HYDROX

Hydrox™ hydraulic actuator

installation, operation and maintenance manual

Contents

NOTE:

This manual must be read and its instructions must be followed when installing, operating and/or performing maintenance on the actuator or its equipment.

These instructions are of general nature and do not cover all possible operating scenarios. For more specific guidance on the installation, operation and maintenance of the actuator or its suitability for an intended use, please contact the manufacturer.

Vexve Oy reserves the right to make alterations to these instructions.

Vexve Oy is not responsible for damages caused by incorrect transportation, handling, installation, operation or maintenance. Furthermore, Vexve Oy is not responsible for damage caused by foreign objects or impurities.

Warranty

Warranty according to Vexve Oy's "General terms and conditions of sale".

The warranty covers manufacturing and material faults. The warranty does not apply to damages caused by inappropriate installation, operation, maintenance, or storage ie. these instructions must be followed for the warranty to apply. Vexve Oy requires that any faulty products under warranty are to be returned to the factory for inspection. Only after the product has been found faulty, Vexve Oy can grant compensation.

Please refer to Vexve Oy's "General terms and conditions of sale" for detailed warranty clauses. The document is available from the manufacturer

Warnings and symbols

Ignoring the warnings and symbols may lead to serious injury or equipment damage. Persons authorized to use the equipment must be familiar with the warnings and instructions.

Appropriate transportation, storage and installation as well as careful commissioning are essential to ensure faultless and stable operation.

The following symbols are used in this manual to draw attention to actions essential to ensure the proper use and safety of the device.

Meaning of the symbol: NOTE

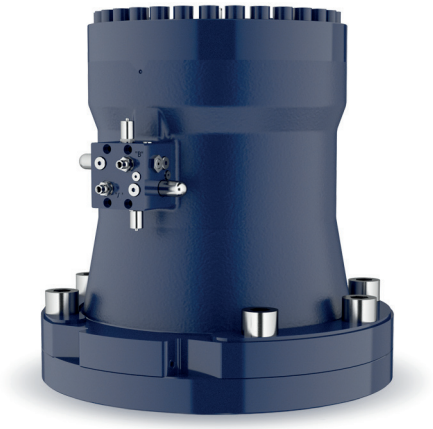
The NOTE symbol is used for actions and functions that are essential for the proper use of the device. Ignoring this symbol may have harmful consequences.

Meaning of the symbol: WARNING

The WARNING symbol is used for actions and functions that, if carried out incorrectly, may lead to injury or equipment damage.

1. General

Vexve Oy's Hydrox hydraulic actuator is suitable for even the most challenging installation sites and conditions. Specifically designed for district heating and district cooling applications and to operate seamlessly with Vexve and Naval ball and butterfly valves, the Hydrox hydraulic actuator is the perfect solution for underground installation providing easy and reliable operation with maximum safety at all times.



NOTE:

When intending to use the actuator with valves from other manufacturers than Vexve Oy please contact Vexve Oy to ensure its suitability.

For detailed technical information including dimensions and weights, torques etc. please refer to Hydrox Product catalogue or data sheets (www.vexve.com).

2. Actuator identification

The identification plate locates at the actuator body. It has the following information:

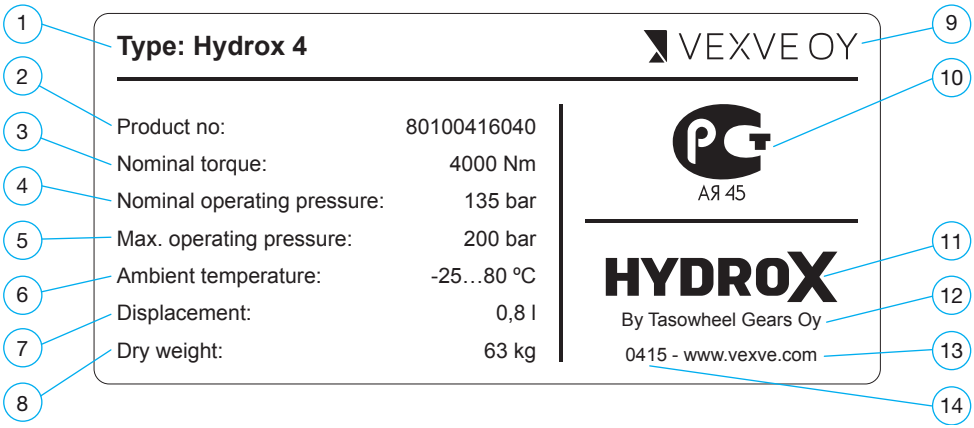


Figure 1. Identification plate.

