

ICF Complete Valve Stations

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Introduction

Growing from the modular concept established with the award-winning ICV industrial valve platform, ICF factory-assembled valve stations incorporate in one housing foundation up to six valve functions in any combination: mechanical, electromechanical, and electronically operated valves.

Danfoss ships ICF valve stations jobsite ready, function and pressure tested. An ICF is a complete valve station with a single part number.

ICF presents a number of design and ordering advantages, and also reduces time and labor during planning, installation, service, and maintenance.

ICF solutions are designed for low and high pressure refrigerants, liquid lines, compressor injection lines, and hot gas lines.



Features

- Designed for industrial refrigeration applications with maximum working pressure of 754 psig (52 bar).
- Approved for all common non-flammable refrigerants including R717 and R744 (CO₂); and for noncorrosive gases and liquids compatible with the seal materials.
- Direct weld connections; socket weld and butt weld versions.
- Low temperature steel housing with stainless steel trim.
- Low weight and compact design.
- Zinc chromate coated for corrosion protection.
- V-port regulating cones on the control modules ensure optimum regulating accuracy even at partial load.
- *Modular Concept*
Valve service is performed by replacing the function module.
- The body has side port connections for pressure gauges, transmitters, sight glasses, drain lines, etc.
- Features for the ICAD motor-actuator used with ICM module will be found in the ICAD section on pages 40 to 46.

Technical data

Refrigerants

All common non-flammable refrigerants including R717, R744 (CO₂) ; and noncorrosive gases and liquids compatible with the seal materials.

For further refrigerant information please refer to ICF installation instructions.

Flammable hydrocarbons are not recommended. For further hydrocarbon information please contact your Danfoss sales representative.

Temperature range

-76 to +302°F (-60 to +150°C).

ICF with ICM/ICAD: to +248°F (120°C)

Surface protection

The external surface is zinc chromate coated for corrosion protection.

Pressure

Max. working pressure: 754 psig (52 bar g)

Opening differential pressure:

Please refer to the data for each individual function module.

Design

The ICF valve station solution brings together up to six functions on a single compact valve body with socket weld connections up to 1½". Each function component is individually removable for service.

The ICF solution offers compact dimensions and shortened installation time due to the reduced number of direct welded connections and to the absence of pipe flanges.

The design allows maximum capacity and minimum pressure drop by using double seats, offering higher capacity than conventional systems that use individual valves and components.

Supplied as a complete factory assembled and tested valve station.

Function modules

Each ICF housing accommodates a maximum of four or six function modules. The following functions can be fitted:

- Stop valve module
- Manual regulating valve module
- Filter (strainer) module
- Solenoid valve module
- Electronic expansion valve module
- Manual opening module for solenoid
- Check valve module
- Stop/check valve module
- Motor valve module
- External welding connection module
- Blank top cover

Options:

The ICF housing can be supplied with side ports for the following:

- Sight glass
- Temperature or pressure sensor
- Pressure gauge
- Side connection for drain or bypass.

Welding:

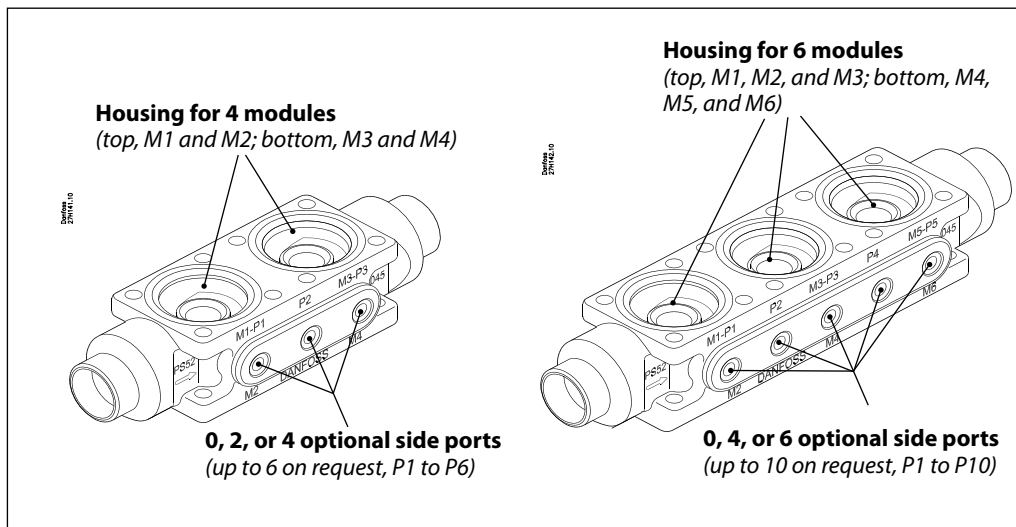
When using TIG or MIG welding technology, it is possible to install the ICF solution without removing the function modules from the body.

When using arc welding, modules need not be removed, but the ICF must be protected against weld splatter.

If using other welding methods the modules must be disassembled.

Housing

The two ICF housings and side port options variants:



Approvals

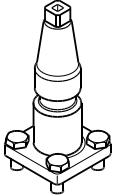
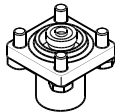
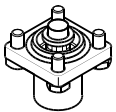
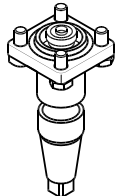
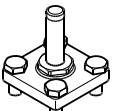
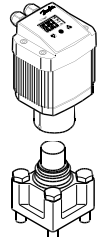
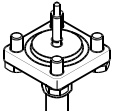
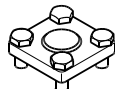


ICF control solution		
Nominal bore	≤1 in.	1¼ - 1½ in.
Classified for	Fluid group I	
Category	Article 3, paragraph 3	II

For specific approval information, please contact Danfoss. The ICF concept is designed to fulfill global refrigeration requirements.

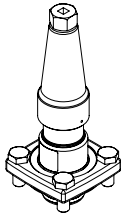
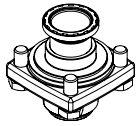
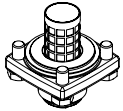
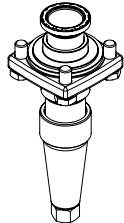
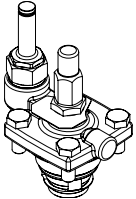
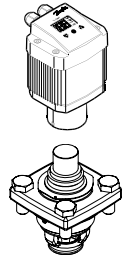
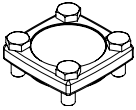
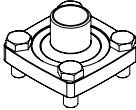
ICF 20

Description of the function modules for ICF 20

<p>ICFS 20 Stop valve module</p> <p>ICFR 20A Manual regulating valve (HEV) module. This module has the function of a hand regulating/expansion valve.</p>	 <p>ICFS 20 ICFR 20A</p>	<p>ICFC 20 Check valve module</p>	 <p>ICFC 20</p>
<p>ICFF 20 Filter (strainer) module</p> <p>Includes a 150µ filter insert and a 50µ internal start-up filter insert that is removed after start-up.</p>	 <p>ICFF 20</p>	<p>ICFN 20 Stop/check valve module This module combines the functions of a stop valve and a check valve.</p>	 <p>ICFN 20</p>
<p>ICFE 20 Solenoid valve module Functions as a normally closed solenoid valve.</p> <p>ICFA 10 Electronic expansion valve module Functions as a pulse width modulating (PWM) electronic expansion valve.</p>	 <p>ICFE 20 ICFA 10</p>	<p>ICM 20-A, B, or C Motorized valve module. A stepper motor actuated valve for modulating and on-off flow control.</p> <p>Requires separately ordered ICAD 600 stepper motor-actuator.</p>	 <p>ICM 20-A, B or C</p>
<p>ICFO 20 Manual opening module This module facilitates manual opening of a solenoid valve (type ICFE).</p>	 <p>ICFO 20</p>	<p>ICFB 20 Blank top cover Functions as a blanking cover for unused module ports.</p>	 <p>ICFB 20</p>

ICF 25-40

Description of the function modules for ICF 25-40

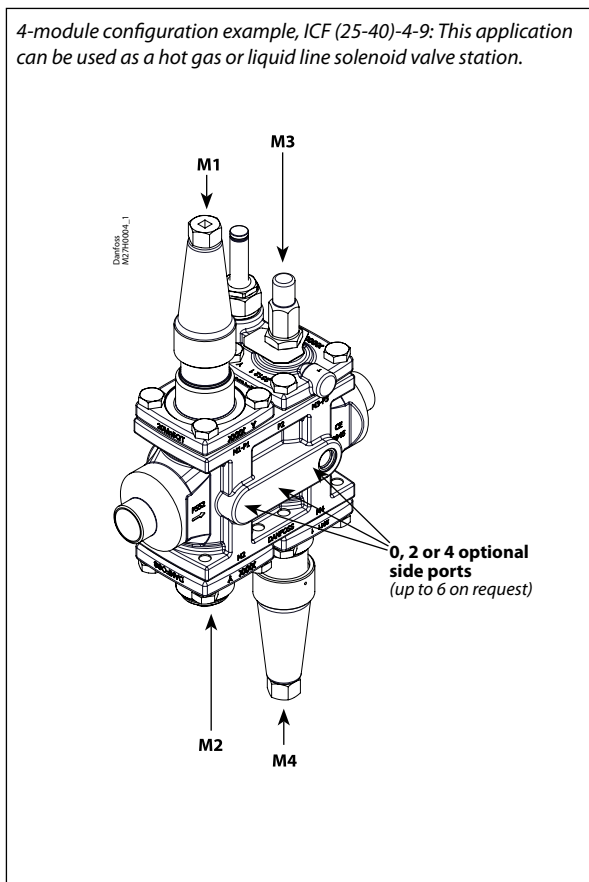
<p>ICFS 25-40 Stop valve module</p> <p>ICFR 25-40 Manual regulating valve (HEV) module. This module has the function of a hand regulating/expansion valve.</p>	 <p>ICFS 25-40 ICFR 25-40</p>	<p>ICFC 25-40 Check valve module</p>	 <p>ICFC 25-40</p>
<p>ICFF 25-40 Filter (strainer) module</p> <p>Includes a 150µ filter insert and a 50µ internal start-up filter insert that is removed after start-up.</p>	 <p>ICFF 25-40</p>	<p>ICFN 25-40 Stop/check valve module This module combines the functions of a stop valve and a check valve.</p>	 <p>ICFN 25-40</p>
<p>ICFE 25-40 Solenoid valve module Functions as a normally closed solenoid valve. It has a build-in manual opening function.</p>	 <p>ICFE 25-40</p>	<p>ICM 25-A or B Motorized valve module A stepper motor actuator valve for modulating and on-off flow control.</p> <p>Requires separately ordered ICAD 600 stepper motor-actuator.</p>	 <p>ICM 25-A or B</p>
<p>ICFB 25-40 Blank top cover Functions as a blanking cover for unused module ports.</p>	 <p>ICFB 25-40</p>	<p>ICFW 25-40 Welding module, (1" connection) Used for a drain connection to direct defrost condensate to the defrost regulator during hot-gas defrosting.</p>	 <p>ICFW 25-40</p>

Function module configurations

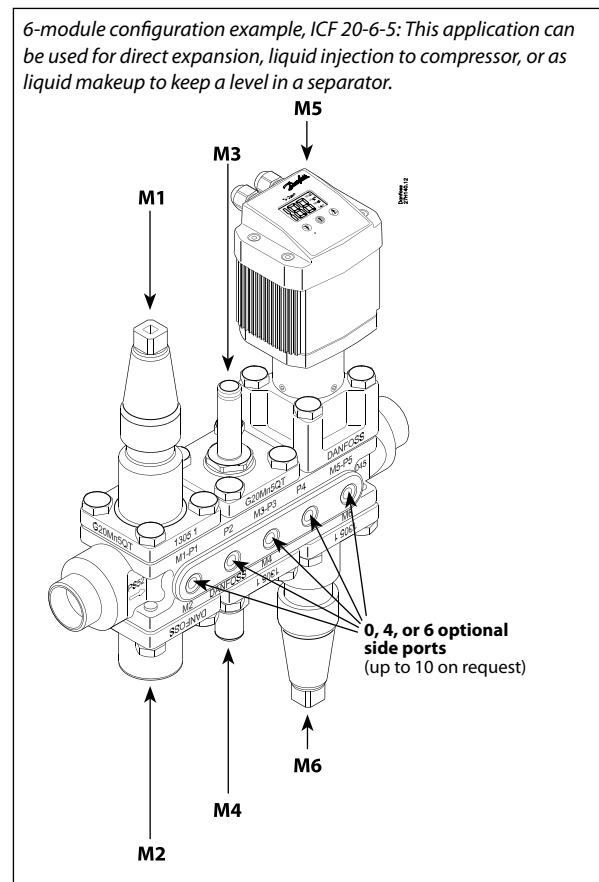
Function Module Type		Can be installed in these locations					
ICFS	Stop valve module	M1	M2	M3	M4	M5	M6
ICFR	Manual regulating (HEV) valve module	M1	M2	M3	M4	M5	M6
ICFF	Filter (strainer) module		M2		M4		M6
ICFE	Solenoid valve module			M3			
ICFC	Check valve module				M4		M6
ICFN	Stop/check valve module				M4		M6
ICM	Motorized valve module	M1		M3		M5	
ICFB	Blank module port cover	M1	M2	M3	M4	M5	M6
ICFA	Electronic expansion valve module for ICF 20 only	M1		M3		M5	
ICFO	Manual opening module for ICFE 20 solenoid				M4		
ICFW	Welding module for ICF 25-40 only	M1	M2	M3	M4	M5	M6

Module locations are indicated by M1, M2, M3, M4, M5, and M6. With respect to refrigerant flow, M1 is closest to inlet.

4-module configuration example, ICF (25-40)-4-9: This application can be used as a hot gas or liquid line solenoid valve station.

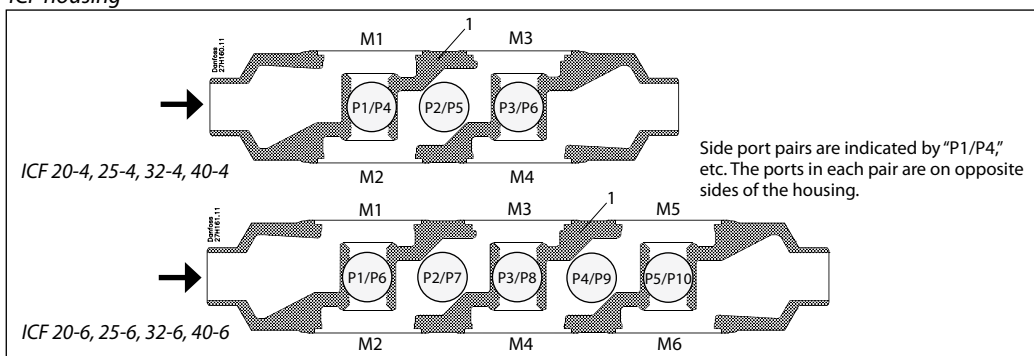


6-module configuration example, ICF 20-6-5: This application can be used for direct expansion, liquid injection to compressor, or as liquid makeup to keep a level in a separator.



