

Data Sheet

Motor operated valves and Actuators Type **ICM** and **ICAD**

65 bar/52 bar ICM motor valve equipped with ICAD actuator provides a higher suction pressure, and a much better COP, ultimately leading to significant energy savings



The motor operated ICM valve comprises four main components: Valve body, top cover, function module and Actuator. On ICM 20 – 65 the top cover and function module will be combined. ICM are motor operated valves driven by actuator type ICAD.

The sizes DN25 to DN65 are designed for MWP of 65 bar, while all other sizes have MWP of 52 bar.

ICM valves are designed to regulate an expansion process in liquid lines with or without phase change or control pressure or temperature in dry and wet suction lines and hot gas lines. ICM valves are designed so that the opening and closing forces are balanced, therefore, only two sizes of ICAD actuators are needed for the complete range of ICM from DN 20 to DN 150. The ICM motor operated valve and ICAD actuator assembly offers a very compact unit with small dimensions.

ICAD

Actuator types ICAD 600A and 1200A are dedicated for use with ICM motor operated valves. There are only two sizes of ICAD actuators that cover the range of valves from ICM 20 to ICM 150.

The ICAD is controlled via a modulating analogue signal (e.g. 4 – 20 mA / 2 – 10 V) or a digital ON / OFF signal. ICAD incorporates an advanced MMI (Man Machine Interface), including continuous display of Opening Degree, which gives the user a very advanced and flexible setup procedure that can meet many different applications.

Features

ICM valve

- Designed for industrial refrigeration applications for a maximum working pressure of:
 - ICS DN 25 to DN 65 (80): 65 bar / 943 psig
 - ICS DN 20 & DN 100 to DN 150: 52 bar / 754 psig
- Applicable to HCFC, HFC, R717 (Ammonia) and R744 (CO₂)
- Direct coupled connections
- Connection types include butt weld, socket weld, solder and threaded connections
- Low temperature steel body
- Low weight and compact design
- V-port regulating cone ensures optimum regulating accuracy particularly at part load
- Cavitation resistant valve seat on A cones
- Modular Concept
 - Each valve body is available with several different connection types and sizes
 - Valve overhaul is performed by replacing the function module (ICM 20 – 65)
 - Possible to convert ICM motor operated valve to ICS pilot operated servo valve
 - Spare parts available for ICM 100 – 150
- Manual opening possible via ICAD or Multifunction tool
- PTFE seat provides excellent valve tightness
- Magnet coupling - real hermetic sealing
- ICAD 600A / 1200A include encoder function that will provide a true valve position feedback to Danfoss controller or non-Danfoss control systems
- Classification: DNV, CRN, BV, EAC etc. To get an updated list of certification on the products please contact your local Danfoss Sales Company

ICAD actuator

- Designed for industrial refrigeration installations
- Advanced and high speed Digital Stepper Motor Technology
- Seven segment LCD display and three programming keys included
- Valve opening degree can be observed continuously
- Can easily be configured to different applications on-site (change speed, ON / OFF, Fail Safe operation, modulating valve, etc..)
- Open – Close time: 3 – 45 seconds depending on valve size
- Modulating, ON / OFF operation or Neutral zone / 3 point control
- Multiple speed selection during operation
- Logging of old alarms
- Password protection
- Control input signal :
 - 4 – 20 mA, 0 – 20 mA, 0 – 10 V, 2 – 10 V.
 - One or two digital inputs
- Position feed back : 0 – 20 mA, 4 – 20 mA (ICM)
- 3 Digital ON / OFF feedback
- Resolution: 20 micron / step (0.02 mm stroke pr. step)
- Total steps: 250 – 3650 depending on size
- Auto Calibration, Neutral zone
- In the event of a power failure, multiple fail safe options are possible. During power failure, ICM can be selected to:
 - Close ICM
 - Open ICM
 - Stay in the same position, as when power failure occurs
 - Go to a specific ICM valve opening degree
- Hermetic magnetic motor
- Enclosure: IP67 ~ NEMA 6

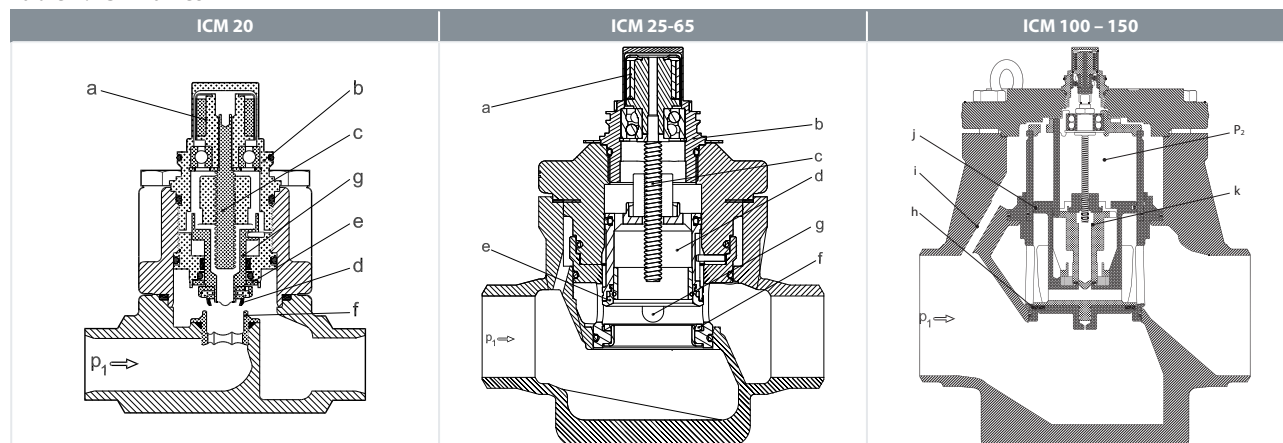
Motor operated valves and Actuators, type ICM and ICAD

- Approvals: CE, UL, CRN
- Connectors for easy installation and servicing
- ICAD 600A / 1200A ensures an accurate feedback on the valve position

Functions

ICM

Table 1: ICM valves



ICM, motor operated valves are designed for use with the ICAD actuator with Display.

The driving force from the actuator is transferred via a magnetic coupling (a) through the stainless steel top housing (b) and thus eliminates the need for a packing gland. The rotational movement of the magnetic coupling (a) is transferred to a spindle (c) which in turn provides the vertical movement of the piston (d) and the valve seat (e), to open and close the valve. The closing force of the actuator, combined with the the valve seat (e) and PTFE valve plate (f), provides an effective seal to prevent leakage across the valve port, when the valve is in the closed position. To prevent damage to the PTFE valve seat (e) and plate (f) from system debris, it is recommended that a filter is installed upstream of the valve. Please refer to page 14 for filter sizing and application recommendations.

ICM 20 – 65:

Valve inlet pressure (P1) acting on the underside of the PTFE valve seat (e) also passes through the hollow piston assembly (d) on to the top of the piston (d) and balances the pressure acting on the piston (d). Any trapped liquid across the throttle cone (g) is allowed to equalise down to the valve outlet without affecting the valve performance.

ICM 100 – 150:

Valve inlet pressure (P1) acting on the underside of the PTFE valve plate (h) also passes through the equalization hole (i) and ensures that the servo piston (j) is pressure balanced. This will equalize P1 and P2. During an opening operation of the valve, the pilot piston (k) will be raised from its valve seat inside the servo piston (j). This allows the P2 pressure to escape through the servo piston (j) to the outlet of the valve. The pressure P1 will act on the underside of the servo piston (j) and force it to open. This will close the gap between the pilot piston (k) and the servo piston (j) until the pressures P1 and P2 are equalized again. When there is no pressure difference between P1 and the outlet of the valve the pilot piston (k) is attached to the servo piston (j) ensuring it to open up.

ICAD

There are two sizes of ICAD actuator that covers the range of valves from ICM 20 to ICM 150. The actuators have a fully weather protected enclosure with none of the moving parts exposed to the environment.

The fast acting actuators and balanced valve design results in the valve being able to move from the fully closed to the fully open position in between 3 to 45 seconds depending on valve size and ICAD setup.

Each body may be fitted with multiple function / top cover to give different capacities

Figure 1: Multiple function / top cover

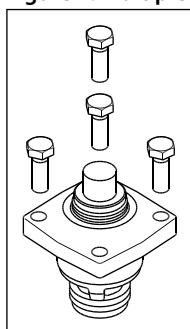


Table 2: Multiple function / top cover with capacities

Type	Valve body size	k_v (m ³ /h)	C_v (US gal/min)
ICM 20A-33	20	0.2	0.23
ICM 20-A		0.6	0.7
ICM 20-B66		1.6	1.9
ICM 20-B		2.4	2.8
ICM 20-C		4.6	5.3
ICM 25-A	25	6	7
ICM 25-A33		2	2.3
ICM 25-B		12	13.9
ICM 32-A	32	9	10.4
ICM 32-B		17	20
ICM 40-A	40	15	17
ICM 40-B		26	30
ICM 50-A	50	23	27
ICM 50-B		40	46
ICM 65-A	65	35	41
ICM 65-B		70	81
ICM 100-B	100	142	167
ICM 125-B	125	223	260
ICM 150-B	150	370	430

ICAD

The design of ICAD is based on a digital stepper motor technology combined with an advanced MMI (Man Machine Interface), that gives excellent possibilities for having a high degree of flexibility with the same type of ICAD actuator.

At the ICAD display the Opening Degree (0 – 100 %) of the actual ICM valve installed can be continuously observed.

The advanced menu system will allow several parameters to be adjusted to obtain the required function.

Many different parameters can be configured, among these:

- Modulating, ON / OFF operation or Neutral zone / 3 point control
- Analog input
 - 0 – 20 mA or 4 – 20 mA
 - 0 – 10 V or 2 – 10 V
- Digital Input
 - ICAD can be configured to support one or two digital inputs
 - When using one digital input, 0 – 10 V can not be used at the same time
 - By using two digital inputs at Neutral zone / 3 point control, the analog input (0/2 – 10 V, 0/4 – 20 mA) and Analog Output (0/4 – 20 mA) can not be used at the same time
- 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 cut

Motor operated valves and Actuators, type ICM and ICAD

For service all Input and Output signals can be recalled and observed from the ICAD display.

A password protection has been linked to the parameter of entering the correct ICM valve to avoid unintentional and non-authorised operation.

ICAD can manage and display different alarms. If an alarm has been detected the display will alternate between showing: Actual alarm present and Opening Degree of ICM valve. If more than one alarm is active at the same time the alarm with the highest priority will take preference. The alarm with the highest priority is shown on the display.

All alarms will automatically reset when disappearing.

Previous alarms can be recalled for traceability and service purposes.

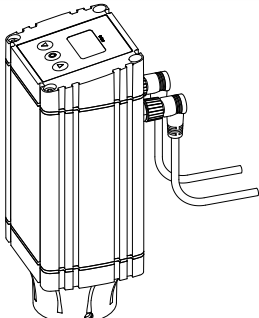
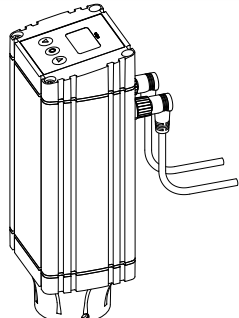
Any active alarm will activate the common digital alarm output. All alarms will automatically reset when disappearing.

ICAD provides two digital output signals to 3rd party control equipment (e.g. PLC) 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.

A magnetic coupled actuator is easily installed. Only two actuators are needed to cover the entire ICM program

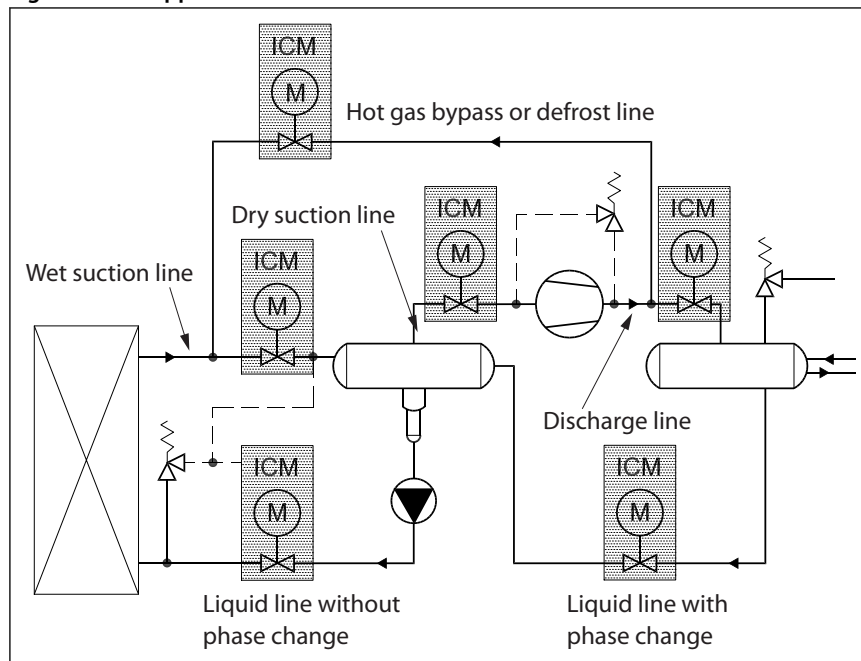
Table 3: ICAD 600A and ICAD 1200A

ICAD 600A	ICAD 1200A
	

Applications

ICM

Figure 2: ICM Application



NOTE:

ICM can be used for pressure and temperature regulation in dry and wet suction lines, in hot gas lines and in liquid lines with or without phase change (i.e. where no expansion occurs in the valve).

Valve selection based on capacity calculation

As for extended capacity calculations and valve selection based on capacities and refrigerants, please refer to Coolselector[®]2. Rated and extended capacities with the Coolselector[®]2 calculation engine to ARI standards with the ASEREP equations based on laboratory measurements of selected valves.

Selection of ICM valves are available with Coolselector[®]2 selection program.

The process for identifying the ICM valve solution can be determined from the ordering pages. Initially select the nominal valve size, identify the required valve body and connection types, followed by the module insert and then the correct actuator to suit the module insert and valve body.

As the ICM and ICS valves use a common body it is possible to install the body without having previously determined whether a servo or motor function is required. A blank top cover complete with fixing screws can be supplied to allow for pressure testing.

