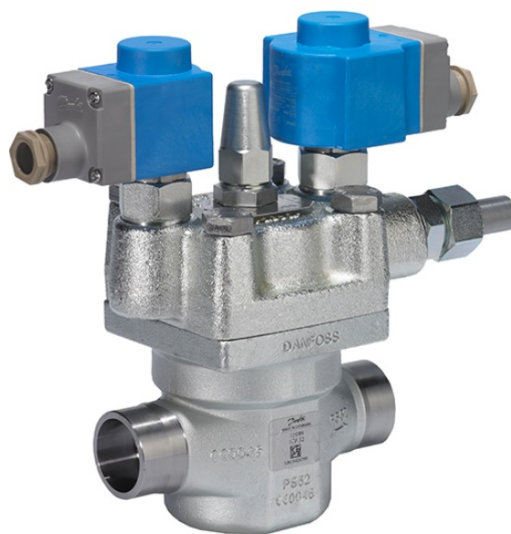


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Danfoss ICLX 32 2 Step Solenoid Valve



Product Information

Specifications

- Product Name: 2-step solenoid valve Type ICLX 32-65
- Pressure Inlet: External
- Compatible Refrigerants: HCFC, HFC, R717 (Ammonia), R744 (CO2)
- Coil Requirements: Both coils must be IP67 rated

Installation

Refrigerants

- Applicable to HCFC, HFC, R717(Ammonia) and R744 (CO2).
- Flammable hydrocarbons are not recommended.
- The valve is only recommended for use in closed circuits. For further information please contact Danfoss.

Please note:

The ICLX function modules can only be used in housings produced in or after week 49 2012; thus the week code on the housing must be 4912 or higher.

Temperature range

-60 – 120 °C / -76 – 248 °F

Pressure

The valves are designed for a max. working pressure of 65 barg / 943 psig.

NOTE: Operating valve maximum working pressure is dependent on maximum working pressure of installed pilots.

Application

The ICLX is used in suction lines for the opening against high differential pressure, e.g. after hot gas defrost in large industrial refrigeration systems with ammonia, fluorinated refrigerants or CO2.

The ICLX opens in two steps

- Step one opens to approx. 10% of the capacity, when the pilot solenoid valves are activated.
- Step two opens automatically after the pressure differential across the valve reaches approximately 1 bar.

External pressure

The external pressure applied to the ICLX should always be 1.5 bar higher than the inlet pressure of the valve. This will give the valve a MOPD of 28 bar. If the external pressure is 2 bar higher than the inlet pressure the MOPD of the ICLX will be 40 bar.

Electrical wiring

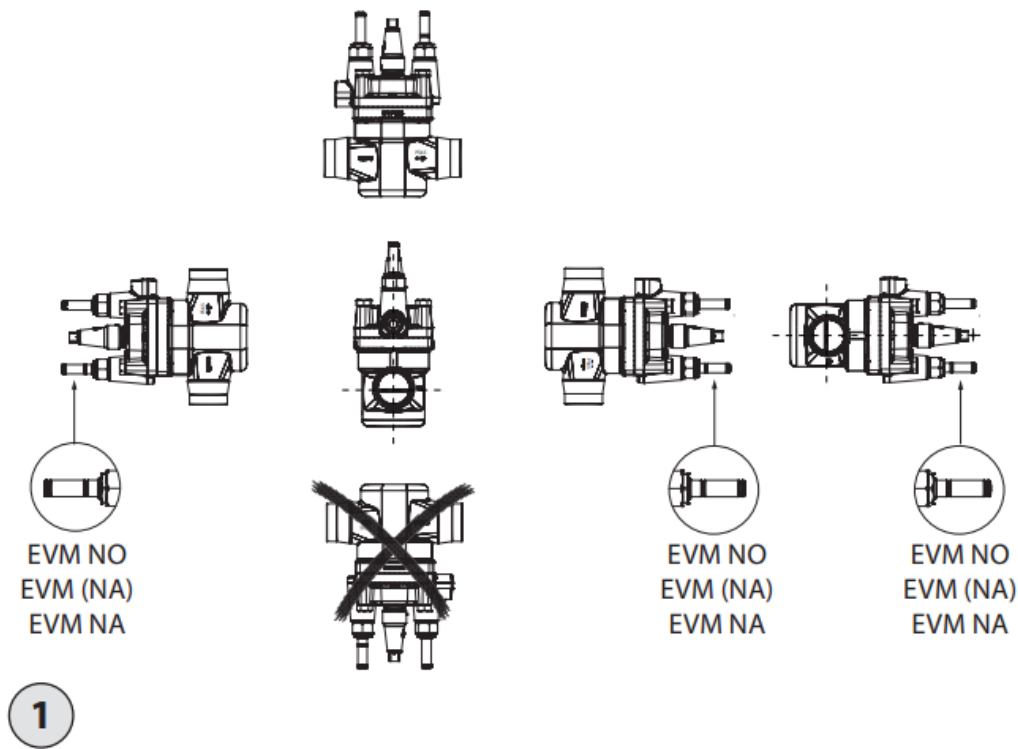
The ICLX valve is a normally closed design. To ensure that the valve operates as normally closed it is important that the EVM NC pilot is mounted in the pilot port next to the external pressure inlet (fig. 2). For normal operation mode both pilots should be energized simultaneously, e.g. same signal can be used for both pilots.

