the connection between the support plates and the body, and remove the drive. Carefully store all items.
6. Remove the packing gland (4).
7. Remove the original packing (5 and 6) using a suitable pointed tool (packing extractor, joints), taking care not to damage the surface of the knife gate (2).
8. Carefully clean the packing gland, ensuring that it is free of any residues so that the new packing strips fi t correctly.
9. Insert the new packing (5 and 6). It is very important for both ends to be perfectly joined during this operation. Below are the packing dimensions (Table 3). As standard, The packing gland is made up of 3 lines (2 packing gland lines and 1 rubber joint line in the middle).
10. Mount the packing gland in its original position (step 6), ensuring that it does not come into contact or interfere with the knife gate. Carefully tighten all bolts crosswise, progressively and uniformly, and ensure that there is the same distance between the knife gate and the packing gland on both sides.

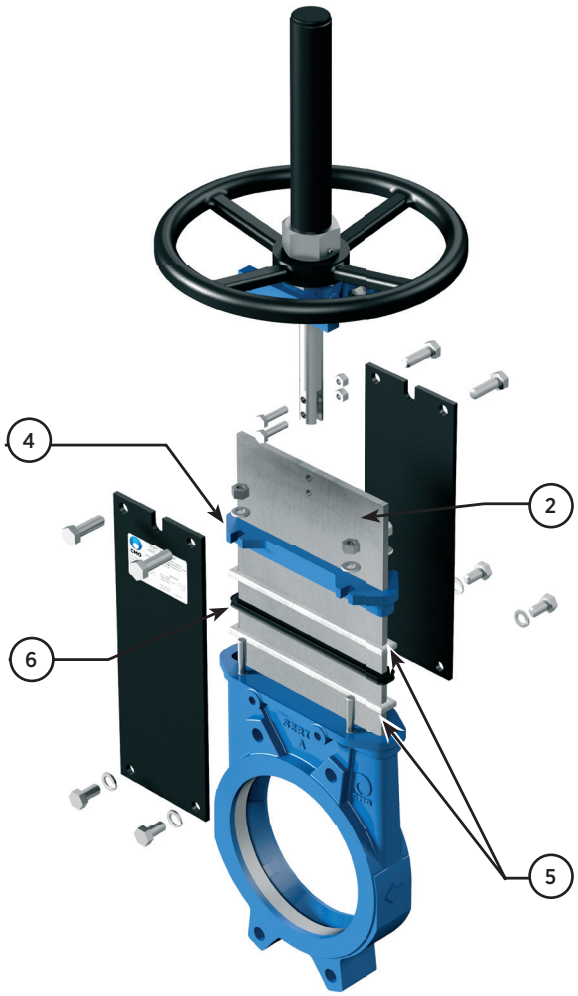

Fig. 11

11. Screw down the support plates and the stem in reverse order to that described in points 4 and 5.
12. Perform several operations with no load to ensure the valve operates correctly and the packing gland is aligned.
13. It is very important to check for any leakages from the packing gland once the knife gate is installed in the pipeline and it has been pressurised. In the event of a leakage, tighten the nuts of the fl anges crosswise, applying the torque gradually and progressively until the leakage stops, ensuring that there is no contact between the packing gland bushings and the stems.

DIAMETER	PACKING	RUBBER RING
DN50	2 lines of 8 x 8 x 204	1 line of 8 x 8 x 204
DN65	2 lines of 8 x 8 x 234	1 line of 8 x 8 x 234
DN80	2 lines of 8 x 8 x 264	1 line of 8 x 8 x 264
DN100	2 lines of 8 x 8 x 304	1 line of 8 x 8 x 304
DN125	2 lines of 8 x 8 x 356	1 line of 8 x 8 x 356
DN150	2 lines of 8 x 8 x 406	1 line of 8 x 8 x 406
DN200	2 lines of 8 x 8 x 516	1 line of 8 x 8 x 516
DN250	2 lines of 10 x 10 x 636	1 line of 10 x 10 x 636
DN300	2 lines of 10 x 10 x 740	1 line of 10 x 10 x 740
DN350	2 lines of 10 x 10 x 810	1 line of 10 x 10 x 810
DN400	2 lines of 10 x 10 x 928	1 line of 10 x 10 x 928
DN450	2 lines of 10 x 10 x 1028	1 line of 10 x 10 x 1028
DN500	2 lines of 14 x 14 x 1144	1 line of 14 x 14 x 1144
DN600	2 lines of 14 x 14 x 1346	1 line of 14 x 14 x 1346

Table. 3

Note: - If it is not possible to place a rubber joint in the middle another packing line should be used instead.
- Dimensions are expressed in millimeters.