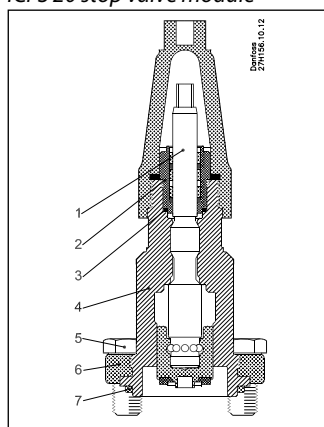
Material specification

ICF housing



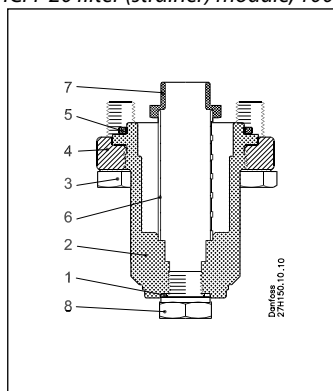
Part	Material	EN	ASTM	JIS
1 Housing	Cast low temperature steel	G20Mn5QT EN 10213-3	LCC, A352	SCPL1, G5151

ICFS 20 stop valve module



Part	Material	EN	ASTM	JIS
1 Spindle	Stainless steel	X8CrNiS 18-9 EN 10088		G4303 G4304
2 Thread part	Stainless steel	X8CrNiS 18-9 EN 10088		G4303 G4304
3 AL-gasket / refrigeration gasket		AL99 alloy no. 1200 DIN 1712 BL.3		
4 Bonnet	Steel	S235JRG2 EN 10025	A283	G3101
5 Hex-head bolt M10 x 25	Stainless steel	A2-70 EN 24017	A320	A2-70
6 Flange	Cast low temperature steel	G20Mn5QT EN 10213-3	A352	G5152
7 Gasket	Chloroprene (Neoprene) / fiber (Non-asbestos)			

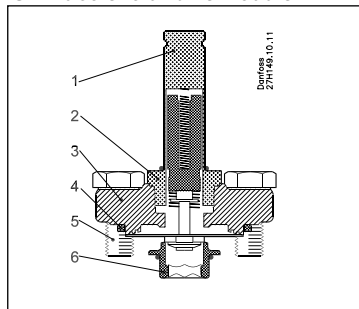
ICFF 20 filter (strainer) module, 100 mesh (150 μ.)



Part	Material	EN	ASTM	JIS
1 Gasket	AL 99 F11			
2 Bonnet	Steel	S235JRG2 EN 10025	A283	G3101
3 Hex-head bolt M10 x 25	Stainless steel	A2-70 EN 24017	A320	A2-70
4 Flange	Cast low temperature steel	G20Mn5QT EN 10213-3	A352	G5152
5 Gasket	Chloroprene (Neoprene) / fiber (Non-asbestos)			
6 Filter (strainer) element	Steel : 150μ with 50 μ removable sleeve			
7 Plug	Steel			
8 Plug*	Stainless steel	A2-70 EN 24017	A320	A2-70

* ICF housings with socket-weld connections will have a 3/8" NPT plug.
ICF housings with butt-weld connections will have a G 1/4" plug.

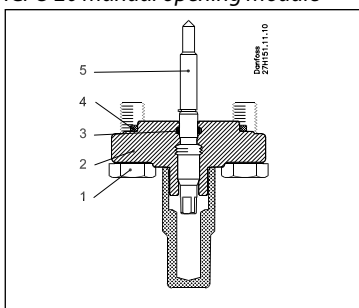
ICFE 20 solenoid valve module



Part	Material	EN	ASTM	JIS
1 Armature tube	Stainless steel	X2CrNi19-11 EN 10088		
2 Armature tube nut	Stainless steel	X8CrNiS18-9 EN 10088		
3 Flange	Cast low temperature steel	G20Mn5QT EN 10213-3	A352	G5152
4 Gasket	Chloroprene (Neoprene) / fiber (non-asbestos)			
5 Hex-Head bolt M10 x 25	Stainless steel	A2-70 EN 24017	A320	A2-70
6 Seat	High density polymer			

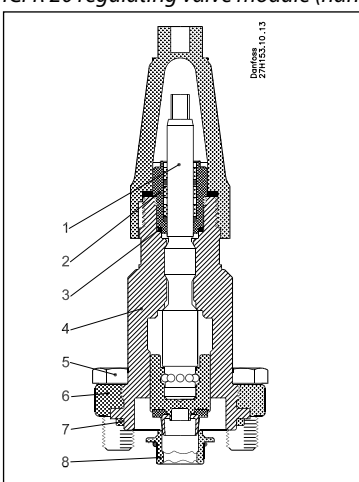
Material specification
(continued)

ICFO 20 manual opening module



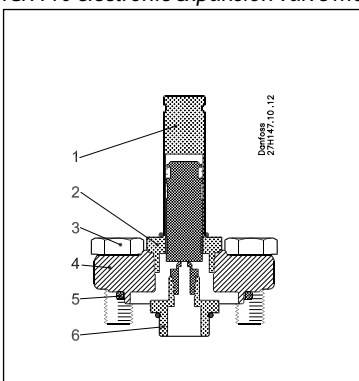
	Part	Material	EN	ASTM	JIS
1	Hex-head bolt M10 × 25	Stainless steel	A2-70 EN 24017	A320	A2-70
2	Flange	Cast low tempera- ture steel	G20Mn5QT EN 10213-3	A352	G5152
3	O-ring	Chloroprene			
4	Rubber gasket	Chloroprene rubber			
5	Spindle	Stainless steel	X8CrNiS 18-9 EN 10088		G4303 G4304

ICFR 20 regulating valve module (hand expansion valve)



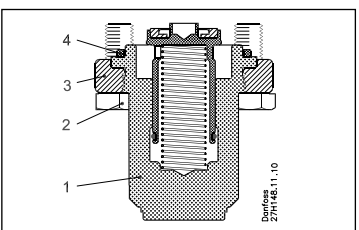
	Part	Material	EN	ASTM	JIS
1	Spindle	Stainless steel	X8CrNiS 18-9 EN 10088		G4303 G4304
2	Thread part	Stainless steel	X8CrNiS 18-9 EN 10088		G4303 G4304
3	AL-gasket		AL99 alloy no. 1200 DIN 1712 BL.3		
4	Bonnet	Steel	S235JRG2 EN 10025	A283	G3101
5	Hex-head bolt M10 × 25	Stainless steel	A2-70 EN 24017	A320	A2-70
6	Flange	Cast low tempera- ture steel	G20Mn5QT EN 10213-3	A352	G5152
7	Gasket	Chloroprene (Neoprene) / fiber (non-asbestos)			
8	Seat	High density polymer			

ICFA 10 electronic expansion valve module



	Part	Material	EN	ASTM	JIS
1	Armature tube	Stainless steel	X2CrNi19-11 EN 10088		
2	Armature tube nut	Stainless steel	X8CrNiS18-9 EN 10088		
3	Hex-head bolt M10 × 25	Stainless steel	A2-70 EN 24017	A320	A2-70
4	Flange	Cast low tempera- ture steel	G20Mn5QT EN 10213-3	A352	G5152
5	Gasket	Chloroprene (Neoprene) / fiber (non-asbestos)			
6	Seat	High density polymer			
6	Adapter	Steel			

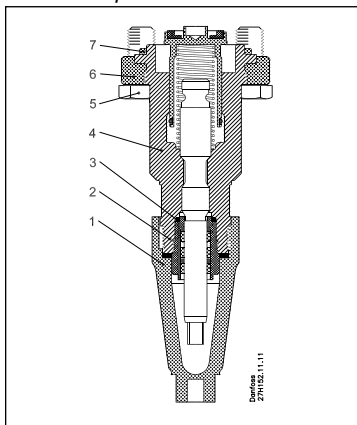
ICFC 20 check valve module



	Part	Material	EN	ASTM	JIS
1	Bonnet	Steel	S235JRG2	A283	G3101
2	Hex-head bolt M10 × 25	Stainless steel	A2-70 EN 24017	A320	A2-70
3	Flange	Cast low tempera- ture steel	G20Mn5QT EN 10213-3	A352	AG5152
4	Gasket	Chloroprene (Neoprene) / fiber (non-asbestos)			

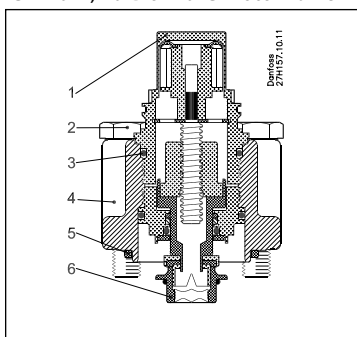
Material specification
(continued)

ICFN 20 stop/check valve module



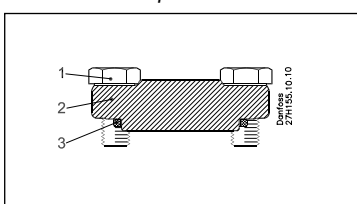
Part	Material	EN	ASTM	JIS
1 Spindle	Stainless steel	X8CrNiS 18-9 EN 10088		G4303 G4304
2 Thread part	Stainless steel	X8CrNiS 18-9 EN 10088		G4303 G4304
3 AL-gasket		AL99 alloy no. 1200 DIN 1712 BL.3		
4 Bonnet	Steel	S235JRG2 EN 10025	A283	G3101
5 Hex-head bolt M10 × 25	Stainless steel	A2-70 EN 24017	A320	A2-70
6 Flange	Cast low tempera- ture steel	G20Mn5QT EN 10213-3	A352	G5152
7 Gasket	Chloroprene (Neoprene) / fiber (non-asbestos)			

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



Part	Material	EN	ASTM	JIS
1 Adapter	Stainless steel	X5CrNi18-10 EN 10088	A240	G4303 G4304
2 Hex-head bolt M10 × 50	Stainless steel	A2-70 EN 24014	A320	A2-70
3 O-ring	Chloroprene			
4 Bonnet	Cast low tempera- ture steel	G20Mn5QT EN 10213-3	A352	G5152
5 Gasket	Chloroprene (Neoprene) / fiber (non-asbestos)			
6 Seat	High density polymer			

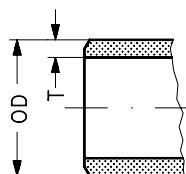
ICFB 20 blank top cover



Pos.	Part	Material	EN	ASTM	JIS
1	Hex-head bolt M10 × 25	Stainless Steel	A2-70 EN 24017	A320	A2-70
2	Flange	Cast low tempera- ture steel	G20Mn5QT EN 10213-3	A352	G5152
3	Gasket	Chloroprene (Neoprene) / fiber (non-asbestos)			

Connections

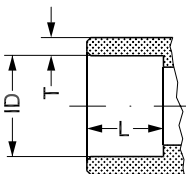
A: Butt-weld ANSI (B 36.10)



Size in.	OD in.	T in.	Schedule
3/4	1.059	0.158	80
1	1.327	0.181	80
1 1/4	1.669	0.193	80
1 1/2	1.902	0.201	80

SOC:

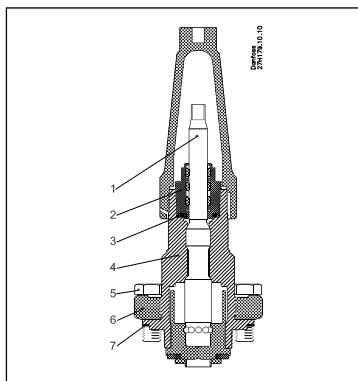
Socket welding ANSI (B 16.11)



Size in.	ID in.	T in.	L in.
3/4	1.071	0.181	0.51
1	1.335	0.284	0.51
1 1/4	1.743	0.240	0.51
1 1/2	1.921	0.260	0.51

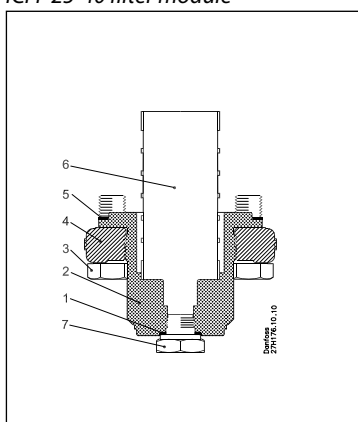
Material specification
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ICFS 25-40 stop valve module



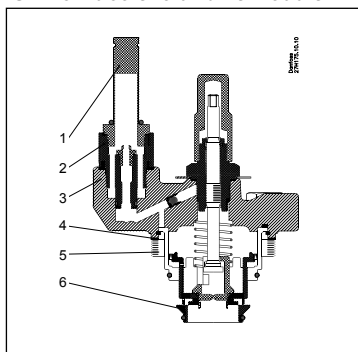
Pos.	Part	Material	EN	ASTM	JIS
1	Spindle	Stainless steel	X8CrNiS 18-9 EN 10088		G4303 G4304
2	Thread part	Stainless steel	X8CrNiS 18-9 EN 10088		G4303 G4304
3	O-ring	Chloroprene			
4	Bonnet	Steel	S235JRG2 EN 10025	A283	G3101
5	Hex-head bolt M12 × 30	Stainless steel	A2-70 EN 24017	A320	A2-70
6	Flange	Cast steel low temperature	G20Mn5QT EN 10213-3	A352	G5152
7	Gasket	Chloroprene (Neoprene) / fiber (non-asbestos)			

ICFF 25-40 filter module



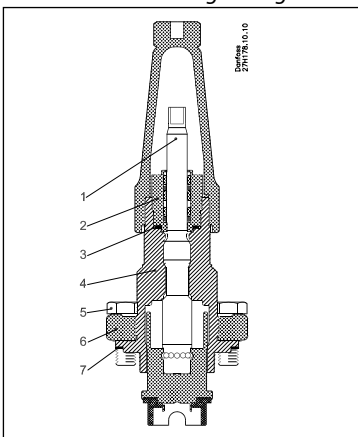
Pos.	Part	Material	EN	ASTM	JIS
1	Al. Gasket	AL 99 F11			
2	Bonnet	Steel	S235JRG2 EN 10025	A283	G3101
3	Hex-head bolt M12 × 30	Stainless steel	A2-70 EN 24017	A320	A2-70
4	Flange	Cast steel low temperature	G20Mn5QT EN 10213-3	A352	G5152
5	Gasket	Chloroprene (Neoprene) / fiber (non-asbestos)			
6	Filter element	Steel 150μ + 50μ			
8	Plug 1/4" RG for butt weld 3/8" NPT for socket weld	Stainless steel	A2-70 EN 24017	A320	A2-70

ICFE 25-40 solenoid valve module



Pos.	Part	Material	EN	ASTM	JIS
1	Armature tube	Stainless steel	X2CrNi19-11 EN 10088		
2	Armature tube nut	Stainless steel	X8CrNiS18-9 EN 10088		
3	Bonnet	Cast steel low temperature	G20Mn5QT EN10213-3	A352	G5152
4	Gasket	Chloroprene (Neoprene) / fiber (non-asbestos)			
5	Hex-Head bolt M10 × 25	Stainless steel	A2-70 EN 24017	A320	A2-70
6	Seat	High density polymer			

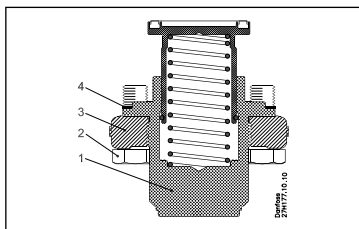
ICFR 25-40 manual regulating valve module



Pos.	Part	Material	EN	ASTM	JIS
1	Spindle	Stainless steel	X8CrNiS 18-9 EN 10088		G4303 G4304
2	Thread part	Stainless steel	X8CrNiS 18-9 EN 10088		G4303 G4304
3	O-ring	Chloroprene			
4	Bonnet	Steel	S235JRG2 EN 10025	A283	G3101
5	Hex-head bolt M12 × 30	Stainless steel	A2-70 EN 24017	A320	A2-70
6	Flange	Cast steel low temperature	G20Mn5QT EN 10213-3	A352	G5152
7	Gasket	Chloroprene (Neoprene) / fiber (non-asbestos)			
8	Seat	High density polymer			