1. Actuator type
2. Product no
3. Nominal torque
4. Nominal operating pressure
5. Max. operating pressure
6. Ambient temperature
7. Displacement
8. Dry weight
9. Producer
10. Russian valve certification
11. Trademark
12. Manufacturer
13. Producer's website
14. Manufacturing date

2.1 Type code

Type codes of Hydrox actuators consist of eleven (11) digits as described in the table below:

Example: 80100416040

8	0	1	0	0	4	1	6	0	4	0

Bore size

011 = [] 11 mm
014 = [] 14 mm
016 = [] 16 mm
019 = HEX-19
020 = [] 20 mm
035 = Ø 35 mm
040 = Ø 40 mm
050 = Ø 50 mm
060 = Ø 60 mm
070 = Ø 70 mm
090 = Ø 90 mm
100 = Ø 100 mm
120 = Ø 120 mm
140 = Ø 140 mm

Flange size (acc. ISO5211)

07 = F07
10 = F10
12 = F12
14 = F14
16 = F16
25 = F25
30 = F30
35 = F35
40 = F40

Actuator size

035 = Hydrox By-pass
002 = Hydrox 2
004 = Hydrox 4
008 = Hydrox 8
016 = Hydrox 16
032 = Hydrox 32
064 = Hydrox 64

Product family

800 = Hydrox actuators with connection block
801 = Hydrox actuators with control block
802 = Hydrox ByPass actuators with connection block
803 = Hydrox ByPass actuators with control block

3. Unloading and storage

Check that the content of the delivery is as ordered. Check that the actuator and related equipment have not been damaged during transportation.

Store the actuator carefully before installation, preferably in a well-ventilated, dry place, on a shelf or a wooden grid to protect it from rising damp.

Protect bare metal surfaces, shaft parts, and flange surfaces with anti-corrosive agent before storage.

The actuator must be transported to the installation site in a sturdy package. Do not remove any protectors before installation. Protect the actuator from dust and other impurities.

NOTE:

If the actuator is delivered pre-assembled with a valve refer to the handling and lifting instructions of the valve.

WARNING:

It is forbidden to lift the actuator by the control block! Make sure that lifting ropes or chains do not even touch the control block during lifting.

Take the weight of the actuator and valve into account when handling them.

When delivered, the actuator is in the open position. During storage, the actuator must also be in the open position.

Maximum recommended storage time is two years. If the actuator is stored for more than two years, it should be operated and cleaned yearly.

Packaging:

Vexve's products are protected during transportation with special packaging. The packaging consists of environmentally friendly materials that are easy to sort and recycle.

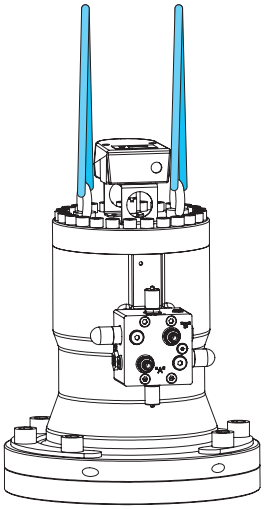
Recycling the packaging materials at designated waste collection points is recommended.

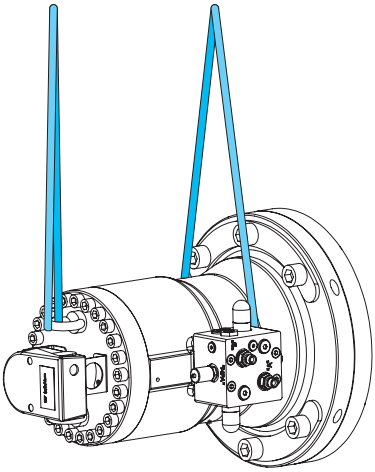
The following packaging materials are used: wood, cardboard, paper, and polyethylene sheets.

