Original

Installation and Operation Manual

Hawle Knife Gate Valve

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A) General

In this manual, a knife gate valve is also called “valve”.

A1 Symbols

Notes in this manual are distinguished by symbols:

	**Danger / caution / warning** ... refers to a dangerous situation that may lead to death or serious injury of people.
	**Note** ... indicates instructions that must be observed without fail.
	**Information** ... provides useful leads and recommendations.

Any failure to comply with these notes, caution and warning information may lead to danger and will invalidate the manufacturer’s warranty.

A2 Intended use

After being installed between the flanges of a (pipeline) system, the knife gate valve is intended to shut off and convey media within the admitted upper limits for pressure and temperature.

The upper temperature limit is 40°C, the maximum operating pressure is indicated at the body **and on the series plate affixed to the valve.**

The medium should flow without vibration and/or pressure surges, and the environment must not involve a risk for the valve.

The knife gate valve shall - preferably - be installed with the actuator situated vertically on top. In case of horizontal installation any attached actuator must be supported.

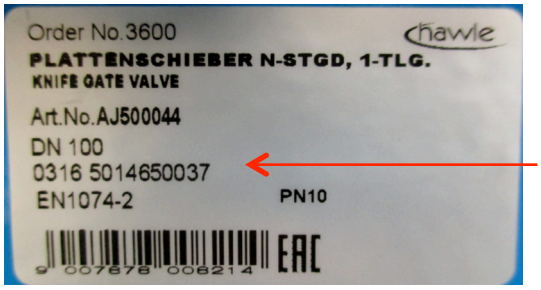
When installing and operating the gate valve, the following shall be observed:

- This Original Installation and Operation Manual

The manufacturer Hawle Armaturenwerke GmbH will not assume any responsibility if this section “Intended use” is not complied with.

A3 Marking

Each gate valve is marked as follows



DN XXX: (mm) nominal width

PN XX: (bar) pressure class of the body

Serial number: year of manufacture, individual Hawle factory number

The type plate should not be covered to ensure that the installed valve can be identified later on.

	The indicated "Max. MOP" is the max. admissible operating pressure.
	If you have any questions for the manufacturer Hawle Armaturenwerke GmbH, please indicate the serial number specified on the type plate.

A4 Transport, storage and handling

Note:
There may be more information contained in the actuator manual, which has to be observed as well.

Transport and storage:
Until the time of installation, the gate valve should be left in the factory package in opened position to protect the polished surface of the slide gate plate from damage. The valves shall be stored in clean and dry rooms and protected from dirt, humidity and other contamination.

The gate valve must not be permanently exposed to direct sunlight since the coating is not UV-resistant. If intermediate storage in the open air is required, the gate valve shall be tightly wrapped in plastic film to protect it form soiling.

	The valve has been packaged as specified in the order conditions - if any damage in transit should be noticed, please submit a written complaint to the forwarder.

Handling:
If hoists have to be used, only flexible straps may be applied, which have to be fastened at the body. The hoists have to be rated in a way that they can carry the weight of the gate valve.

	**Straps must never be fastened** • at the actuator, handwheel • through the opening area of an opened gate valve

B) Installation and function testing

	**This manual contains safety instructions for foreseeable risks that may occur when installing the valve into a (pipeline) system.** **It is the responsibility of the user to add information regarding other risks that may be associated with specific local conditions. Compliance with all requirements for this system is taken for granted.**

B1 Safety instructions for installation

	• Only qualified personnel is allowed to install valves into the system. For the purpose of this manual, qualified personnel shall mean people who are able, as a result of their training, technical knowledge and professional experience, to properly assess and correctly perform the tasks assigned to them and to identify and eliminate possible dangers. • The function of a valve (and actuator, if any) intended after installation has to comply with the <Intended use> as described in section A2.
	1. A valve with an actuator may be operated only, if • the gate valve is installed between 2 flanges or between a flange and a protective device. 2. A gate valve which is installed at the end of a line must be secured with a protective device in such a way that the operating personnel and other people are prevented from getting too close to the opened gate valve and that they are protected from injury caused by the outflowing medium when the valve is opened. **Disregarding these instructions puts the user's life and limb in jeopardy - any other use of the valve is at the user's risk.**