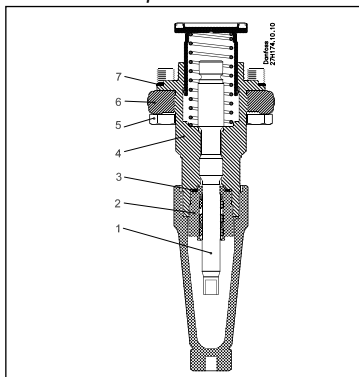
Material specification
(continued)

ICFC 25-40 check valve module



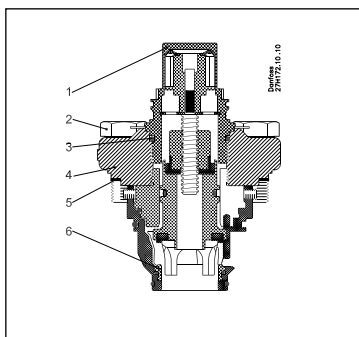
Pos.	Part	Material	EN	ASTM	JIS
1	Bonnet	Steel	S235JRG2	A283	G3101
2	Hex-head bolt M12 × 30	Stainless steel	A2-70 EN 24017	A320	A2-70
3	Flange	Cast steel low temperature	G20Mn5QT EN 10213-3	A352	AG5152
4	Gasket	Chloroprene (Neoprene) / fiber (non-asbestos)			

ICFN 25-40 stop/check valve module



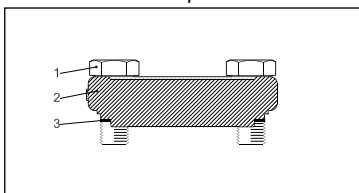
Pos.	Part	Material	EN	ASTM	JIS
1	Spindle	Stainless steel	X8CrNiS 18-9 EN 10088		G4303 G4304
2	Thread part	Stainless steel	X8CrNiS 18-9 EN 10088		G4303 G4304
3	O-ring	Chloroprene			
4	Bonnet	Steel	S235JRG2 EN 10025	A283	G3101
5	Hex-head bolt M12 × 30	Stainless steel	A2-70 EN 24017	A320	A2-70
6	Flange	Cast steel low temperature	G20Mn5QT EN 10213-3	A352	G5152
7	Gasket	Chloroprene (Neoprene) / fiber (non-asbestos)			

ICM 25-A or B motor valve module



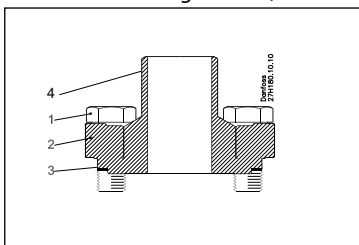
Pos.	Part	Material	EN	ASTM	JIS
1	Adapter	Stainless steel	X5CrNi18-10 EN 10088	A240	G4303 G4304
2	Hex-head bolt M12 × 30	Stainless steel	A2-70 EN 24014	A320	A2-70
3	O-ring	Chloroprene			
4	Bonnet	Cast steel low temperature	G20Mn5QT EN 10213-3	A352	G5152
5	Gasket	Chloroprene (Neoprene) / fiber (non-asbestos)			
6	Seat	High density polymer			

ICFB 25-40 blank top cover



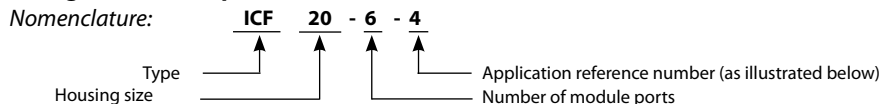
Pos.	Part	Material	EN	ASTM	JIS
1	Hex-head bolt M10 × 25	Stainless Steel	A2-70 EN 24017	A320	A2-70
2	Flange	Cast steel low temperature	G20Mn5QT EN 10213-3	A352	G5152
3	Gasket	Chloroprene (Neoprene) / fiber (non-asbestos)			

ICFW 25-40 welding module, 1"



Pos.	Part	Material	EN	ASTM	JIS
1	Hex-head bolt M10 × 25	Stainless Steel	A2-70 EN 24017	A320	A2-70
2	Flange	Cast steel low temperature	G20Mn5QT EN 10213-3	A352	G5152
3	Gasket	Chloroprene (Neoprene) / fiber (non-asbestos)			
4	Weld connection	Steel	S235JRG2 EN 10025	A283	G3101

Configuration examples - ICF with six function modules



The applications described below for each configuration are the most typical, but the configuration will serve also in other applications not described.

Module locations in relation to refrigerant flow are indicated by M1, M2, M3, M4, M5, and M6.

Application 1: ICF 20-6-1

Pumped liquid lines in flooded systems without hot gas defrost.

The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICFE solenoid valve module (M3)
- ICFO manual opening module (M4) for the solenoid valve
- ICFR manual regulating valve module (M5)
- ICFS stop valve module (M6)

Application 5: ICF 20-6-5A, B, or C cone

Liquid makeup to separators, direct expansion, or liquid injection to compressor. This valve station uses a modulating motorized valve module. A, B, or C represents the cone size of the motorized valve.

The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICFE solenoid valve module (M3)
- ICFO manual opening module (M4) for solenoid valve
- ICM 20-A/20B/20C motor valve module (M5)
- ICFS stop valve module (M6)

Motor for ICM must be ordered separately.

Application 2: ICF 20-6-2

Pumped liquid lines in flooded systems with hot gas defrost.

The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICFE solenoid valve module (M3)
- ICFO manual opening module (M4) for the solenoid valve
- ICFR manual regulating valve module (M5)
- ICFN stop/check valve module (M6)

Application 6: ICF 20-6-6

Valve station for direct expansion or for liquid injection to the compressor. A pulse width modulation electronic expansion valve is used.

The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICFE solenoid valve module (M3)
- ICFO manual opening module (M4) for solenoid valve
- ICFA electronic expansion valve module (M5)
- ICFS stop valve module (M6)

Application 3: ICF 20-6-3

Pumped liquid lines in flooded systems with hot gas defrost, and no manual opening required for solenoid valve.

The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICFE solenoid valve module (M3)
- ICFC check valve module (M4)
- ICFR manual regulating valve module (M5)
- ICFS stop valve module (M6)

Recommendation: For this application side port P5 (or P10) can be used to bypass the defrost condensate back to the defrost relief valve and suction line.

Application 7: ICF 20-6-7

This application can be used for direct expansion where a check valve is required.

The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICFA electronic expansion valve module (M3)
- ICFC check valve module (M4)
- ICFB blank top cover (M5)
- ICFS stop valve module (M6)

Application 4: ICF 20-6-4

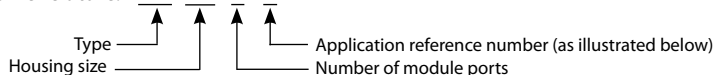
A hot gas or liquid line solenoid valve station. When used in a hot gas line, the side ports can be used to power a gas-powered valve.

The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICFE solenoid valve module (M3)
- ICFO manual opening module (M4) for the solenoid valve
- ICFB blank top cover (M5)
- ICFS stop valve module (M6)

Configuration examples - ICF with four function modules

Nomenclature: **ICF 20-4-9**



The applications described below for each configuration are the most typical, but the configuration will serve also in other applications not described.

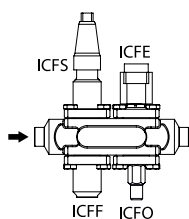
Module locations in relation to refrigerant flow are indicated by M1, M2, M3, and M4.

Application 8: ICF 20-4-8

A hot gas or liquid line solenoid valve station where no stop valve is needed on the outlet side.

The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICFE solenoid valve module (M3)
- ICFO manual opening module (M4)

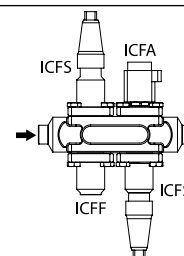


Application 12: ICF 20-4-12

Valve station using electronic pulse width modulating expansion valve module for direct expansion or for liquid injection to compressor.

The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICFA electronic expansion valve module (M3)
- ICFS stop valve module (M4)

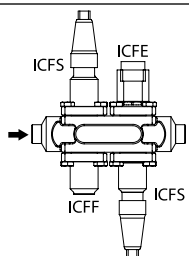


Application 9: ICF 20-4-9

A hot gas or liquid line solenoid valve station where no manual stem is needed for the solenoid valve.

The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICFE solenoid valve module (M3)
- ICFS stop valve module (M4)

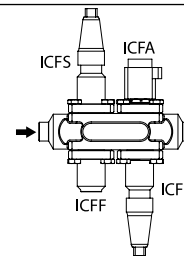


Application 13: ICF 20-4-13

Valve station using electronic pulse width modulation valve module for direct expansion where a check valve is required.

The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICFA electronic expansion valve module (M3)
- ICFN stop/check valve module (M4)

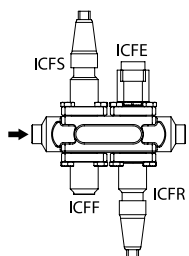


Application 10: ICF 20-4-10

Pumped liquid lines of flooded systems without hot gas defrost, where no manual stem is needed for the solenoid valve.

The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICFE solenoid valve module (M3)
- ICFR manual regulating valve module (M4)



Application 14: ICF 20-4-14A, B or C.

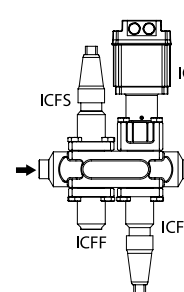
Valve station using modulating motorized valve module for liquid make-up to separator, direct expansion, or liquid injection to compressor. A, B, or C represents the cone size of the motorized valve. A battery backup or UPS must be connected to the motorized valve for it to close during power failure.

The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICM 20-A/20B/20C motor valve module (M3)
- ICFS stop valve module (M4)

Motor for ICM must be ordered separately.

(This configuration is the same as for application 5, but without solenoid valve)

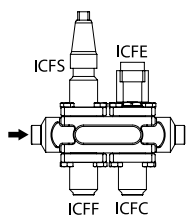


Application 11: ICF 20-4-11

Liquid line solenoid valve to feed multiple evaporators with individual hand regulating or expansion valves and hot gas defrost.

The modules are:

- ICFS stop valve module
- ICFF filter module
- ICFE solenoid valve module
- ICFC check valve module



ICF (25-40)-6

Configuration examples - ICF with six function modules

Nomenclature: **ICF 25-6-3**

Type ↑ Application reference number (as illustrated below)
 Housing size ↑ Number of module ports

The applications described below for each configuration are the most typical, but the configuration will serve also in other applications not described.

Module locations in relation to refrigerant flow are indicated by M1, M2, M3, M4, M5, and M6.

Application 1: ICF (25-40)-6-1A or B

Pumped liquid lines in flooded systems without hot gas defrost.

The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICFE solenoid valve module (M3)
- ICFB blank port cover (M4)
- ICFR A or B manual regulating (HEV) valve module (M5)
- ICFS stop valve module (M6)

Application 5: ICF (25-40)-6-5A or B

Motorized valve station with solenoid. 'A' cones can be used for liquid makeup, direct expansion, or liquid injection to compressor. The 'B' cone can only be used for pressure regulation.

The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICFE solenoid valve module (M3)
- ICFB blank port cover (M4)
- ICM 25-A or B motor valve module (M5)
- ICFS stop valve module (M6)

Motor-actuator for ICM must be ordered separately.

Application 3: ICF (25-40)-6-3A or B

Pumped liquid lines in flooded systems with hot gas defrost.

The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICFE solenoid valve module (M3)
- ICFC check valve module (M4)
- ICFR A or B manual regulating (HEV) valve module (M5)
- ICFS stop valve module (M6)

Recommendation: for this application side port P5 (or P10) can be used for small capacities to bypass the defrost condensate back to the defrost relief valve and suction line.

Application 15: ICF 20-6-15A or B

Pumped liquid lines in flooded systems with hot gas defrost. An ICFW welding module is used to drain defrost condensate to a defrost relief regulator, and the hand regulating (HEV) valve will also be used as a stop valve.

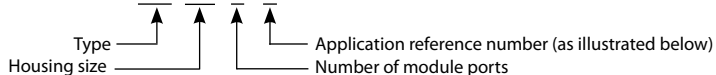
The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICFE solenoid valve module (M3)
- ICFC check valve module (M4)
- ICFW external connection welding module (M5)
- ICFR A or B manual regulating valve module (M6)

ICF (25-40)-4

Configuration examples - ICF with four function modules

Nomenclature: **ICF 25-4-9**



The applications described below for each configuration are the most typical, but the configuration will serve also in other applications not described.

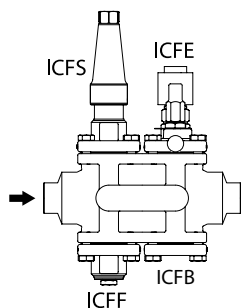
Module locations in relation to refrigerant flow are indicated by M1, M2, M3, and M4.

Application 8: ICF (25-40)-4-8

A hot gas or liquid line solenoid valve station where no stop valve is needed on the outlet side

The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICFE solenoid valve module (M3)
- ICFB blank port cover (M4)

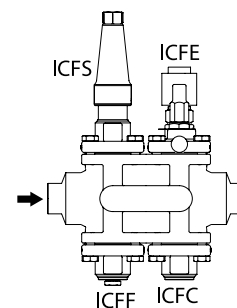


Application 11: ICF (25-40)-4-11

Liquid line solenoid valve to feed multiple evaporators with individual hand regulating or expansion valves and hot gas defrost.

The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICFE solenoid valve module (M3)
- ICFC check valve module (M4)

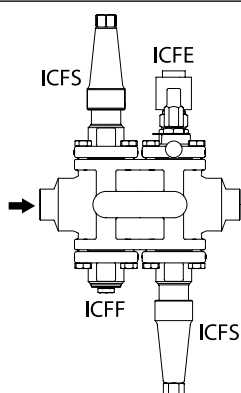


Application 9: ICF (25-40)-4-9

A hot gas or liquid line solenoid valve station.

The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICFE solenoid valve module (M3)
- ICFS stop valve module (M4)



Application 14: ICF (25-40)-4-14A or B.

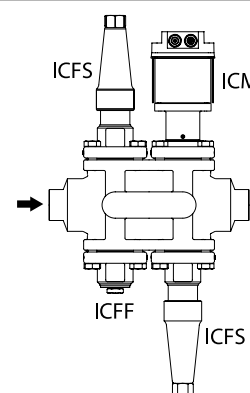
Motorized valve station without solenoid. 'A' cones can be used for liquid makeup, direct expansion, or liquid injection to compressor. The 'B' cone can only be used for pressure regulation or on/off solenoid function. A battery backup or UPS must be connected to the motorized valve for it to close during power failure.

The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICM 25 A or B motor valve module (M3)
- ICFS stop valve module (M4)

(same as application 5, but without solenoid valve)

Motor-actuator for ICM module must be purchased separately.

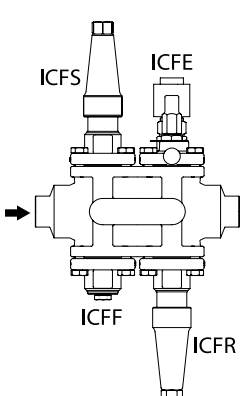


Application 10: ICF (25-40)-4-10A or B

A solenoid valve station for pumped liquid lines of flooded systems without hot gas.