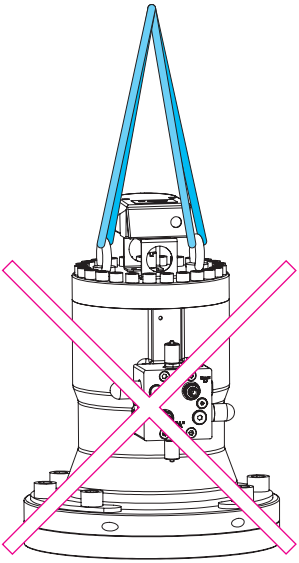
Recycling and disposal

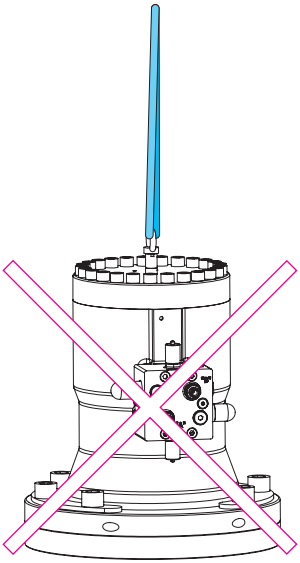
Nearly all parts of the actuator are made of recyclable materials. The material type is marked on most parts. Separate recycling and disposal instructions are available from the manufacturer. The actuator can also be returned to the manufacturer for recycling and disposal against a fee.

3.1 Lifting the actuator









4. Functional description

The oil pressure which is supplied through connections “A” and “B” causes a rotary movement on the actuator shaft. The linear movement of the piston is converted into a rotary movement by means of multiple gears.

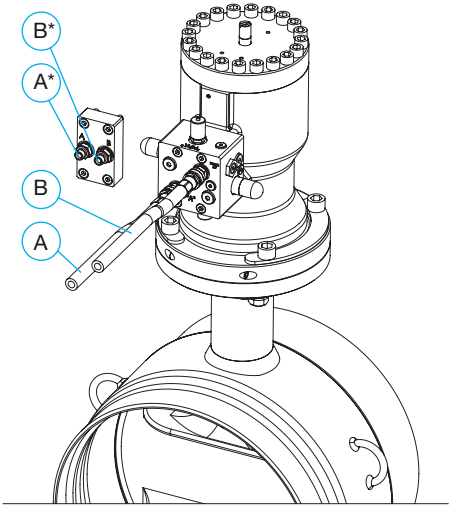
4.1 Rotation direction

See Figure 2.

The rotation direction of the actuator shaft depends on which connection the pressure is applied:

- If the pressure is applied to the connection “A” the actuator shaft rotates clockwise closing the valve.
- If the pressure is applied to the connection “B” the actuator shaft rotates counterclockwise opening the valve.

There is an indicator slot on the top of the actuator shaft so it is easy to notice which direction the shaft is rotating. When the slot is parallel to the front face of control block, valve is closed. When the slot is perpendicular to the front face of the control block, valve is open, see Figure 3.



*) connection block

Figure 2.

Pressure on A: valve closes.
Pressure on B: valve opens

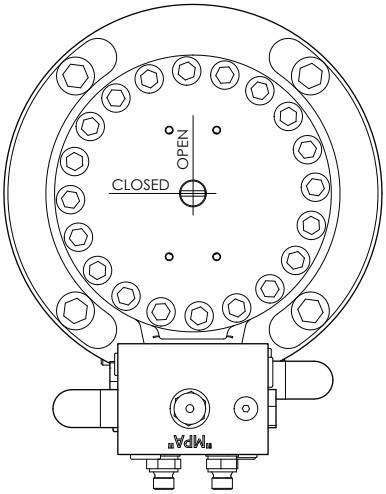


Figure 3.

Indicator slot tells if the valve is open or closed

5. Actuator disassembly, installation and mechanical adjustment

NOTE:

Avoid removing the actuator from the valve. The actuator has been calibrated at the factory to ensure that the valve is tight. If the actuator is removed, it may have to be re-calibrated.

Vexve Oy accepts responsibility only for actuators installed by Vexve.

Refer to the Hydrox product catalogue or data sheets (www.vexve.com) for maximum permissible diameter of shaft and shaft intrusion. Note that the adapter of the actuator is equipped with one key way so it is not possible to change its installation position on the valve. The actuator is installed on top of the adapter. The installation position of the actuator can be changed, but it is recommended to install the actuator so that the control block is parallel to the flow pipe.

WARNING:

All couplings and hoses of the actuator, and equipment connected to it, must always be kept clean since impurities might cause failures in the operation of the system.

If the actuator is equipped with quick couplings and fast and significant changes in temperature are possible, thermal expansion of the hydraulic oil must be taken into consideration.

