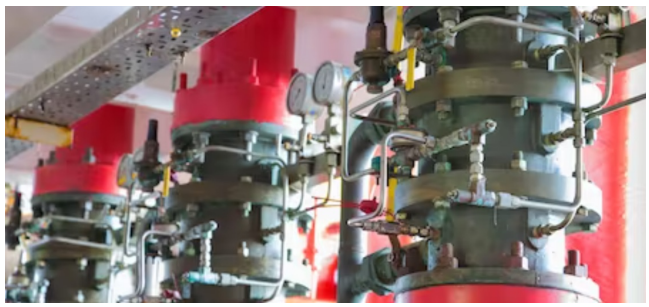

Danfoss ICLX 100-150 2-Step Solenoid Valve Installation Guide

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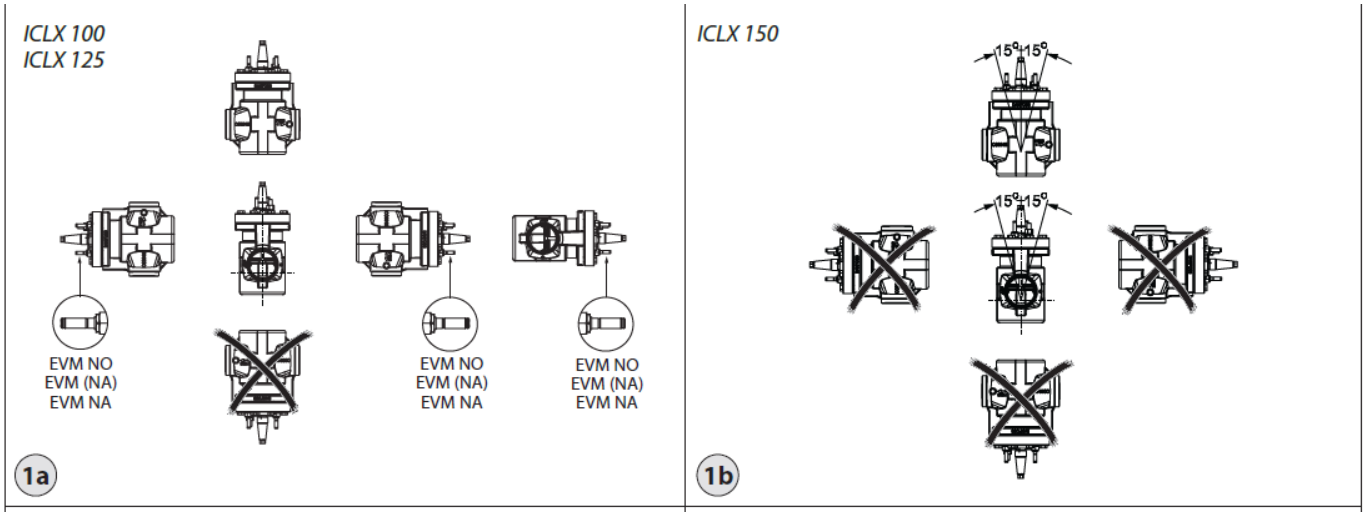
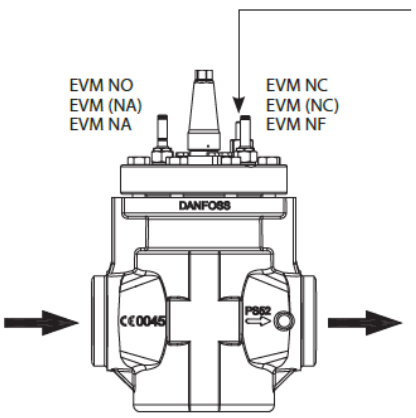
Danfoss ICLX 100-150 2-Step Solenoid Valve