In applications where the ICM is used to control pressure / temperature at differing operating conditions e.g. dual temperature store, the ICM must be selected so that the full operating conditions (minimum and maximum capacity / summer and winter conditions) are within the control range of the selected ICM valve.

It is particularly important to ensure that the ICM valve selection is not oversized and as a consequence operates at a minimum opening degree, which can result in a hunting condition and continuous recalibration of the ICM valve.

NOTE:

ICM valves should be sized to suit required capacity and operating conditions. ICM valves should not be line sized.

For ICM 20 – 65 applications it is recommended that the valve opening degree at the minimum operating conditions is greater than 5%.

For ICM 100 – 150 applications it is recommended that the valve opening degree at the minimum operating conditions is greater than 10%.

Figure 3: Filter

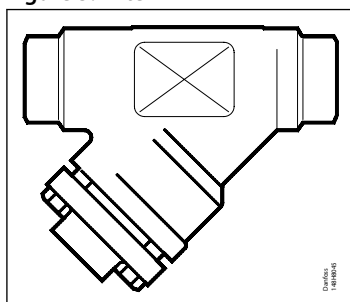
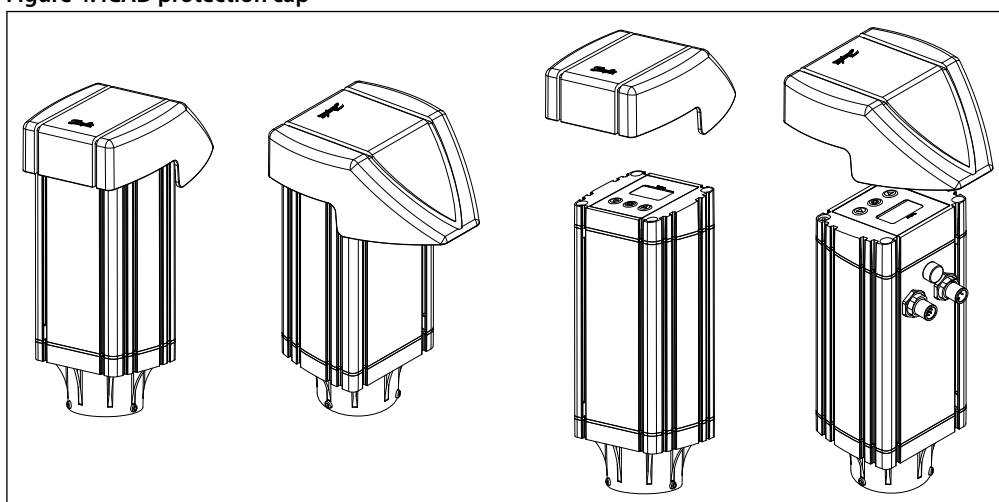


Table 4: Recommended filters

Recommended filters						Filter element for liquid line		Filter element for suction line	
						150 mesh	100 mesh	72 mesh	38 mesh
Filter Type	Size	D	A	FPT	SOC	100 my	150 my	250 my	500 my
FIA Straight-way	20 (¾ in.)	148B5343	148B5347	148B5349	148B5348	148H3122	148H3124	148H3126	148H3128
FIA Straight-way	25 (1 in.)	148B5443	148B5447	148B5449	148B5448	148H3123	148H3125	148H3127	148H3129
FIA Straight-way	32 (1 ¼ in.)	148B5544	148B5552	148B5549	148B5548	148H3123	148H3125	148H3127	148H3129
FIA Straight-way	40 (1 ½ in.)	148B5625	148B5644		148B5645	148H3123	148H3125	148H3127	148H3129
FIA Straight-way	50 (2 in.)	148B5713	148B5716		148B5717	148H3157	148H3130	148H3138	148H3144
FIA Straight-way	65 (2 ½ in.)	148B5813	148B5815				148H3131	148H3139	148H3145
FIA Straight-way	80 (3 in.)	148B5906	148B5908				148H3119	148H3120	148H3121
FIA Straight-way	100 (4 in.)	148B6007	148B6009				148H3132	148H3140	148H3146
FIA Straight-way	125 (5 in.)	148B6106	148B6108				148H3133	148H3141	148H3147
FIA Straight-way	150 (6 in.)	148B6203	148B6205				148H3134	148H3142	148H3148

ICAD

Figure 4: ICAD protection cap



ICAD protection cap

For all outdoor applications or where extra protection of the display and keyboard is needed, Danfoss recommends using the ICAD protection cap.

The protection cap will give the ICAD display and keyboard an extra protection against e.g. sun radiation or other impacts from the surrounding environment. Furthermore it protects the cable connectors against inappropriate loads.

Motor operated valves and Actuators, type ICM and ICAD

The special designed protection cap can be mounted on all ICAD 600A / 1200A.

The installation of the protection cap is done by sliding the protection cap down on the top of the ICAD. To secure the protection cap, tie it to the connector cables using the hole in the protection cap.

Figure 5: ICAD-UPS for ICM 20 – 150



ICAD-UPS for ICM 20 – 150

ICAD-UPS is dedicated for use along with ICM sizes 20 - 150 installed with ICAD 600A and ICAD 1200A actuators.

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

ICAD-UPS can be connected to the ICAD 600A / 1200A.

The solution ICM with ICAD connected to ICADUPS will give one of the following possibilities in the event of power failure:

- close ICM
- open ICM
- stay
- go to a specific ICM Opening Degree

When power supply has been re-established the system will automatically return to normal operation.

Facts and features

- Industrial product
- Can support up to
 - 3 pcs. of ICAD 1200A or
 - 8 pcs. of ICAD 600A
- Integrated solution - battery and UPS
- Industrial approvals:
 - CE, UL
- DIN rail mounting
- LED status indication
- 24 V DC supply → Same transformer as for ICAD can be used
- Continuous monitoring of battery
- Integrated temperature sensor for optimized battery charging
- Adjustable buffer time ⁽¹⁾. (1, 2, 3, 5, 10, 15, 20 or infinity) = Ensures longer life time of the battery
- Forced remote shutdown in buffer mode via digital input
- 3 digital volt free relay change over contacts for signals to PLC systems. (Power OK, Buffer mode (failsafe supply to ICAD), Alarm).

Code number: **027H0388**

For further information please see the instruction [ICAD-UPS](#)

¹ Buffer time is defined as the period where ICAD is only powered from the ICAD-UPS (i.e. not from main supply). On ICAD-UPS there is an adjustable buffer time setting (1, 2, 3, 5, 10, 15, 20, 30 min. or infinity). If set to 3, ICAD-UPS will switch off power to connected ICAD 600A / 1200A, 3 minutes after the power failure occurs. This ensures that the internal battery inside ICAD-UPS do not fully discharge.

ICAD-UPS applications

Figure 6: Seperate 24 V DC tranformer for both ICAD-UPS and ICAD 600A / 1200A

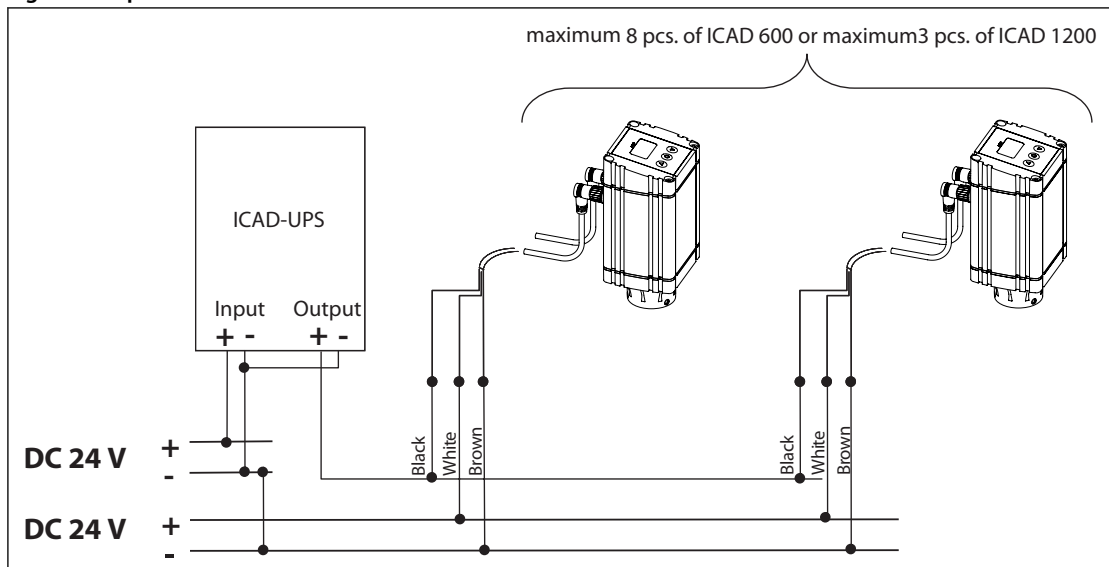
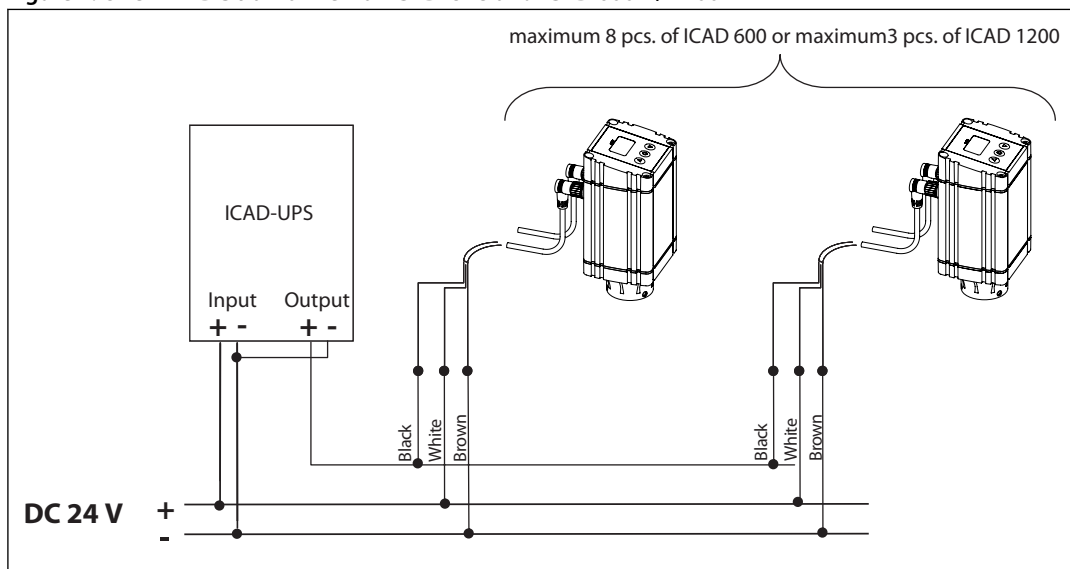


Figure 7: One 24 V DC tranformer for ICAD-UPS and ICAD 600A / 1200A



Media

Refrigerants

ICM 20, ICM 100, ICM 125 and ICM 150:

Applicable to HCFC, non flammable HFC, R717 (Ammonia) and R744 (CO₂).

ICM 25-65:

Applicable to HCFC, non flammable HFC, R717 (Ammonia), R744 (CO₂) and R1234ze.

Use with flammable hydrocarbons cannot be recommended. For further information please contact your local Danfoss sales company.

New refrigerants

Danfoss products are continually evaluated for use with new refrigerants depending on market requirements.

When a refrigerant is approved for use by Danfoss, it is added to the relevant portfolio, and the R number of the refrigerant (e.g. R513A) will be added to the technical data of the code number. Therefore, products for specific refrigerants are best checked at store.danfoss.com/en/, or by contacting your local Danfoss representative.

Product specification

Pressure and temperature data

ICM

Table 5: Pressure and temperature data

Description	Values
Media temperature range	Media: -60 / +120 °C (-76 / +248 °F)
Max. working pressure	Size DN 25 to DN 65 (80): 65 bar (943 psig) Size DN 20 & DN 100 to DN 150: 52 bar (754 psig)

Max. opening pressure differential (MOPD)

- ICM 20-32: 52 bar / 750 psi
- ICM 40: 40 bar / 580 psi
- ICM 50: 30 bar / 435 psi
- ICM 65: 20 bar / 290 psi
- ICM 100 20 bar / 290 psi
- ICM 125 20 bar / 290 psi
- ICM 150 20 bar / 290 psi

Time to move from Closed to Open position or in reverse order with maximum selected speed at ICAD

- ICM 20: 3 Sec.
- ICM 25: 7 Sec.
- ICM 32: 8 Sec.
- ICM 40: 10 Sec.
- ICM 50: 13 Sec.
- ICM 65: 13 Sec.
- ICM 100: 25 Sec.
- ICM 125: 35 Sec.
- ICM 150: 45 Sec.

❗ IMPORTANT:

When used in liquid refrigerant above 75 °C / 167 °F, please contact Danfoss.

ICAD

Table 6: Temperature and enclosure data

Description	Values
Temperature range (ambient)	-30 / +50 °C (-22 / +122 °F)
Enclosure	IP 67 (~NEMA 6)

Design

ICM

Valve body and top cover material

Low temperature steel

Surface protection

ICM 20 – 150: The external surface is zinc-chromated to provide good corrosion protection.

ICAD

ICAD 600A and ICAD 1200A can be used together with following Danfoss valves.

Table 7: Valve and actuator combination

ICAD 600A	ICAD 1200A
ICM 20	ICM 40
ICM 25	ICM 50
ICM 32	ICM 65

Motor operated valves and Actuators, type ICM and ICAD

ICAD 600A	ICAD 1200A
	ICM 100
	ICM 125
	ICM 150

Materials

Housing

Aluminium

Top part of ICAD

PBT thermo plastic

Weight

- **ICAD 600A:** 1.2 kg / 2.64 lb
- **ICAD 1200A:** 1.9 kg / 4.19 lb

The ICM Concept

The ICM concept is developed around a modular principle. This gives the possibility of combining function modules and top covers with special valve body size that is available in a variety of connection possibilities.

There are nine valve bodies available.