The actuator may not be removed or dismantled if the valve is pressurized! It is recommended to use the special actuator removal tools!

Incorrect disconnection may cause serious personal injuries as well as malfunction and damage to the equipment. Extreme caution must be exercised during the disconnection!

Do not use too high torques to operate the valve. Too high torques can damage the valve or the actuator! See tables 1 and 2 in chapter 6.2.1 for maximum torques.

5.1 Disassembly

Part numbers mentioned in this chapter refer to the figure 4.

1. **Ball valves:** Turn the valve to the open position (counter-clockwise) before removing the actuator (1).

   Butterfly valves: Turn the valve to the close position (clockwise) before removing the actuator (1).

   Valve opens by pumping hydraulic oil into connection “B” and closes when hydraulic oil is pumped into connection “A”. Use a hand pump or a hydraulic power unit

2. Turn the actuator slightly backwards to release forces between the valve and the actuator in order to make it easier to remove the actuator:

   Ball valves: Turn the actuator slightly towards the close position (clockwise) by pumping a little hydraulic oil into connection “A” until pressure level is low

   Butterfly valves: Turn the actuator slightly towards open position (counter-clockwise) by pumping a little hydraulic oil into connection “B” until pressure level is low

3. Remove any position indicator if used
4. Remove the attachment bolts (2) of the actuator and remove the actuator (1)
5. Remove the insert (6) from the stem of the valve.

Reinstallation instructions for ball valves see chapter 5.2.1 steps 1-5 and for butterfly valves, see chapter 5.2.2 steps 1-5.

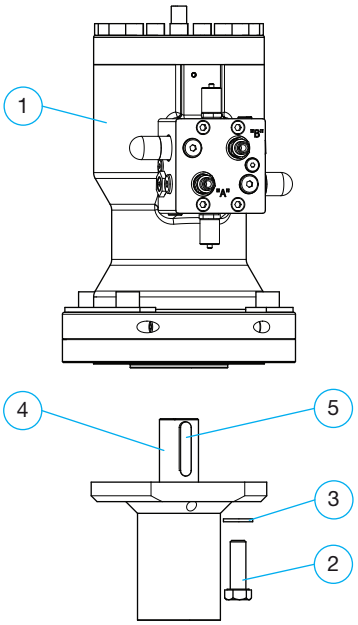


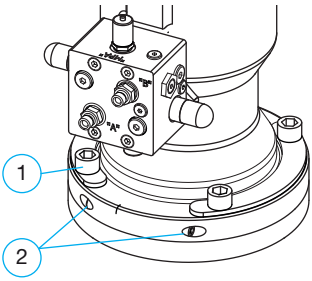
Figure 4. Assembly

NOTE:

If working in potentially explosive atmosphere all related safety and work instructions must be followed.

Any tools or working methods generating sparks or extensive heat are not allowed without written permission from responsible personnel.

5.2 Installation and angle adjustment



1 Fastening screws

2 Angle adjustment screws

Figure 5. Angle adjustment

Installation tightening torques [Nm]

Hydrox model	Screws 1	Screws 2
Hydrox035BP	25	8
Hydrox2	170	10
Hydrox4	170	10
Hydrox8	350	10
Hydrox16	350	10
Hydrox32	1200	20
Hydrox64	2400	20

Torques suitable for default screws

5.2.1 Ball valve

If the actuator is already installed to the valve, you can skip the points 1-6

NOTE:

If working in potentially explosive atmosphere all related safety and work instructions must be followed.

Any tools or working methods generating sparks or extensive heat are not allowed without written permission from responsible personnel.

Please check the actuator's position before mounting it on the valve.

Please also check that the top flange and the valve stem are perpendicular to each other and that there are no impurities between the actuator and the valve. Impurities or wrong position between the top flange and valve stem might damage the actuator.

Installing the actuator

Part numbers refer to the figure 4

1. Vexve ball valves are delivered from the factory in the open position. If the valve has been operated so that it is in some other position, turn the valve to the open position.
2. Check that the valve stem (4) is intact and clean. Check also that the key (5) of the valve stem is properly in its groove
3. Turn the actuator to the open position
4. Install the actuator on the valve. Note that the adapter (6) of the actuator is equipped with one key way so it is not possible to change its installation position on the valve. The key way of the adapter must fit the stem easily and you must not force it in its place.
5. The actuator (1) is installed on top of the adapter so that the serrations fit. The installation position of the actuator can be changed, but it is recommended to install the actuator so that the control block is parallel to the flow pipe.
6. Grease the attachment screws (2) of the actuator. Put all the washers (3) and the attachment screws (2) first loosely in their places and finally tighten them up.