The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICFE solenoid valve module (M3)
- ICFR A or B manual regulating valve module (M4)

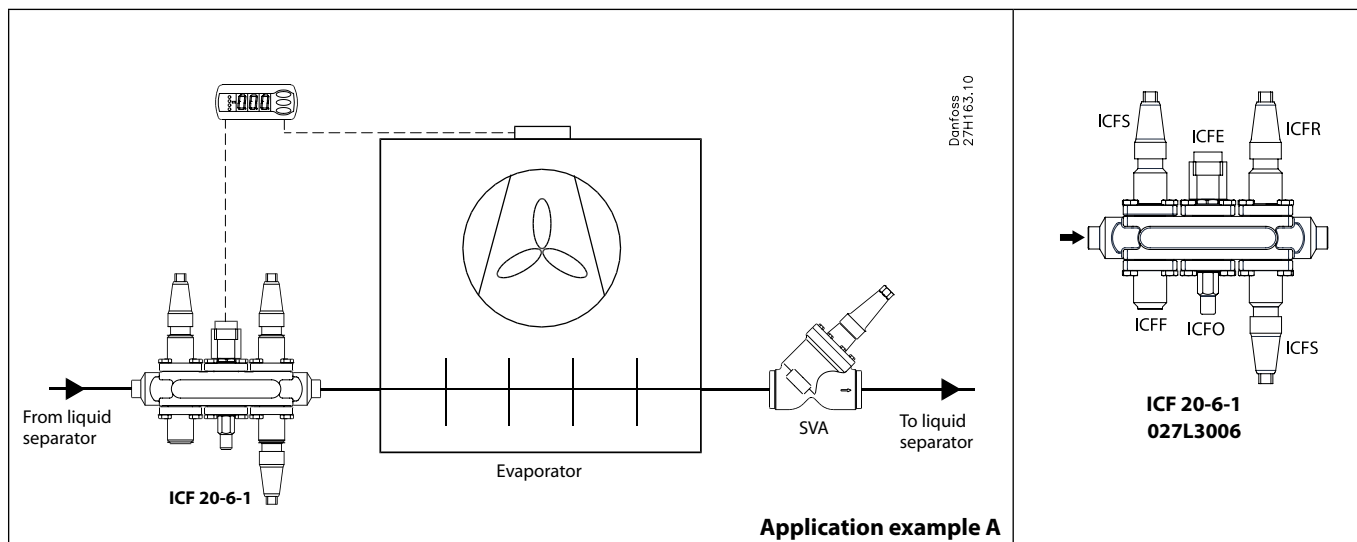


Application Example A

A valve station is required for a flooded evaporator operated on and off by a thermostat, and with electric defrost. Manual opening of the solenoid valve is required. Pipe dimension is 1", and the preferred connection is socket weld. There is no requirement for a sight glass nor for

side pressure gauge or drain connections.

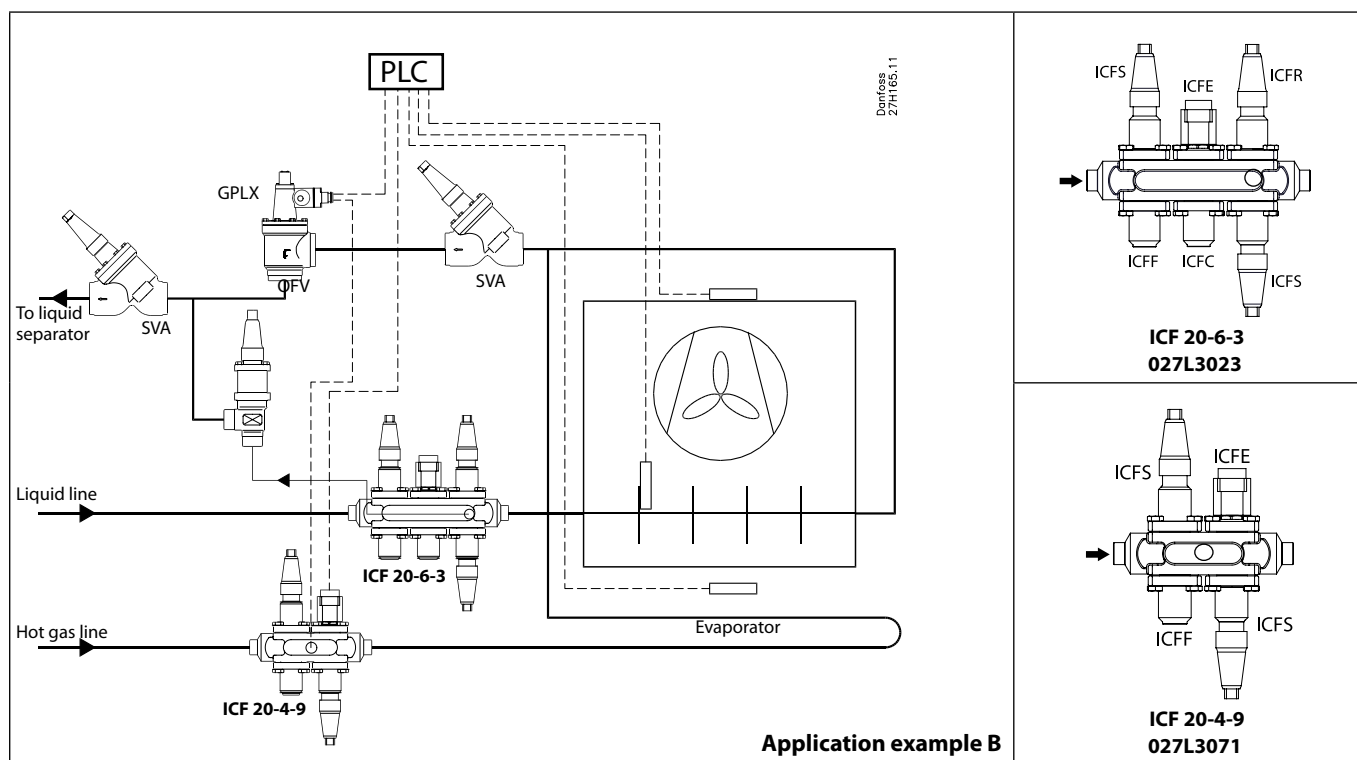
Depending on capacity, choose either ICF 20-6-1 (code number 027L3006) or ICF 25-6-1A (code number 027L4001). For this example, ICF 20-6-1 was used.



Application Example B

Valve stations are required for a flooded evaporator with hot gas defrost. The pumped liquid line size is 3/4" and the preferred connection is socket weld. No manual opening stem is needed, and a side port is needed to drain defrost condensate to the defrost relief valve. For this application, ICF 20-6-3 (code number 027L3023) was chosen.

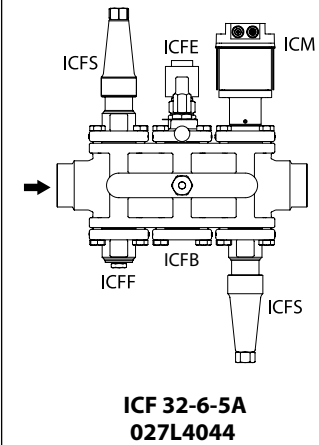
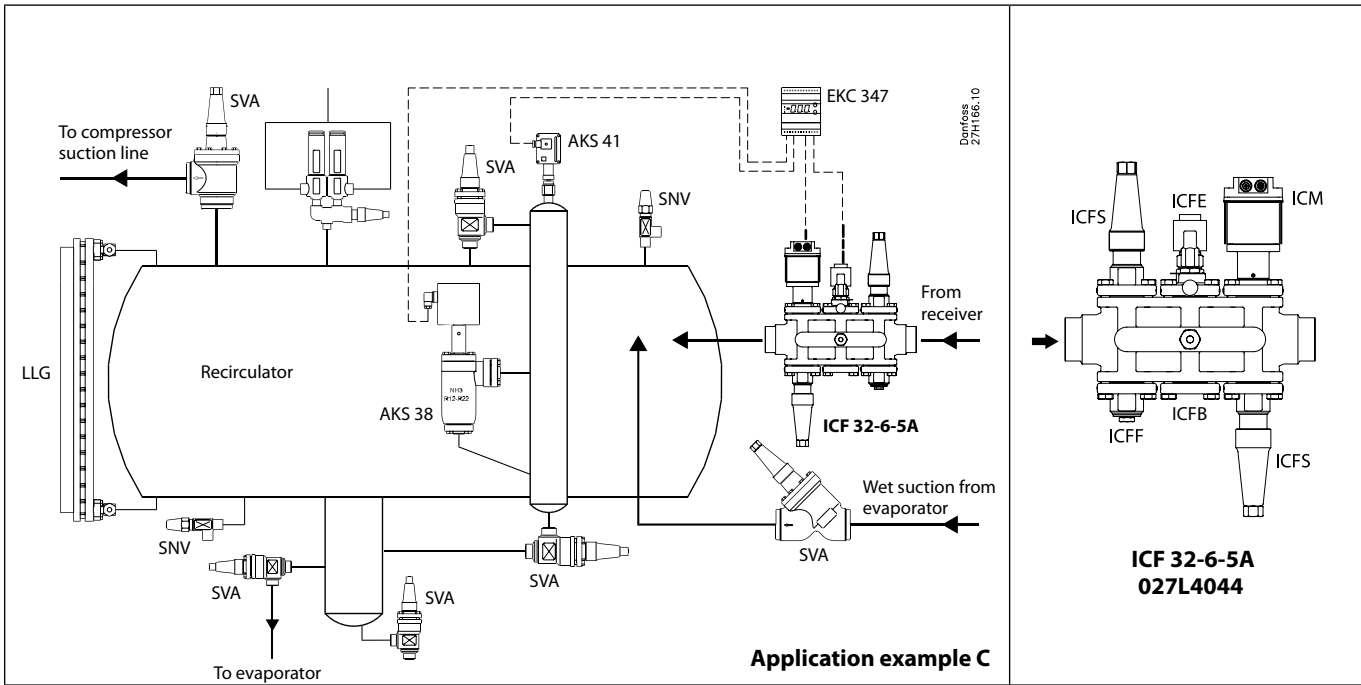
The hot gas line size is 1" and the preferred connection is socket weld. No manual opening stem is needed, and side ports are needed to connect the hot gas pilot line to the gas-powered valve. For this application, ICF20-4-9 (code number 027L3071) was chosen. For a larger capacity, ICF 25-4-9 would have been chosen.



Application Example C

A valve station using a motorized valve is required for liquid makeup to a recirculator. A solenoid valve in front of the motorized valve and side ports for sight glasses are requested. The

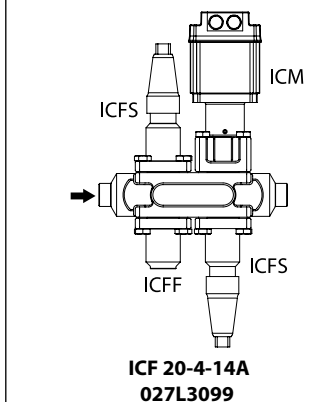
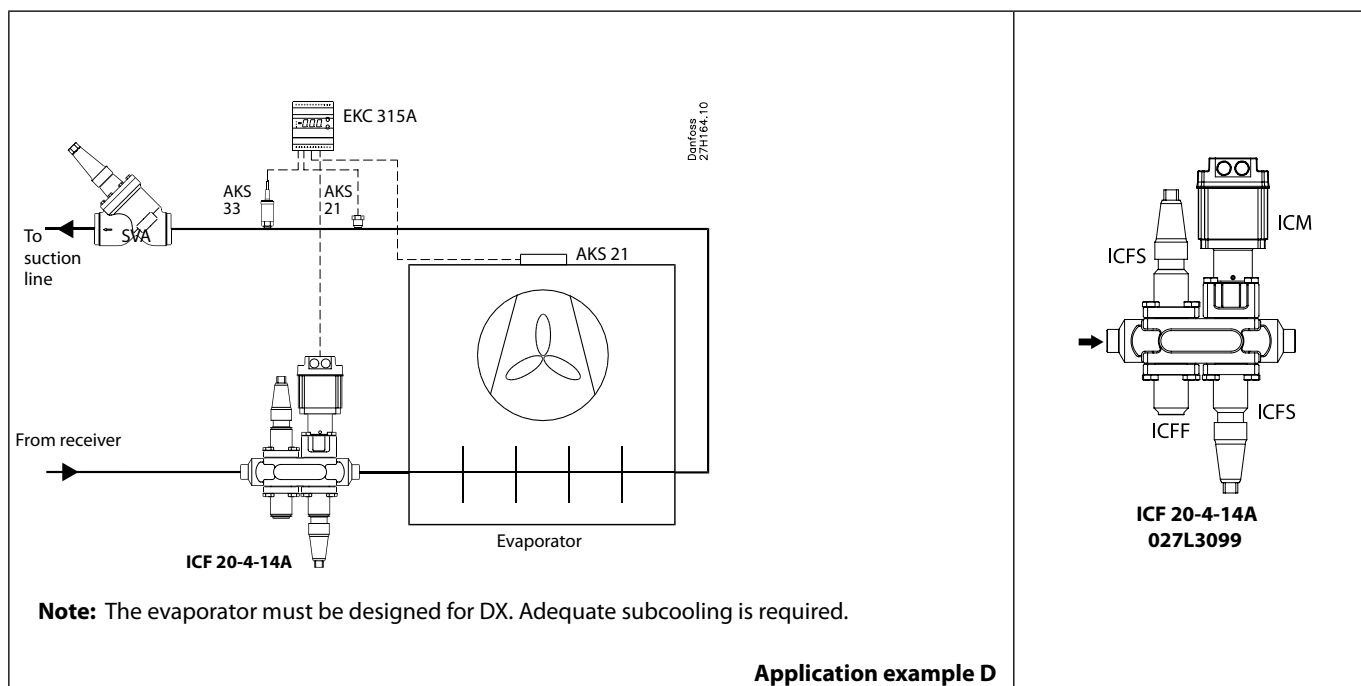
pipe size is 1 ¼" and the preferred connection is socket weld. For this application, ICF 32-6-5A was chosen.



Application Example D

A valve station is required for a direct expansion evaporator using an electronic expansion valve and electric defrost. It is not required to have a solenoid valve in front of the motorized valve. Pipe dimension is ¾ in, and the preferred connection is socket weld. There are requirements for side connections for a sight glass, drain, and pressure gauges.

For this application, the capacity was assumed to be small, and ICF 20-4-14A (code number 027L3099) was chosen. For larger capacities, a larger cone size or a larger ICF (25-40)-4-14 would have been chosen.



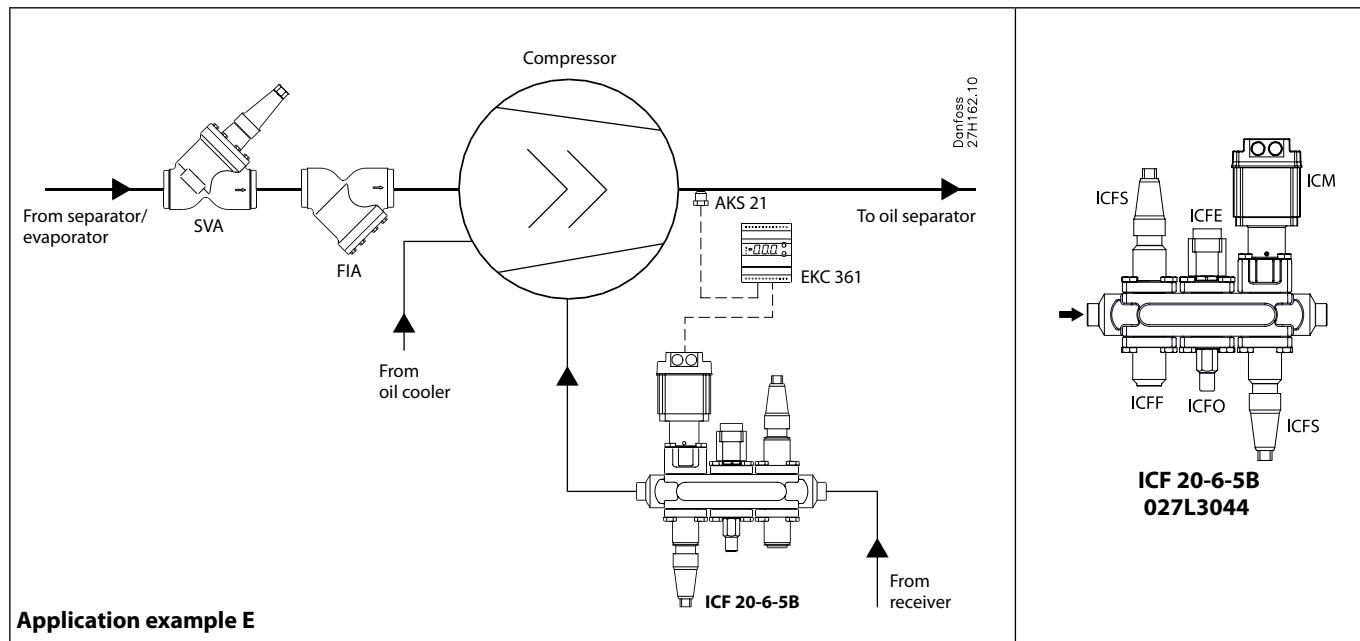
Note: The evaporator must be designed for DX. Adequate subcooling is required.