MAINTENANCE OF THE PNEUMATIC ACTUATOR

The pneumatic cylinders in our valves are manufactured and assembled at our premises. The maintenance of these cylinders is simple, if your need to replace any elements and you have any questions please consult ARMATEC. Below is an exploded diagram of the pneumatic actuator (fi g. 9) and a list of the cylinder's components (table 4). The top cover and the support cover are usually made of aluminium, but from pneumatic cylinders greater than Ø200 mm, they are made of cast ductile iron.

The maintenance kit normally includes: The socket and its joints and the scraper, and if the customer wishes the piston is also supplied. Below we show the steps to follow to replace these parts.

1. Position the valve in closed position and shut off the pneumatic circuit pressure.
2. Loosen the cylinder air input connections.
3. Release and remove the cylinder cap (5), the cylinder tube (4) and the tie rods (16).
4. Loosen the nut (14) which connects the piston (3) and the rod (1), remove the parts. Disassemble the cir-clip (10) and remove socket (7) with its joints (8 & 9).
5. Release and remove the cylinder head (2), in order to remove the scraper (6).
6. Replace the damaged parts with new ones and assemble the actuator in the opposite order to that described for the disassembly.

The pneumatic drive's technical and manual catalogue (double-acting and single-acting pneumatic cylinders) provides additional information on these devices.

In single-acting spring-loaded return drives, do not manipulate the drive as it contains high preload springs.

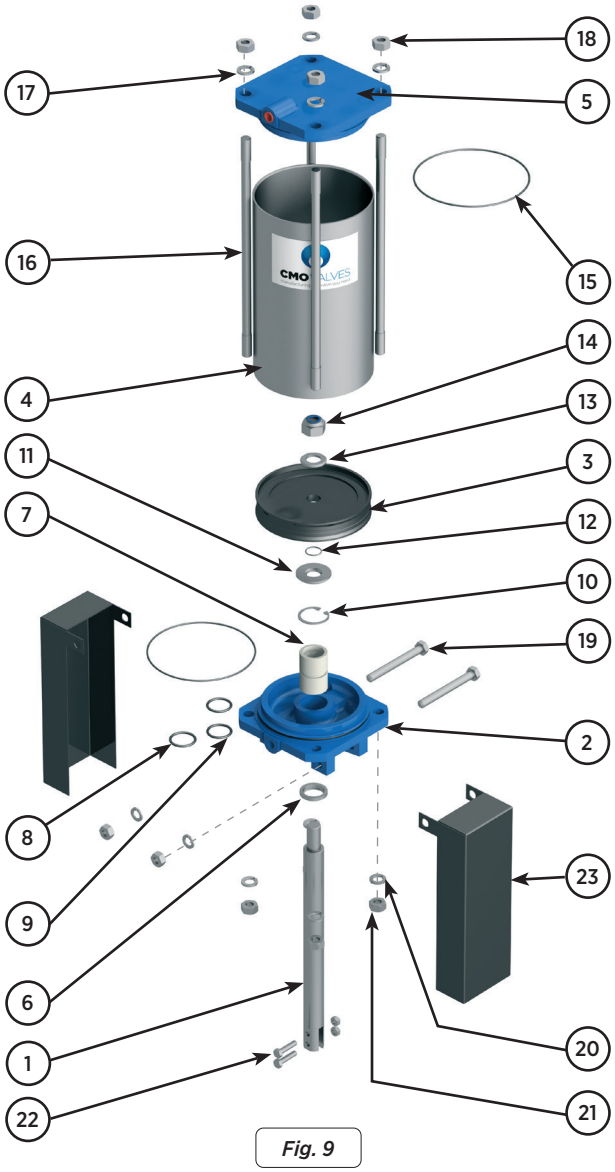

Fig. 9

PNEUMATIC ACTUATOR		
POS.	DESCRIPTION	MATERIAL
1	STEM	AISI-304
2	COVER SUPPORT	ALUMINIUM
3	PISTON	S275JR + EPDM
4	CASING	ALUMINIUM
5	UPPER COVER	ALUMINIUM
6	SCRAPER	NITRILE
7	SOCKET	PA6
8	EXTERIOR O-RING	NITRILE
9	INTERIOR O-RING	NITRILE
10	CIR-CLIP	STEEL
11	WASHER	ST ZINC
12	O-RING	NITRILE
13	WASHER	ST ZINC
14	SELF-LOCKING NUT	5.6 ZINC
15	O-RING	NITRILE
16	TIES	F-114 ZINC
17	WASHER	ST ZINC
18	NUT	5.6 ZINC
19	SCREW	5.6 ZINC
20	WASHER	ST ZINC
21	NUT	5.6 ZINC
22	SCREW	A-2
23	PROTECTION	S275JR

Table. 4

MAINTENANCE OF OTHER DRIVES

For maintenance of other types of drives mounted on the reduced knife gate valves, such as manual geared motors, electric actuators and hydraulic actuators, follow the manufacturer's recommendations as indicated in their user manual and technical documentation. This documentation is provided with the reduced knife gate valves.

