Instructions

Control Solution
ICF 20-4, ICF 25-4,
ICF 32-4. ICF 40-4,
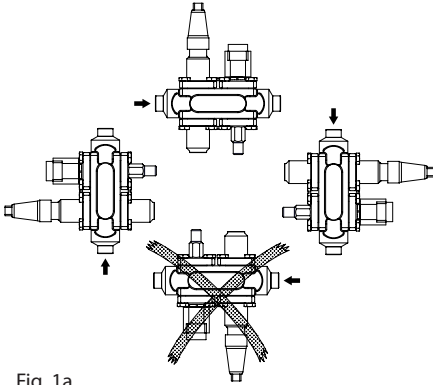ICF 20-6, ICF 25-6,
ICF 32-6, ICF 40-6,

Direction and position

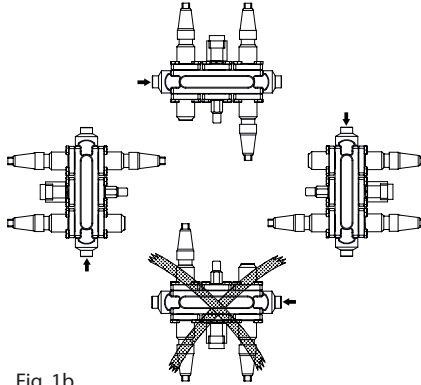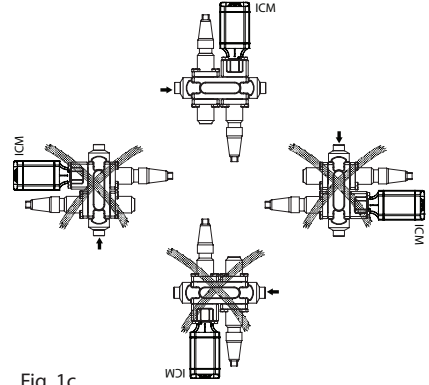| ICF xx-4	ICF xx-6	ICF xx-4 / ICF xx-6 with ICM

Fig. 1a

Fig. 1b

Fig. 1c

Welding

TIG/MIG/SMAW welding	Other welding methods

Inlet and outlet stop valves must be closed all the time before commissioning of the installation in ordre to prevent rust formations in the valve. The stop valves are closed when delivered from the factory. ICF must be cooled during the welding (e.g. by means of a wet cloth).
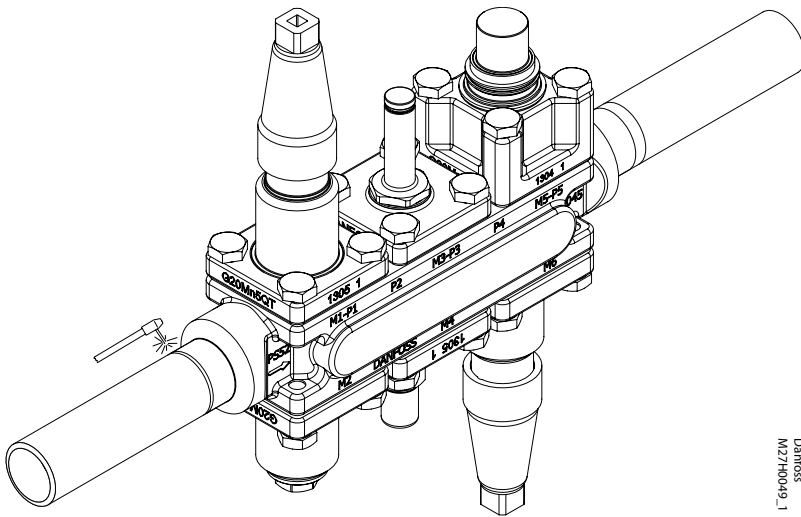
Remove all parts before welding. When the valve is assembled make sure that some rust protective oil is supplied in the valve. Before commissioning inlet and outlet valves must be closed at all time.
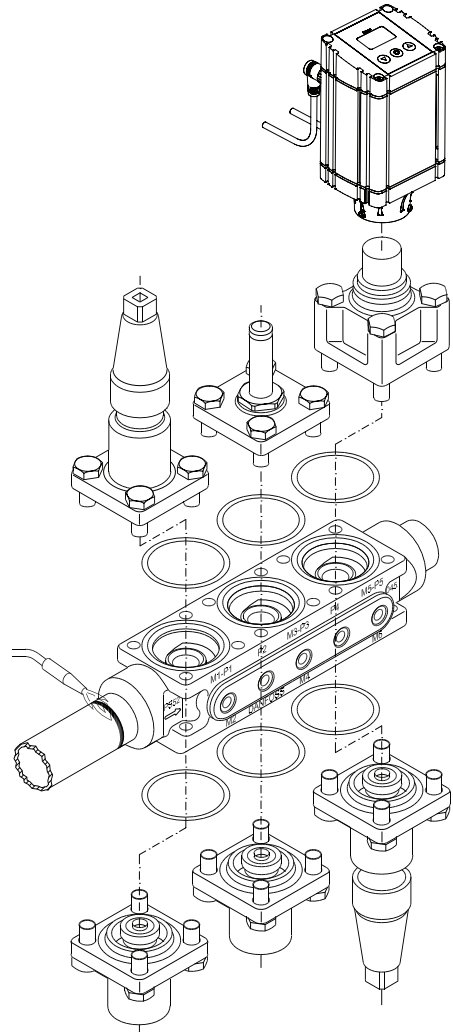