Table 8: Valve sizes

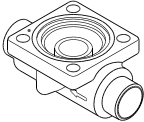
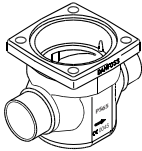
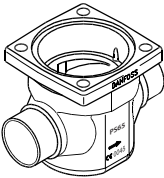
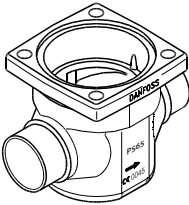
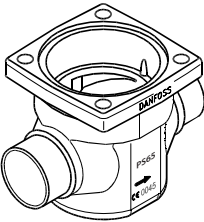
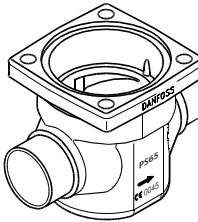
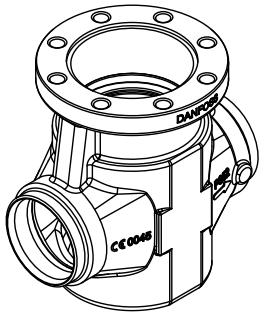
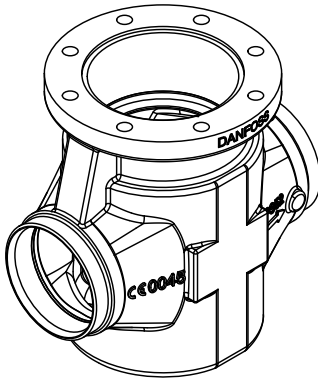
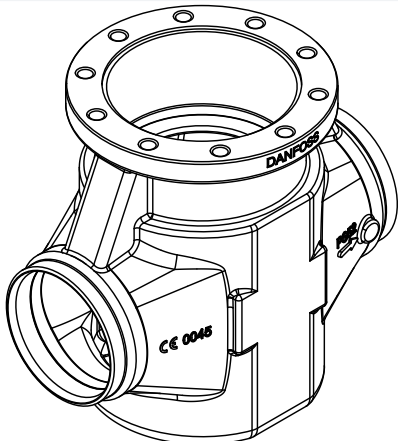
ICV 20	ICV 25	ICV 32	ICV 40	ICV 50	ICV 65
					

Table 9: Valve sizes

ICV 100	ICV 125	ICV 150
		

Valve bodies in the sizes ICV 20 – ICV 65 are available with a range of undersizes through oversized connection sizes and types.

ICV 100 – ICV 150 are available in butt-weld DIN and butt-weld ANSI nominal sizes.

Table 10: Connections

D	A	J	SOC	SD	SA	FPT
Butt-weld DIN	Butt-weld ANSI	Butt-weld JIS	Socket weld ANSI	Solder DIN	Solder ANSI	Female Pipe Thread

ICM motor and ICAD actuator combinations

The ICM motor operated valve and ICAD actuator combinations are as follows:

Table 11: Valve and actuator combination

Actuator	ICAD 600A	ICAD 1200A
Valve size	ICM 20	ICM 40
	ICM 25	ICM 50
	ICM 32	ICM 65
	-	ICM 100
	-	ICM 125
	-	ICM 150

ICAD 600A / ICAD 1200A

ICAD actuators can be controlled using the following signals:

- 0 – 20 mA
- 4 – 20 mA (default)
- 0 – 10 V
- 2 – 10 V
- One or two digital Input

ICAD actuators can operate an ICM valve as an On / Off function supported by one digital input.

ICAD actuators can operate an ICM valve as Neutral zone / 3 point control supported by two digital inputs.

The ICM valve can be operated manually via the ICAD actuator or the Multi-function tool for ICM (see the ordering section).

Fail Safe supply options

In the event of a power failure, multiple fail safe options are possible, provided that a ICAD-UPS or similar is used.

During power failure, ICM can be selected to:

- Close ICM
- Open ICM
- Stay in the same position, as when power failure occurs
- Go to a specific ICM valve opening degree

See the section ICAD UPS for further information.

NOTE:

A fail safe supply (battery or UPS) is required.

Electrical

ICAD

Electrical connection

Connection to ICAD is done via M12 connectors. ICAD has two M12 male connectors build-in:

Power supply:

4 poled M12 male connector

Control signals:

8 poled M12 male connector

ICAD can be delivered with (1.5 m. / 60 in.) or without cables with M12 female connectors:

Power Supply cable with 4 poled M12 female connector: 3 x 0.34 mm² (3 x ~22 AWG)


Control cable with 8 poled M12 female connector: 7 x 0.25 mm² (7 x ~24 AWG)

Cable set with M12 female connectors in other lengths are available. See the section "Spare parts and accessories".

Please observe cable voltage drop

Distance between the applied DC transformer and the ICAD terminal box may cause a voltage drop. Cross section of cables and size of DC transformer must be calculated so that the voltage at all time **at the ICAD terminal box** ⁽²⁾, both during standstill and during operation of ICAD, is within this range:

Table 12: Voltage at all time at the ICAD terminal box

Prefabricated ICAD cable length Code number	1.5 m 027H0426	3 m 027H0438	10 m 027H0427	15 m 027H0435	
 Voltage ICAD terminal (600A / 1200A) [V DC]	Min.	21	22	23	24
	Max.	26.4			

Supply voltage is galvanic isolated from Input/Output

Supply voltage: see [Table 12](#)

Load:

- ICAD 600A: 1.2 A
- ICAD 1200A: 2.0 A

Fail safe supply: See [Table 12](#)

Load:

- ICAD 600A: 1.2 A
- ICAD 1200A: 2.0 A

Analogue Input - Current or Voltage

- Current: 0/4 – 20 mA
- Load: 200 Ω
- Voltage: 0/2 – 10 V DC
- Load : 10 kΩ

Analogue Output:

- Current: 0/4 – 20 mA
- Load : ≤ 250 Ω

Digital Input

Digital ON / OFF input by means of volt-free contact (Signal / Telecom relays with goldplated contacts recommended) – Voltage input used

ON: Contact impedance < 50 Ω

OFF: Contact impedance > 100 kΩ

Digital Output

- 3 pcs. NPN transistor output
- External supply: 5 – 24 V DC (Same supply as for ICAD can be used, but please note that the galvanically isolated system will then be spoiled)
- Output load: 50 Ω
- Load: Max. 50 mA

² Do not measure inside the ICAD itself

Motor operated valves and Actuators, type ICM and ICAD

Table 13: Battery capacity: For each open / closed cycle

Type				
ICAD 600A	Speed Parameter i04	ICM 20	ICM 25	ICM 32
	Max. (i04 = 100)	2 mAh	5 mAh	5 mAh
	Min. (i04 = 1)	200 mAh	467 mAh	533 mAh
ICAD 1200A	Speed Parameter i04	ICM 40	ICM 50	ICM 65
	Max. (i04 = 100)	17 mAh	22 mAh	22 mAh
	Min. (i04 = 1)	1667 mAh	2167 mAh	2167 mAh
ICAD 1200A	Speed Parameter i04	ICM 100	ICM 125	ICM 150
	Max. (i04 = 100)	54 mAh	65 mAh	76 mAh
	Min. (i04 = 1)	5318 mAh	6351 mAh	7501 mAh

Cable connection

Table 14: Cable connection - Two 1.5 m / 60 in. cables pre-mounted

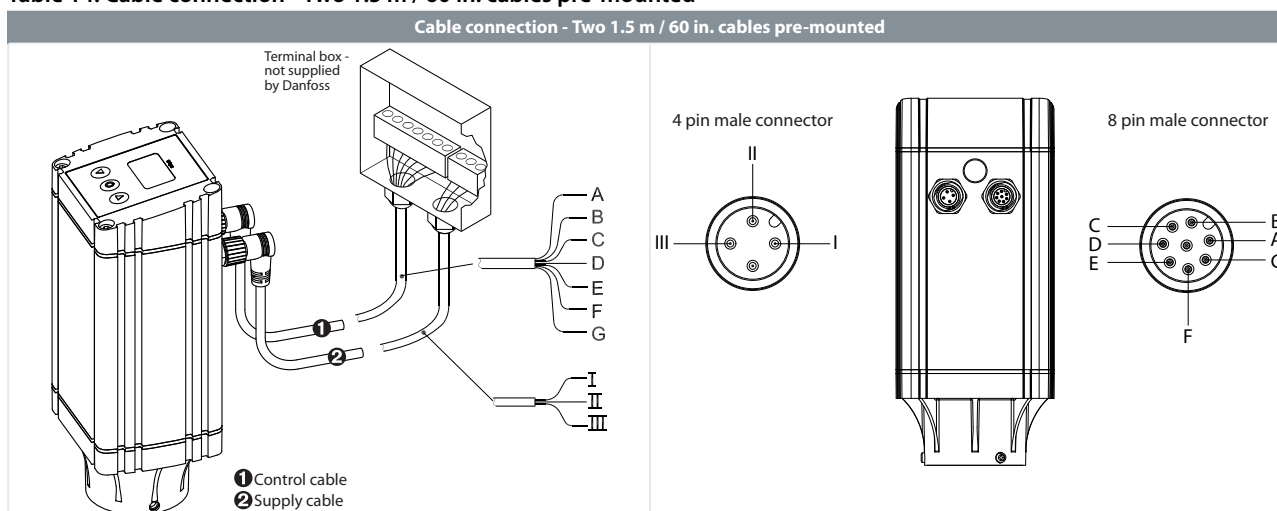


Table 15: Cable connection

Ref.	Colour		Description		
A	Black	–	Common Alarm	Digital Ouput	
B	Brown	–	ICM fully open		
C	Red	–	ICM fully closed		
D	Orange	–	GND ground		
E	Yellow	+	0/4 – 20 mA Input ⁽²⁾	Analogue In/Output	
F	Green	+	0/2 – 10 V Input ⁽³⁾		
G	Blue	+	0/4 – 20 mA Output ⁽²⁾		
I	Black	+	Fail safe supply Battery / UPS ⁽⁴⁾ 19 V DC		
II	White	+	Supply voltage 24 V DC		
III	Brown	–			

⁽²⁾ If Neutral zone / 3 point control is selected (parameter i02 = 3) then E and G are used as DI2 - Digital ON / OFF input

⁽³⁾ Also used with D (GND, ground) for DI1 - Digital ON-OFF operation

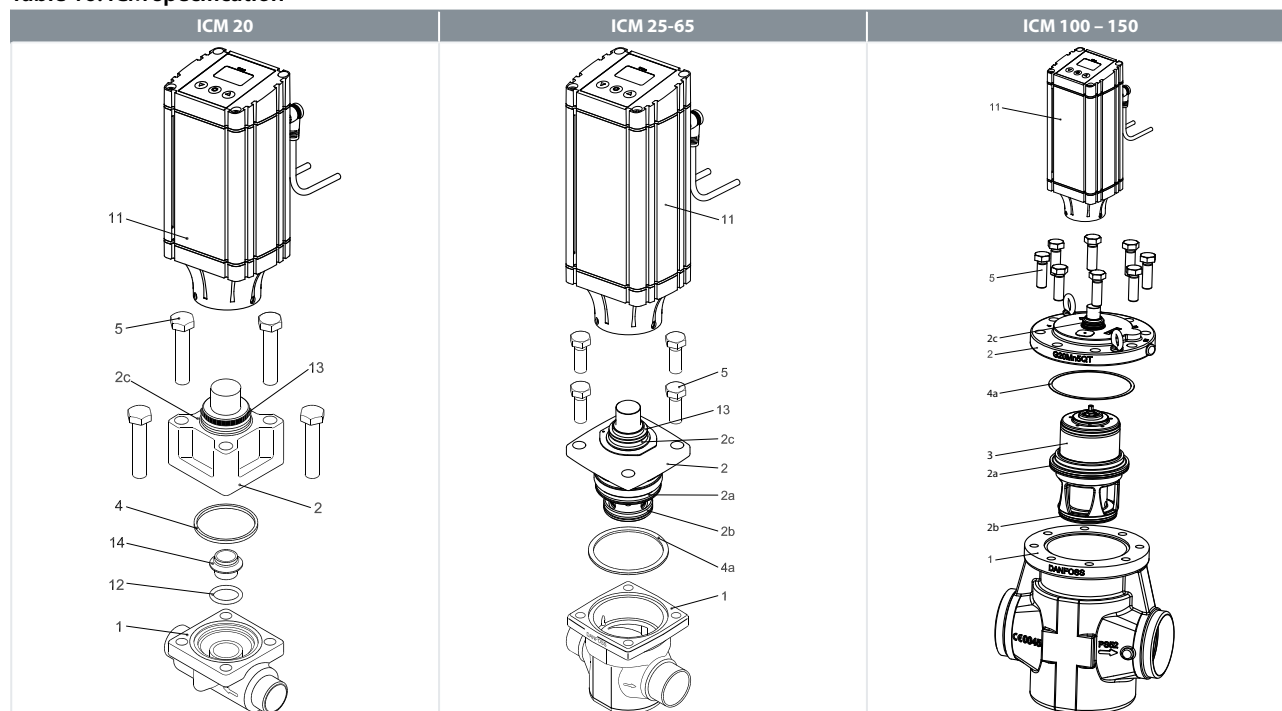
⁽⁴⁾ Uninterruptable Power Supply

NOTE:

Colour code changed when compared to older colour wiring diagram.