Angle adjustment

NOTE:

Adjust the angle so that it exceeds the actual OPEN and CLOSE positions of the valve evenly.

Part numbers refer to the figure 5

7. Open the fastening screws (1). Adjust the correct OPEN position by loosening the other and tightening the other angle adjustment screw (2). If left screw (figure 5) is tightened and right one is loosened the valve will be closing more. If right screw is tightened and left one is loosened the valve will be opening more. Tighten the fastening screws (1)
8. Turn the valve slightly towards the close position and then back to the open position against the limit. Check if the OPEN position is correct. If it is not correct, repeat the steps 6 and 7
9. Check that the valve opens and closes correctly

5.2.2 Butterfly valve

If the actuator is already installed to the valve, you can skip the points 1-6

NOTE:

If working in potentially explosive atmosphere all related safety and work instructions must be followed.

Any tools or working methods generating sparks or extensive heat are not allowed without written permission from responsible personnel.

Please check the actuator's position before mounting it on the valve.

Please also check that the top flange and the valve stem are perpendicular to each other and that there are no impurities between the actuator and the valve. Impurities or wrong position between the top flange and valve stem might damage the actuator.

Installing the actuator

Part numbers refer to the figure 4

1. Vexve butterfly valves are delivered from the factory in the close position. If the valve has been operated so that it is in some other position, turn the valve to the close position.
2. Check that the valve stem (4) is intact and clean. Check also that the key (5) of the valve stem is properly in its groove
3. Turn the actuator (1) to the close position
4. Install the actuator on the valve. Note that the adapter (6) of the actuator is equipped with one key way so it is not possible to change its installation position on the valve. The key way of the adapter must fit the stem easily and you must not force it in its place.
5. The actuator (1) is installed on top of the adapter so that the serrations fit. The installation position of the actuator can be changed, but it is recommended to install the actuator so that the control block is parallel to the flow pipe.
6. Grease the attachment screws (2) of the actuator. Put all the washers (3) and the attachment screws (2) first loosely in their places and finally tighten them up

Angle adjustment

NOTE:

Adjust the angle so that the disc doesn't exceed its correct CLOSE position. If the disc turns over the correct CLOSE position, it will damage the disc seal.

Part numbers refer to the figure 5

7. Open the fastening screws (1). Adjust the correct CLOSE position by loosening the other and tightening the other angle adjustment screw (2). If left screw (figure 5) is tightened and right one is loosened the valve will be closing more. If right screw is tightened and left one is loosened the valve will be opening more. Tighten the fastening screws (1)
8. Turn the valve slightly towards the open position and then back to the close position against the limit. Be sure not to turn the disc too much towards the CLOSE position, it will damage the disc seal. Check if the CLOSE position is correct. If it is not correct, repeat the steps 6 and 7
9. Check that the valve opens and closes correctly

6. Commissioning and hydraulic adjustment

6.1 Commissioning

Connect the hydraulic hoses to connections “A” and “B”. Refer to 4.1 to ensure turning direction of actuator in relation to connections.

NOTE:

Refer to manufacturer manual of the control unit to ensure proper commissioning and operation with control unit in use.

WARNING:

Before first operation the hydraulic system has to be cleaned and bled carefully so that there is no air in the hydraulic system.

6.2 Hydraulic adjustment

NOTE:

Written permission from Vexve Oy is required to perform hydraulic adjustment.

WARNING:

It is strictly prohibited to exceed the torques in the tables 1 and 2! Too high torques can damage the valve or the actuator!

See Figure 6

The maximum hydraulic operating pressure can be adjusted (and limited) by the control block (if equipped) of the actuator for both directions separately: By turning the adjustment screw (1) clockwise the maximum hydraulic operating pressure increases and vice versa it decreases by turning the screw counterclockwise.

If needed, increase the maximum operating pressure, maximum allowed operating pressure is 200 bars.

A pressure gauge can be attached to the control block to monitor the hydraulic pressure while adjusting. The pressure gauge can be mounted on connections (2) “MPA” for connection “A” and “MPB” for connection “B”.