- Coil requirements
- Both coils must be IP67.
- EVM NC: 10W ac (or higher) for MOPD up to 21 bar
- EVM NC: 20W ac for MOPD 21 → 40 bar EVM NO: 10W ac (or higher)

The valve will have a malfunction in systems where the pressure differential across the valve in normal open conditions will exceed 1 bar (15 psig). In this case the step two of the valve will close.

Orientation

The valve must be installed with the arrow in the direction of the flow and with the pilots pointing in one of the directions shown in fig.1. Downwards pointing pilots (any angle) is not possible. The top cover can be rotated 4 X 90° in relation to the valve body.



If the ICLX is installed with a vertical pilot orientation (see fig. 1) attention should be paid to have the EVM NO in lower position. If needed rotate the top cover.

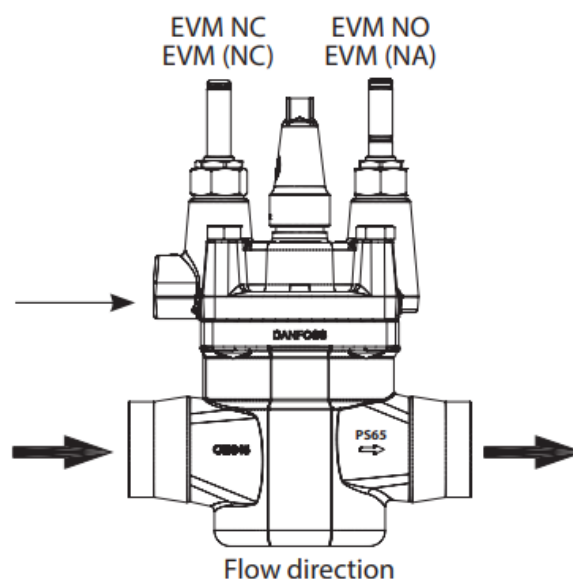
The valve is fitted with a spindle for manual opening. Make sure that the external pilot line is connected to the upper side of the main line so that any dirt and oil from the plant will not find its way into the pilot line. The valve is designed to withstand a high internal pressure. However, the piping system should be designed to avoid liquid traps and reduce the risk of hydraulic pressure caused by thermal expansion. It must be ensured that the valve is protected from pressure transients like “liquid hammer” in the system.

Welding (fig. 5 and 8a)

The top cover (fig. 8a, pos. 2) and function module (fig. 8a, pos. 3), must be removed before welding to prevent damage to o-rings and teflon (PTFE) in the function module. Often the cover and function module can be removed while still assembled (fig. 3a), but if the internal O-rings stick to the metal surface it is necessary to disassemble in 2 steps (fig. 3b). In both cases the parts can be lifted out by the careful use of 2 screwdrivers.

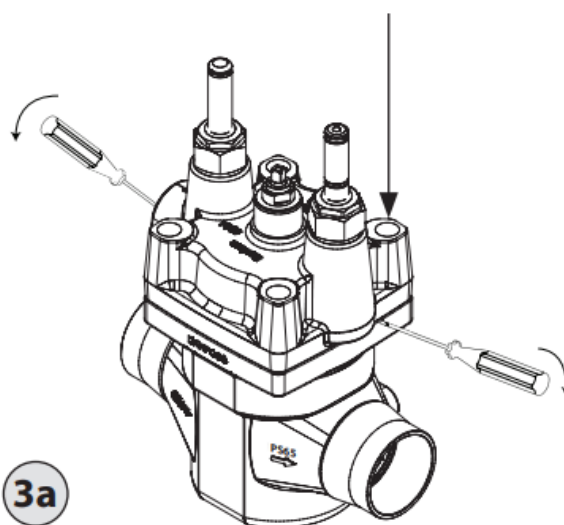
Note: Remove all parts from the valve body before welding (as shown in fig. 5).