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M27H0049_1

Fig. 2

Fig. 3

DKRCI.PI.FT0.A9.02 / 520H2234

Service and maintenance

*For both ICF 20 and ICF 25-40
with ICM and ICFE 25-40*
Please Note:
When used in CO_2, the o-rings (see fig. 4) on the ICM and ICFE 25-40 modules can swell (grow).
At service it is recommend that new o-rings are installed, before the ICM and ICFE 25-40 function modules are reinstalled in the ICV valve body.
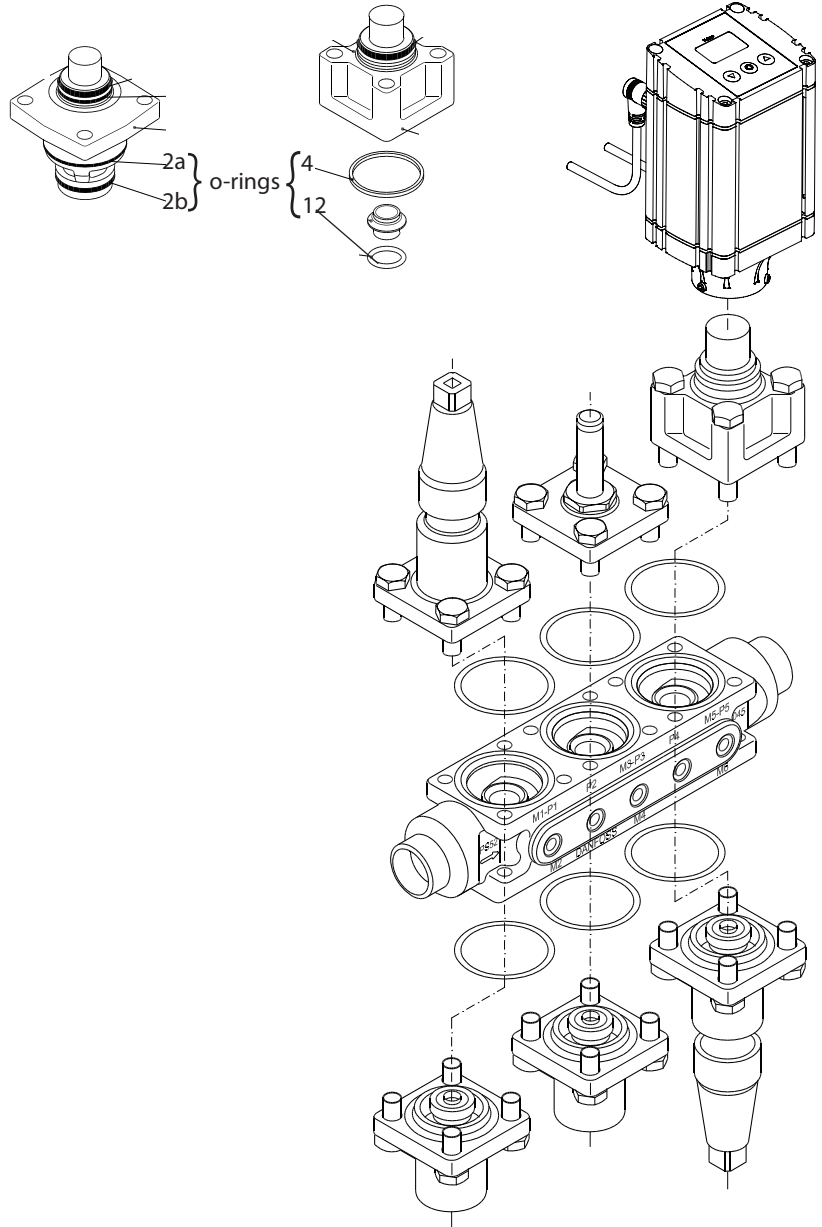
2a
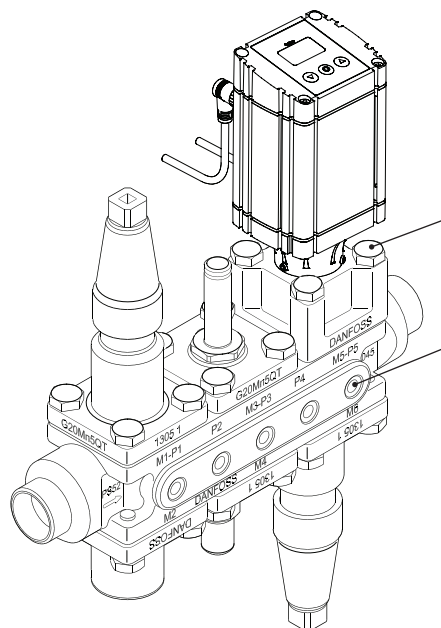2b } o-rings { 4
12