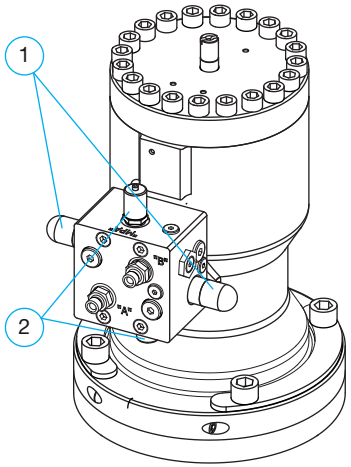


Figure 6. Hydraulic adjustment

6.2.1. Maximum torques

NOTE:

Actuators that are equipped with control block have been preadjusted to the correct pressure / torque level.

Actuators with connection block do not include pressure limiter.
Therefore pay extra attention when comissioning and using them.

It is prohibited to exceed the torques in tables 1 and 2!

Butterfly valves

DN	Max torque [Nm]	Hydrox model	Max pressure [bar]
300	1560	Hydrox2	110
350	1820	Hydrox2	130
400	2990	Hydrox4	110
450	6000	Hydrox8	100
500	6370	Hydrox8	110
600	9360	Hydrox8	165
700	14300	Hydrox16	125
750	18000	Hydrox16	155
800	20800	Hydrox16	180

For sizes DN 900–1400 please contact the manufacturer

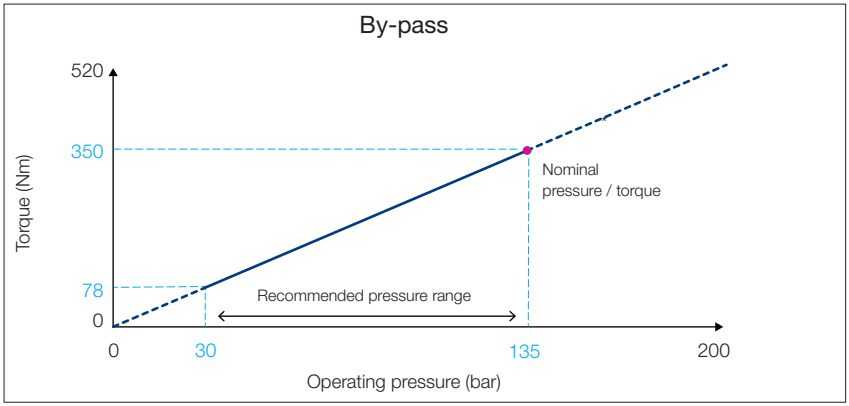
Table 1. Maximum torques of Vexve butterfly valves and corresponding pressures of actuators