B2 Prerequisites for installation

It must be ensured that

- the installation complies with the "Intended use" - see section A2. **The data specified on the type plate must be observed - see section A4.**
- the pipe section is free from vibrations and pressure surges during operation, and no pipe forces deform the gate valve body in a way that opening/closing and/or the tightness/function of the gate valve are adversely affected.
- the environment does not involve a risk for the valve or the actuator.
- the flanges, the pipeline and the valve are drained and free from hard - especially sharp - dirt particles.
- the gate valve is fixed between flanges in a way that it is durably sealed to the outside.
- the gate valve is protected against thermal radiation if it is installed near heat sources exceeding the admissible temperature for the gate valve (and its actuator).
- the sealing surfaces of the opposing flanges, in particular, completely cover the raised faces of the gate valve on both sides. Detailed information about the flange dimensions can be found in the data sheet of the respective version of the gate valve - see Hawle catalogue.
- the instructions regarding the connection of the installed actuator to the local control are observed.

- the pipe section is unpressurized during installation.
- additional information contained in the actuator manual is observed, especially instructions regarding the adjustment of OPENED and CLOSED positions before installation of the valve in the pipeline section.

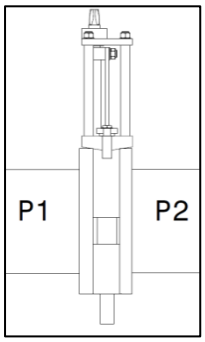


Fig. 2

B3 Pressure, flow direction and mounting position

When the valve is **opened** (P1=P2), the pressure must be limited to the value specified as max. permissible value on the type plate.
When the valve is **closed,** the differential pressure ▲ P = (P1-P2) must not exceed the specified value. (Fig. 2)

B4 Support of valve in special cases

The weight of the structure and the actuator of the valve may cause deformations and malfunctions, especially when the valve is installed in sloping or vertical pipelines. To avoid this, the gate valve and the actuator have to be supported by measures provided by the customer.
The valve shall also be supported if the pipeline transmits vibrations and/or pipe forces that might adversely affect the function of the gate valve.
Details and type of support are the responsibility of the user.

B5 Installation steps

In accordance with Fig. 3 it shall be ensured that

- the gate valve is aligned with the two opposing pipe ends,
- and the sealing surfaces of the gate valve and the pipeline flanges are exactly parallel.

Otherwise, the gate valve may get damaged by erosion, and/or dead spaces will occur upstream or downstream of the valve, where deposits may accumulate that prevent the valve from closing tightly and cause corrosion at the gate valve.

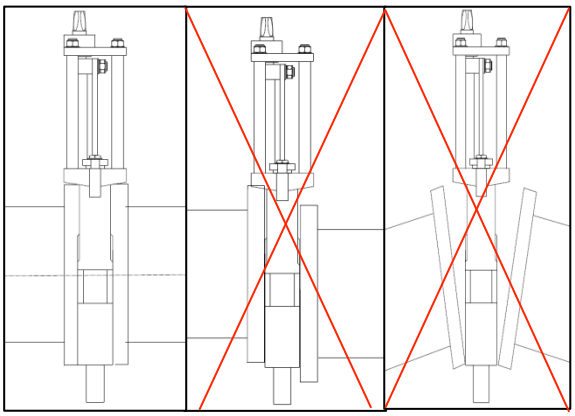


Fig. 3

1. Insert flange gaskets between the gate valve and the opposing flanges and centre them exactly. The gasket must fully cover the face for the flat gasket.
2. Grease flange bolts slightly. This facilitates tightening and later loosening of the nuts.

!	The bolt dimensions to be used can be inferred from the HAWLE catalogue sheet and shall be rated on the basis of the opposing flanges. Flange bolts fastened **inside** the knife gate valve body have to be shortened accordingly.

3. At first, tighten the bolts finger-tight around the circle, then tighten them crosswise (see Fig. 4 and catalogue) and evenly.
4. For galvanized steel bolts St 4.8 (non-lubricated) the following tightening torques shall be observed:

Bolt dimension	Max. tightening torque per bolt (Nm)
M 16	90
M 20	140
M 24	200

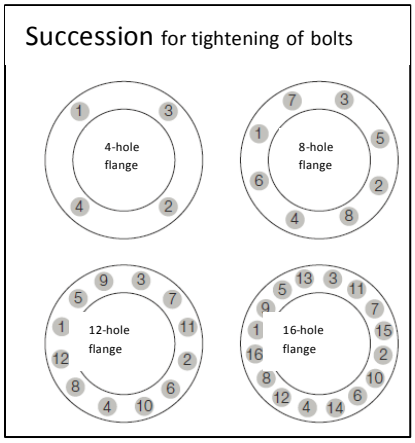


Fig. 4

Finally, a function test opening/closing shall be performed, observing the actuator manual.