Fig. 4

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27H170.10

Tightening torques

For the 4 bolts in all ICF modules

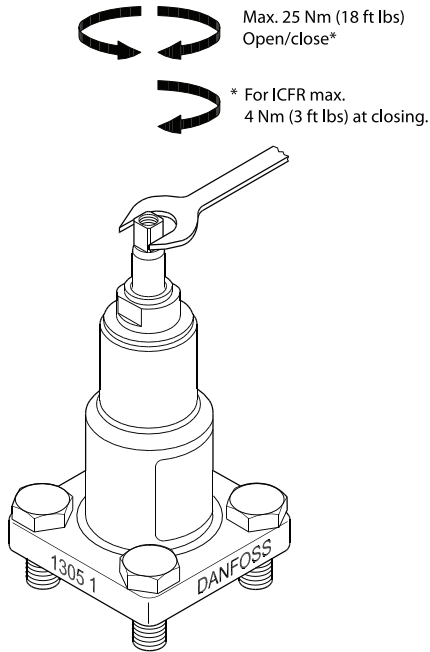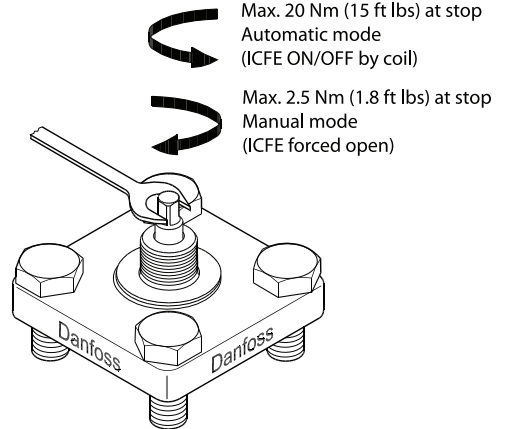|	**ICF 20:**	**ICF 25-40:**
	50 Nm (36 ft lbs)	80 Nm (58 ft lbs)
	50 Nm (36 ft lbs)	50 Nm (36 ft lbs)

Fig. 5

ICF 20

ICFS - stop valve module
ICFR - manual regulating valve module
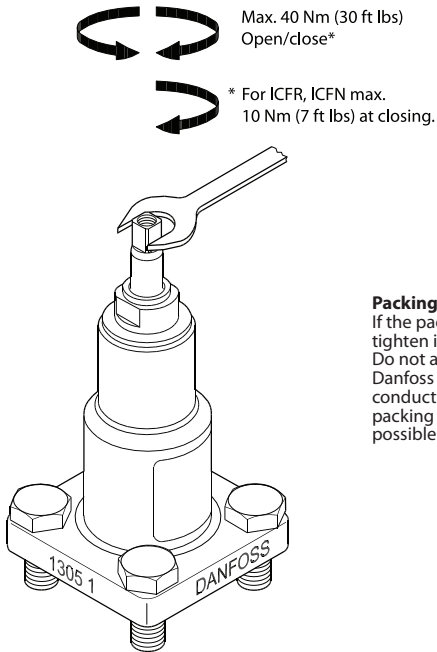**ICFN - stop/check valve module**

ICFO - manual opening module

Max. 25 Nm (18 ft lbs)
Open/close*

* For ICFR max.
4 Nm (3 ft lbs) at closing.

Max. 20 Nm (15 ft lbs) at stop
Automatic mode
(ICFE ON/OFF by coil)

Max. 2.5 Nm (1.8 ft lbs) at stop
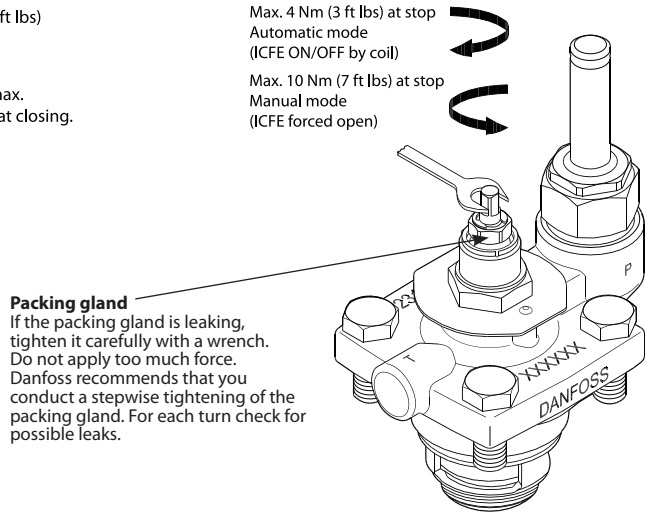Manual mode
(ICFE forced open)

ICF 25 - 40

ICFS - stop valve module
ICFR - manual regulating valve module
ICFN - stop/check valve module

ICFE - solenoid valve module

Max. 40 Nm (30 ft lbs)
Open/close*

* For ICFR, ICFN max.
10 Nm (7 ft lbs) at closing.