Application Example E

A valve station is required for compressor liquid injection using a motorized valve. A solenoid valve is required in front of the motorized valve. Pipe dimension is 1", and socket weld connections are preferred. There is no requirement for a sight glass or for

side drain or pressure gauge connections.

For this application, choose ICF 20-6-5B (code number 0273044). For larger capacities, a larger cone size or a larger ICF (25-40)-6-5 would be the right choice.



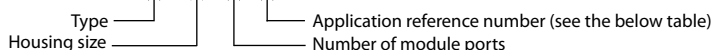
Application example E

**ICF 20-6-5B
027L3044**

Ordering ICF 20 with six function modules

ICF 20-6

Nomenclature: **ICF 20-6-4**



Standard configurations are shown below.

For special order configurations, see pages 24-27.

Application 1: ICF 20-6-1

Pumped liquid lines in flooded systems without hot gas defrost.

The modules are:

- ICFS stop valve module (M1)
- ICFE filter module (M2)
- ICFE solenoid valve module (M3)
- ICFO manual opening module (M4) for the solenoid valve
- ICFR manual regulating valve module (M5)
- ICFS stop valve module (M6)

Application 4: ICF 20-6-4

A hot gas or liquid line solenoid valve station. When used in a hot gas line, the side ports can be used to power a gas-powered valve.

The modules are:

- ICFS stop valve module (M1)
- ICFE filter module (M2)
- ICFE solenoid valve module (M3)
- ICFO manual opening module (M4) for the solenoid valve
- ICFB blank top cover (M5)
- ICFS stop valve module (M6)

Application 2: ICF 20-6-2

Pumped liquid lines in flooded systems with hot gas defrost.

The modules are:

- ICFS stop valve module (M1)
- ICFE filter module (M2)
- ICFE solenoid valve module (M3)
- ICFO manual opening module (M4) for the solenoid valve
- ICFR manual regulating valve module (M5)
- ICFN stop/check valve module (M6)

Application 5: ICF 20-6-5A, B or C

For liquid makeup to separators, direct expansion, or liquid injection to compressor. This valve station uses a modulating motorized valve module. A, B, or C represents the cone size of the motorized valve.

The modules are:

- ICFS stop valve module (M1)
- ICFE filter module (M2)
- ICFE solenoid valve module (M3)
- ICFO manual opening module (M4) for solenoid valve
- ICM 20-A/20B/20C motor valve module (M5)
- ICFS stop valve module (M6)

Motor for ICM must be ordered separately.

Code numbers for ordering are given in the following table.

Each code number represents a completely assembled valve station with all components as shown above except for coils and ICAD motor where applicable.

Type	Connection	Side Ports Number and size*	ICF Part Number	ICF 20 description
ICF 20-6-1	3/4 in. SOC	none	027L3125	ICF 20-6-1: Stop valve, strainer, solenoid valve with manual stem, HEV, stop valve modules.
	1 in. SOC		027L3006	
	1 1/4 in. SOC		027L3128	
ICF 20-6-2	3/4 in. SOC	none	027L3126	ICF 20-6-2: Stop valve, strainer, solenoid valve with manual stem, HEV, stop/check valve modules.
	1 in. SOC		027L3015	
	1 1/4 in. SOC		027L3129	
ICF 20-6-4	3/4 in. SOC	6 (3/8" NPT)	027L3124	ICF 20-6-4: Stop valve, strainer, solenoid valve with manual stem, blank cover, stop valve modules.
	1 in. SOC		027L3032	
	1 1/4 in. SOC		027L3033	
ICF 20-6-5A **	3/4 in. SOC	6, (3/8" NPT)	027L3038 **	ICF 20-6-5: Stop valve, strainer, solenoid valve with manual stem, motorized ICM, stop valve. Note: ICAD motor actuator (P/N 027H1200) for ICM module and coils are not included and must be ordered separately. Please refer to the section "Ordering accessories."
ICF 20-6-5B **	3/4 in. SOC	6 (3/8" NPT)	027L3127 **	
	1 in. SOC		027L3045 **	
ICF 20-6-5C **	1 in. SOC	6 (3/8" NPT)	027L3051 **	
	1 1/4 in. SOC		027L3052 **	

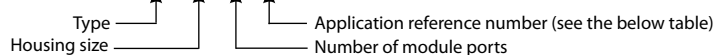
SOC = Socket welding ANSI (B 16.11)

* ICF configuration ICF 20-6-5A, B or C ordered with 6 side ports are shipped with removable sight glasses in locations P4/P9 and removable plugs in locations P2/P7 and P5/P10. All other configurations with 6 side ports will be shipped with removable plugs in locations P2/P7, P4/P9, and P5/P10 (see page 8 for an explanation of side port locations).

** ICAD motor actuator (P/N 027H1200) for ICM module and coils for solenoid valve modules are not included, and must be ordered separately. Refer to the section "Ordering accessories."

Ordering ICF 20 with four function modules

Nomenclature: ICF 20 - 4 - 12



Standard configurations are shown below.

For special order configurations, see pages 24-27.

Application 12: ICF 20-4-12

Valve station using electronic pulse width modulating expansion valve module for direct expansion or for liquid injection to compressor.

The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICFA electronic expansion valve module (M3)
- ICFS stop valve module (M4)

Application 14: ICF 20-4-14A, B or C.

Valve station using modulating motorized valve module for liquid make-up to separator, direct expansion, or liquid injection to compressor. A, B, or C represents the cone size of the motorized valve. A battery backup or UPS must be connected to the motorized valve for it to close during power failure.

The modules are:

- ICFS stop valve module (M1)
- ICFF filter module (M2)
- ICM 20-A/20B/20C motor valve module (M3)
- ICFS stop valve module (M4)

Motor for ICM must be ordered separately.

(This configuration is the same as for application 5, but without solenoid valve)

Code numbers for ordering are given in the following table.

Each code number represents a completely assembled valve station with all components as shown above except for coils and ICAD motor where applicable..

Type	Connection	Side Ports Number and size*	ICF Part Number	ICF 20 description
ICF 20-4-12	3/4 in. SOC	4 (3/8" NPT)	027L3091	ICF 20-4-12: Stop valve, strainer, electronic expansion valve, stop valve module.
ICF 20-4-14A **	3/4 in. SOC	4 (3/8" NPT)	027L3099 **	ICF 20-4-14: Stop valve, strainer, motorized ICM, stop valve module. Note: ICAD and coils are not included and must be ordered separately. Please refer to the section "Ordering accessories."
ICF 20-4-14B **	1 in. SOC	4 (3/8" NPT)	027L3106 **	
ICF 20-4-14C **	1 in. SOC	4 (3/8" NPT)	027L3112 **	
	1 1/4 in. SOC		027L3113 **	

SOC = Socket welding ANSI (B 16.11)

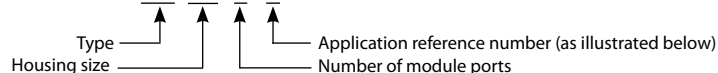
* ICF configurations ICF 20-4-12 and ICF 20-4-14A, B or C ordered with 4 side ports are shipped with removable sight glasses in locations P2/P5 and removable plugs in locations P3/P6 (see page 8 for an explanation of side port locations).

** ICAD motor-actuator (P/N 027H1200) for ICM module and coils for solenoid valve modules are not included, and must be ordered separately. Refer to the section "Ordering accessories."

Configuration examples - ICF with four function modules

ICF (25-40)-4

Nomenclature: ICF 25 - 4 - 9



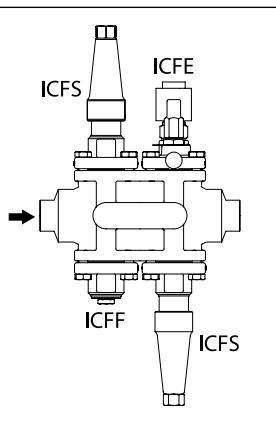
Standard configurations are shown below.
For special order configurations, see pages 24-27.

Application 9: ICF (25-40)-4-9

A hot gas or liquid line solenoid valve station.

The modules are:

- ICFS stop valve module (M1)
- ICFE filter module (M2)
- ICFE solenoid valve module (M3)
- ICFS stop valve module (M4)



Application 14: ICF (25-40)-4-14A or B.

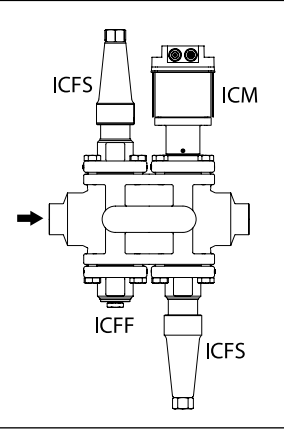
Motorized valve station without solenoid. 'A' cones can be used for liquid makeup, direct expansion, or liquid injection to compressor. The 'B' cone can only be used for pressure regulation or on/off solenoid function. A battery backup or UPS must be connected to the motorized valve for it to close during power failure.

The modules are:

- ICFS stop valve module (M1)
- ICFE filter module (M2)
- ICM 25 A or B motor valve module (M3)
- ICFS stop valve module (M4)

(same as application 5, but without solenoid valve)

Motor-actuator for ICM module must be purchased separately.



Code numbers for ordering are given in the following table.
Each code number represents a completely assembled valve station with all components as shown above except for coils and ICAD motor where applicable.

Type	Connection	Side Ports Number and size*	ICF Part Number	ICF 25-40 description
ICF 25-4-9	1 in. SOC	4 (3/8" NPT)	027L4064	ICF (25-40)-4-9: Stop valve, strainer, solenoid valve with manual stem, stop valve modules.
ICF 32-4-9	1 1/4 in. SOC		027L4069	
ICF 40-4-9	1 1/2 in. SOC		027L4073	
ICF 25-4-14A**	1 in. SOC	4 (3/8" NPT)	027L4104**	ICF (25-40)-6-14 A or B cone: Stop valve, strainer, motorized ICM, stop valve modules.
ICF 32-4-14A**	1 1/4 in. SOC		027L4109**	
ICF 32-4-14B**	1 1/4 in. SOC		027L4114**	
ICF 40-4-14B**	1 1/2 in. SOC		027L4118**	

SOC = Socket welding ANSI (B 16.11)

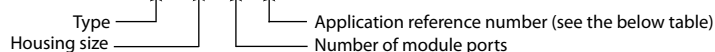
* ICF configuration ICF (25-40)-14A or B ordered with 4 side ports are shipped with removable sight glasses in locations P2/P5 and removable plugs in locations P3/P6. All other configurations with 4 side ports are shipped with removable plugs in locations P2/P5 and P3/P6 (see page 8 for an explanation of side port locations).

** ICAD motor actuator (P/N 027H1200) for ICM module and coils for solenoid valve modules are not included, and must be ordered separately. Refer to the section "Ordering accessories."

Ordering ICF 20 with six function modules: special order configurations

ICF 20-6

Nomenclature: **ICF 20-6-4**



In the drawings and ordering table below, standard configurations are shown in bold type. Special order configurations appear in regular type.

<p>ICF 20-6-1</p> <p>Fig. 1, application 1 STANDARD</p>	<p>ICF 20-6-2</p> <p>Fig. 2, application 2 STANDARD</p>	<p>ICF 20-6-3</p> <p><i>Fig. 3, application 3</i> <i>SPECIAL ORDER</i></p>	<p>ICF 20-6-4</p> <p>Fig. 4, application 4 STANDARD</p>
<p>ICF 20-6-5A, B or C</p> <p>Fig. 5, application 5 STANDARD</p>	<p>ICF 20-6-6</p> <p><i>Fig. 6, application 6</i> <i>SPECIAL ORDER</i></p>	<p>ICF 20-6-7</p> <p><i>Fig. 7, application 7</i> <i>SPECIAL ORDER</i></p>	

Code numbers

The code numbers refer to one complete assembled control solution.

Standard configurations are indicated by bold type. Special order configurations are indicated by regular type.

Connection***	Side Ports Number and size*	Application reference number (see page 13)								
		1	2	3	4	5	5	6	7	
		ICF 20-6-1 <i>Fig. 1</i>	ICF 20-6-2 <i>Fig. 2</i>	ICF 20-6-3 <i>Fig. 3</i>	ICF 20-6-4 <i>Fig. 4</i>	ICF 20-6-5A <i>Fig. 5 **</i>	ICF 20-6-5B <i>Fig. 5 **</i>	ICF 20-6-5C <i>Fig. 5 **</i>	ICF 20-6-6 <i>Fig. 6</i>	ICF 20-6-7 <i>Fig. 7</i>
3/4 in. SOC	None	027L3125	027L3126							
	6 (3/8" NPT)	027L3005	027L3014	027L3023	027L3124	027L3038 **	027L3127 **		027L3055	027L3058
1 in. SOC	None	027L3006	027L3015	027L3024	027L3031	027L3039 **	027L3044 **	027L3050 **		
	6 (3/8" NPT)	027L3007	027L3016	027L3025	027L3032	027L3040 **	027L3045 **	027L3051 **		
1 1/4 in. SOC	None	027L3128	027L3129							
	6 (3/8" NPT)	027L3008	027L3017	027L3026	027L3033			027L3052 **		

SOC = Socket welding ANSI (B 16.11)

Not available

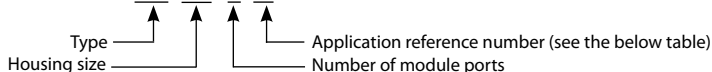
* ICF bodies with 6 side ports and with an ICFA or ICM module are shipped with removable sight glasses in locations P4/P9 and removable plugs in locations P2/P7 and P5/P10. All other configurations with 6 side ports will be shipped with removable plugs in locations P2/P7, P4/P9, and P5/P10 (see page 8 for an explanation of side port locations).

** ICAD motor-actuator (P/N 027H1200) for ICM module and coils for solenoid valve modules are not included, and must be ordered separately. Refer to the section "Ordering accessories."

***For butt-weld connections, contact Danfoss.

Ordering ICF 20 with four function modules

Nomenclature: **ICF 20-4-12**



In the drawings and ordering table below, standard configurations are shown in bold type. Special order configurations appear in regular type.