Material specification

Table 16: ICM specification



No.	Part	Material	EN	ASTM	JIS
1	Housing	Low temperature steel	G20Mn5QT, EN 10213-3	LCC, A352	SCPL1, G5151
2	Top cover	Low temperature steel	G20Mn5QT, EN 10213-3	LCC, A352	SCPL1, G5151
2a	O-ring	Chloroprene (Neoprene)			
2b	O-ring	Chloroprene (Neoprene)			
2c	O-ring	Chloroprene (Neoprene)			
3	Function module				
4	Gasket	Chloroprene (Neoprene)			
4a	Gasket	Fiber, non-asbestos			
5	Bolts	Stainless steel	A2-70, EN 1515-1	Grade B8 A320	A2-70, B 1054
11	Actuator				
12	O-ring	Chloroprene (Neoprene)			
13	O-ring	Chloroprene (Neoprene)			
14	Seat	High density polymer			

NOTE:

Table 17: Bolt sizes (pos. 5)

Type	Screw	Type	Screw
ICM 20	M10 × 55 A2-70 DIN 931	ICM 100	M20 × 60 A2-70 DIN 933
ICM 25	M12 × 30 A2-70 DIN 933	ICM 125	M20 × 60 A2-70 DIN 933
ICM 32	M14 × 35 A2-70 DIN 933	ICM 150	M20 × 70 A2-70 DIN 933
ICM 40	M14 × 35 A2-70 DIN 933		
ICM 50	M16 × 40 A2-70 DIN 933		
ICM 65	M16 × 40 A2-70 DIN 933		

Connections

There is a very wide range of connection types available with ICM valves:

- **D:** Butt weld, EN 10220
- **A:** Butt weld, ANSI (B 36.10)
- **J:** Butt weld, JIS (B S 602)
- **SOC:** Socket weld, ANSI (B 16.11)

- **SD:** Solder connection, EN 1254-1
- **SA:** Solder connection, ANSI (B 16.22)
- **FPT:** Female pipe thread (ANSI/ASME B 1.20.1)

Table 18: Connections

D	A	J	SOC	SD	SA	FPT
Butt-weld DIN	Butt-weld ANSI	Butt-weld JIS	Socket weld ANSI	Solder DIN	Solder ANSI	Female Pipe Thread

Table 19: D: Butt-weld DIN (2448)

Size	Size	ØD	T	ØD	T
mm	in.	mm	mm	in.	in.
20	3/4	26.9	2.3	1.059	0.091
25	1	33.7	2.6	1.327	0.103
32	1 1/4	42.4	2.6	1.669	0.102
40	1 1/2	48.3	2.6	1.902	0.103
50	2	60.3	2.9	2.37	0.11
65	2 1/2	76.1	2.9	3	0.11
80	3	88.9	3.2	3.5	0.13
100	4	114.3	3.6	4.5	0.14
125	5	140.7	4	5.5	0.16
150	6	168.3	6.3	6.6	0.25

Table 20: A: Butt-weld ANSI (B 36.10)

Size	Size	ØD	T	ØD	T	Schedule
mm	in.	mm	mm	in.	in.	
-20	3/4	26.9	4	1.059	0.158	80
-25	1	33.7	4.6	1.327	0.181	80
-32	1 1/4	42.4	4.9	1.669	0.193	80
-40	1 1/2	48.3	5.1	1.902	0.201	80
-50	2	60.3	3.9	2.37	0.15	40
-65	2 1/2	73	5.2	2.87	0.2	40
-80	3	88.9	5.5	3.5	0.22	40
-100	4	114.3	6	4.5	0.24	
-125	5	140.7	6.5	5.5	0.26	
-150	6	168.3	7.1	6.6	0.28	

Table 21: J: Butt-weld JIS

Size	Size	ØD	T	ØD	T
mm	in.	mm	mm	in.	in.
-20	3/4	26.9	4	1.059	0.158
-25	1	33.7	4.6	1.327	0.181
-32	1 1/4	42.4	4.9	1.669	0.193
-40	1 1/2	48.3	5.1	1.902	0.201
-50	2	60.3	3.9	2.37	0.15
-65	2 1/2	76.3	5.2	3	0.2
-80	3	88.9	5.5	3.5	0.22

Table 22: SOC: Socket welding ANSI (B 16.11)

Size	Size	ID	T	ID	T	L	L
mm	in.	mm	mm	in.	in.	mm	in.
-20	3/4	27.2	4.6	1.071	0.181	13	0.51
-25	1	33.9	7.2	1.335	0.284	13	0.51
-32	1 1/4	42.7	6.1	1.743	0.24	13	0.51
-40	1 1/2	48.8	6.6	1.921	0.26	13	0.51
-50	2	61.2	6.2	2.41	0.24	16	0.63
-65	2 1/2	74	8.8	2.91	0.344	16	0.63

Table 23: SD: Soldering (DIN 2856)

Size	ID	L
mm	mm	mm
16	16.07	15
22	22.08	16.5
28	28.08	26
35	35.07	25
42	42.07	28
54	54.09	33
76	76.1	33

Table 24: SA: Soldering (ANSI B 16.22)

Size	ID	L
in.	in.	in.
5/8	0.625	0.591
7/8	0.875	0.65
1 1/8	1.125	1.024
1 3/8	1.375	0.984
1 5/8	1.625	1.102
2 1/8	2.125	1.3
2 5/8	2.625	1.3

Table 25: FPT: Female pipe thread, (ANSI/ASME B 1.20.1)

Size	Size	Inside pipe thread
mm	in.	
-20	3/4	(3/4 x 14 NPT)
-25	1	(1 x 11.5 NPT)
-32	1 1/4	(1 1/4 x 11.5 NPT)

Dimensions and weights

ICM 20 / ICAD 600A

Figure 8: ICM 20 / ICAD 600A

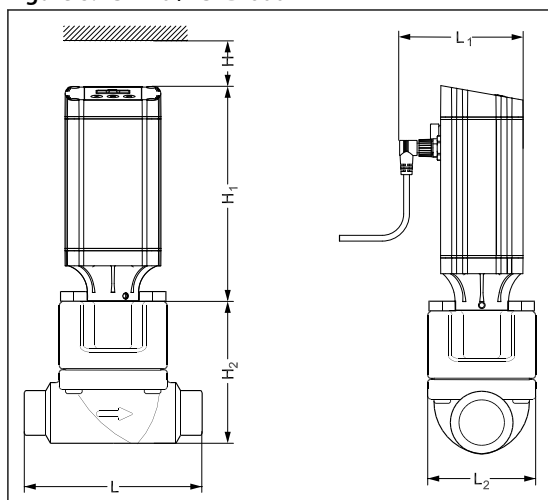
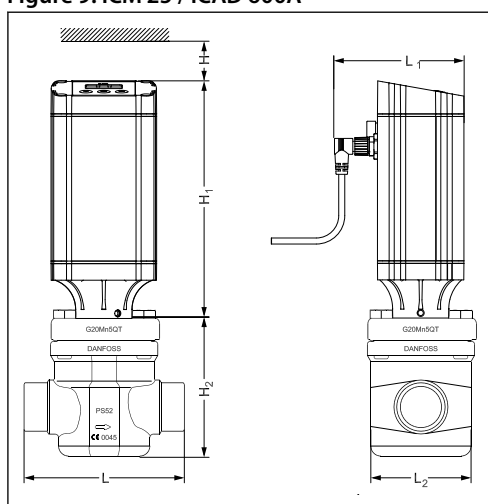


Table 26: ICM 20 / ICAD 600A

Connection		H	H ₁	H ₂	L	L ₁	L ₂	Weight ICM incl. ICAD
20 D (¾ in.)	mm	40	195	85	107	102	65	3 kg
	in.	1.58	7.68	3.35	4.21	4.02	2.56	6.6 lb.
25 D (1 in.)	mm	40	195	85	107	102	65	3 kg
	in.	1.58	7.68	3.35	4.21	4.02	2.56	6.6 lb.
25 A (1 in.)	mm	40	195	85	107	102	65	3 kg
	in.	1.58	7.68	3.35	4.21	4.02	2.56	6.6 lb.
20 A (¾ in.)	mm	40	195	85	107	102	65	3 kg
	in.	1.58	7.68	3.35	4.21	4.02	2.56	6.6 lb.
20 SOC (¾ in.)	mm	40	195	85	107	102	65	3 kg
	in.	1.58	7.68	3.35	4.21	4.02	2.56	6.6 lb.
16 SD (⅝ in.)	mm	40	195	85	107	102	65	3 kg
	in.	1.58	7.68	3.35	4.21	4.02	2.56	6.6 lb.
22 SD (⅞ in.)	mm	40	195	85	107	102	65	3 kg
	in.	1.58	7.68	3.35	4.21	4.02	2.56	6.6 lb.
16 SA (⅝ in.)	mm	40	195	85	107	102	65	3 kg
	in.	1.58	7.68	3.35	4.21	4.02	2.56	6.6 lb.
22 SA (⅞ in.)	mm	40	195	85	107	102	65	3 kg
	in.	1.58	7.68	3.35	4.21	4.02	2.56	6.6 lb.
20 FPT (¾ in.)	mm	40	195	85	107	102	65	3 kg
	in.	1.58	7.68	3.35	4.21	4.02	2.56	6.6 lb.

NOTE:

D = Butt-weld DIN ; A = Butt-weld ANSI ; SOC = Socket weld ANSI ; SD = Solder DIN ; SA = Solder ANSI ; FPT = Female Pipe Thread

ICM 25 / ICAD 600A
Figure 9: ICM 25 / ICAD 600A

Table 27: ICM 25 / ICAD 600A

Connection		H	H ₁	H ₂	L	L ₁	L ₂	Weight ICM incl. ICAD
20 D (¾ in.)	mm	40	195	99	135	102	84	4.1 kg
	in.	1.58	7.68	3.9	5.31	4.02	3.31	8.8 lb.
25 D (1 in.)	mm	40	195	99	135	102	84	4.1 kg
	in.	1.58	7.68	3.9	5.31	4.02	3.31	8.8 lb.
32 D (1 ¼ in.)	mm	40	195	99	135	102	84	4.1 kg
	in.	1.58	7.68	3.9	5.31	4.02	3.31	8.8 lb.
40 D (1 ½ in.)	mm	40	195	99	135	102	84	4.1 kg
	in.	1.58	7.68	3.9	5.31	4.02	3.31	8.8 lb.
20 A (¾ in.)	mm	40	195	99	135	102	84	4.1 kg
	in.	1.58	7.68	3.9	5.31	4.02	3.31	8.8 lb.

Motor operated valves and Actuators, type ICM and ICAD

Connection		H	H ₁	H ₂	L	L ₁	L ₂	Weight ICM incl. ICAD
25 A (1 in.)	mm	40	195	99	135	102	84	4.1 kg
	in.	1.58	7.68	3.9	5.31	4.02	3.31	8.8 lb.
32 A (1 ¼ in.)	mm	40	195	99	135	102	84	4.1 kg
	in.	1.58	7.68	3.9	5.31	4.02	3.31	8.8 lb.
20 SOC (¾ in.)	mm	40	195	99	135	102	84	4.1 kg
	in.	1.58	7.68	3.9	5.31	4.02	3.31	8.8 lb.
25 SOC (1 in.)	mm	40	195	99	148	102	84	4.1 kg
	in.	1.58	7.68	3.9	5.83	4.02	3.31	8.8 lb.
22 SD (7/8 in.)	mm	40	195	99	135	102	84	4.1 kg
	in.	1.58	7.68	3.9	5.31	4.02	3.31	8.8 lb.
28 SD (1 ⅛ in.)	mm	40	195	99	147	102	84	4.1 kg
	in.	1.58	7.68	3.9	5.79	4.02	3.31	8.8 lb.
22 SA (7/8 in.)	mm	40	195	99	135	102	84	4.1 kg
	in.	1.58	7.68	3.9	5.31	4.02	3.31	8.8 lb.
28 SA (1 ⅛ in.)	mm	40	195	99	147	102	84	4.1 kg
	in.	1.58	7.68	3.9	5.79	4.02	3.31	8.8 lb.
35 SD (1 ⅜ in. SA)	mm	40	195	99	147	102	84	4.1 kg
	in.	1.58	7.68	3.9	5.79	4.02	3.31	8.8 lb.
20 FPT (¾ in.)	mm	40	195	99	135	102	84	4.1 kg
	in.	1.58	7.68	3.9	5.31	4.02	3.31	8.8 lb.
25 FPT (1 in.)	mm	40	195	99	135	102	84	4.1 kg
	in.	1.58	7.68	3.9	5.31	4.02	3.31	8.8 lb.

NOTE:

D = Butt-weld DIN ; A = Butt-weld ANSI ; SOC = Socket weld ANSI ; SD = Solder DIN ; SA = Solder ANSI ; FPT = Female Pipe Thread

ICM 32 / ICAD 600A

Figure 10: ICM 32 / ICAD 600A

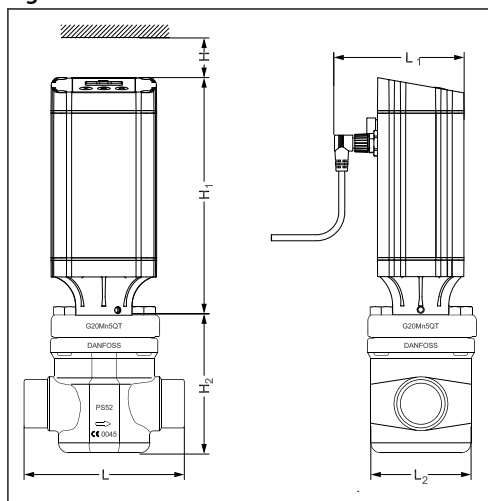


Table 28: ICM 32 / ICAD 600A

Connection		H	H ₁	H ₂	L	L ₁	L ₂	Weight ICM incl. ICAD
32 D (1 ¼ in.)	mm	40	195	117	145	102	102	5.8 kg
	in.	1.58	7.68	4.61	5.71	4.02	4.02	11.0 lb.
40 D (1 ½ in.)	mm	40	195	117	145	102	102	5.8 kg
	in.	1.58	7.68	4.61	5.71	4.02	4.02	11.0 lb.
32 A (1 ¼ in.)	mm	40	195	117	145	102	102	5.8 kg
	in.	1.58	7.68	4.61	5.71	4.02	4.02	11.0 lb.
40 A (1 ½ in.)	mm	40	195	117	145	102	102	5.8 kg
	in.	1.58	7.68	4.61	5.71	4.02	4.02	11.0 lb.

Motor operated valves and Actuators, type ICM and ICAD

Connection		H	H ₁	H ₂	L	L ₁	L ₂	Weight ICM incl. ICAD
32 SOC (1 ¼ in.)	mm	40	195	117	147	102	102	5.8 kg
	in.	1.58	7.68	4.61	5.79	4.02	4.02	11.0 lb.
35 SD (1 ⅜ in. SA)	mm	40	195	117	148	102	102	5.8 kg
	in.	1.58	7.68	4.61	5.83	4.02	4.02	11.0 lb.
42 SD (1 ⅝ in.)	mm	40	195	117	148	102	102	5.8 kg
	in.	1.58	7.68	4.61	5.83	4.02	4.02	11.0 lb.
42 SA (1 ⅝ in.)	mm	40	195	117	148	102	102	5.8 kg
	in.	1.58	7.68	4.61	5.83	4.02	4.02	11.0 lb.