2-step solenoid valve

ICLX 100-150

Installation



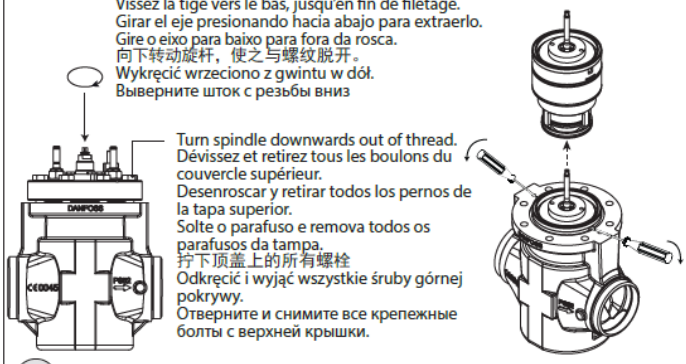


2

Remove spindle sign, lock ring and lock washer.
Retirez la marque de la tige, l'anneau de blocage et la rondelle frein.
Retirar la cubierta del eje, el anillo de bloqueo y la arandela de bloqueo.
Remova o sinal do eixo, anel de bloqueio e arruela de bloqueio.
取下旋杆标签、锁环和锁紧垫圈。
Zdemontować znacznik wrzeciona, pierścień blokujący i podkładkę.
Снимите со штока стопорное кольцо и стопорную шайбу.

Unscrew and remove all top cover bolts
Vissez la tige vers le bas, jusqu'en fin de filetage.
Girar el eje presionando hacia abajo para extraerlo.
Gire o eixo para baixo para fora da rosca.
向下转动旋杆，使之与螺纹脱开。
Wykręcić wrzeciono z gwintu w dół.
Выверните шток с резьбы вниз

Turn spindle downwards out of thread.
Dévissez et retirez tous les boulons du couvercle supérieur.
Desenroscar y retirar todos los pernos de la tapa superior.
Solte o parafuso e remova todos os parafusos da tampa.
拧下顶盖上的所有螺栓
Odkręcić i wyjąć wszystkie śruby górnej pokrywy.
Отверните и снимите все крепежные болты с верхней крышки.



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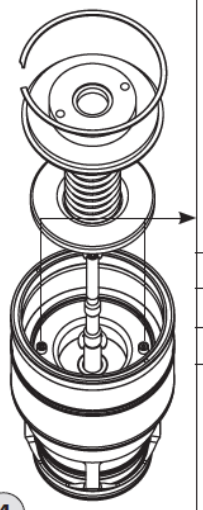
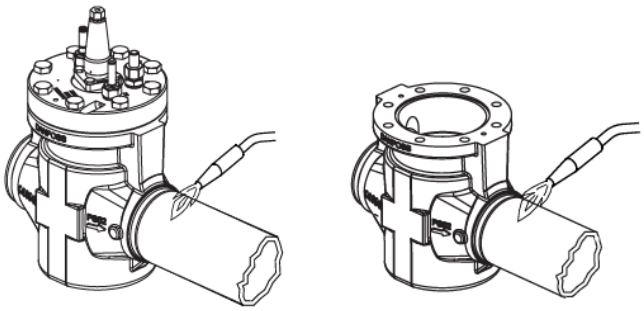