COMPONENTS LIST

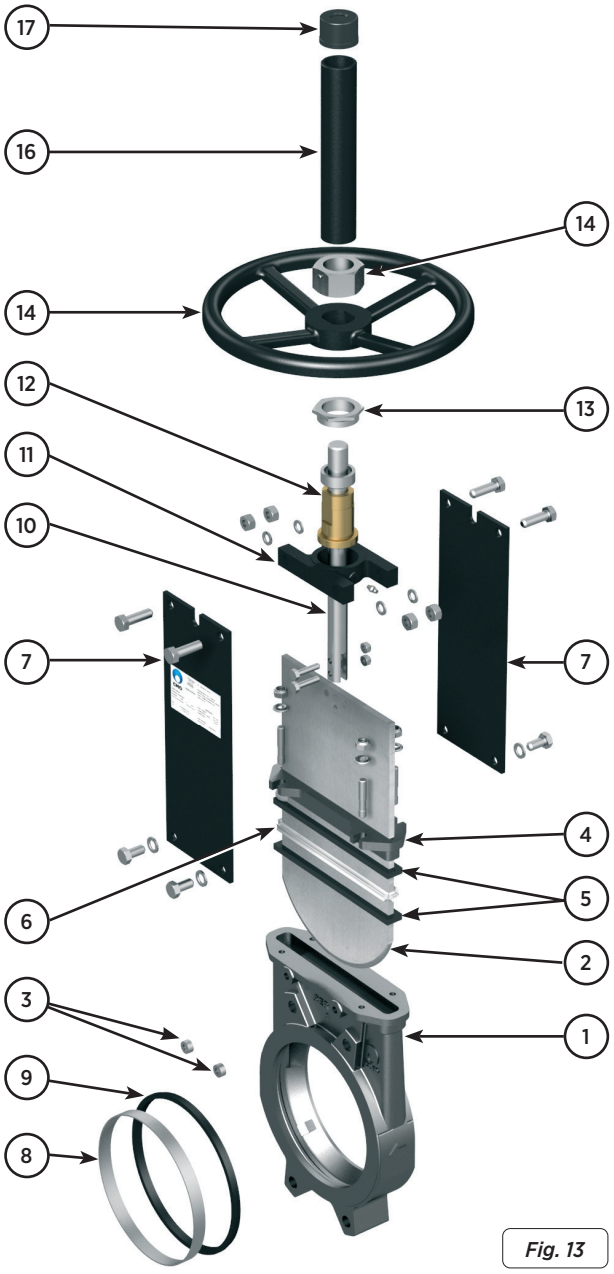

Fig. 13

HANDWHEEL DRIVE	
POS.	DESCRIPTION
1	BODY
2	GATE
3	GUIDE
4	PACKING GLAND
5	PACKING
6	O-RING SEAL
7	SUPPORT PLATES
8	RING
9	SEAT
10	STEM
11	YOKE
12	STEM NUT
13	CHECK NUT
14	HANDWHEEL
15	NUT
16	HOOD
17	TOP CAP

Tabla. 5

PARTS

All components and materials used in the manufacture of ARMATEC knife valves have been designed and selected according to the requirements and specifi cations of each project. Use only original spare parts.

For any request or inquiry, contact ARMATEC, stating the material or component required and the order or project number.

ENVIRONMENTAL ASPECTS: DISPOSAL AND RECYCLABILITY

To minimise environmental impact during the life cycle of A series knife valves, users are given the following environmental guidelines and should consult the relevant standards and directives before disposal;

- During transport, storage, assembly and commissioning: Materials used in packaging must be processed through the appropriate recycling channels.
- At the end of the product's (or component's) life cycle: The materials used to manufacture the A knife valve can be recycled by specialist waste management companies, such as:
    - Metal: steel, aluminium, cast iron, copper, bronze, etc.
    - Plastic: Sliders, rubbers and seals
    - Oils and greases require special treatment before disposal; be sure to use approved waste management companies for this task.
    - For optional items such as limit switches, sensors, etc., refer to the relevant manufacturer's instructions.