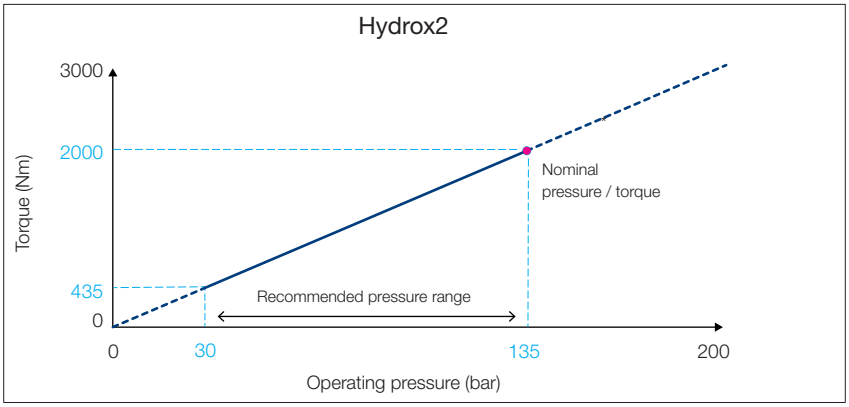
Ball valves

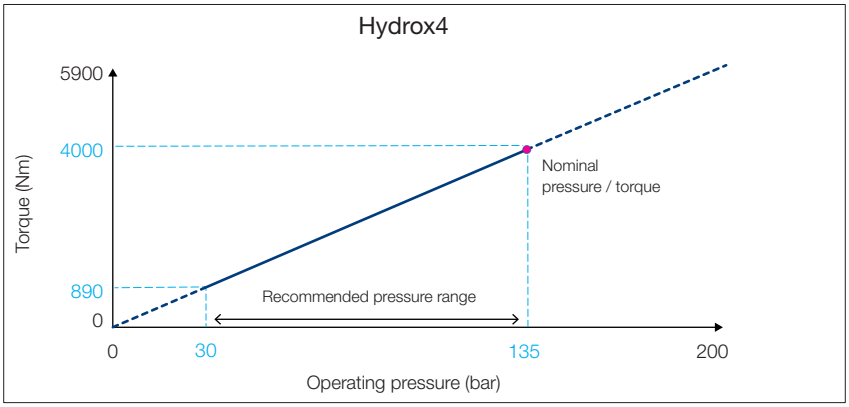
DN		Hydrox model	Max torque [Nm]	Max pressure [bar]
RB	FB			
50	40	Hydrox035BP	70	27
65	50	Hydrox035BP	85	33
80	65	Hydrox035BP	130	50
100	80	Hydrox035BP	250	95
125	100	Hydrox2	390	25
150	125	Hydrox2	750	50
200	150	Hydrox2	1200	80
250	200	Hydrox2	2500	170
300	250	Hydrox4	5000	170
350	300	Hydrox4	5000	170
400	350	Hydrox8	6500	110
500	400	Hydrox8	12000	200
600	500	Hydrox8	12000	200
700	600	Hydrox16	18000	155
800	700	Hydrox32	28000	120
	800	Hydrox64	37500	105

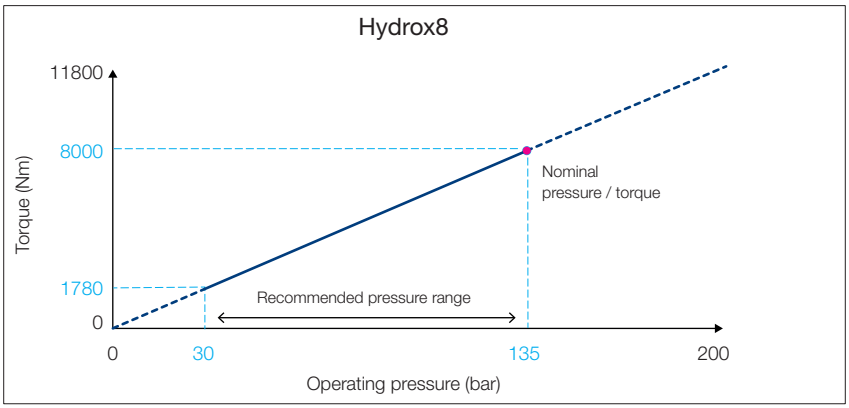
Table 2. Maximum torques of Vexve ball valves and corresponding pressures of actuators