<p>ICF 20-4-8</p> <p>Fig 8, application 8 <i>SPECIAL ORDER</i></p>	<p>ICF 20-4-9</p> <p>Fig. 9, application 9 <i>SPECIAL ORDER</i></p>	<p>ICF 20-4-10</p> <p>Fig. 10, application 10 <i>SPECIAL ORDER</i></p>	<p>ICF 20-4-11</p> <p>Fig. 11, application 11 <i>SPECIAL ORDER</i></p>
<p>ICF 20-4-12</p> <p>Fig. 12, application 12 STANDARD</p>	<p>ICF 20-4-13</p> <p>Fig. 13, application 13 <i>SPECIAL ORDER</i></p>	<p>ICF 20-4-14A, B or C</p> <p>Fig. 14, application 14 STANDARD</p>	

Code numbers

Each code numbers refer to a complete assembled control solution. Standard configurations are indicated by bold type. Special order configurations are indicated by regular type.

Connection***	Side Ports Number and size*	Application reference number (see page 14)								
		8	9	10	11	12	13	14	14	14
		ICF 20-4-8 <i>Fig. 8</i>	ICF 20-4-9 <i>Fig. 9</i>	ICF 20-4-10 <i>Fig. 10</i>	ICF 20-4-11 <i>Fig. 11</i>	ICF 20-4-12 <i>Fig. 12</i>	ICF 20-4-13 <i>Fig. 13</i>	ICF 20-4-14A <i>Fig. 14 **</i>	ICF 20-4-14B <i>Fig. 14 **</i>	ICF 20-4-14C <i>Fig. 14 **</i>
³ / ₄ in. SOC	4			027L3078		027L3091	027L3094	027L3099 **		
1 in. SOC	None	027L3063	027L3070	027L3079	027L3086			027L3100 **	027L3105 **	027L3111 **
	4	027L3064	027L3071	027L3080	027L3087			027L3101 **	027L3106 **	027L3112 **
1 ¹ / ₄ in. SOC	4	027L3065	027L3072	027L3081	027L3088					027L3113 **

SOC = Socket welding ANSI (B 16.11)

 Not available

* ICF bodies with 4 side ports and with an ICFA or ICM module are shipped with removable sight glasses in locations P2/P5 and removable plugs in locations P3/P6. All other configurations with 4 side ports are shipped with removable plugs in locations P2/P5 and P3/P6 (see page 8 for an explanation of side port locations).

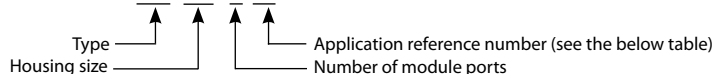
** ICAD motor-actuator (P/N 027H1200) for ICM module and coils for solenoid valve modules are not included, and must be ordered separately. Refer to the section "Ordering accessories."

***For butt-weld connections, contact Danfoss.

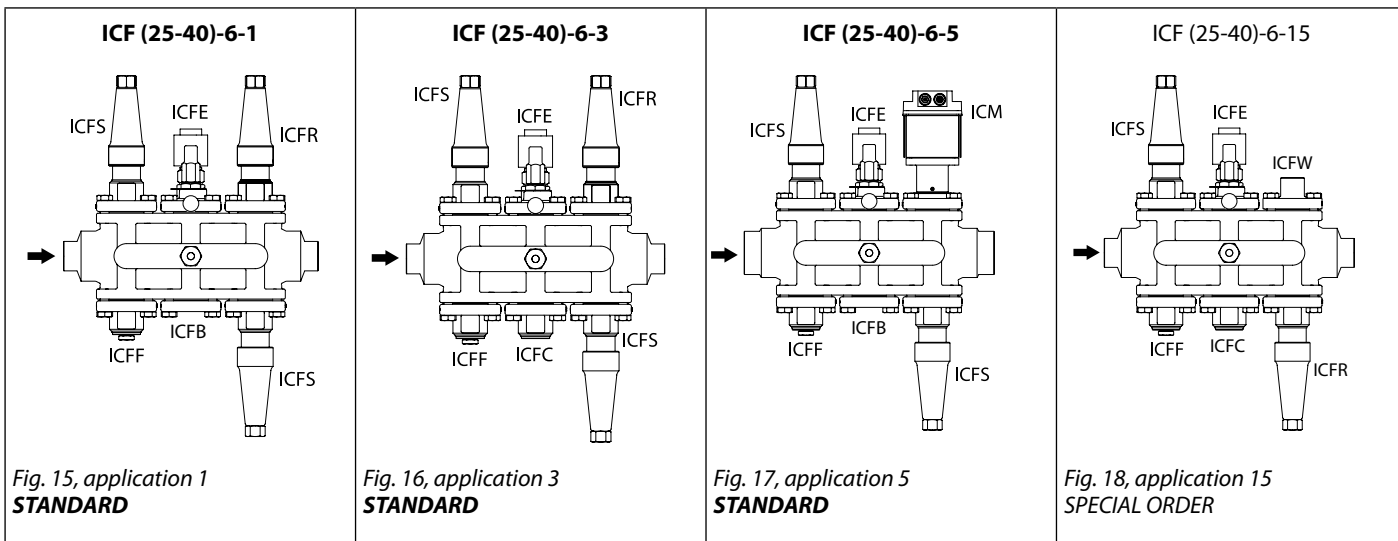
ICF (25-40)-6

Ordering ICF 25-40 with six function modules

Nomenclature: **ICF 25-6-3**



In the drawings and ordering table below, standard configurations are shown in bold type. Special order configurations appear in regular type.



Code numbers

The code numbers refer to one complete assembled control solution.

Standard configurations are indicated by bold type. Special order configurations are indicated by regular type.

Connection***	Side Ports Number and size*	Application reference number (see page 15)							
		1A	1B	3A	3B	5A	5B	15A	15B
		ICF 25-6-1A ICF 32-6-1A <i>Fig. 15</i>	ICF 32-6-1B ICF 40-6-1B <i>Fig. 15</i>	ICF 25-6-3A ICF 32-6-3A <i>Fig. 16</i>	ICF 32-6-3B ICF 40-6-3B <i>Fig. 16</i>	ICF 25-6-5A ICF 32-6-5A <i>Fig. 17</i>	ICF 32-6-5B ICF 40-6-5B <i>Fig. 17</i>	ICF 25-6-15A <i>Fig. 18</i>	ICF 32-6-15B ICF 40-6-15B <i>Fig. 18</i>
1 in. SOC	None	027L4001		027L4019		027L4037**		027L4120	
1 1/4 in. SOC	None	027L4005	027L4010	027L4023	027L4028	027L4041**	027L4046**		027L4124
1 1/2 in. SOC	None		027L4015		027L4033		027L4051**		027L4129
1 in. SOC	6 (3/8" NPT)	027L4003		027L4021		027L4039**		027L4122	
1 1/4 in. SOC	6 (3/8" NPT)	027L4008	027L4013	027L4026	027L4031	027L4044**	027L4049**		027L4127
1 1/2 in. SOC	6 (3/8" NPT)		027L4017		027L4035		027L4053**		027L4131

SOC = Socket welding ANSI (B 16.11)

Not available

* ICF configuration ICF (25-40)-6-5A or B ordered with 6 side ports are shipped with removable sight glasses in locations P4/P9 and removable plugs in locations P2/P7 and P5/P10. All other configurations with 6 side ports will be shipped with removable plugs in locations P2/P7, P4/P9, and P5/P10 (see page 8 for an explanation of side port locations).

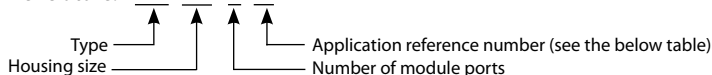
** ICAD motor-actuator (P/N 027H1200) for ICM module and coils for solenoid valve modules are not included, and must be ordered separately. Refer to the section "Ordering accessories."

*** For butt-weld connections, contact Danfoss.

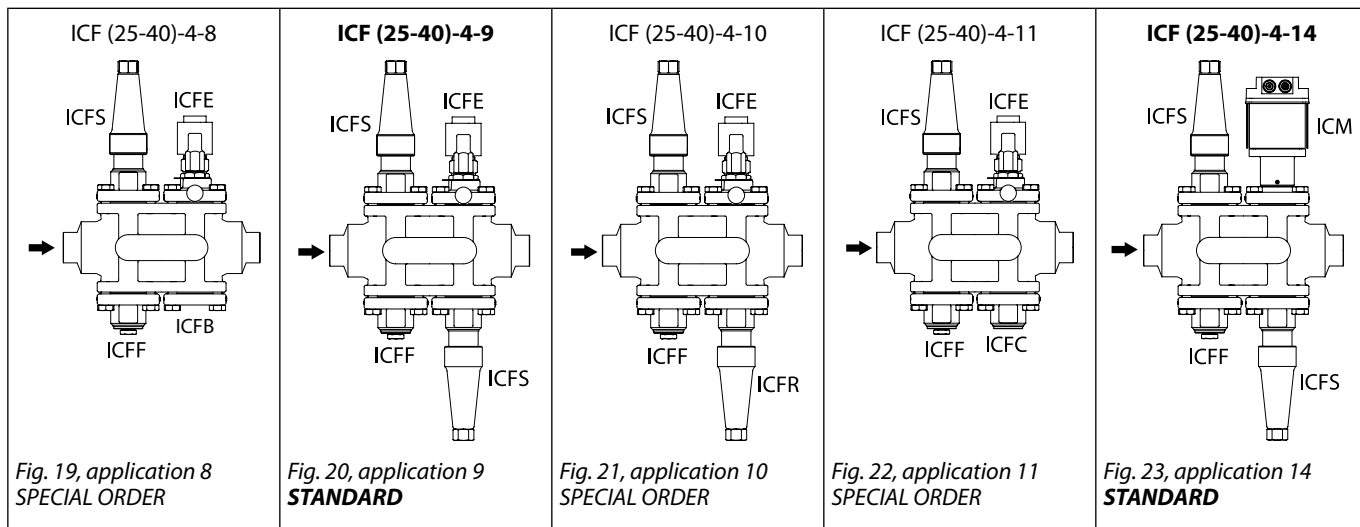
ICF (25-40)-4

Ordering ICF 20 with four function modules

Nomenclature: ICF 32-4-11



In the drawings and ordering table below, standard configurations are shown in bold type. Special order configurations appear in regular type.



Code numbers

The code numbers refer to one complete assembled control solution.

Standard configurations are indicated by bold type. Special order configurations are indicated by regular type.

Connection***	Side Ports Number and size*	Application reference number (see page 16)						
		8	9	10A	10B	11	14A	14B
		ICF 25-4-8	ICF 25-4-9	ICF 25-4-10A	ICF 25-4-10B	ICF 25-4-11	ICF 25-4-14A	ICF 25-4-14B
		ICF 32-4-8	ICF 32-4-9	ICF 32-4-10A	ICF 32-4-10B	ICF 32-4-11	ICF 32-4-14A	ICF 32-4-14B
		ICF 40-4-8	ICF 40-4-9	ICF 40-4-10A	ICF 40-4-10B	ICF 40-4-11	ICF 40-4-14A	ICF 40-4-14B
		Fig. 19	Fig. 20	Fig. 21	Fig. 21	Fig. 22	Fig. 23	Fig. 18
1 in. SOC	None	027L4055	027L4062	027L4075			027L4102**	
1 1/4 in. SOC	None	027L4057	027L4066	027L4079	027L4084	027L4093	027L4106**	027L4111**
1 1/2 in. SOC	None	027L4060	027L4071		027L4089	027L4098		027L4116**
1 in. SOC	4 (3/8" NPT)		027L4064	027L4077			027L4104**	
1 1/4 in. SOC	4 (3/8" NPT)		027L4069	027L4082	027L4087	027L4096	027L4109**	027L4114**
1 1/2 in. SOC	4 (3/8" NPT)		027L4073		027L4091	027L4100		027L4118**

SOC = Socket welding ANSI (B 16.11)

Not available


* ICF configuration ICF (25-40)-14A or B ordered with 4 side ports are shipped with removable sight glasses in locations P2/P5 and removable plugs in locations P3/P6. All other configurations with 4 side ports are shipped with removable plugs in locations P2/P5 and P3/P6 (see page 8 for an explanation of side port locations).

** ICAD motor-actuator (P/N 027H1200) for ICM module and coils for solenoid valve modules are not included, and must be ordered separately. Refer to the section "Ordering accessories."


*** For butt-weld connections, contact Danfoss.

Ordering accessories

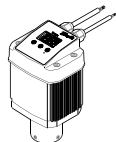
Side port plug, 3/8" NPT for ICM20 valve module

	Quantity	Code no.
	2	027L1268


Sight glass for side port, 3/8" NPT

	Quantity	Code no.
	2	027L1269

ICAD 600 Motor actuator for ICM module

	Quantity	Code no.
	1	027H1200

SNV-ST Gauge valve, 3/8" MPT bottom X 3/8" FPT side

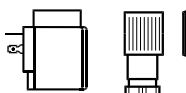
	Quantity	Code no.
	1	148B4181

Accessories

Description	Code no.
Magnetic tool for manually operating ICM valve sizes 20, 25, and 32	027H0180
ICAD-UPS, battery backup for ICM/ICAD motorized valves	027H0182

Coils

Standard Encapsulated Solenoid Coils with DIN connector *

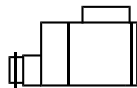


Voltage	Hz	Holding	Connection	Code no.
110-120 AC	60	14 W	DIN connector	018F766356
208-240 AC	60	14 W	DIN connector	018F765856
24 AC	50/60	14 W	DIN connector	018F765556

Encapsulated Solenoid Coils with DIN Connector and Built-in Pilot Light*

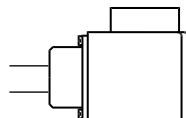
Voltage	Hz	Holding	Color	Connection	Code no.
110-120 AC	60	14 W	RED	DIN connector with pilot light	018F7663RD
110-120 AC	60	14 W	YELLOW	DIN connector with pilot light	018F7663YL
110-120 AC	60	14 W	GREEN	DIN connector with pilot light	018F7663GR
208-240 AC	60	14 W	RED	DIN connector with pilot light	018F7658RD
24 AC	50/60	14 W	RED	DIN connector with pilot light	018F7655RD

Encapsulated Solenoid Coils with Terminal Box



Voltage	Hz	Holding	Connection	Code no.
220/230 AC	50/60	10 W	Terminal Box	018F6732
110 AC	50/60	10 W	Terminal Box	018F6730
115 AC	60	10 W	Terminal Box	018F6710
24 AC	60	10 W	Terminal Box	018F6715
24 DC	-	20 W	Terminal Box	018F6857
24 AC	60	12 W	Terminal Box	018F6815
110 AC	60	12 W	Terminal Box	018F6813

Encapsulated Solenoid Coils with 18" Wire Leads**



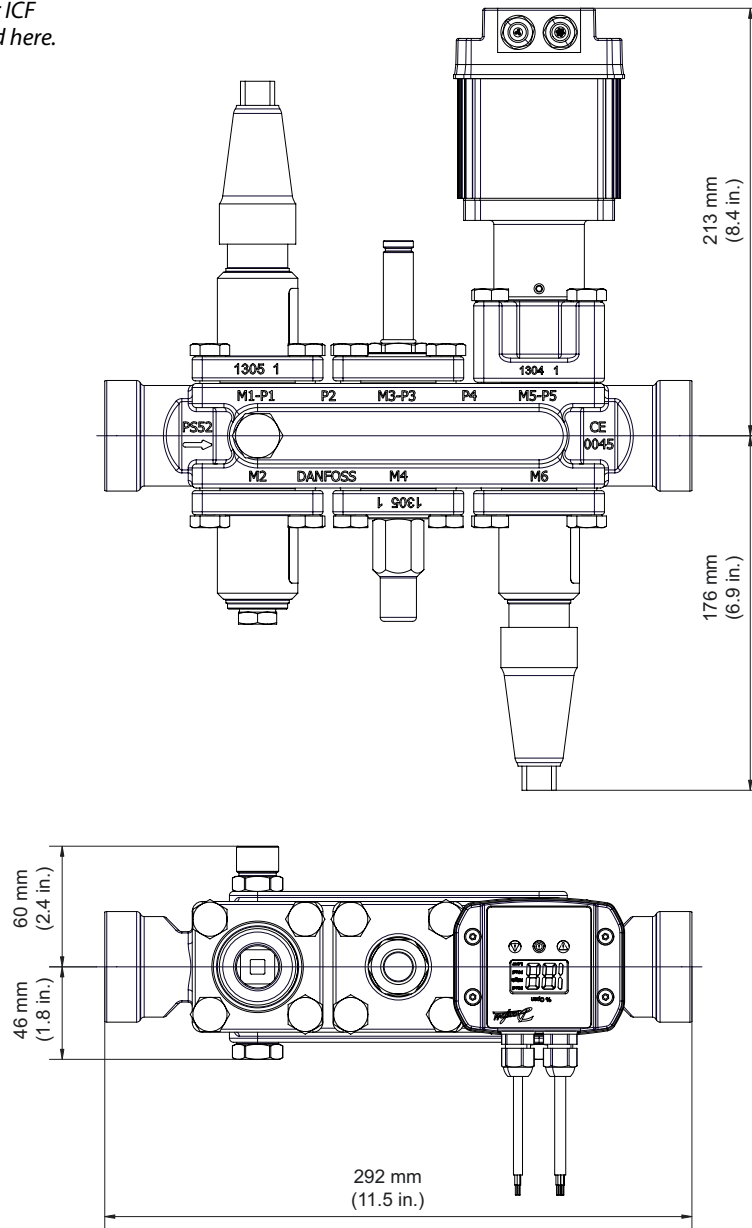
Voltage	Hz	Holding	Connection	Code no.
110-120 AC	60	14 W	DIN connector	018F766356
208-240 AC	60	14 W	DIN connector	018F765856
24 AC	50/60	14 W	DIN connector	018F765556

Note: Please contact Danfoss for solenoid coils with junction box. * These coils are UL recognized ** These coils are UL listed

Dimensions and weight

The maximum dimensions for ICF control solutions are indicated here.