Max. 4 Nm (3 ft lbs) at stop
Automatic mode
(ICFE ON/OFF by coil)

Max. 10 Nm (7 ft lbs) at stop
Manual mode
(ICFE forced open)

Packing gland
If the packing gland is leaking,
tighten it carefully with a wrench.
Do not apply too much force.
Danfoss recommends that you
conduct a stepwise tightening of the
packing gland. For each turn check for
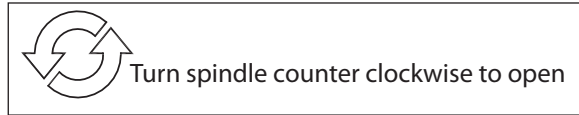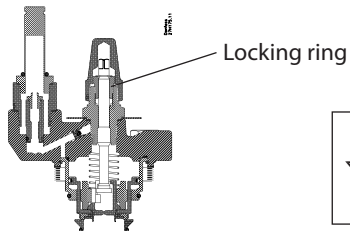possible leaks.

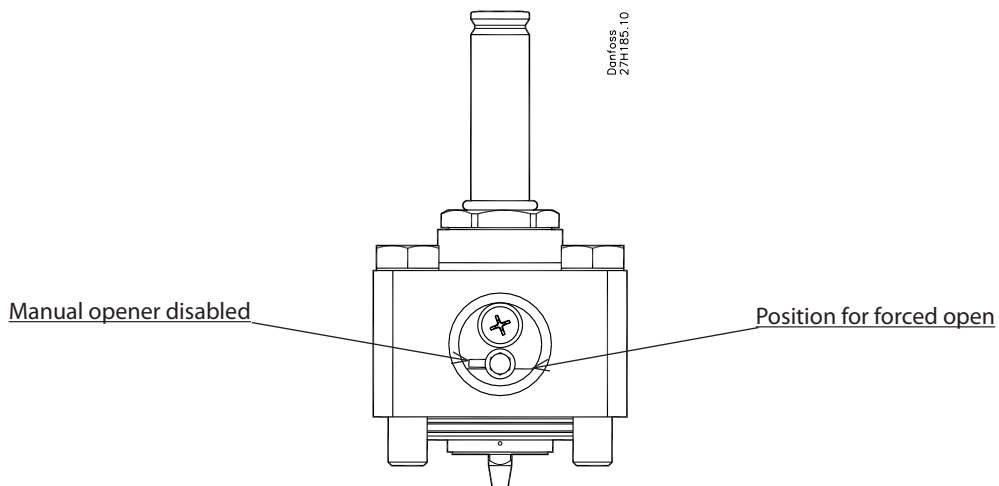## Operating the manual opener on ICFE 25 solenoid module

To force open the solenoid by the manual stem turn it **counter clockwise** full way up. (Manual mode)
To operate the solenoid in automatic mode, turn the manual stem **clockwise** until the locking ring stops.
Do not force the spindle further. If the locking ring is damaged or removed the spindle will start to leak.
The valve cannot be forced closed by the manual stem.

ICFE 25-40 solenoid valve module

Locking ring

Turn spindle counter clockwise to open

Operating the manual opener on ICFE 20H solenoid valve module

Remove the cap on the side of the ICFE 20H
At 9 o'clock position the manual opener is disabled (not active)
To force the ICFE 20H solenoid to open use a 5 mm Allen key and turn it **clockwise** to 3 o'clock position.

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Manual opener disabled

Position for forced open

Module location

ICF 20-4

M1 **M3**

0, 2 or 4 optional side ports
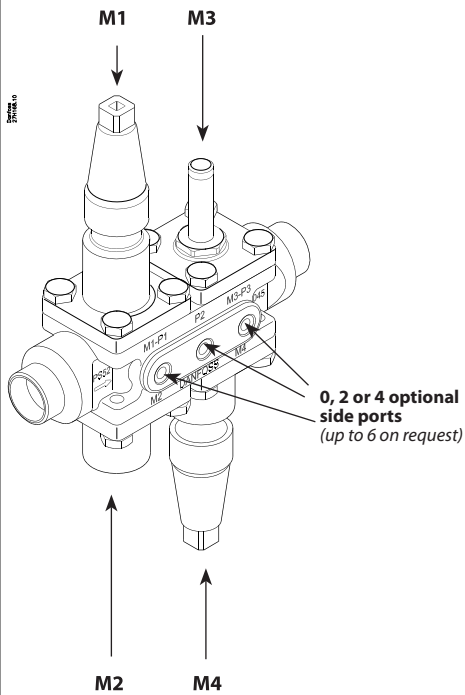*(up to 6 on request)*

M2 **M4**

Fig. 6

In order to supply the ICF solution best suited for liquid lines and hot gas lines certain function modules are dedicated to specific module ports.