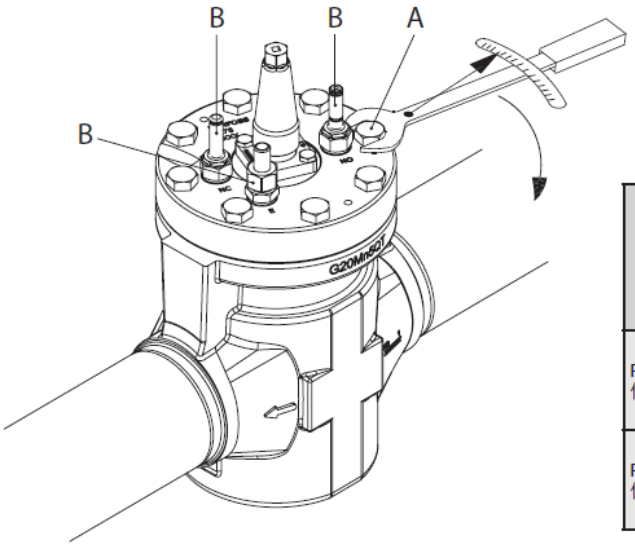
	two-step deux temps Dos etapas dois estágios 两步式 Praca dwustopniowa двухступенчатый	one-step un temps Una etapa um estágio 一步式 Praca jednostopniowa одноступенчатый
ICLX 100 ICLX 125 ICLX 150	M6 x 6	M6 x 16
	Allen key Clé Allen Llave Allen Chave Allen 内六角 Klucz imbusowy Торцевой ключ	Allen key Clé Allen Llave Allen Chave Allen 内六角 Klucz imbusowy Торцевой ключ

4



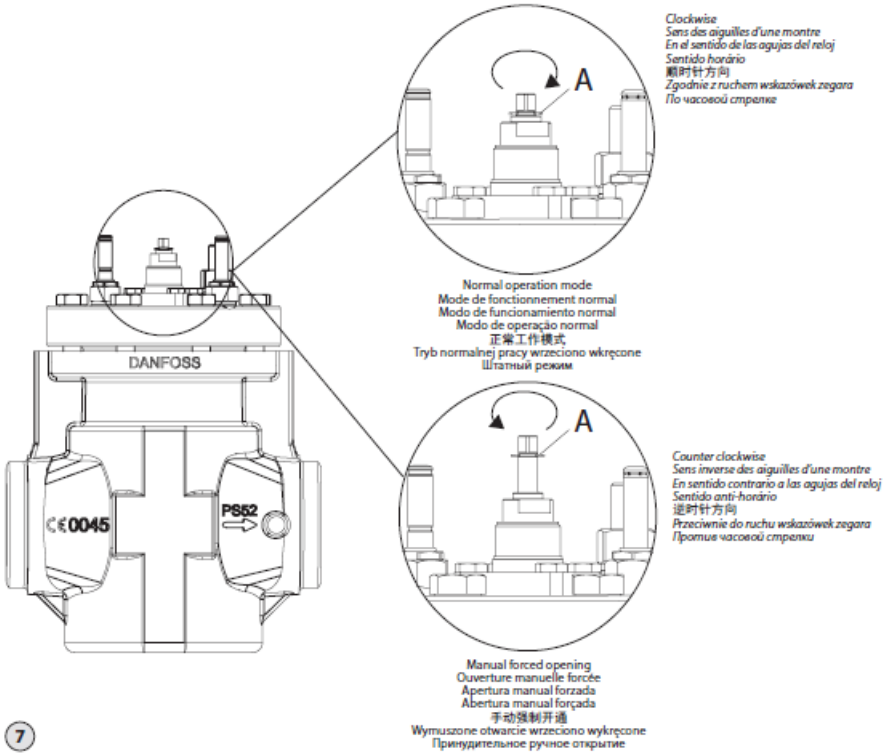
Only for heat controlled welding with no welding debris.
Uniquement pour les soudages à chaleur contrôlée sans résidus.
Sólo para soldadura con control de calor y sin residuos de soldadura.
Somente para soldagem com aquecimento controlado sem detritos da soldagem.
只可采用不产生焊屑的控温焊接。
Przeznaczone wyłącznie do spawania z kontrolą temperatury i bez odprysków.
Только при сварке скорошим отводом тепла.