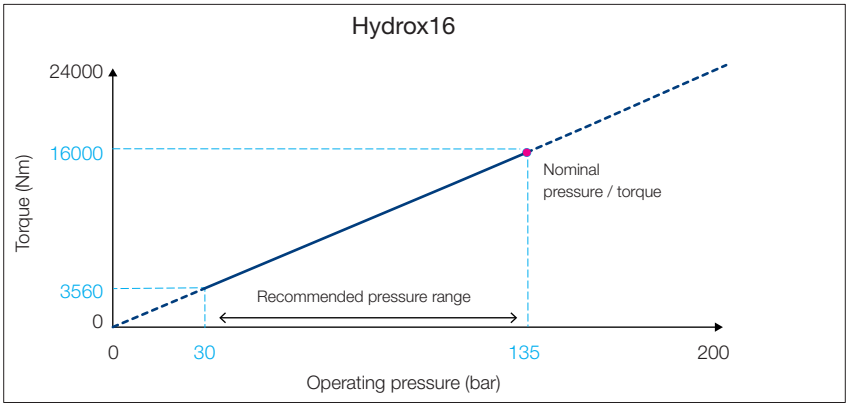
6.2.2. Torque / Pressure tables

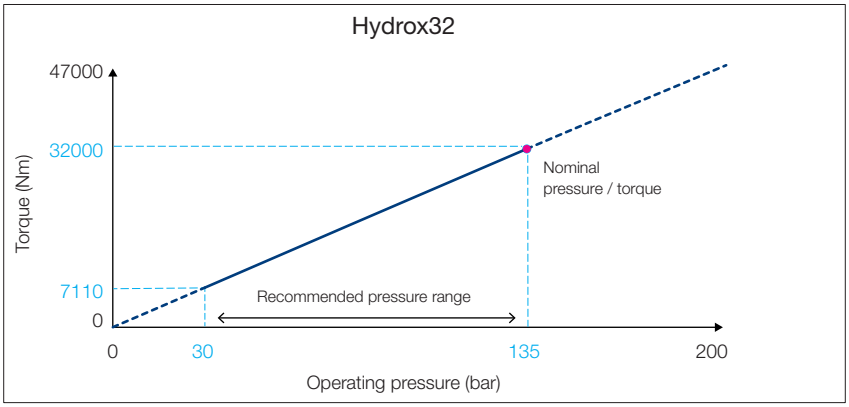


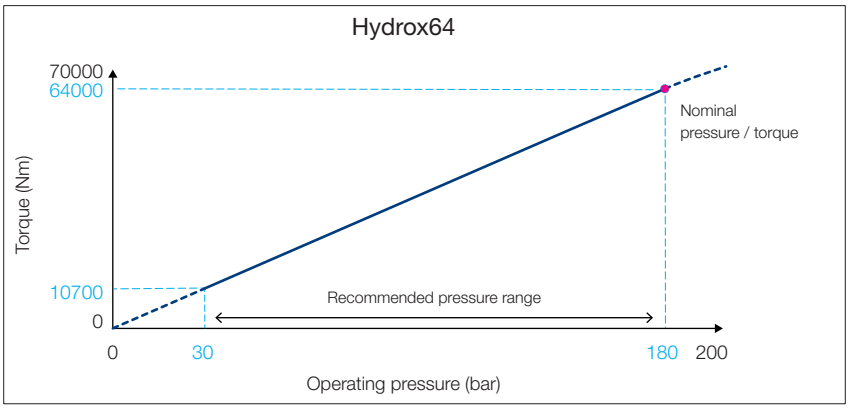

Hydrox2
3000
2000
435
0
Torque (Nm)
Nominal
pressure / torque
Recommended pressure range
0
30
135
200
Operating pressure (bar)


Hydrox4
5900
4000
890
0
Torque (Nm)
Nominal
pressure / torque
Recommended pressure range
0
30
135
200
Operating pressure (bar)


Hydrox8
11800
8000
1780
0
Torque (Nm)
Nominal
pressure / torque
Recommended pressure range
0
30
135
200
Operating pressure (bar)


Hydrox16
24000
16000
3560
0
Torque (Nm)
Nominal
pressure / torque
Recommended pressure range
0
30
135
200
Operating pressure (bar)


Hydrox32
47000
32000
7110
0
Torque (Nm)
Nominal
pressure / torque
Recommended pressure range
0
30
135
200
Operating pressure (bar)


Hydrox64
70000
64000
10700
0
Torque (Nm)
Nominal
pressure / torque
Recommended pressure range
0
30
180
200
Operating pressure (bar)

7. Maintenance

Hydrox actuators need only little maintenance.

The correct choice of valve and actuator combination as well as careful installation, commissioning and use, significantly reduce any need for maintenance.

WARNING:

When the valve is installed in the line, also the surface temperature of the actuator may be dangerously high. Protect yourself against burns.

If working in potentially explosive atmosphere all related safety and work instructions must be followed.

Any tools or working methods generating sparks or extensive heat are not allowed without written permission from responsible personnel.

We recommend checking the following periodically:

Check that the actuator is free from oil leaks, and carefully tighten if any leakages occurred.

To ensure long-term operational reliability, even when seldom used (around ten times a year or less), we recommend the following:

Approximately six months after commissioning and then once a year, check the functionality of the actuator, inspect the actuator for oil leaks, and ensure the tightness of the fastening screws between actuator and valve.

7.1 Oil change

Oil changes are necessary and depend on size of the system. Under clean conditions, it is recommended that the condition of the oil is inspected approximately every two years and that the oil is replaced at every second inspection. If dirty/low-quality oil is used, oil changes are necessary at shorter intervals. Because the small oil volume in part-turn actuators compared to the volume in the pipework, there is no oil change during the operating cycles. Because of this, it is recommended to change the hydraulic oil so that the oil changes also inside the part-turn actuator and hoses not only in the hydraulic pump.

Notes

Vexve Oy

Pajakatu 11
FI-38200 Sastamala
Finland

Tel. +358 10 734 0800

Riihenkalliontie 10
FI-23800 Laitila
Finland

vexve.customer@vexve.com

www.vexve.com