External pressure inlet



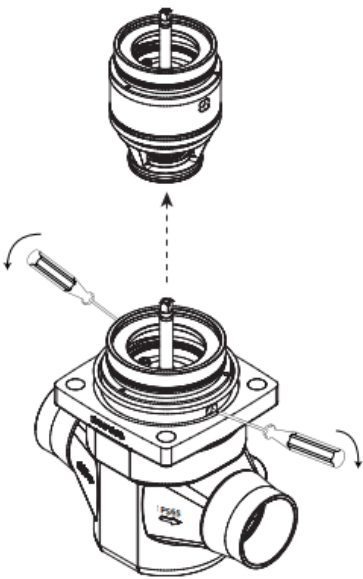
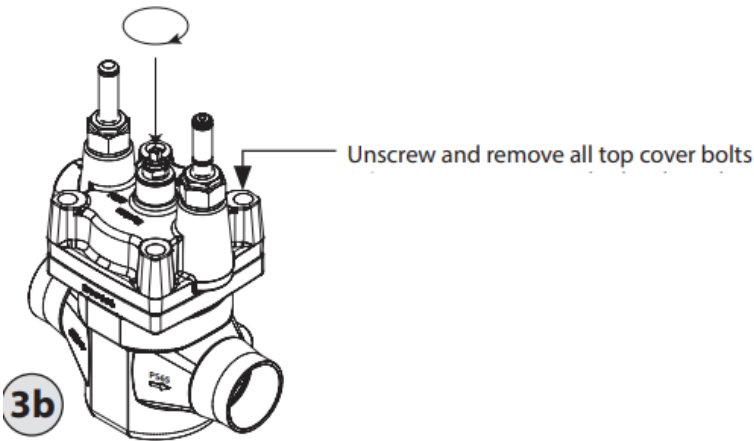
2



Unscrew and remove all top cover bolts.

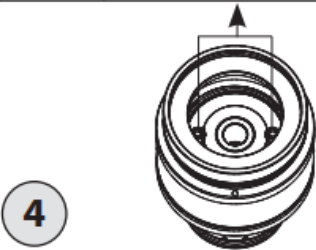


Remove spindle sign, lock ring and lock washer.

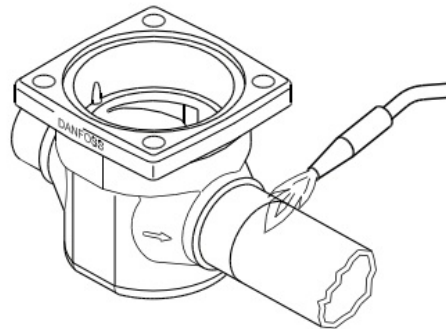
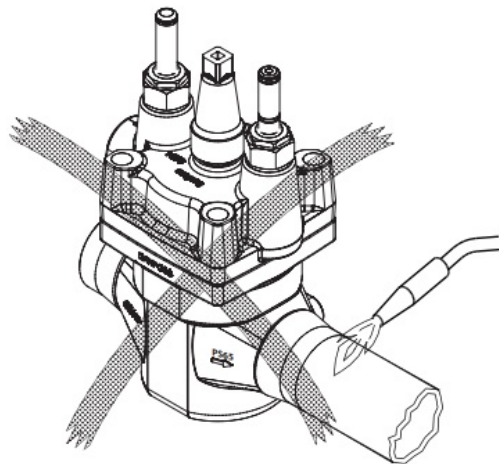
Turn spindle downwards out of thread.