5

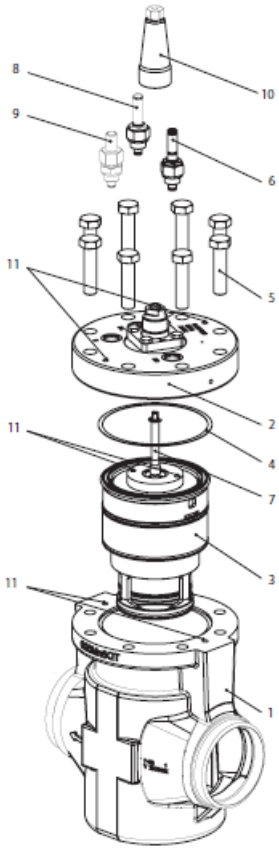


	Valve body size Taille du corps de vanne Tamaño del cuerpo de la válvula Corpo da válvula tamanho 阀体 尺寸 Wielkość zaworu Размер корпуса клапана	Nm	ft lb
Pos. A 位置 A	100	220	162
	125		
	150		
Pos. B 位置 B	100	50	37
	125		
	150		

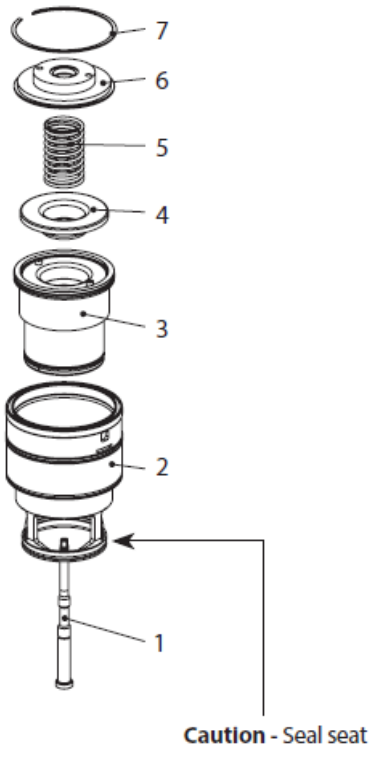
6



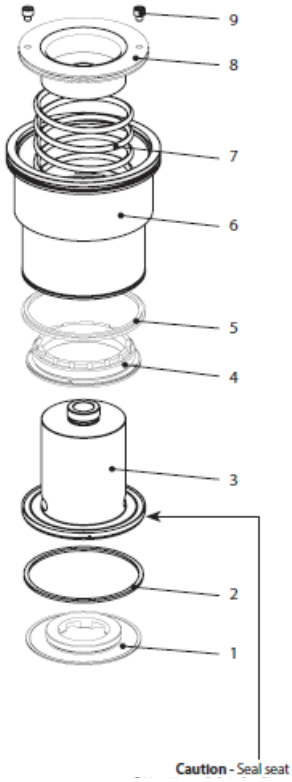
1. Body
2. Top cover
3. Function module
4. Gasket
5. Bolts
6. EVM NO
7. Manual operating spindle
8. EVM NC
9. External pressure inlet
10. Cap
11. Eyebolt threads

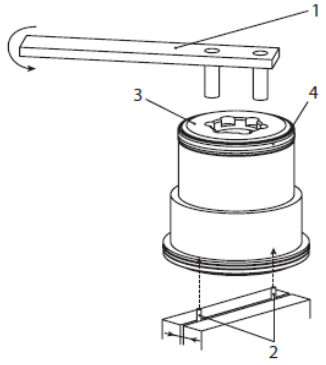


1. Manual operating spindle
2. Insert
3. Piston assembly
4. Spring retainer (lower)
5. Spring
6. Spring retainer (upper)
7. Retaining ring



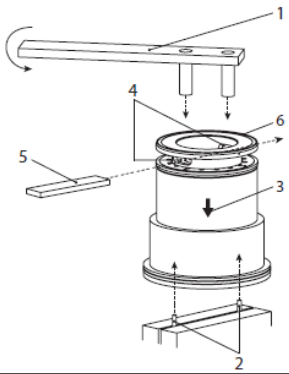
1. Sealing retainer
2. PTFE seat plate main
3. Main piston
4. Sealing retainer
5. PTFE seat plate bleed
6. Bleed piston
7. Bleed spring
8. Main piston top
9. Bolts