Function	M1	M2	M3	M4
ICFS 20 - Stop valve module				
ICFR 20A - Manual regulating valve module				
ICFF 20 - Filter module	✗		✗	
ICFE 20 - Solenoid valve module	✗	✗		✗
ICFE 20H - Solenoid valve module		✗	✗	
ICFA 10 - Electronic expansion valve module		✗	✗	
ICFO 20 - Manual opening module	✗	✗	✗	
ICFC 20 - Check valve module	✗		✗	
ICFN 20 - Stop/check valve module	✗	✗	✗	
ICM 20-A, B or C - Motor valve module		✗		✗
ICFB 20 - Blank top cover				

⊠ *location not possible*

ICF 20-6

M5
M3
M1

0, 4 or 6 optional side ports
(up to 10 on request)
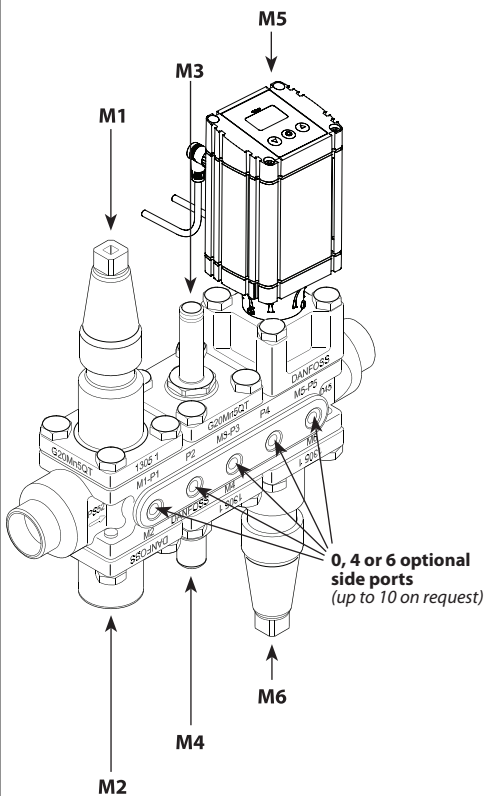
M6
M4
M2

Fig. 7

In order to supply the ICF solution best suited for liquid lines and hot gas lines certain function modules are dedicated to specific module ports.

Function	M1	M2	M3	M4	M5	M6
ICFS 20 - Stop valve module						
ICFR 20A - Manual regulating valve module						
ICFF 20 - Filter module	✗		✗		✗	
ICFE 20 - Solenoid valve module	✗	✗		✗	✗	✗
ICFE 20H - Solenoid valve module		✗		✗		✗
ICFA 10 - Electronic expansion valve module		✗		✗		✗
ICFO 20 - Manual opening module	✗	✗		✗	✗	
ICFC 20 - Check valve module	✗				✗	
ICFN 20 - Stop/check valve module	✗				✗	
ICM 20-A, B or C - Motor valve module		✗		✗		✗
ICFB 20 - Blank top cover						