- In case of gate valves with handwheels opening and closing should be possible with normal manual force.
- When connecting the actuator, the instructions of the actuator manufacturer shall be observed:
- Via the control signals, the actuator has to move the gate valve correctly into OPENED and CLOSED positions.

5. If the pipeline is to be flushed clean, the gate valve must be opened 100%.

	Gate valves with an actuator delivered by Hawle are factory-adjusted in terms of the end positions. - This setting should not be changed as long as the gate valve works properly.

	Only for gate valves with electric actuator: It has to be ensured in the settings that on closing the actuator is switched off via the signal of the torque switch. It has to be ensured in the settings that on opening the actuator is switched off via the signal of the limit switch. The signal of the torque switch within the end position should be used for a fault indication. Excessive forces may damage the gate valve. *For more information please refer to the manual of the electric actuator.*

B6 Pressure testing before/during commissioning

Hawle has subjected each gate valve to a final factory inspection in accordance with EN 12266-1. For pressure testing of a valve in the system the testing conditions of the pipeline section shall apply, although with the following restrictions:

- The test pressure of a valve must not exceed the value “1.5 x max. working pressure” (acc. to the type plate of the valve - see section A4). In the process, the slide gate plate has to be in opened position.
- A closed knife gate valve must not be subjected to more than “1.1 x max. working pressure” to avoid overstressing the slide gate plate.

B7 Dismantling of valve

Note:
Additionally, the information in the actuator manual shall be observed.

The same safety instructions as specified for the pipe section shall apply here, too, and also - if present - for the actuator and the control system. These instructions shall also be observed for dismantling the valve.

Steps for dismantling the gate valve:

1. First depressurize the pipeline section and drain it completely.
2. Then disconnect all electric supply lines (only in case of an actuator).
3. Use only the fastening options mentioned in section A4.

	The gate valve may be dismantled from the pipeline only if • the pipe section is completely unpressurized and empty, and • all electric supply lines are disconnected (actuator). **The life and limb of people staying close to the valve is in danger if this warning is disregarded by the user.**

4. Be careful when pulling out the valve: avoid any damage to the flange sealing surfaces.
5. For transport and storage observe section A4.

C) Operation and maintenance

Note:
Additional information may be contained in the actuator manual.

Pursuant to the Machinery Directive 2006/42/EC the planner of the system has to prepare a comprehensive risk analysis.
To this end, Hawle Armaturenwerke GmbH provides the following documents:

- Installation and Operation Manual
- Operating instructions for the actuator with information about connection to the control system.

	This manual contains safety instructions for foreseeable risks when using the valve for industrial purposes. It is the responsibility of the planner/operating company to add information regarding other risks that may be associated with plant-specific conditions.

C1 Warning information for operation and maintenance

	• The function of a valve has to comply with the <Intended use> as described in section A2. • The conditions of use have to comply with the information on the type plate of the gate valve - see section A3. • Necessary work at the valve may be performed only by qualified personnel. For the purpose of this manual, qualified personnel shall mean people who are able, as a result of their training, technical knowledge and professional experience, to properly assess and correctly perform the tasks assigned to them and to identify and eliminate possible dangers. • During operation, the gate valve shall be checked periodically to ensure the safety of the personnel. During maintenance or repair work, the gate valve shall be switched off as described in section B7. Before starting any work, the pipe sections on both sides of the valve must be unpressurized and empty.

	1. Actuating a gate valve with an actuator is allowed only • if the valve is installed between flanges (and/or a flange and a protective device). 2. If the gate valve is installed as an end valve in a system section, a suitable safety device shall prevent access to the movable parts of the gate valve and protect the personnel against any outflowing medium. **Disregarding these instructions puts the user's life and limb in jeopardy - any other use of the valve is at the user's risk.**

C2 Automated operation

A manually actuated gate valve is closed by turning the handwheel clockwise and opened by turning it counter-clockwise.
A gate valve with an actuator is actuated via the signals of the control system. Knife gate valves delivered ex works with an actuator are factory-adjusted to exact values - this setting should not be changed as long as the valve works properly.

Rarely operated gate valves:
To maintain the operability of the gate valve it should be operated over the complete travel at least once a year.

C3 Maintenance

As long as the gate valve is sufficiently tight, the only maintenance needed is the visual inspection of the tightness of the body at suitable intervals.