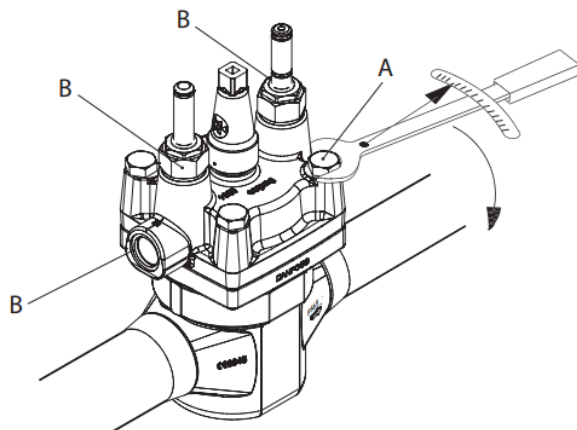
	two-step	one-step
		
ICLX 32	M5 x 6	M5 x 16
ICLX 40	M5 x 6	M5 x 16
ICLX 50	M5 x 6	M5 x 16
ICLX 65	M5 x 6	M5 x 16
	Allen key	Allen key



5

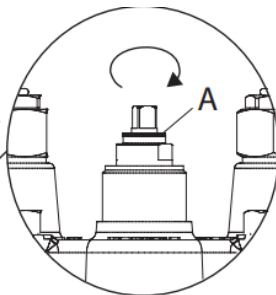
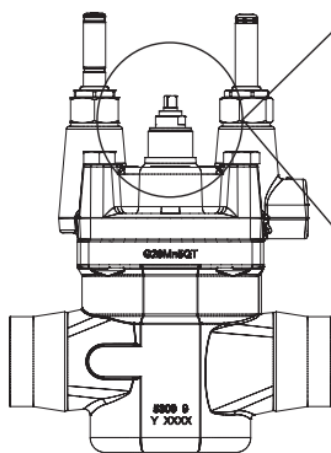


6

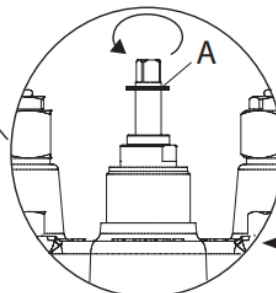


Normal operation mode

Valve body size		Nm	ft lb
Pos. A	32	120	88
位置 A	40	120	88
Poz. B	50	140	103
Поз. A	65	150	110
Pos. B	32	50	37
位置 B	40		
Poz. B	50		
Поз. B	65		



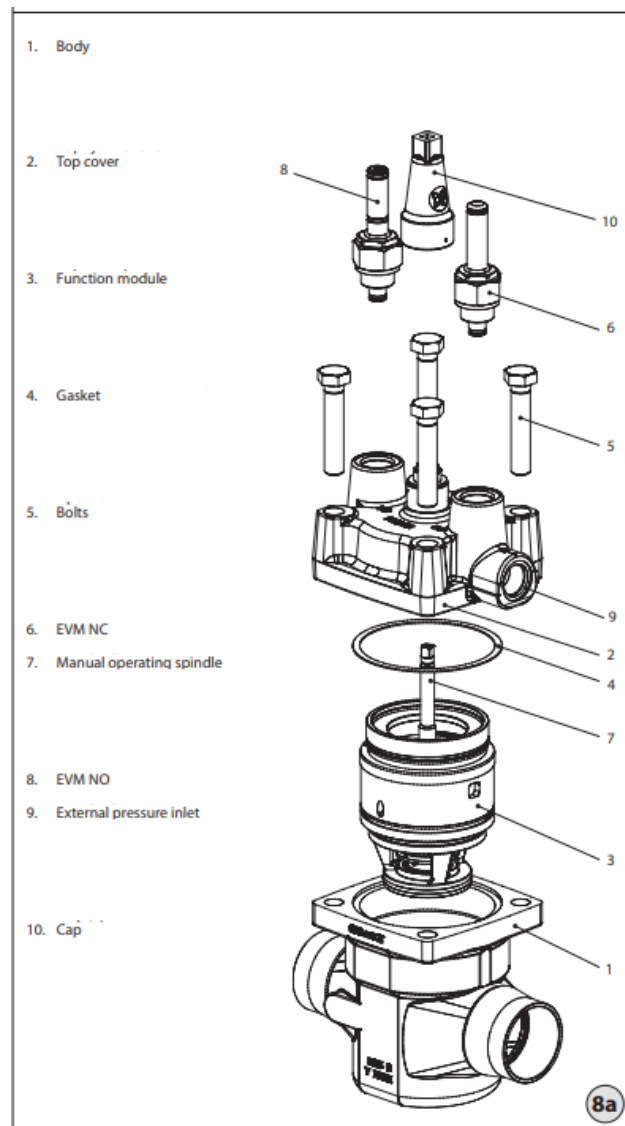
Clockwise



Counter clockwise

Manual forced opening

7



The internal surfaces and weld connections of the enclosed ICLX valve have been applied with an anti-corrosion treatment.