⊠ *location not possible*

	Module location		

ICF 25-4 → 40-4

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M1

M3

M4

M2

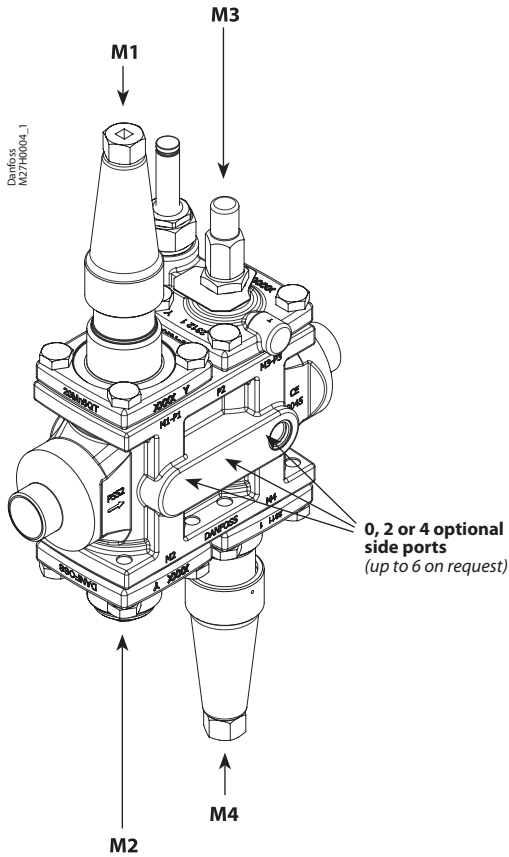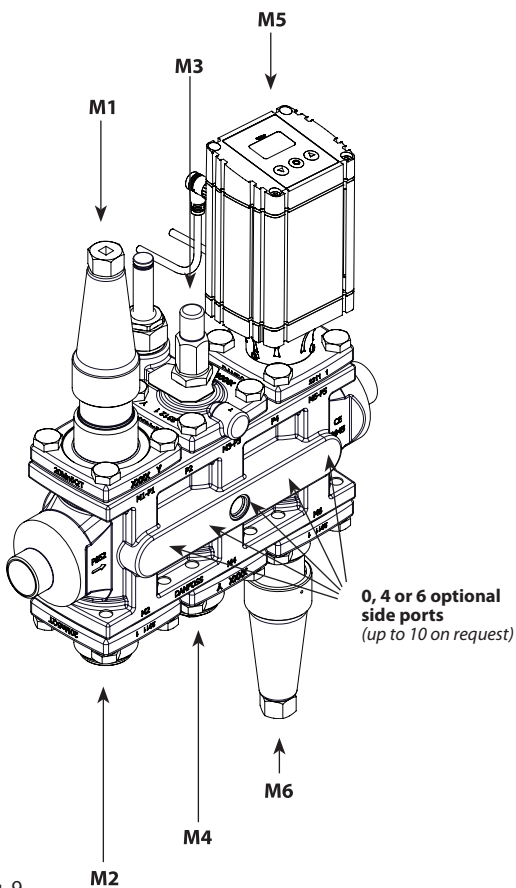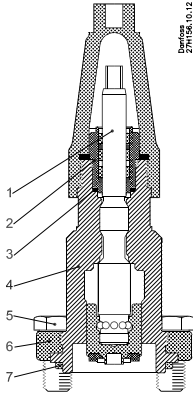0, 2 or 4 optional
side ports
(up to 6 on request)

Fig. 8

In order to supply the ICF solution best suited for liquid lines and hot gas lines certain function modules are dedicated to specific module ports.

Function	M1	M2	M3	M4
ICFS 25-40 - Stop valve module				
ICFR 25-40 A or B - Manual regulating valve module				
ICFF 25-40 - Filter module	⊠		⊠	
ICFE 25-40 - Solenoid valve module	⊠	⊠	⊠	
ICFC 25-40 - Check valve module	⊠		⊠	
ICFN 25-40 - Stop/check valve module	⊠		⊠	
ICM 25-A or C - Motor valve module		⊠		⊠
ICFB 25-40 - Blank top cover				
ICFW 25-40 - Welding module, 25DIN				

⊠   *location not possible*

ICF 25-6 → 40-6

M1

M3

M5

M2

M4

M6

0, 4 or 6 optional
side ports
(up to 10 on request)

Fig. 9

In order to supply the ICF solution best suited for liquid lines and hot gas lines certain function modules are dedicated to specific module ports.

Function	M1	M2	M3	M4	M5	M6
ICFS 25-40 - Stop valve module						
ICFR 25-40 A or B - Manual regulating valve module						
ICFF 25-40 - Filter module	⊠		⊠		⊠	
ICFE 25-40 - Solenoid valve module	⊠	⊠	⊠		⊠	
ICFC 25-40 - Check valve module	⊠		⊠		⊠	
ICFN 25-40 - Stop/check valve module	⊠		⊠		⊠	
ICM 25-A or C - Motor valve module		⊠		⊠		⊠
ICFB 25-40 - Blank top cover						
ICFW 25-40 - Welding module, 25DIN						

⊠   *location not possible*

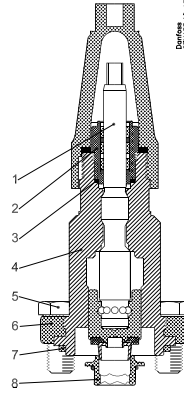DKRCI.PI.FT0.A9.02 / 520H2234   © Danfoss A/S (AC-SMC / MWA), 08-2010

The function modules - ICF 20
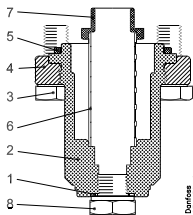
ICFS 20 stop valve module

1. Spindle
2. Thread part
3. AL-gasket
4. Bonnet
5. Hex-head bolt
6. Flange
7. Gasket
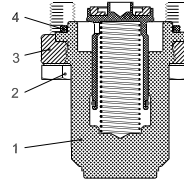
ICFR 20 manual regulating valve module

1. Spindle
2. Thread part
3. AL-gasket
4. Bonnet
5. Hex-head bolt
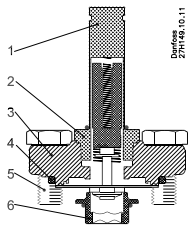6. Flange
7. Gasket
8. Seat