ICF 20-6



Weight*

Connection	ICF 20-6-1	ICF 20-6-2	ICF 20-6-3	ICF 20-6-4	ICF 20-6-5A	ICF 20-6-5B	ICF 20-6-5C	ICF 20-6-6	ICF 20-6-7
	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs
3/4 in. BW	19.3	19.3	19.6	18.03	21.8	21.8	21.8	18.1	18.3
3/4 in. SOC	19.9	20.0	20.2	18.7	22.5	22.5		18.7	19.0
1 in. SOC	19.9	20.0	20.2	18.7	22.5	22.5	22.5		
1 1/4 in. SOC	19.9	20.0	20.2	18.7			22.5		

*Weight includes ICAD motor-actuator where applicable.

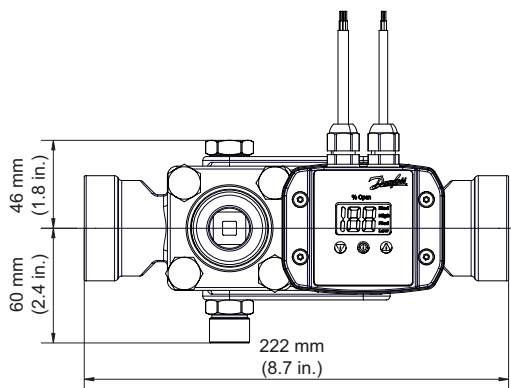
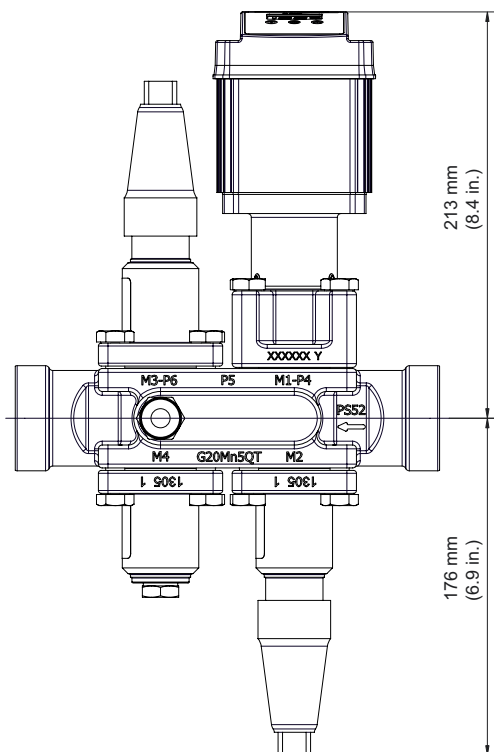
BW = Butt-weld ANSI (B 36.10)

SOC = Socket welding ANSI (B 16.11)

Dimensions and weight

This example indicates the maximum dimensions for the ICF control solutions.

ICF 20-4



Weight*

Connection	ICF 20-4-8	ICF 20-4-9	ICF 20-4-10	ICF 20-4-11	ICF 20-4-12	ICF 20-4-13	ICF 20-4-14A	ICF 20-4-14B	ICF 20-4-14C
	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs
3/4 in. BW	12	12.9	12.9	12.2	12.9	12.9	14.2	14.2	14.2
3/4 in. SOC			13.3		13.2	13.3	14.5		
1 in. SOC	12.4	13.3	13.3	12.6			14.5	14.5	14.5
1 1/4 in. SOC	12.4	13.3	13.3	12.6					14.5

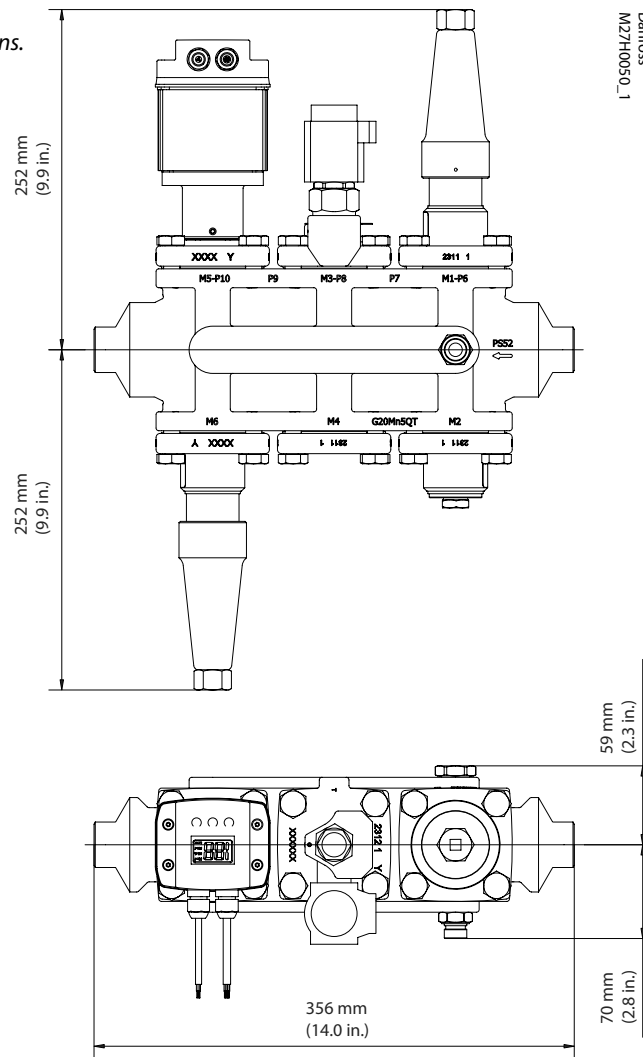
*Weight includes ICAD motor actuator where applicable.

BW = Butt-weld ANSI (B 36.10)

SOC = Socket welding ANSI (B 16.11)

Dimensions and weight

This example indicates the maximum dimensions for the ICF control solutions.



ICF (25-40)-6

Danfoss
M27H0050_1

Weight*

Connection	ICF 25-6-1A ICF 32-6-1A/B ICF 40-6-1B	ICF 25-6-3A ICF 32-6-3A/B ICF 40-6-3B	ICF 25-6-5A ICF 32-6-5A/B ICF 40-6-5B	ICF 25-6-15A ICF 32-6-15B ICF 40-6-15B
	lbs	lbs	lbs	lbs
1 in. SOC	52.0	52.5	52.5	52.0
1 1/4 in. SOC	52.5	52.9	52.9	52.5
1 1/2 in. SOC	52.9	53.4	53.4	52.9

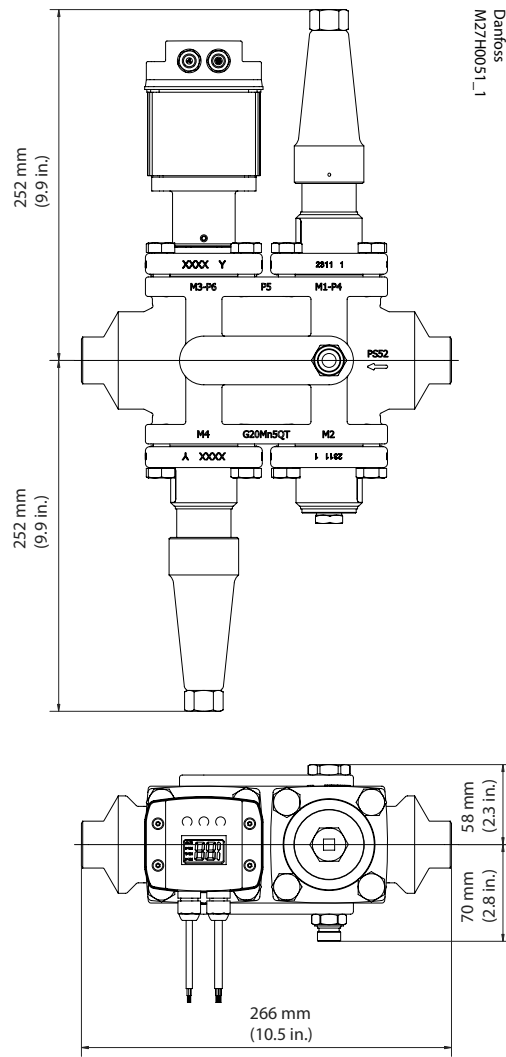
*Weight includes ICAD motor-actuator where applicable.

SOC = Socket welding ANSI (B 16.11)

Dimensions and weight

This example indicates the maximum dimensions for the ICF control solutions.

ICF (25-40)-4



Weight*

Connection	ICF 25-4-8	ICF 25-4-9	ICF 25-4-10A	CF 25-4-11	ICF 25-4-14A
	ICF 32-4-8	ICF 32-4-9	ICF 32-4-10A/B	ICF 32-4-11	ICF32-4-14A/B
	ICF 40-4-8	ICF 40-4-9	ICF 40-4-10B	ICF 40-4-11	ICF40-4-14B
	lbs	lbs	lbs	lbs	lbs
1 in. SOC	32.2	32.6	32.6	32.6	32.6
1 1/4 in. SOC	32.6	33.3	33.3	33.3	33.3
1 1/2 in. SOC	33.5	34.0	34.0	34.0	34.0

*Weight includes ICAD motor-actuator where applicable.
SOC = Socket welding ANSI (B 16.11)

ICAD motor-actuator for ICM module

When an ICM-20 motorized valve module is used in an ICF configuration, an ICAD motor-actuator (part number 027H1200, not included with the valve module) is required.

The ICAD is controlled by a modulating analog signal (e.g. 4-20 mA or 2-10V) or a digital on-off signal. ICAD incorporates a display that includes a real time digital display of the degree of valve opening.

Features (motor-actuator)

- Specifically designed for industrial refrigeration installations
- Advanced and high speed digital stepper motor technology
- Three digit seven segment LCD display with three programming keys
- Degree of valve opening can be observed continuously from actuator
- Easily configured on site for different applications (change speed, on-off, modulating valve)
- Open-close time, ICM-20: 3seconds
- Modulating or on-off operation
- Multiple speed selection during operation
- Alarm capability, with logging of past alarms
- Control input signal :
4-20 mA, 0-20 mA, 0-10 V, 2-10 V
- Position feed back : 0-20 mA, 4-20 mA (ICM)
- 3 digit on-off feedback
- Resolution: 20 microns per step
(0.02 mm stroke per step)
- Total steps, ICM-20: 250
- Automatic calibration, neutral zone
- In the event of a power failure, multiple fail safe options are possible. During power failure, ICM can be programmed to:
Close ICM, or
Open ICM, or
Stay in the same position as when power failure occurs, or
Go to a specific ICM valve opening degree.
- Enclosure: IP65 ~ NEMA 4

Technical data (actuator)

ICAD 600 for ICM 20 motorized valve module.

Materials

Housing:
Aluminium

Top part of ICAD:
PBT thermo plastic

Weight

ICAD 600: 2.64 lb(1.2 kg)

Temperature range (ambient)
-22°F/122°F(-30°C/+50°C)

Enclosure

IP 65 (~NEMA 4)

Cable connection

2 cable premounted of 70.7 in. (1.8 m length)

Supply cable

3 × ~22 AWG (3 × 0.34 mm²)
diameter 0.17" (Ø4.4 mm)

Control cable

7 × ~24 AWG (7 × 0.25 mm²)
diameter 0.20" (Ø5.2 mm)

Electrical data

Supply voltage is galvanically isolated from input/output

Supply voltage: 24 V d.c., + 10% / -15%

Load: ICAD 600: 1.2 A

Fail safe supply: Min. 19 V d.c, max. 26.4 Vdc

Load: ICAD 600: 1.2 A

Battery capacity:

For each open/closed cycle

ICAD 600: 8.3 mAh

Analogue input - current or voltage

Current: 0/4-20 mA

Load: 200 Ω

Voltage: 0/2-10 V d.c

Load : 10 kΩ

Analogue Output: 0/4-20 mA

Load : ≤ 250 Ω

Digital input - Digital on-off input from dry contact (voltage free). (signal or telecom relays with gold-plated contacts recommended)

- Voltage input used
ON: contact impedance < 50 Ω)
OFF: contact impedance > 100 k Ω

Digital Output - 3 pcs. NPN transistor output

External supply: 5-24 V d.c.

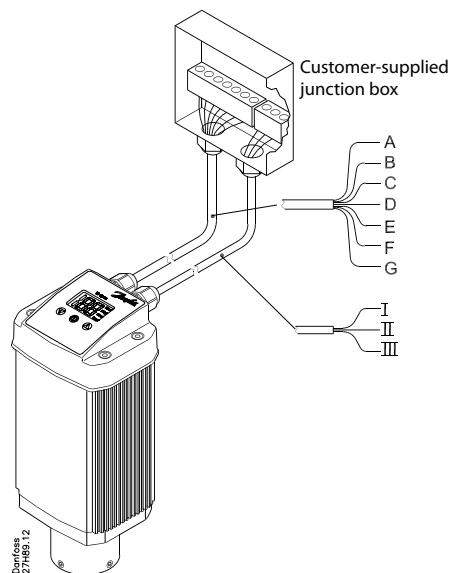
(Same supply as for ICAD can be used, but please note that the system will no longer be galvanically isolated)

Output load: 50 Ω

Max. 50 mA

Technical data (cont.)

Cable connection
Two 1.8 m (70.7 in.) cables premounted



Ref.	Color		Description
A	White	-	Common Alarm
B	Brown	-	ICM fully open
C	Green	-	ICM fully closed
D	Yellow	-	GND ground
E	Grey	+	0/4 - 20 mA Input
F	Pink	+	0/2 - 10 V Input
G	Blue	+	0/4 - 20 mA Output

} Digital Output

} Analog In/Output

I	White	+	Fail safe supply Battery / UPS* 19 V d.c.
II	Brown	+	Supply voltage
III	Green	-	24 V d.c.