In order to maintain the effectiveness of this anti-corrosion treatment, it is important to ensure that the valve is disassembled just prior to the welding process being undertaken.

In the event that the function modules are to be left disassembled for even a short period, please ensure that the function modules are further protected by placing in a polyethylene bag or by applying a rust protection agent (e.g. refrigeration oil or BRANOROL) on the surfaces.

Only materials and welding methods, compatible with the valve body material, must be applied to the valve body.

Avoid welding debris and dirt in the valve body and the function module. The valve body must be free from stresses (external loads) after installation.

The valves must not be mounted in systems where the outlet side of the valve is open to atmosphere. The outlet side of the valve must always be connected to the system or properly capped off, for example with a welded-on end plate.

Assembly

Remove welding debris and any dirt from pipes and valve body before assembly. Check that the o-rings are intact before replacing the function module. If possible, apply some refrigeration oil to ease the insertion and to protect the o-rings. Check that the top gasket has not been damaged. If the surface has been damaged or the gasket has been bent, it must be replaced.

Tightening (fig. 6)

Tighten the top cover with a torque wrench, to the values indicated in the table.

Colours and identification

The ICLX valves are Zinc-Chromated from factory. The Zinc-Chromatization does not cover the welding connections.

Precise identification of the valve is made via the ID plate on the top cover.

The external surface of the valve housing must be protected against corrosion with a suitable top coating after installation involving welding and consequent assembly.

Protection of the ID plate when painting the valve is recommended.

Important note for ICLX valves:

The ICLX valve is kept in its open position by hot gas. The hot gas condenses in the cold valve and creates liquid under the servo piston.

- When the pilot valves change status to close the ICLX, the pressure on the servo piston equalises with the suction pressure through the pilot valve.
- This equalisation takes time because condensed liquid is present in the valve. The exact time taken from when the pilot valves change position to complete closing of the ICLX will depend on temperature,
- pressure, refrigerant and size of valve. Thus an exact closing time for the valves cannot be given but, in general, lower temperatures give longer closing times.

- It is very important to take the closing times into consideration when hot gas defrost is performed on evaporators.
- Steps must be taken to ensure that the hot gas supply valve is not opened before the ICLX in the suction line is completely closed. If the hot gas supply valve is opened before the ICLX in the suction line is closed, considerable energy will be lost and potentially dangerous situations might arise because of “liquid hammer”. In ICLX valves, the spring-loaded second stage might be induced to hammer by gas and liquid being forced through the valve at $\Delta p > 1.5$ bar across the ICLX. The final result could be severe damage to the valve.
- As a rule of thumb a closing time of 2 minutes can be used as a starting point. The optimum closing time for each individual system must be determined at initial start-up of the plant at intended operational conditions. It is recommended to check if the closing time needs to be changed when conditions changes (suction pressure, ambient temp. etc.) and closing time should be checked at service of the valve.
- Once the optimum closing time has been identified it is recommended to add a safety margin of 30 sec. to the optimum closing time.