ICFF 20 filter module

1. Gasket
2. Bonnet
3. Hex-head bolt
4. Flange
5. Gasket
6. Filter element
7. Plug
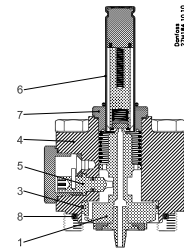8. Plug ¼" RG or ³/₈" NPT

ICFC 20 check valve module

1. Bonnet
2. Hex-head bolt
3. Flange
4. Gasket
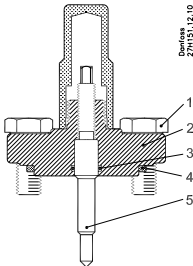
ICFE 20 solenoid valve module

1. Armature tube
2. Armature tube nut
3. Flange
4. Gasket
5. Hex-head bolt
6. Seat
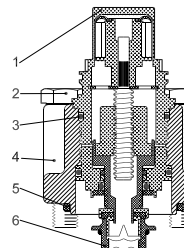
ICFE 20H solenoid valve module

1. Piston

3. Piston ring
4. Bonnet cylindre
5. Manual opener
6. Armature tube
7. Armature tube nut
8. Gasket

ICFO 20 manual opening module

1. Hex-head bolt
2. Flange
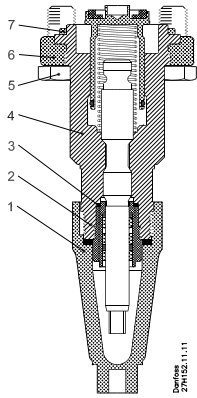3. O-ring
4. Rubber gasket
5. Spindle

ICM 20 A, 20 B or 20 C motor valve module

1. Adapter
2. Hex-head bolt
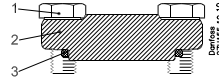3. O-ring
4. Bonnet
5. Gasket
6. Seat

The function modules - ICF 20
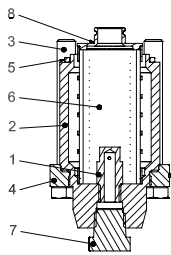
ICFN 20 stop/check valve module

1. Spindle
2. Thread part
3. AL-gasket
4. Bonnet
5. Hex-head bolt
6. Flange
7. Gasket

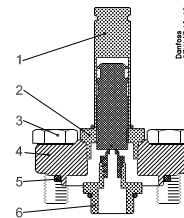### ICFB 20 blank top cover module

1. Hex-head bolt
2. Flange
3. Gasket
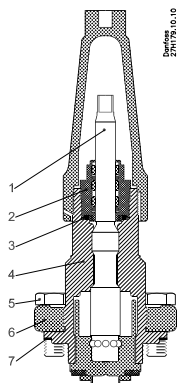
ICFF 20E extended filter module

1. Dirt protection plug
2. Bonnet
3. Hex-head bolt M12x80
4. Flange
5. Gasket
6. Filter element
7. Plug ³/₈" NPT
8. Filter adaptor

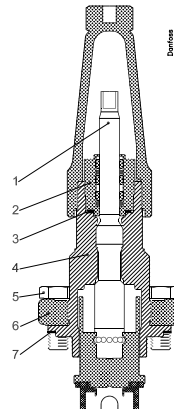### ICFA 10 Electronic expansion valve

1. Armature tube
2. Armature tube nut
3. Hex-head bolt
4. Flange
5. Gasket
6. Adaptor

ICFS 25-40 stop valve module

1. Spindle
2. Thread part
3. O-ring
4. Bonnet
5. Hex-head bolt
6. Flange
7. Gasket

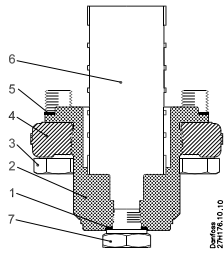### ICFR 25- 40 A or B manual regulating valve module

1. Spindle
2. Thread part
3. O-ring
4. Bonnet
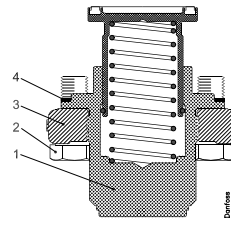5. Hex-head bolt
6. Flange
7. Gasket

ICFF 25-40 filter module
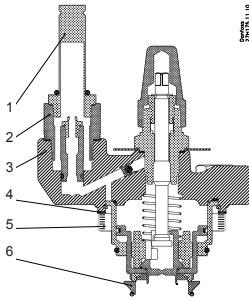
1. Al gasket
2. Bonnet
3. Hex-head bolt
4. Flange
5. Gasket
6. Filter element
7. Plug ¼" RG or ³/₈" NPT