C4 Troubleshooting

Problem	Cause	Measure
Leakage of flange connection	Wrong length of flange bolts Flange bolts insufficiently tightened Gate valve not properly centred Flange sealing surfaces pipeline/valve not exactly parallel Flange gasket not properly centred Wrong material of flange gasket	Cf. this manual - section B5 Exchange slide gate plate
Leakage in seat of gate valve	U-gasket in body worn out Slide gate plate does not close 100% Damaged gasket or slide gate plate	See related instructions of actuator Exchange slide gate plate
Slide gate plate does not open/close 100%	Fault in actuator Fault in actuator switching (installed limit switches or mechanical stop) Gate valve clogged by deposits Seat gasket or plate mechanically damaged Spindle nut worn out	See related instructions of actuator Exchange spindle nut Re-grease spindle

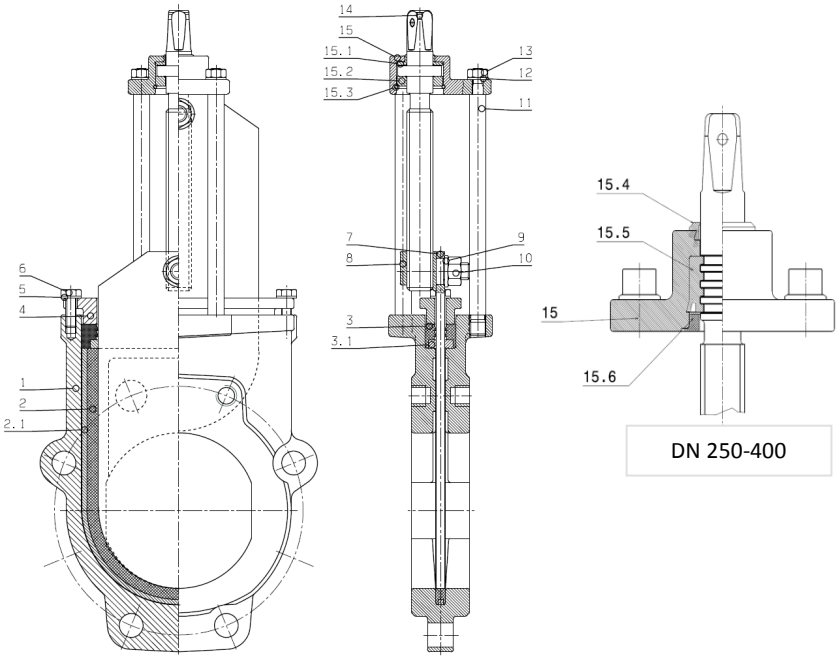
Gate valve requires excessive actuation force	Gate valve body got jammed or deformed by high pipeline forces Guide of slide gate plate clogged by deposits Seat gasket or plate damaged Spindle nut worn out	Exchange spindle nut Re-grease spindle

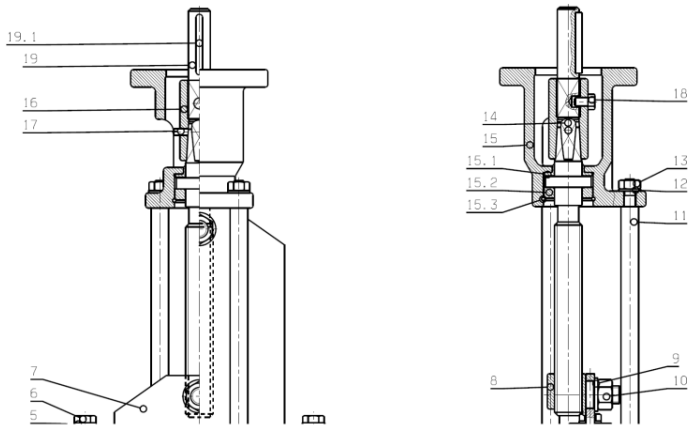
If spare parts other than original Hawle spare parts are used for maintenance/repair and/or if the information regarding operation, maintenance and repair contained herein are disregarded by the user, the manufacturer Hawle Armaturenwerke GmbH will not accept any guarantee in case of damage to the valve.