Maintenance

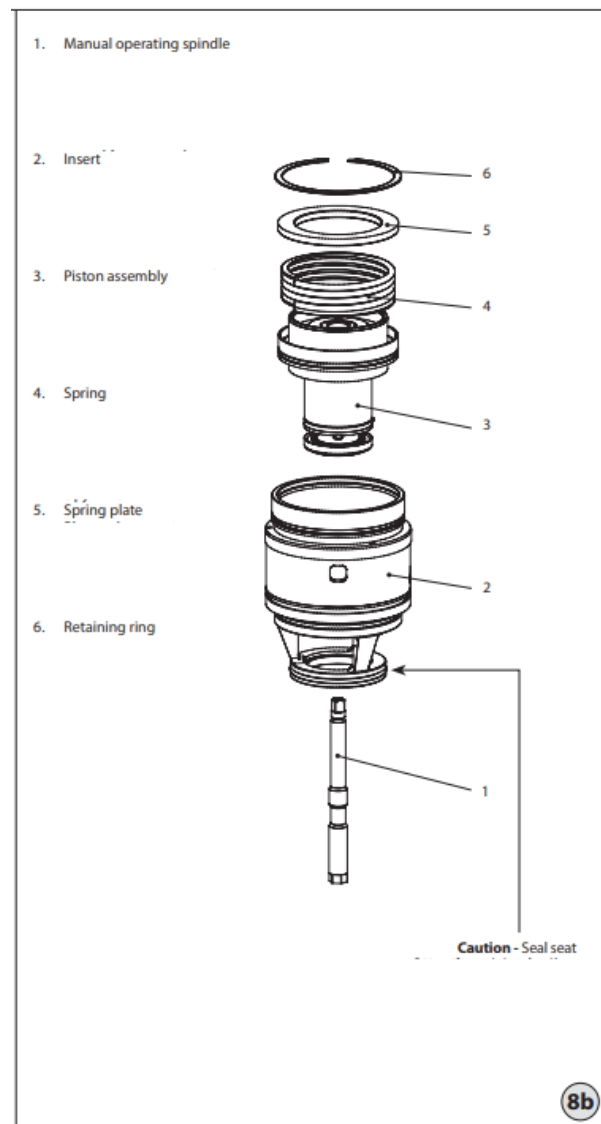
Service

- The ICLX valves can be disassembled for service purposes.
- Only skilled and trained refrigeration engineers are allowed to service the ICLX valves.
- Do not open the valve while the valve is still under pressure.
- Pressure relief can be done by carefully opening the manual operating spindle. Small grooves along the thread will release refrigerant into open air. This operation must only be done after providing the correct countermeasures under local legislation.
- Often the cover and function module can be removed while still assembled (fig. 3a), but if the internal O-rings stick to the metal surface it is necessary to disassemble in 2 steps (fig. 3b). In both cases the parts can be lifted out by the careful use of 2 screwdrivers.

Upon opening and removal of the function module:

- Check that the o-rings on the function module has not been damaged.
A valve with a damaged o-ring might not operate according to the specification.
- The insert and piston assembly can be disassembled according to figure 8b & 8c. Be careful when removing the retaining ring (fig. 8b, pos. 6). The retaining ring (fig. 8b, pos. 6) will be submitted to the force from the compressed spring (fig. 8b, pos. 4).

Be careful not to damage the two Seal Seats shown in fig. 8b and 8c since any deformation of the steel surface will lead to malfunction of the valve.



- Check pistons, cylinders and valve plates for wear and scratches and replace if needed.
- Check that the movement of the pistons and valve seats are free and with low friction.
- **Replacement of Valve Plates (ordinary wear parts)**

It is possible to replace the two PTFE valve plates (fig. 8c, pos. 2 and pos. 5) by following fig. 9 and these instructions:

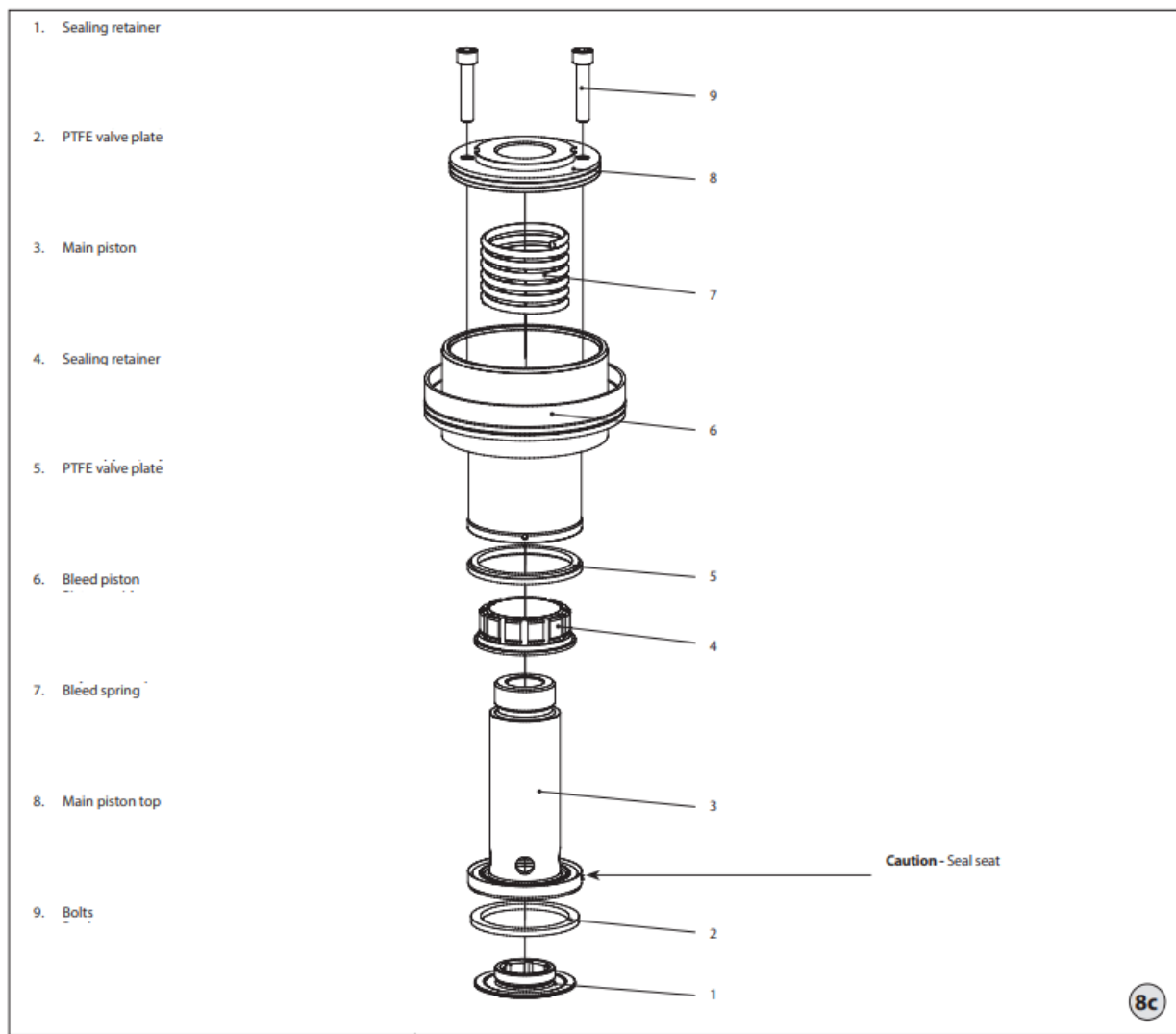
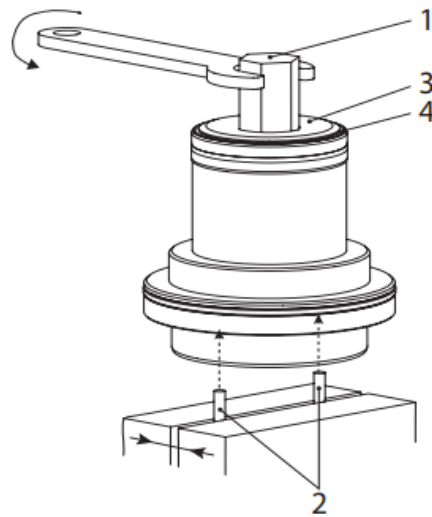


Fig. 9a, pos.1 shows a hexagon profile (tool) that fits into the female hexagon hole in the sealing retainer (pos. 3) of the piston assembly of ICLX 50 – 65.

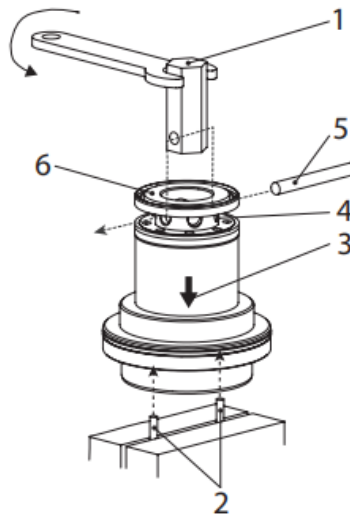


Valve size	Nm	lb-ft
ICLX 32	30	22
ICLX 40	30	22
ICLX 50	50	37
ICLX 65	50	37

9a

For ICLX 32 – 40 the corresponding tool has to be a hollow hexagon to fit onto the male hexagon.