ICFC 25-40 check valve module

1. Bonnet
2. Hex-head bolt
3. Flange
4. Gasket

ICFE 25-40 solenoid valve module

1. Armature tube
2. Armature tube nut
3. Bonnet
4. Gasket
5. Hex-head bolt
6. Seat

ICM 25 A or 20 B motor valve module

1. Adapter
2. Hex-head bolt
3. O-ring
4. Bonnet
5. Gasket
6. Seat

ICFN 25-40 stop/check valve module

1. Spindle
2. Thread part
3. O-ring
4. Bonnet
5. Hex-head bolt
6. Flange
7. Gasket

ICFB 25-40 blank top cover module

1. Hex-head bolt
2. Flange
3. Gasket

ICFW 25-40 Welding module 25 DIN

1. Hex-head bolt
2. Flange
3. Gasket
4. Weld connection

ICFF 25-40E extended filter module

1. Dirt protection plug ³/₈" NPT
2. Bonnet
3. Hex-head bolt M12x140
4. Flange
5. Gasket
6. Filter element
7. Plug ³/₈" NPT

Installation

Refrigerants
Applicable to all common non-flammable refrigerants, including R717 and non-corrosive gases/liquids dependent on sealing material compatibility.

The use of ICF solutions with flammable hydrocarbons is not recommended.

The ICF is only recommended for use in closed circuits. For further information please contact Danfoss.

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

Pressure range
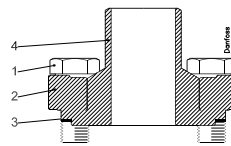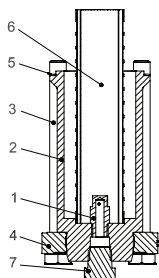The ICF is designed for a max. working pressure of 52 bar g (754 psi g).

Technical data
The ICF can be used in suction, liquid, hotgas and liquid/vapor lines. The ICF are available with 4 or 6 function modules. The ICF regulates the flow of the medium by modulation or on/off function, depending on function modules installed on the ICF.

Regulating range
Dependent on the chosen type and combination of modules installed in the valve.

Installation
The ICF must be installed according to fig. 1. The ICF must be installed with the arrow in the direction of the flow).

The ICF will be delivered with all the function modules fully assembled. The modules can be taken off for service or inspection and may be rotated 4 x 90° in relation to the valve body upon installation.

The ICF may be fitted with a spindle for manual opening of the solenoid valve.

The ICF 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 ICF is protected from pressure transients like "liquid hammer" in the system.

Welding
The ICF solution can be welded by using either TIG/MIG/SMAW welding (fig. 2) or gas welding (fig. 3).

Attention!
It is not necessary to remove any of the modules before TIG/MIG/SMAW welding; however, it must be ensured that the valve is cooled during the welding (e. g. by wet cloth) and that the ICF is protected against weld splatter. Inlet and outlet stop valves must be closed all the time before commissioning in order to protect ICF against rust formations.
The ICF valves are delivered with closed stop valves.
During Gas welding the modules must be removed.
Avoid welding debris and dirt in the valve body and the function module. The housing must be free from stresses (external loads) after installation. The ICF must not be mounted in systems where the outlet side of the ICF is open to atmosphere. The outlet side of the ICF must always be connected to the system or properly capped off, for example with a welded-on end plate.

Colours and identification
The ICF solutions are Zinc-Chromated from factory. The Zinc-Chromatization does not cover the welding connections. If further corrosion protection is required, the ICF can be painted.

Precise identification of the ICF is made via the ID label on each of the 4 or 6 function modules. The external surface of the housing must be protected against corrosion with a suitable top coating after installation involving welding and consequent assembly. Protection of the ID label when painting the ICF is recommended.

Maintenance

Service
The ICF solutions are easy to service. Do not open the ICF while the it is still under pressure.

Debris blocking the bolt hole will need cleaning. Upon opening and removal of the function modules:
- Check that the O-rings on the function module has not been damaged.
  A valve with a damaged o-ring might not modulate according to the specification.

For both ICF 20 and ICF 25 - 40 with ICM

Please Note:
When used in CO_2, the o-rings (see fig.4) on the ICM and ICFE 25-40 modules can swell (grow). At service it is recommend that new o-rings are installed, before the ICM function module is reinstalled in the ICF valve body.

- Check that the piston and cylinder is free of scratches and look for wear marks. If the wear is excessive the function module should be replaced to prevent false pilot signal around the piston ring.
- Check that the movement of the cylinder and valve seat is free and with low friction.
- If the teflon valve plate has been damaged, the function module must be replaced.
- On ICM 20 motor valve modules check that the PEEK seat has not been damaged or scratched. If damaged or scratched; replace the PEEK seat.

Assembly
Remove any dirt from the housing before the ICF is assembled.
- Check that all channels in the ICF are free of particles or similar debris. If possible, apply some refrigeration oil to ease the insertion of the modules and to protect the O-rings.

Tightening (fig. 5)
Tighten the top cover with a torque wrench, to the values indicated in the table.
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 accepts no responsibility for errors and omissions.

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