C5 Parts list

Item	Part	Material
1	housing	GJL200
2	U-gasket	NBR/ST
3	transverse seal	NBR
3.1	wiper seal	titanium universal
4	back rest	GJL200
5	washer	A4
6	hexagon bolt	A4
7	plate	A2
8	spindle nut	bronze
9	washer	A4
10	lock nut	A4
11	tie bar	A2
12	washer	A4
13	hexagon nut	A4
14	spindle	A2
15	bearing block	EN-GJS400
15.1	friction washer	POM
15.2	spindle bracket	POM
15.3	snap ring	A2
15.4	wiper ring	EPDM
15.5	thrust collar	brass
15.6	cover cap	EPDM

Item	Part	Material
15	adapter	EN-GJS400
15.1	friction washer	POM
15.2	spindle bracket	POM
15.3	snap ring	A2
16	spindle coupling box	EN-GJS400
17	pin	brass
18	hexagon bolt	A2
19	trunnion	A2
19.1	feather key	A2

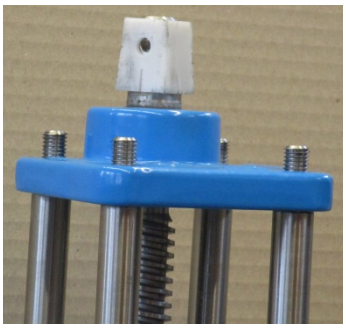




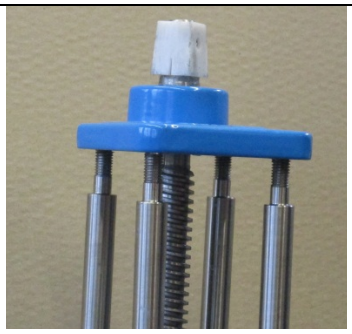
C6 Conversion knife gate valve bearing block (3600) to adapter for electric actuator (3600EL)

Close knife gate valve

Loosen bolts between bearing block and tie bars.



Remove nuts/bolts and washers.



Remove bearing block by turning the spindle clockwise.

Put on adapter.

Position the adapter between the 4 tie bars by turning the spindle counter-clockwise.

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Fasten the adapter by means of washers and nuts/bolts.
Tightening torque: max. 40Nm</td>
<td> 
Turn spindle until the transverse spindle bore becomes visible in the recess of the adapter.</td>
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Put the spindle coupling box with the trunnion onto the spindle square in such a way that the bores coincide.</td>
<td> 

Install and secure cotter pin.</td>
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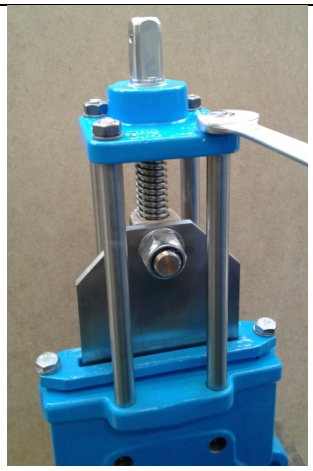
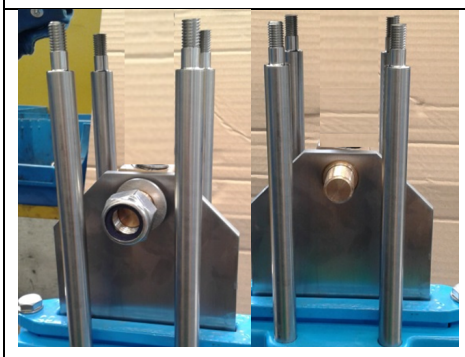
1. Depressurize pipeline



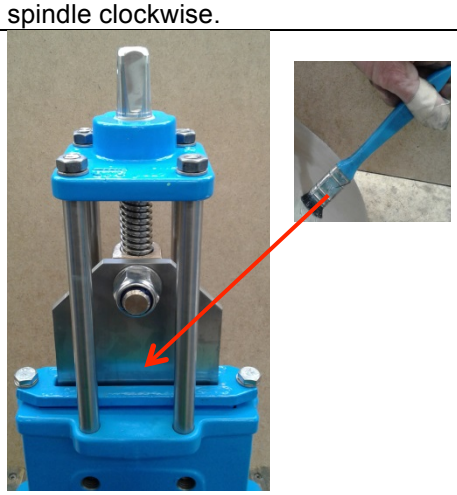
2. Open hexagon bolts

3. Remove hexagon nuts and washers

4. Remove bearing block by turning the spindle clockwise.



5. Remove lock nut and washer. Exchange spindle nut.



6. Grease plate with silicone grease.

7. Optional when exchanging the spindle: remove snap ring in the bearing block.

8. Exchange and grease spindle as needed.

Assemble the valve in reverse order.

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