NOTE:

D = Butt-weld DIN ; A = Butt-weld ANSI ; SOC = Socket weld ANSI ; SD = Solder DIN ; SA = Solder ANSI

ICM 40 / ICAD 1200A

Figure 11: ICM 40 / ICAD 1200A

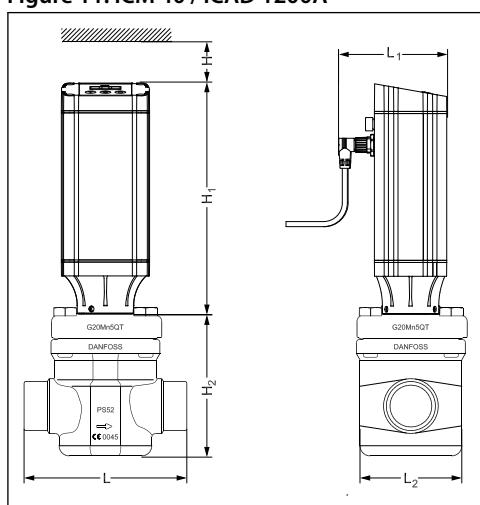


Table 29: ICM 40 / ICAD 1200A

Connection		H	H ₁	H ₂	L	L ₁	L ₂	Weight ICM incl. ICAD
40 D (1 ½ in.)	mm	45	219	131	160	102	107	7.8 kg
	in.	1.77	8.62	5.16	6.3	4.02	4.21	17.2 lb.
50 D (2 in.)	mm	45	219	131	180	102	107	7.8 kg
	in.	1.77	8.62	5.16	7.09	4.02	4.21	17.2 lb.
40 A (1 ½ in.)	mm	45	219	131	160	102	107	7.8 kg
	in.	1.77	8.62	5.16	6.3	4.02	4.21	17.2 lb.
50 A (2 in.)	mm	45	219	131	180	102	107	7.8 kg
	in.	1.77	8.62	5.16	7.09	4.02	4.21	17.2 lb.
40 SOC (1 ½ in.)	mm	45	219	131	180	102	107	7.8 kg
	in.	1.77	8.62	5.16	7.09	4.02	4.21	17.2 lb.
42 SD (1 ⅝ in.)	mm	45	219	131	180	102	107	7.8 kg
	in.	1.77	8.62	5.16	7.09	4.02	4.21	17.2 lb.
42 SA (1 ⅝ in.)	mm	45	219	131	180	102	107	7.8 kg
	in.	1.77	8.62	5.16	7.09	4.02	4.21	17.2 lb.

NOTE:

D = Butt-weld DIN ; A = Butt-weld ANSI ; SOC = Socket weld ANSI ; SD = Solder DIN ; SA = Solder ANSI

ICM 50 / ICAD 1200A

Figure 12: ICM 50 / ICAD 1200A

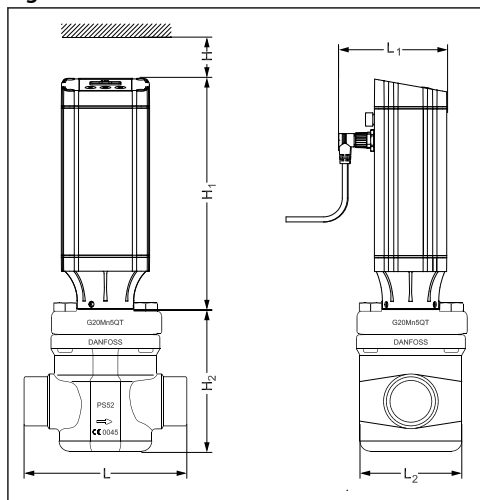


Table 30: ICM 50 / ICAD 1200A

Connection		H	H ₁	H ₂	L	L ₁	L ₂	Weight ICM incl. ICAD
50 D (2 in.)	mm	45	219	159	200	102	125	11.1 kg
	in.	1.77	8.62	6.26	7.87	4.02	4.92	24.4 lb.
65 D (2 ½ in.)	mm	45	219	159	210	102	125	11.1 kg
	in.	1.77	8.62	6.26	8.27	4.02	4.92	24.4 lb.
50 A (2 in.)	mm	45	219	159	200	102	125	11.1 kg
	in.	1.77	8.62	6.26	7.87	4.02	4.92	24.4 lb.
65 A (2 ½ in.)	mm	45	219	159	210	102	125	11.1 kg
	in.	1.77	8.62	6.26	8.27	4.02	4.92	24.4 lb.
50 SOC (2 in.)	mm	45	219	159	216	102	125	11.1 kg
	in.	1.77	8.62	6.26	8.5	4.02	4.92	24.4 lb.
54 SD (2 ⅛ in. SA)	mm	45	219	159	216	102	125	11.1kg
	in.	1.77	8.62	6.26	8.5	4.02	4.92	24.4 lb.

NOTE:

D = Butt-weld DIN ; A = Butt-weld ANSI ; SOC = Socket weld ANSI ; SD = Solder DIN

ICM 65 / ICAD 1200A

Figure 13: ICM 65 / ICAD 1200A

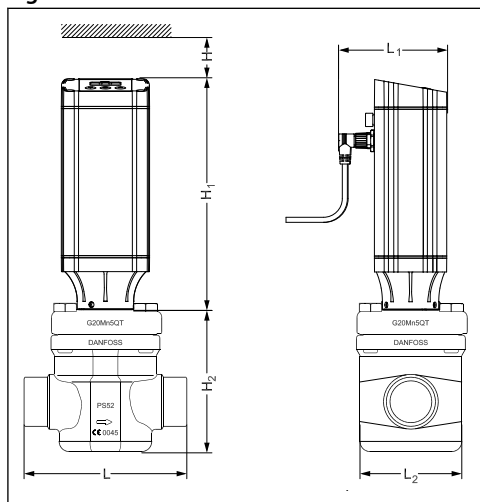


Table 31: ICM 65 / ICAD 1200A

Connection		H	H ₁	H ₂	L	L ₁	L ₂	Weight ICM incl. ICAD
65 D (2 ½ in.)	mm	45	219	188	230	102	139	16.6 kg
	in.	1.77	8.62	7.4	9.06	4.02	5.47	36.5 lb
80 D (3 in.)	mm	45	219	188	245	102	139	16.6 kg
	in.	1.77	8.62	7.4	9.65	4.02	5.47	36.5 lb
65 A (2 ½ in.)	mm	45	219	188	230	102	139	16.6 kg
	in.	1.77	8.62	7.4	9.06	4.02	5.47	36.5 lb
80 A (3 in.)	mm	45	219	188	245	102	139	16.6 kg
	in.	1.77	8.62	7.4	9.65	4.02	5.47	36.5 lb
65 J (2 ½ in.)	mm	45	219	188	230	102	139	16.6 kg
	in.	1.77	8.62	7.4	9.06	4.02	5.47	36.5 lb
65 SOC (2 ½ in.)	mm	45	219	188	230	102	139	16.6 kg
	in.	1.77	8.62	7.4	9.06	4.02	5.47	36.5 lb
76 SD (3 in.)	mm	45	219	188	245	102	139	16.6 kg
	in.	1.77	8.62	7.4	9.65	4.02	5.47	36.5 lb
67 SA (2 ⅝ in.)	mm	45	219	188	245	102	139	16.6 kg
	in.	1.77	8.62	7.4	9.65	4.02	5.47	36.5 lb

NOTE:

D = Butt-weld DIN ; A = Butt-weld ANSI ; J = Butt-weld JIS ; SOC = Socket weld ANSI ; SD = Solder DIN ; SA = Solder ANSI

ICM 100 / ICAD 1200A

Figure 14: ICM 100 / ICAD 1200A

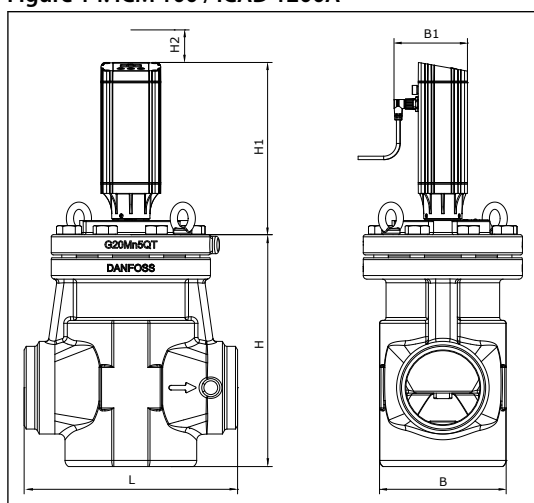


Table 32: ICM 100 / ICAD 1200A

Connection		H	H ₁	H ₂	L	B	B ₂	Weight ICM incl. ICAD
100 D/A (4 in.)	mm	321	238	45	295	175	102	44 kg.
	in.	12.64	9.37	1.77	11.61	6.89	4.02	97 lb.

NOTE:

D = Butt-weld DIN ; A = Butt-weld ANSI

ICM 125 / ICAD 1200A

Figure 15: ICM 125 / ICAD 1200A

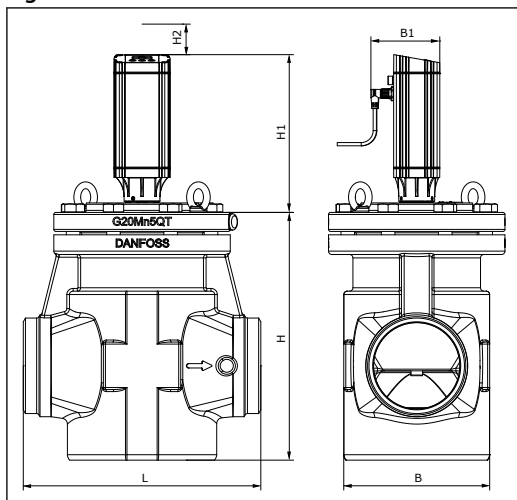


Table 33: ICM 125 / ICAD 1200A

Connection		H	H ₁	H ₂	L	B	B ₂	Weight ICM incl. ICAD
125 D/A (5 in.)	mm	365	238	45	350	215	102	55 kg
	in.	14.37	9.37	1.77	13.78	8.47	4.02	121 lb.

NOTE:

D = Butt-weld DIN ; A = Butt-weld ANSI

ICM 150 / ICAD 1200A

Figure 16: ICM 150 / ICAD 1200A

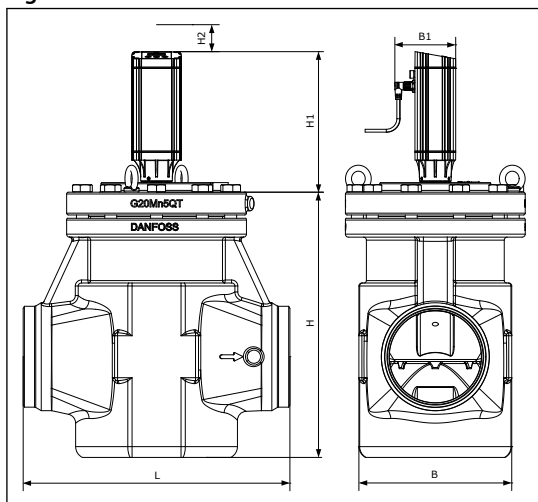


Table 34: ICM 150 / ICAD 1200A

Connection		H	H ₁	H ₂	L	B	B ₁	Weight ICM incl. ICAD
150 D/A (6 in.)	mm	443	238	45	445	255	102	95 kg
	in.	17.77	9.37	1.77	17.52	10.04	4.02	209 lb.

NOTE:

D = Butt-weld DIN ; A = Butt-weld ANSI

NOTE:

Weight presented in tables 26 to 34 is approximated only

Ordering

Ordering from the parts programme

ICM 20 / ICAD 600A

Table 35: Example (select from table I, II and III)

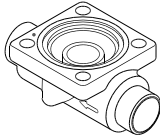
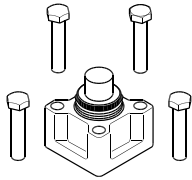
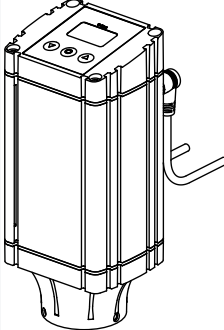
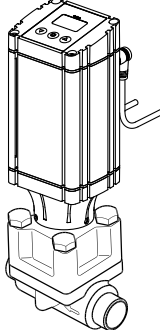
Valve body 22 SD (7/8 in.) 027H1154 Table 36		Top cover/function module ICM 20-B 027H1181 Table 37		Actuator 027H9075 Table 38		
	+		+		=	

Figure 17: ICM 20 valve body

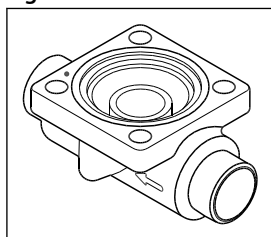


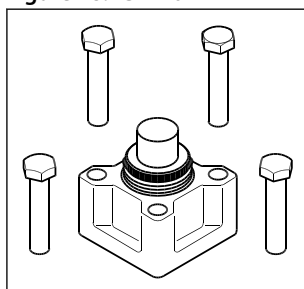
Table 36: ICM 20 valve body w/different connections Table I

20 D (3/4 in.)	25 D (1 in.)	20 A (3/4 in.)	20 SOC (3/4 in.)
027H1145	027H1163	027H1148	027H1151
16 SA (5/8 in.)	22 SA (7/8 in.)	16 SD (5/8 in.)	22 SD (7/8 in.)
027H1129	027H1160	027H1132	027H1154
20 FPT (3/4 in.)		25 A (1 in.)	
027H1157		027H1166	

NOTE:

D = Butt-weld DIN ; A = Butt-weld ANSI ; J = Butt-weld JIS ; SOC = Socket weld ANSI ; SD = Solder DIN ; SA = Solder ANSI ; FPT = Female Pipe Thread

Figure 18: ICM 20



Motor operated valves and Actuators, type ICM and ICAD

Table 37: ICM 20 Function module / top cover Table II

Description	Code Number
ICM 20-A33	027H1186 ⁽¹⁾
ICM 20-A	027H1180 ⁽¹⁾
ICM 20-B66	027H1194 ⁽¹⁾
ICM 20-B	027H1181 ⁽¹⁾
ICM 20-C	027H1182 ⁽¹⁾

⁽¹⁾ Bolts and O-ring (for assembly with ICV valve body) Seat and O-ring (for seat to be mounted in ICV valve body)

Figure 19: Actuator ICAD 600A

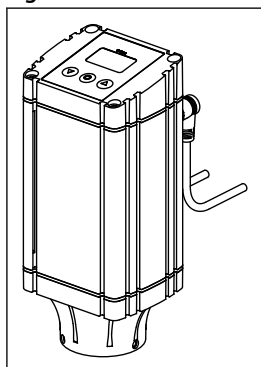


Table 38: Actuator ICAD 600A Table III

Description	Code Number
ICAD 600A with 1.5 m. / 60 in. cables	027H9075
ICAD 600A without cables	027H9120