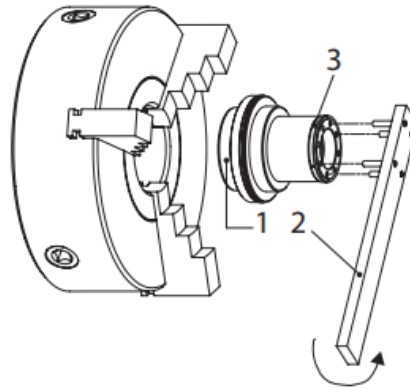
- As backstop when unscrewing the sealing retainer it is recommended to make an arrangement of two steel pins that fits into the small female hexagon holes of the Allen bolts (fig. 8c, pos. 9), clamped into a vice(fig. 9a, pos. 2).
- Once the sealing retainer is removed, the Valve plate (pos. 4) can be lifted out.
- Move the two steel pins (fig. 9b, pos. 2) to a higher position in the vice to allow the bleed piston (fig. 9b, pos. 3) to be slid downwards and expose a ring of holes (pos. 4).
- While there is access to the holes (pos. 4) a steel pin (pos. 5) with matching diameter is inserted through two opposed holes with tool pos. 1 (or similar punched tool) in the middle.
- Unscrew the main piston (fig. 9b, pos. 6).



Valve size	Nm Hm	lb-ft
ICLX 32	30	22
ICLX 40	30	22
ICLX 50	50	37
ICLX 65	50	37

9b

- For disassembling of the last sealing retainer it is recommended to utilise a mandrel with three point suspension to avoid deformation of the surfaces (fig. 9c).
- Clamp the bleed piston carefully to the mandrel at surface pos.1. Block the mandrel from rotation and unscrew the sealing retainer with a tool (pos. 2) manufactured for the purpose.



Valve size	Nm	lb-ft
ICLX 32	30	7
ICLX 40	30	7
ICLX 50	30	22
ICLX 65	50	37

9c

When the sealing retainer is removed the remaining valve plate (pos. 3) can be replaced.

Reassembling of the piston assembly is done in reverse order. The torque values for the different joints are shown in fig. 9.

Assembly

- Remove any dirt from the body before the valve is assembled. Check that all channels in the valve are not blocked by particles or similar.
- If possible, apply some refrigeration oil to ease the insertion and to protect the o-rings.

Tightening (fig. 6)

Tighten the top cover with a torque wrench, to the values indicated in the table.

Changing from two step to one step function

The ICLX valve is from factory side setup as two step function. To change the opening characteristics to one step function the following step must be completed:

- Remove the topcover from the valve housing (fig. 3).

- Change the two bolts (fig. 8c, pos. 9), with insert still in the valve housing.
- The length of the two bolts corresponds to the desired characteristic of the valve and should be applied according to the table (fig. 4).
- After changing the bolts the valve can be reassembled.

Manual opening device (fig. 7)

Normal operation mode

For the valve to operate normally under the influence of the pilot valves the spindle of the manual operation device needs to be turned fully clockwise until the locking ring (A) sits on the top of the packing gland.

Manual forced opening

To manually open the valve the spindle of the manual operation device needs to be turned fully counter clockwise until hitting the mechanical stop.

Commissioning

- The time span required to secure full closing of the ICLX valve depends on valve size and application, and needs to be investigated on site. The optimum should be determined during commissioning.
- Use only original Danfoss parts, including O-rings and gaskets for replacement. Materials of new parts are certified for the relevant refrigerant.
- In cases of doubt, please contact Danfoss.
- Drawings are only for illustration, not for dimensioning or construction.

Danfoss A/S Climate Solutions

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FAQ

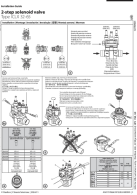
- **Q: What type of refrigerants are compatible with this valve?**

A: The valve is suitable for use with HCFC, HFC, R717 (Ammonia), and R744 (CO2) refrigerants.

- **Q: What are the coil requirements for this solenoid valve?**

A: Both coils must have an IP67 rating. EVM NC requires a 10W ac (or higher) for MOPD up to 21 bar, and 20W ac for MOPD 21-40 bar. EVM NO requires a 10W ac (or higher) coil.

Documents / Resources

	<p>Danfoss ICLX 32 2 Step Solenoid Valve [pdf] Installation Guide</p> <p>ICLX 32, ICLX 40, ICLX 50, ICLX 65, ICLX 32 2 Step Solenoid Valve, 2 Step Solenoid Valve, Solenoid Valve, Valve</p>
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References

- [User Manual](#)

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🔍 2 Step Solenoid Valve, Danfoss, ICLX 32, ICLX 32 2 Step Solenoid Valve, ICLX 40, ICLX 50, ICLX 65, Solenoid Valve, Valve

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