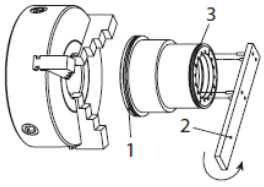
Valve size Taille de la vanne Tamaño de la válvula Tamanho da válvula 阀门规格 Valve size Размер клапана	Nm	lb-ft
100-150	100	74

9a



Valve size Taille de la vanne Tamaño de la válvula Tamanho da válvula 阀门规格 Valve size Размер клапана	Nm	lb-ft
100-150	100	74

9b



Valve size Taille de la vanne Tamaño de la válvula Tamanho da válvula 阀门规格 Valve size Размер клапана	Nm	lb-ft
100	100	74
125	150	111
150	260	192

9c

Installation

Refrigerants

Applicable to all common non-flammable refrigerants, including R717 and R744 (CO2) and all non-corrosive gases/liquids. Flammable hydrocarbons are not recommended.
The valve is only recommended for use in closed circuits. For further information please contact Danfoss.

Temperature range
–60/+120°C (–76/+248°F)

Pressure
The valves are designed for a max. working pressure of 52 bar g (754 psi g).

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, flourinated 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 marked NC in the top cover, EVM NO in port NO and the external pressure to E (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.

The valve/valve housing can be lifted by means of eyebolts positioned like shown in fig. 8a, pos. 11.

Orientation
The valve must be installed with the arrow in the direction of the flow (fig. 2).
The top cover can be rotated 4×90° in relation to the valve body.

ICLX 150
The valve must be installed with the spindle in upwards position 15°/15° (fig. 1b).

ICLX 100 and 125
The valve must be installed with the pilots pointing in one of the directions shown in fig. 1a. Downwards pointing pilots (any angle) is not possible.
If the ICLX is installed with a vertical pilot orientation (see fig. 1a) 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)
For heat controlled welding methods and welding methods ensuring no debris, the valve can stay assembled during the welding process.

The top cover (fig. 8a, pos. 2) and function module (fig. 8a, pos. 3), can be removed before welding to prevent damage to o-rings and teflon (PTFE) in the function module. The function module can be lifted out by applying a vertical force on the grooves as shown in figure 3. Additionally eyebolts can be threaded as shown in fig. 8a, pos. 11 for external lifting.

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 / brazing 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. If further corrosion protection is required, the valves can be painted.

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 equalizes with the suction pressure through the pilot valve.

This equalization 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. The function module can be lifted out by applying a vertical force on the grooves shown in figure 3.

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. 7). The retaining ring (fig. 8b, pos. 7) will be submitted to the force from the compressed spring (fig 8b, pos. 5).

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 tool (purpose made) that fits into the hole pattern of the sealing retainer (pos. 3) of the piston assembly.
As backstop when unscrewing the sealing retainer it is recommended to make an arrangement of two steel pins that fits into the 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 sided downwards and expose two elongated holes (pos.4).

While there is access to the holes (pos. 4) a steel bar (pos.5) with matching dimensions is inserted through the two opposed holes with tool pos. 1 (or similar fork tool) bridging the bar.

Unscrew the main piston (fig. 9b, pos. 6).
For disassembling of the last sealing retainer it is recommended to utilize 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.

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.AC
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 function module from the valves house (fig 3.).
- Remove the locking ring, upper spring retainer, spring and lower spring retainer (fig. 4).
- Change the two bolts (fig 8c, pos. 9).
- 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.

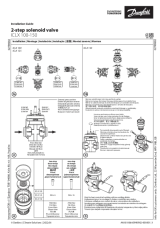
Manual opening device (fig. 7)

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.

Documents / Resources

	Danfoss ICLX 100-150 2-Step Solenoid Valve [pdf] Installation Guide ICLX 100-150 2-Step Solenoid Valve, ICLX 100-150, 2-Step Solenoid Valve, Solenoid Valve, Valve

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