Ordering complete factory assembled valve without actuator

Figure 20: Valve without actuator

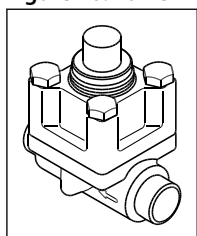


Table 39: Body, function module/top cover Table A

Type	Available connections									
	20 D (¾ in.)	25 D (1 in.)	20 A (¾ in.)	20 SOC (¾ in.)	16 SA (⅝ in.)	22 SA (⅞ in.)	16 SD (⅝ in.)	22 SD (⅞ in.)	20 FPT (¾ in.)	25 A (1 in.)
ICM 20-A	027H1030	027H1020	027H1035	027H1040	(2)	027H1050	(2)	027H1045	(2)	(2)
ICM 20-B	027H1031	027H1021	027H1036	027H1041	(2)	027H1051	(2)	027H1046	(2)	(2)
ICM 20-C	027H1032	027H1022	(2)	(2)	(2)	027H1052	(2)	027H1047	(2)	027H1025

⁽²⁾ Select from parts programme

ICM 25 / ICAD 600A

Table 40: Example (select from table I, II and III)

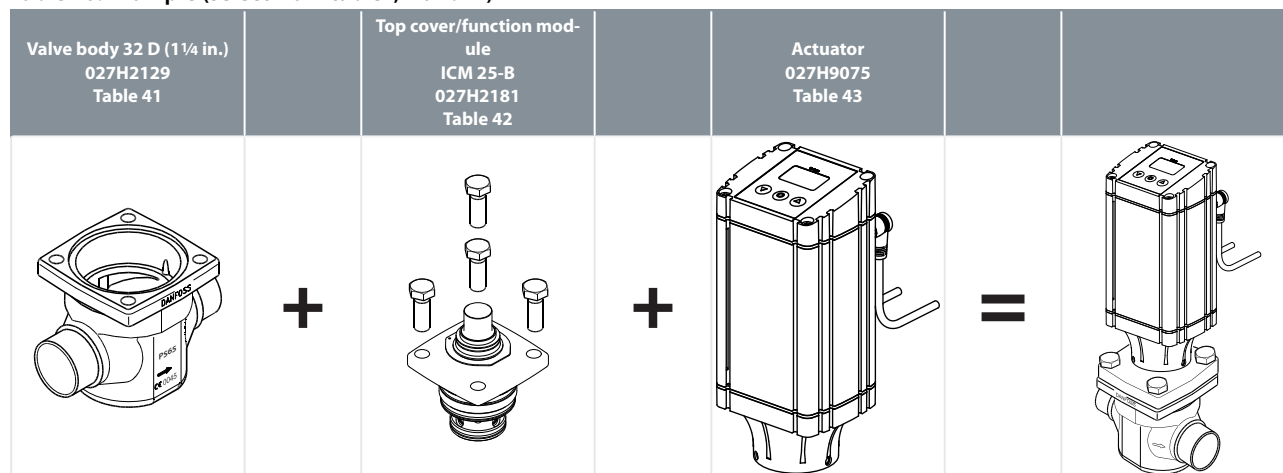


Figure 21: ICM 25 valve body

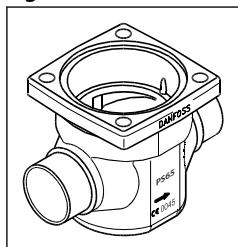


Table 41: ICM 25 valve body w/different connections Table I

20 D (3/4 in.)	25 D (1 in.)	32 D (1 1/4 in.)	40 D (1 1/2 in.)
027H2128	027H2120	027H2129	027H2135
35 SD (1 3/8 in. SA)	28 SA (1 1/8 in.)	22 SA (7/8 in.)	28 SD (1 1/8 in.)
027H2134	027H2126	027H2125	027H2124
22 SD (7/8 in.)	20 A (3/4 in.)	25 A (1 in.)	32 A (1 1/4 in.)
027H2123	027H2131	027H2121	027H2130
20 SOC (3/4 in.)	25 SOC (1 in.)	20 FPT (3/4 in.)	25 FPT (1 in.)
027H2132	027H2122	027H2133	027H2127

NOTE:

D = Butt-weld DIN ; A = Butt-weld ANSI ; J = Butt-weld JIS ; SOC = Socket weld ANSI ; SD = Solder DIN ; SA = Solder ANSI ; FPT = Female Pipe Thread

Figure 22: ICM 25

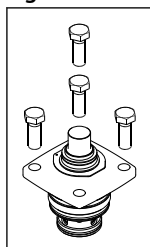


Table 42: ICM 25 Function module / top cover Table II

Description	Code Number
ICM 25-A	027H2180 ⁽¹⁾
ICM 25-A33	027H2190 ⁽¹⁾
ICM 25-B	027H2181 ⁽¹⁾

⁽¹⁾ Including gasket and O-rings

Figure 23: Actuator ICAD 600A

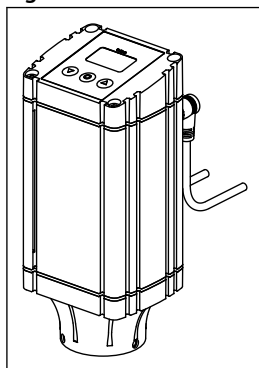


Table 43: Actuator ICAD 600A Table III

Description	Code Number
ICAD 600A with 1.5 m. / 60 in. cables	027H9075
ICAD 600A without cables	027H9120

Ordering complete factory assembled valve without actuator

Figure 24: Valve without actuator

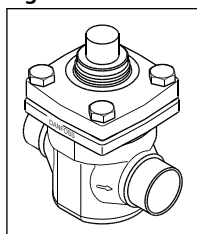


Table 44: Body, function module / top cover Table A

Type	Available connections							
	20 D (3/4 in.)	25 D (1 in.)	32 D (1 1/4 in.)	40 D (1 1/2 in.)	35 SD (1 3/8 in. SA)	28 SA (1 1/8 in.)	22 SA (7/8 in.)	28 SD (1 1/8 in.)
ICM 25-A	(1)	027H2000	(1)	027H2016	027H2014	027H2012	027H2010	027H2008
ICM 25-B	(1)	027H2001	(1)	(1)	027H2015	027H2013	027H2011	027H2009
	22 SD (7/8 in.)	20 A (3/4 in.)	25 A (1 in.)	32 A (1 1/4 in.)	20 SOC (3/4 in.)	25 SOC (1 in.)	20 FPT (3/4 in.)	25 FPT (1 in.)
ICM 25-A	027H2006	(1)	027H2002	(1)	(1)	027H2004	(1)	(1)
ICM 25-B	027H2007	(1)	027H2003	(1)	(1)	027H2005	(1)	(1)

(1) Select from parts programme

ICM 32 / ICAD 600A

Table 45: Example (select from table I, II and III)

Valve body 40 D (1 1/2 in.) 027H3125 Table 46		Top cover/function module ICM 32-A 027H3180 Table 47		Actuator 027H9075 Table 48		
	+		+		=	

Figure 25: ICV 32 valve body

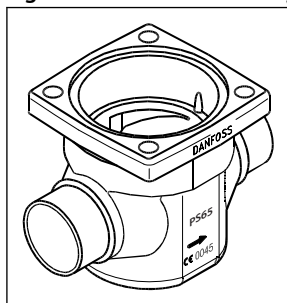


Table 46: ICV 32 valve body w/different connections Table I

32 D (1 1/4 in.)	40 D (1 1/2 in.)	42 SA (1 5/8 in.)	42 SD (1 5/8 in.)
027H3120	027H3125	027H3127	027H3128
35 SD (1 3/8 in. SA)	32 A (1 1/4 in.)	32 SOC (1 1/4 in.)	40 A (1 1/2 in.)
027H3123	027H3121	027H3122	027H3126

NOTE:

D = Butt-weld DIN ; A = Butt-weld ANSI ; J = Butt-weld JIS ; SOC = Socket weld ANSI ; SD = Solder DIN ; SA = Solder ANSI ; FPT = Female Pipe Thread

Figure 26: ICM 32

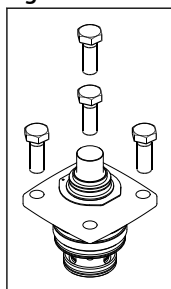


Table 47: ICM 32 Function module / top cover Table II

Description	Code Number
ICM 32-A	027H3180 ⁽¹⁾
ICM 32-B	027H3181 ⁽¹⁾

⁽¹⁾ Including gasket and O-rings

Figure 27: Actuator ICAD 600A

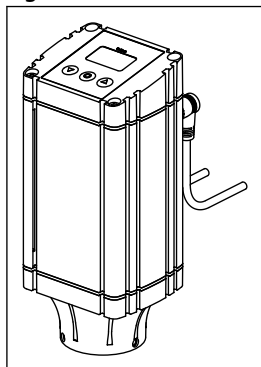


Table 48: Actuator ICAD 600A Table III

Description	Code Number
ICAD 600A with 1.5 m. / 60 in. cables	027H9075
ICAD 600A without cables	027H9120

Ordering complete factory assembled valve without actuator

Figure 28: Valve without actuator

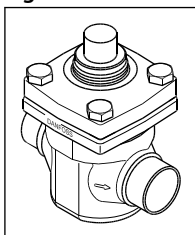


Table 49: Body, function module / top cover Table A

Available connections								
	32 D (1 1/4 in.)	40 D (1 1/2 in.)	42 SA (1 5/8 in.)	42 SD (1 5/8 in.)	35 SD (1 3/8 in. SA)	32 A (1 1/4 in.)	32 SOC (1 1/4 in.)	40 A (1 1/2 in.)
ICM 32-A	027H3000	027H3012	027H3008	(2)	027H3006	027H3002	027H3004	(2)
ICM 32-B	027H3001	(2)	(2)	(2)	027H3007	027H3003	027H3005	(2)

⁽²⁾ Select from parts programme

ICM 40 / ICAD 1200A

Table 50: Example (select from table I, II and III)

Valve body A 40 (1 1/2 in.) 027H4121 Table 51		Top cover/function module ICM 40-A 027H4180 Table 52		Actuator 027H9077 Table 53		
	+		+		=	

Figure 29: ICV 40 valve body

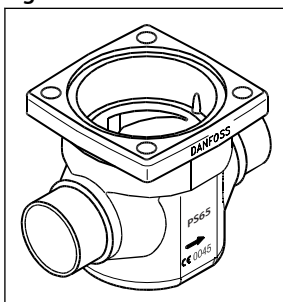


Table 51: ICV 40 valve body w/different connections Table I

40 D (1 1/2 in.)	50 D (2 in.)	42 SA (1 5/8 in.)	42 SD (1 5/8 in.)
027H4120	027H4126	027H4124	027H4123
40 A (1 1/2 in.)	40 SOC (1 1/2 in.)	50 A (2 in.)	
027H4121	027H4122	027H4127	

NOTE:

D = Butt-weld DIN ; A = Butt-weld ANSI ; J = Butt-weld JIS ; SOC = Socket weld ANSI ; SD = Solder DIN ; SA = Solder ANSI ; FPT = Female Pipe Thread

Figure 30: ICM 40

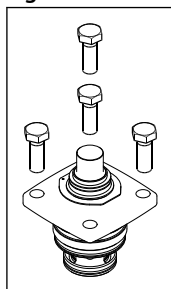


Table 52: ICM 40 Function module / top cover Table II

Description	Code Number
ICM 32-A	027H3180 ⁽¹⁾
ICM 32-B	027H3181

⁽¹⁾ Including gasket and O-rings

Figure 31: Actuator ICAD 1200A

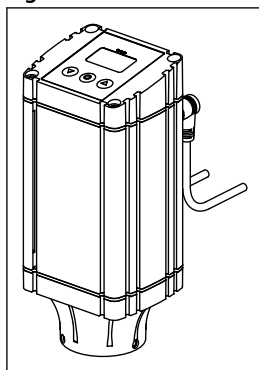


Table 53: Actuator ICAD 1200A Table III

Description	Code Number
ICAD 1200A with 1.5 m. / 60 in. cables	027H9077
ICAD 1200A without cables	027H9122

Ordering complete factory assembled valve without actuator

Figure 32: Valve without actuator

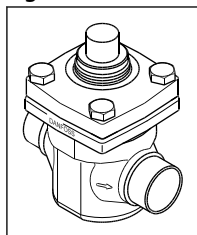


Table 54: Body, function module/top cover Table A

Type	Available connections						
	40 D (1 1/2 in.)	50 D (2 in.)	42 SA (1 5/8 in.)	42 SD (1 5/8 in.)	40 A (1 1/2 in.)	40 SOC (1 1/2 in.)	50 A (2 in.)
ICM 40-A	027H4000	027H4010	027H4006	027H4008	027H4002	027H4004	⁽²⁾
ICM 40-B	027H4001	⁽²⁾	027H4007	027H4009	027H4003	027H4005	⁽²⁾

⁽²⁾ Select from parts programme

ICM 50 / ICAD 1200A

Table 55: Example (select from table I, II and III)

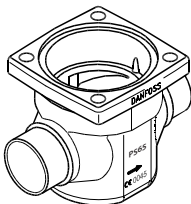
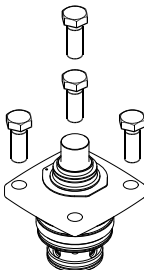
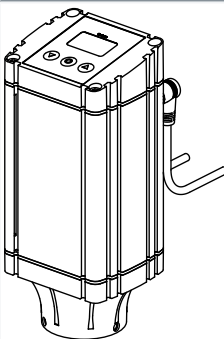
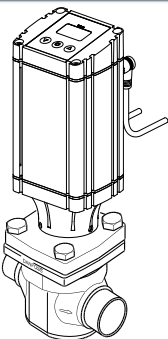
Valve body 65 D (1½ in.) 027H5124 Table 56		Top cover/function mod- ule ICM 50-A 027H4180 Table 57		Actuator 027H9077 Table 58		
	+		+		=	