* Uninterruptable Power Supply

Figure 1

Approvals

CE according to 89/336 EEC (EMC)
Emission: EN61000-6-3
Immunity: EN61000-6-2

Function (actuator)

The ICAD design is based on digital stepper motor technology that provides a high degree of flexibility with a single type of ICAD actuator.

The ICAD continuously displays the degree of opening (0-100 %).

The advanced menu system allows adjustment of several parameters to obtain a required function. Many different parameters can be configured, including:

Modulating and on-off control

Analog input

0- 20 mA or 4-20 mA

0-10 V or 2-10 V

Analog output

0- 20 mA or 4-20 mA

Automatic or manual control

Change of ICM valve speed

Automatic calibration

Multiple Fail Safe set-up options during power failure

For service, all input and output signals can be recalled and observed from the ICAD display.

Password protection has been linked to the entering the correct ICM valve module identification in order to avoid unintentional and non-authorized operation.

The ICAD can manage and display various alarms. If an alarm has been detected the display will alternate between showing the actual alarm present and the valve opening percentage. If more than one alarm is active at the same time the alarm with the highest priority will take precedence and will be shown on the display. All alarms automatically reset when no longer displayed.

Previous alarms can be recalled for traceability and service purposes.

Any active alarm will activate the common digital alarm output.

ICAD provides two digital output signals to 3rd party control equipment (for example, PLCs), indicating if the ICM valve is completely open or completely closed.

The hermetic magnetic motor coupling makes it easy to dismount the ICAD from ICM valve module.

ICAD-UPS for ICM



ICAD-UPS is designed for use with ICM-20 motorized valve modules installed with ICAD 600 actuators.

In the event of power failure, there is a need to make sure that the ICM goes to a safe position.

An ICM module with ICAD connected to ICAD-UPS will offer the choice of one of the following possibilities in the event of power failure:

- close ICM
- open ICM
- stay in its position at the time of power failure
- go to a specific ICM opening percentage

When mains power has been restored, the system will automatically return to normal operating mode as previously programmed.

Facts and features

Industrial product.
 Can support up to 8 ICAD 600 motor-actuators
 An integrated solution - battery and UPS.

Industrial approvals:
 CE, UL, GL (Germanisher Lloyd).
 DIN rail mounting.

LED indication

- Green (Power ON)
- Yellow (Flashing: charging; Constant: buffer mode, failsafe supply to ICAD)
- Red (battery fully discharged or faulty)

24 Vdc supply: The same transformer as for ICAD can be used. Only +0.5 A extra load on the transformer.

Battery check every 60 sec.

Adjustable buffer time*. (1, 2, 3, 5, 10, 15, 20, 30 or infinity) ensures longer battery lifetime.

Forced remote shutdown in buffer mode by digital input.

3 digital voltage-free relay contacts for signals to PLC systems. (power OK; buffer mode (failsafe supply to ICAD); and alarm).

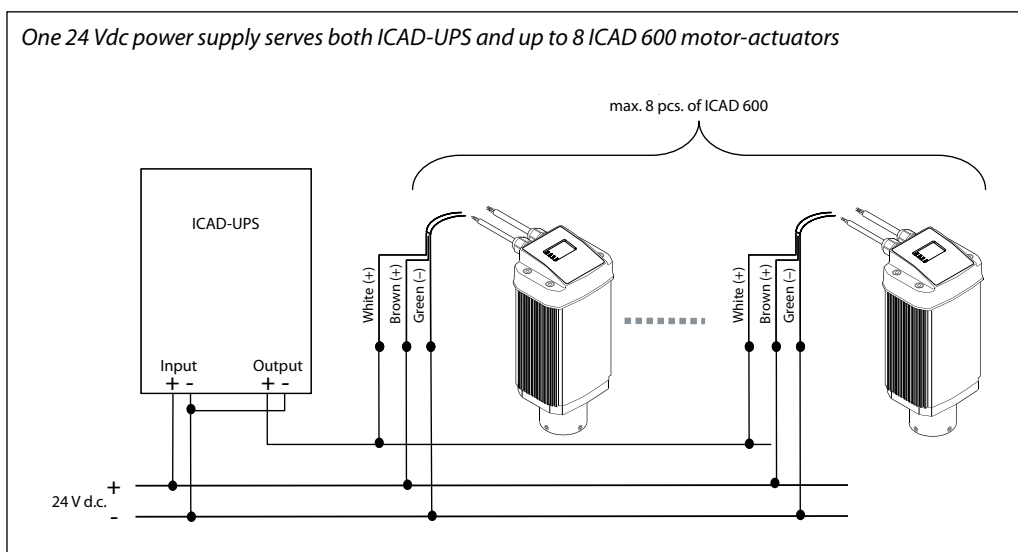
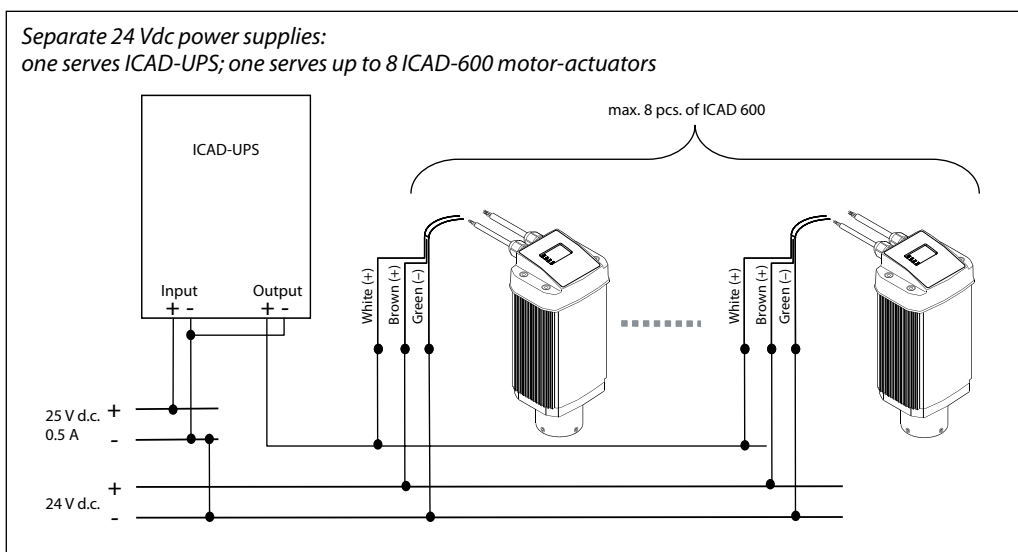
* Buffer time is defined as the period during which where ICAD is powered solely by the ICAD-UPS (not by mains power).

On ICAD-UPS there is an adjustable buffer time setting (1, 2, 3, 5, 10, 15, 20, 30 minutes, or infinity). If set to 3 minutes, the ICAD-UPS will switch off power to the connected ICAD 600 3 minutes after the power failure occurs, ensuring that the ICAD-UPS internal battery does not fully discharge.

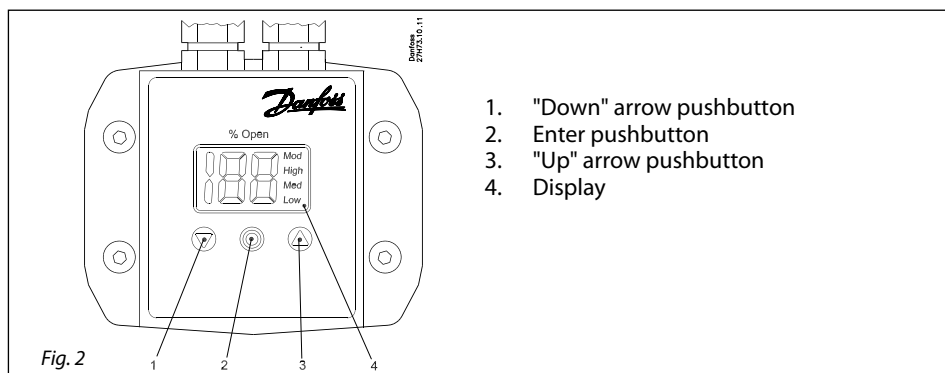
Code number: **027H0182**

For further information please see the ICAD-UPS instructions (PIHV0B).

ICAD-UPS applications



General operation



1. "Down" arrow pushbutton
2. Enter pushbutton
3. "Up" arrow pushbutton
4. Display

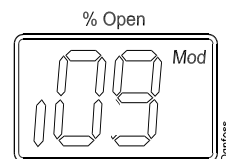
From the ICAD-600 display, it is possible to monitor operation of the ICM motor-actuator and to change parameter settings to adapt the ICAD and ICM to the actual refrigeration application.

The display (fig. 2)

- Normally shows open percentage (OD), (0-100%) of the ICM valve. If no pushbuttons are depressed for 20 seconds, the display will return to this mode.
- Gives access to change a value once the parameter list has been accessed.
- Displays the function status by means of text (in the figure above, "Mod" is displayed; and the figure below shows an indication of "High"). These are the meanings indicated:
 - **Mod** means that the ICAD is positioning the ICM valve according to an analog input signal (current or voltage).
 - **Low** means that the ICAD is operating the ICM valve as an on-off solenoid valve at low speed according to a digital input signal.
 - **Med** means that the ICAD is operating the ICM valve as an on-off solenoid valve at medium speed according to a digital input signal.
 - **High** means that the ICAD is operating the ICM valve as an on-off solenoid valve at high speed according to a digital input signal.

Navigating with the display

To gain access to the parameter list, press the ENTER pushbutton continuously for 2 seconds. The display will change to show one of the parameters, as in the figure below:



The figure displays parameter j09, digital input function. A complete parameter list, with the range and meaning of each, is found on the following two pages.

The UP and DOWN arrow buttons can be used to scroll through the parameters.

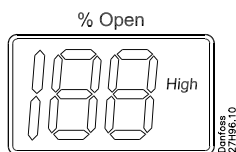
Changing a parameter

Select the parameter you wish to change by scrolling through the parameter list with the UP and DOWN arrow pushbuttons. When the parameter you wish to change is displayed, briefly press the ENTER pushbutton. Now use the arrow buttons to change the value of the parameter up or down as you desire. When the value you want is displayed, press the ENTER button briefly to save the setting.

You may now select another parameter to be changed, or return to the operating mode as explained below.

Returning to operating mode

When you are finished reading or changing parameters, press the ENTER button for 2 seconds to return to the operating mode.



Alarms

ICAD can handle and display several alarms.

Description	ICM alarm text	Comments
No valve type selected	A1	At start-up A1 and CA will be displayed
Controller fault	A2	Internal fault inside electronics
Analog input error	A3	Not active if i01 = 2 or i02 = 2 When i03 = 1 and AI > 22 mA When i03 = 2 and AI > 22 mA or AI < 2 mA When i03 = 3 and AI > 12 V When i03 = 4 and AI > 12 V or AI < 1 V
Low voltage of fail safe supply	A4	If 5 V d.c. < Fail safe supply < 18 V d.c.
Check Supply to ICAD	A5	If supply voltage < 18 V d.c.

If an alarm condition exists, the ICAD display (fig. 2) will alternate between showing the alarm text and the current opening percentage.

If more than one alarm is active at the same time the alarm with the highest priority will be displayed. **A1** has the highest priority, **A5** the lowest.

Any alarm will close the normally open contacts of the common digital alarm output.

Alarms will automatically reset when the causative condition no longer exists.

Alarm history can be found in parameter **i11**.

Parameter list

Parameter name	Parameter number	Minimum	Maximum	Factory setting	Unit	Comments
ICM OD (valve open percentage)	-	0	100	-	%	ICM valve open percentage is displayed during normal operation. Running display value (see i01 , i05).
Main switch	i01	1	2	1	-	Internal main switch 1: Normal operation 2: Manual operation. Display flashing. The OD (valve open percentage) can be manually adjusted with the arrow buttons over a range from 0-100%.
Mode	i02	1	2	1	-	Operating mode 1: Modulating: The ICM modulates in response to an analog input (see i03) 2: ON-OFF: the ICM is operated as an on-off solenoid valve and controlled by a digital input. See also i09 .
Analog Input signal	i03	1	4	2	-	The type of analog input signal from the external controller 1: 0 - 20 mA 2: 4 - 20 mA 3: 0 - 10 V 4: 2 - 10 V
Speed in ON-OFF and in modulating mode	i04	1	100	100	%	Not active when i01 = 2 The rate of change in valve opening can be set. If i02 = 2 the display will indicate the speed with which the valve open percentage is changed. Low , Med and High also means ON-OFF operation. If i04 less than or equal to 33, Low is displayed If i04 is from 34 to 66, Med is displayed If i04 > = 67 High is displayed
Automatic calibration	i05	0	1	0	-	Only active when valve type has been configured by setting i26 . Always resets automatically to 0. Display will flash " CA " during calibration, if ENTER push button has been pressed for two seconds.
Analog output signal	i06	0	2	2	-	Type of analog output signal to be used for ICM valve positioning. 0: No signal 1: 0 - 20 mA 2: 4 - 20 mA
Fail safe	i07	1	4	1	-	Determines valve position in fail-safe mode after power fails. 1: Close ICM valve 2: Open ICM valve 3: Maintain ICM valve position 4: Go to open percentage configured by i12
Digital Input function	i09	1	2	1	-	Define function when DI is ON (short circuited DI terminals) when i02 = 2 1: Open ICM valve (DI = OFF => Close ICM valve) 2: Close ICM valve (DI = OFF => Open ICM valve)
Password	i10	0	199	0	-	Enter number to access password protected parameters: i26 Password = 11
Old Alarms	i11	A1	A99	-	-	Old alarms are listed, most recent first. The alarm list can be reset by simultaneously pressing the up and down arrow pushbuttons for 2 seconds.
OD on power fail	i12	0	100	50	-	Only active if i07 = 4 Determines fail safe OD (with fail-safe power supply) when main power fails.
ICM configuration	i26	0	6	0	-	NB: Password protected. Password = 11 At first start up A1 will flash in display. Enter valve type 0: No valve selected. Alarm A1 will become active. 1: ICM20 with ICAD 600 2: ICM25 with ICAD 600 (not used with ICF 20) 3: ICM32 with ICAD 600 (not used with ICF 20) 4: ICM40 with ICAD 900 (not used with ICF 20) 5: ICM50 with ICAD 900 (not used with ICF 20) 6: ICM65 with ICAD 900 (not used with ICF 20)

Parameter list (continued)

Service

Description	Display name	Min.	Max.	Factory setting	Unit	Comments
OD %	i50	0	100	-	%	ICM valve opening degree
AI [mA]	i51	0	20	-	mA	Analog input signal
AI [V]	i52	0	10	-	V	Analog input signal
AO [mA]	i53	0	20	-	mA	Analog output signal
DI	i54	0	1	-	-	Digital input signal
DO Close	i55	0	1	-	-	Digital output closed status. ON when ICM valve open < 3 %
DO Open	i56	0	1	-	-	Digital output open status. ON when ICM valve open > 97 %
DO Alarm	i57	0	1	-	-	Digital output alarm status. ON when an alarm is detected
MAS mP SW ver.	i58	0	100	-	-	Software version for MASTER Microprocessor
SLA mP SW ver.	i59	0	100	-	-	Software version for SLAVE Microprocessor

To reset to factory settings :

1. Remove power supply.
2. Activate down arrow and up arrow pushbuttons at the same time and hold.
3. Connect the power supply.
4. Release down arrow and up arrow push buttons.
5. When the ICAD display (fig. 2) is alternating between showing: **CA** and **A1**, reset to factory settings is complete.

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