Figure 33: ICV 50 valve body

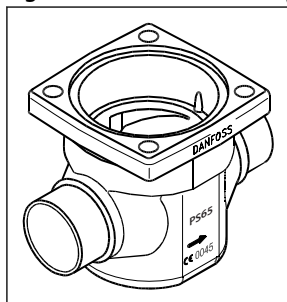


Table 56: ICV 50 valve body w/different connections Table I

50 D (2 in.)	65 D (2 ½ in.)	54 SD (2 ⅛ in. SA)	50 A (2 in.)
027H5120	027H5124	027H5123	027H5121
50 SOC (2 in.)	65 A (2 ½ in.)		
027H5122	027H5125		

Figure 34: ICM 50

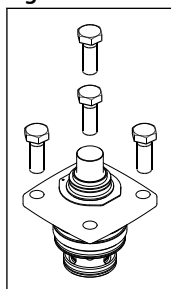


Table 57: ICM 50 Function module / top cover Table II

Description	Code Number
ICM 50-A	027H5180 ⁽¹⁾
ICM 50-B	027H5181 ⁽¹⁾

⁽¹⁾ Including gasket and O-rings

Figure 35: Actuator ICAD 1200A

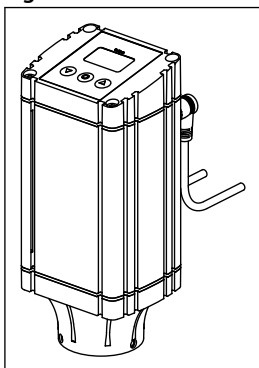


Table 58: Actuator ICAD 1200A Table III

Description	Code Number
ICAD 1200A with 1.5 m. / 60 in. cables	027H9077
ICAD 1200A without cables	027H9122

Ordering complete factory assembled valve without actuator

Figure 36: Valve without actuator

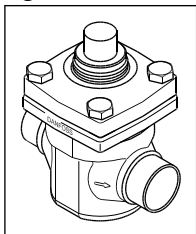


Table 59: Body, function module / top cover Table A

Type	Available connections					
	50 D (2 in.)	65 D (2 ½ in.)	54 SD (2 ⅛ in. SA)	50 A (2 in.)	50 SOC (2 in.)	65 A (2 ½ in.)
ICM 50-A	027H5000	027H5008	027H5006	027H5002	027H5004	(2)
ICM 50-B	027H5001	(2)	027H5007	027H5003	027H5005	(2)

⁽²⁾ Select from parts programme

ICM 65 / ICAD 1200A

Table 60: Example (select from table I, II and III)

Valve body 65 J (2 ½ in.) 027H6122 Table 61		Top cover/function module ICM 65-B 027H6181 Table 62		Actuator 027H9077 Table 63		
	+		+		=	

Figure 37: ICV 65 valve body

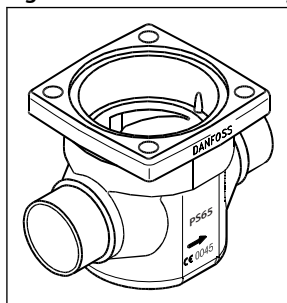


Table 61: ICV 65 valve body w/different connections Table I

65 D (2 1/2 in.)	65 A (2 1/2 in.)	65 J (2 1/2 in.)	80 D (3 in.)
027H6120	027H6121	027H6122	027H6126
80 A (3 in.)	67 SA (2 5/8 in.)	76 SD (3 in.)	65 SOC (2 1/2 in.)
027H6127	027H6125	027H6124	027H6123

NOTE:

D = Butt-weld DIN ; A = Butt-weld ANSI ; J = Butt-weld JIS ; SOC = Socket weld ANSI ; SD = Solder DIN ; SA = Solder ANSI ; FPT = Female Pipe Thread

Figure 38: ICM 65

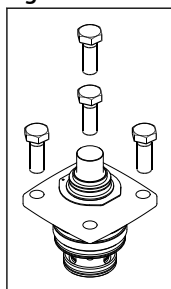


Table 62: ICM 65 Function module / top cover Table II

Description	Code Number
ICM 65-A	027H6180 ⁽¹⁾
ICM 65-B	027H6181 ⁽¹⁾

⁽¹⁾ Including gasket and O-rings

Figure 39: Actuator ICAD 1200A

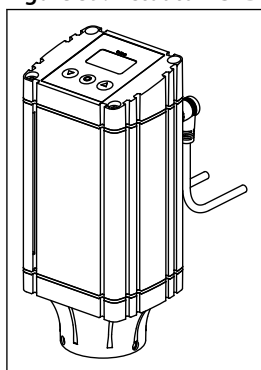


Table 63: Actuator ICAD 1200A Table III

Description	Code Number
ICAD 1200A with 1.5 m. / 60 in. cables	027H9077
ICAD 1200A without cables	027H9122

Ordering complete factory assembled valve without actuator

Figure 40: Valve without actuator

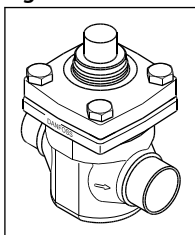


Table 64: Body, function module / top cover Table A

Type	Available connections							
	65 D (2 1/2 in.)	65 A (2 1/2 in.)	65 J (2 1/2 in.)	80 D (3 in.)	80 A (3 in.)	67 SA (2 5/8 in.)	76 SD (3 in.)	65 SOC (2 1/2 in.)
ICM 65-A	027H6010	027H6012	(2)	(2)	(2)	(2)	(2)	(2)
ICM 65-B	027H6001	027H6003	(2)	(2)	(2)	027H6007	027H6009	027H6005

⁽²⁾ Select from parts programme

ICM 100

Complete factory assembled valve without actuator

Figure 41: Body, function module / top cover Figure 42: ICM 100 Valve body

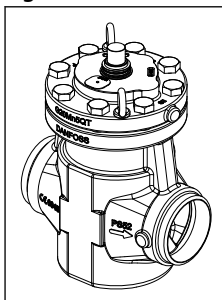
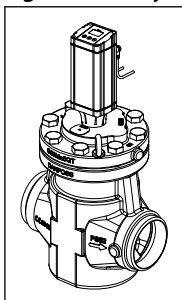


Table 65: Body, function module / top cover

Type	Available connections	
	100 D (4 in.)	100 A (4 in.)
ICM 100	027H7130	027H7131

Figure 43: Actuator ICAD 1200A

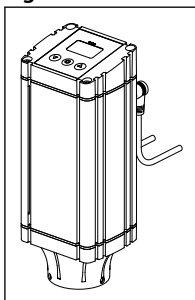


Table 66: Actuator ICAD 1200A

Description	Code Number
ICAD 1200A with 1.5 m. / 60 in. cables	027H9077
ICAD 1200A without cable	027H9122

ICM 125

Complete factory assembled valve without actuator

Motor operated valves and Actuators, type ICM and ICAD

Figure 44: Body, function module / top cover Figure 45: ICM 100 Valve body

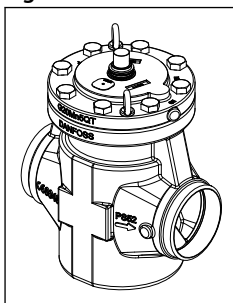
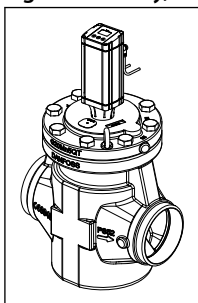


Table 67: Body, function module / top cover

Type	Available connections	
	125 D (5 in.)	125 A (5 in.)
ICM 125	027H7150	027H7151

Figure 46: Actuator ICAD 1200A

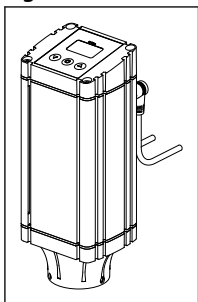


Table 68: Actuator ICAD 1200A

Description	Code Number
ICAD 1200A with 1.5 m. / 60 in. cables	027H9077
ICAD 1200A without cable	027H9122

ICM 150

Complete factory assembled valve without actuator

Figure 47: Body, function module / top cover Figure 48: ICM 100 Valve body

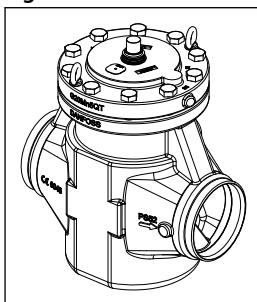
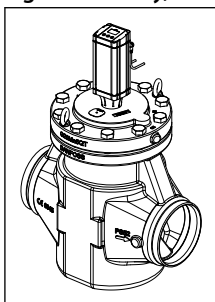


Table 69: Body, function module / top cover

Type	Available connections	
	150 D (6 in.)	150 A (6 in.)
ICM 150	027H7170	027H7171

Figure 49: Actuator ICAD 1200A

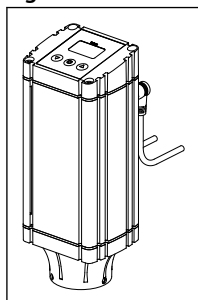


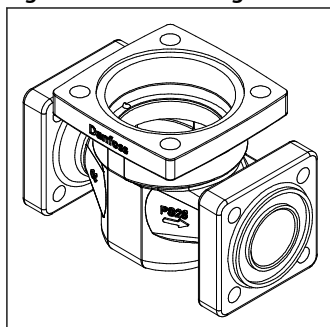
Table 70: Actuator ICAD 1200A

Description	Code Number
ICAD 1200A with 1.5 m. / 60 in. cables	027H9077
ICAD 1200A without cable	027H9122

Accessories

ICV PM flanged valve housings

Figure 50: ICV PM flanged valve housings



ICV PM flanged valve housings

ICV PM flanged valve housings can replace the PM valves on already installed refrigeration systems.

Pressure range

The ICV PM valve housing is designed for a max. working pressure of 28 bar g / 406 psig and therefore a suitable replacement for PM valves in the service market. They also offer the same drop-in dimensions as the PM valves.

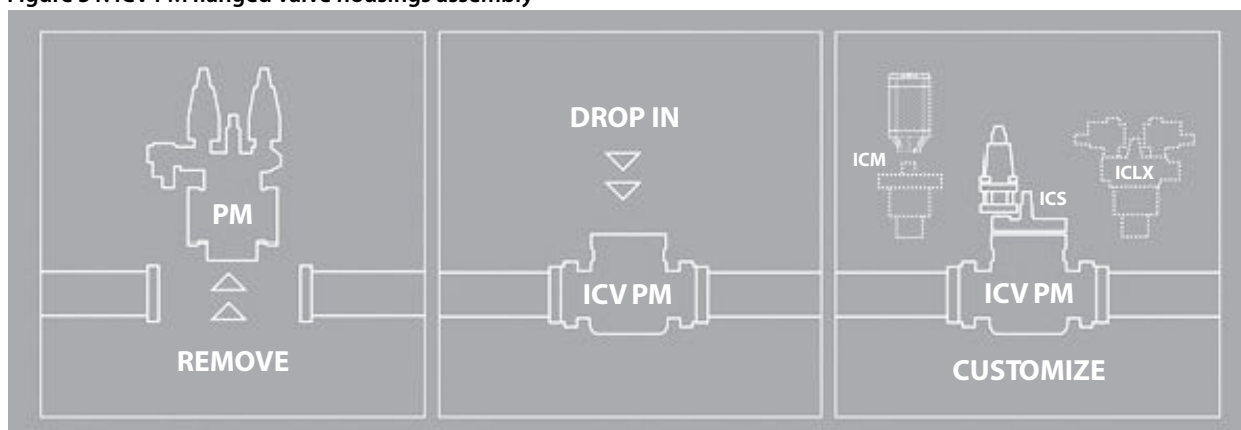
Table 71: ICV PM flanged valve housings

Description	Code no.
ICV 25 PM Valve housing	027H2119 ⁽¹⁾
ICV 32 PM Valve housing	027H3129 ⁽¹⁾
ICV 40 PM Valve housing	027H4128 ⁽¹⁾
ICV 50 PM Valve housing	027H5127 ⁽²⁾
ICV 65 PM Valve housing	027H6128 ⁽²⁾

⁽¹⁾ Includes ICV PM valve housing, flange gaskets and flange bolts

⁽²⁾ Includes ICV PM valve housing, flange gaskets, flange bolts and flange nuts

Figure 51: ICV PM flanged valve housings assembly

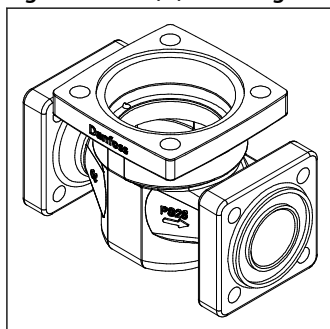


NOTE:

Function modules and top covers must be ordered separately (see the section [Page 26](#)).

ICV (H)A4A flanged valve housings

Figure 52: ICV (H)A4A flanged valve housings



ICV (H)A4A flanged valve housings

ICV (H)A4A flanged valve housings can replace the (H)A4A valves on already installed refrigeration systems.

The ICV (H)A4A flanged valve housing provides an upgrade of the old motor valve types HMMR and HMMV to ICM motorized valve as a drop-in solution.

Pressure range

The ICV (H)A4A valve housing is designed for a max. working pressure of 28 bar g / 406 psig and therefore a suitable replacement for (H)A4A valves in the service market. They also offer the same drop-in dimensions as the (H)A4A valves.

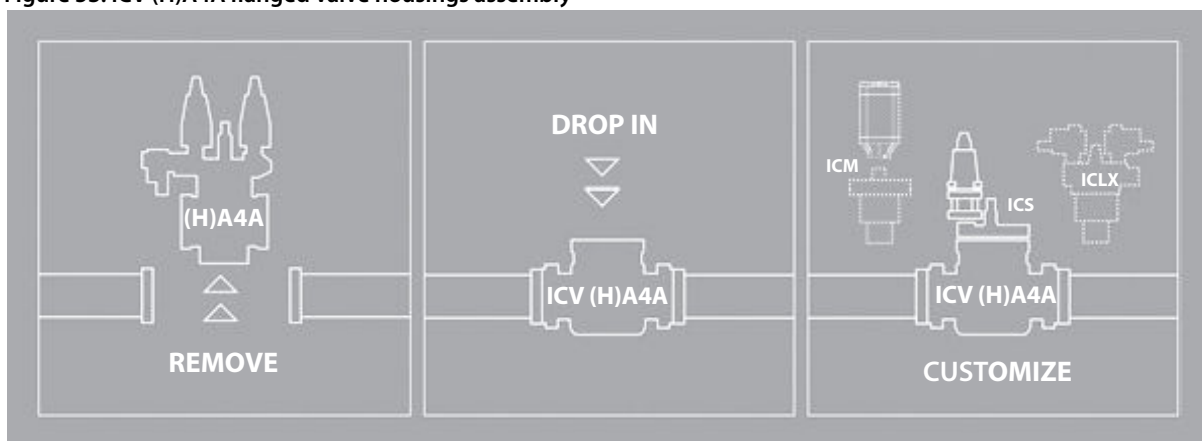
Table 72: ICV (H)A4A flanged valve housings

Description	Code no.
ICV 25 (H)A4A Valve housing	027H2304 ⁽¹⁾
ICV 32 A4A Valve housing	027H3130 ⁽¹⁾
ICV 32 HA4A Valve housing	027H3131 ⁽¹⁾
ICV 40 (H)A4A Valve housing	027H4129 ⁽¹⁾
ICV 50 (H)A4A Valve housing	027H5128 ⁽²⁾
ICV 65 (H)A4A Valve housing	027H6129 ⁽²⁾

⁽¹⁾ Includes ICV PM valve housing, flange gaskets and flange bolts

⁽²⁾ Includes ICV PM valve housing, flange gaskets, flange bolts and flange nuts

Figure 53: ICV (H)A4A flanged valve housings assembly



NOTE:

Function modules and top covers must be ordered separately (see the section [Page 26](#)).

ICM 20 / ICAD 600A

Figure 54: Repair kit

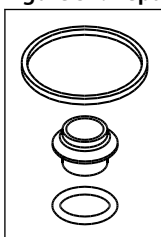


Table 73: Spare parts

Description	Code Number
Repair kit ICM 20-A / ICM 20-A-33 (Metal with plastic seat) ICM 20-B / ICM 20-C (Plastic seat)	027H1190

Figure 55: Connectors

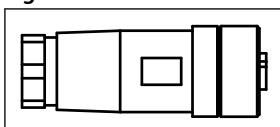


Table 74: Accessories

Connectors for ICAD 600A / 1200A	
Connector type	Code Number
Two Female Connectors with screw terminals: • connector for power • connector for control signals	027H0430

Figure 56: ICAD-UPS



Motor operated valves and Actuators, type ICM and ICAD

Table 75: Accessories

Description	Code Number
ICAD-UPS	027H0388

Figure 57: Multi-function tool



Table 76: Accessories

Description	Code Number
Multi-function tool	027H0180

Figure 58: Cable

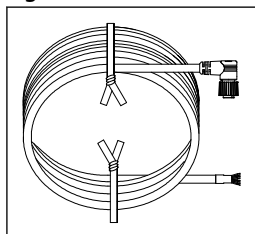


Table 77: Accessories

Connectors for ICAD 600A / 1200A	
Cable length	Code Number
Cable set 1.5 m, female	027H0426
Cable set 3 m, female	027H0438
Cable set 10 m, female	027H0427
Cable set 15 m, female	027H0435

Figure 59: Protection cap

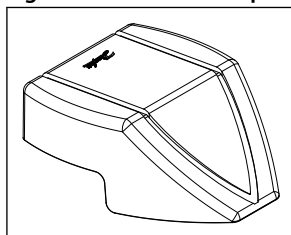


Table 78: Accessories

Protection cap ICAD 600A / 1200A	
Description	Code Number
Protection cap	027H0431

i NOTE:

Please observe, when used in CO₂, that the o-rings on the ICM module can swell (grow). At service it is recommend that new o-rings are installed before the ICM functions module again is installed in the ICV valve body.

ICM 25 – 32 / ICAD 600A

Figure 60: Inspection kit

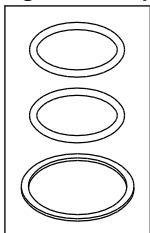


Table 79: Spare parts

Description	Code Number
ICM 25 Inspection kit	027H2218
ICM 32 Inspection kit	027H3016

Figure 61: Connectors

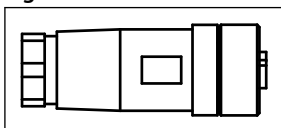


Table 80: Accessories

Connectors for ICAD 600A / 1200A	
Connector type	Code Number
Two Female Connectors with screw terminals: <ul style="list-style-type: none"> connector for power connector for control signals 	027H0430

Figure 62: ICAD-UPS



Table 81: Accessories

Description	Code Number
ICAD-UPS	027H0388

Figure 63: Multi-function tool



Table 82: Accessories

Description	Code Number
Multi-function tool	027H0180

Figure 64: Cable

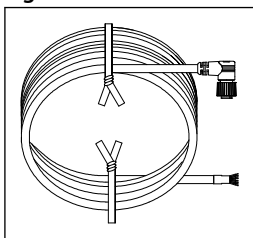


Table 83: Accessories

Cable for ICAD 600A / 1200A	
Cable length	Code Number
Cable set 1.5 m, female	027H0426
Cable set 3 m, female	027H0438
Cable set 10 m, female	027H0427
Cable set 15 m, female	027H0435

Figure 65: Protection cap

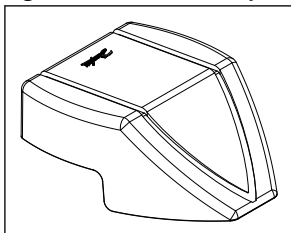


Table 84: Accessories

Protection cap ICAD 600A / 1200A	
Description	Code Number
Protection cap	027H0431

NOTE:

Please observe, when used in CO₂, that the o-rings on the ICM module can swell (grow). At service it is recommend that new o-rings are installed before the ICM functions module again is installed in the ICV valve body.

ICM 40 – 50 – 65 / ICAD 1200A

Figure 66: Inspection kit

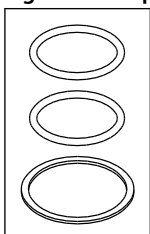
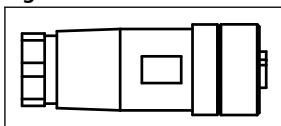


Table 85: Spare parts

Description	Code Number
ICM 40 Inspection kit	027H4014
ICM 50 Inspection kit	027H5014
ICM 65 Inspection kit	027H6016

Figure 67: Connectors



Motor operated valves and Actuators, type ICM and ICAD

Table 86: Accessories

Connectors for ICAD 600A / 1200A	
Connector type	Code Number
Two Female Connectors with screw terminals: <ul style="list-style-type: none"> connector for power connector for control signals 	027H0430

Figure 68: ICAD-UPS



Table 87: Accessories

Description	Code Number
ICAD-UPS	027H0388

Figure 69: Multi-function tool



Table 88: Accessories

Description	Code Number
Multi-function tool	027H0181

Figure 70: Cable

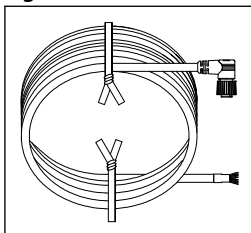
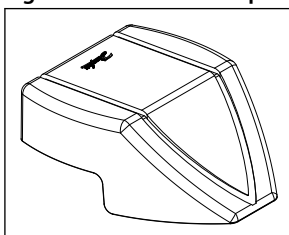


Table 89: Accessories

Cable for ICAD 600A / 1200A	
Cable length	Code Number
Cable set 1.5 m, female	027H0426
Cable set 3 m, female	027H0438
Cable set 10 m, female	027H0427
Cable set 15 m, female	027H0435

Figure 71: Protection cap



Motor operated valves and Actuators, type ICM and ICAD

Table 90: Accessories

Protection cap ICAD 600A / 1200A	
Description	Code Number
Protection cap	027H0431

NOTE:

Please observe, when used in CO₂, that the o-rings on the ICM module can swell (grow). At service it is recommend that new o-rings are installed before the ICM functions module again is installed in the ICV valve body.

ICM 100 – 125 – 150 / ICAD 1200A

Figure 72: Top covers

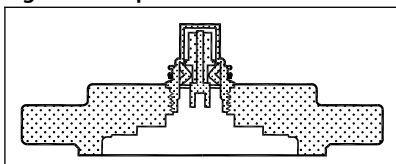


Table 91: Accessories

Top covers	
Size	Code number
ICM 100	027H7133
ICM 125	027H7153
ICM 150	027H7173

NOTE:

Consist of: Top cover complete with magnet coupling and gasket

Figure 73: ICAD-UPS



Table 92: Accessories

Description	Code Number
ICAD-UPS	027H0388

Figure 74: Cable

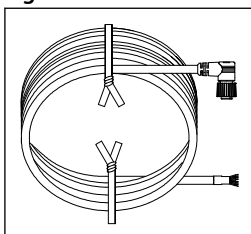


Table 93: Accessories

Cable for ICAD 600A / 1200A	
Cable length	Code Number
Cable set 1.5 m, female	027H0426
Cable set 3 m, female	027H0438
Cable set 10 m, female	027H0427
Cable set 15 m, female	027H0435

Figure 75: Connectors

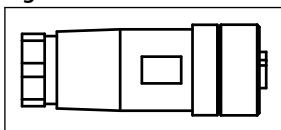


Table 94: Accessories

Connectors for ICAD 600A / 1200A	
Connector type	Code Number
Two Female Connectors with screw terminals: <ul style="list-style-type: none"> connector for power connector for control signals 	027H0430

Figure 76: Protection cap

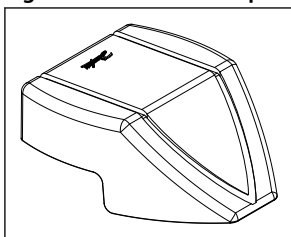


Table 95: Accessories

Protection cap ICAD 600A / 1200A	
Description	Code Number
Protection cap	027H0431

Figure 77: Multi-function tool



Table 96: Accessories

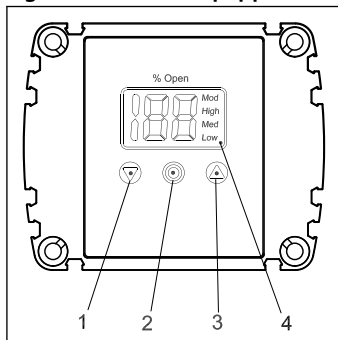
Description	Code Number
Multi-function tool	027H0181

i NOTE:

For spare parts refer Data sheet [AI245486497115](#)

General operation

Figure 78: ICAD is equipped with an MMI



- 1 "Down" arrow push button
- 2 Enter
- 3 "Up" arrow push button
- 4 Display

ICAD is equipped with an MMI (Man Machine Interface) from which it is possible to monitor and change the setting of parameters to adapt the ICAD and the corresponding ICM to the actual refrigeration application.

Figure 79: Mod, high, med and low

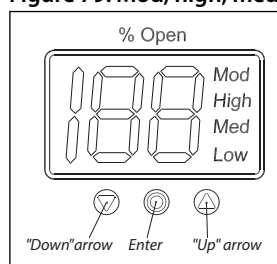


Figure 80: Mod

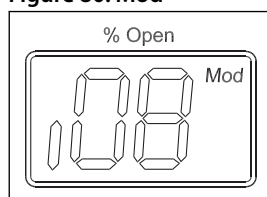


Figure 81: Mod

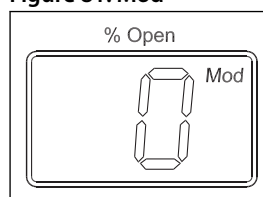
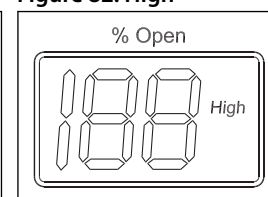


Figure 82: High



The setting of parameters is managed by means of the integrated ICAD MMI (see **Figure 78** and **Figure 79**) and consists of:

- "Down" arrow push button (**Figure 78**, pos. 1)
 - Decreases parameter number by 1 at each activation
- "Up" arrow pushbutton (**Figure 78**, pos. 3)
 - Increases parameter number by 1 at each activation
- Enter push button (**Figure 78**, pos. 2)
 - Gives access to the **Parameter list** by keeping the push button activated for 2 seconds. A **Parameter list** example is shown below (parameter **i08**, **Figure 80**)
 - Gives access to change a value once the Parameter list has been accessed
 - Acknowledge and save change of value of a parameter
 - To exit from the **Parameter list** and return to the display of Opening Degree (OD) keep the push button activated for 2 seconds
- Display (**Figure 78**, pos. 4)
 - Normally the Opening Degree (OD) 0 – 100% of the ICM valve is displayed. No activation of push buttons for 20 seconds means that the display will always show OD (see **Figure 81**)
- Displays the parameter
- Displays the actual value of a parameter
- Displays the function status by means of text (**Figure 78**, pos. 4)
 - **Mod** represents that ICAD is positioning the ICM valve according to an analog input signal (Current or Voltage)
 - **Low** represents that ICAD is operating the ICM valve like an ON / OFF solenoid valve with low speed according to a digital input signal
 - **Med** represents that ICAD is operating the ICM valve like an ON / OFF solenoid valve with medium speed according to a digital input signal
 - **High** represents that ICAD is operating the ICM valve like an ON / OFF solenoid valve with high speed according to a digital input signal (see **Figure 82**)

Alarms

Table 97: ICAD can handle and display different alarms

Description	ICAD alarm text	Definition of event	Comments
No Valve type selected	A1	Alarm ON	At start-up A1 will be displayed
Controller fault	A2	Alarm ON	Internal fault inside electronics. Carry out: 1) Power OFF and Power ON If A2 still active 2) Make a Reset to factory setting If A2 still active. Return ICAD to Danfoss
AI input error	A3	Alarm ON	Not active if i01 = 2, or i02 = 2 When i03 = 1 and AI A > 22 mA When i03 = 2 and AI A > 22 mA or AI A < 2 mA When i03 = 3 and AI A > 12 V When i03 = 4 and AI A > 12 V or AI A < 1 V
Low voltage of fail safe Supply	A4	Alarm ON	If 5 V < fail safe supply < 18 V Enabled by i08
Check supply to ICAD	A5	Alarm ON	If supply voltage < 18 V
Calibration extended failed	A6	Alarm ON	Check valve type selected Check presence of foreign body internally in ICM valve

Motor operated valves and Actuators, type ICM and ICAD

Description	ICAD alarm text	Definition of event	Comments
Internal temperature alarm	A7	Alarm ON	Temperature for stepper motor component too high.Ventilate/lower ambient ICAD temperature
	A8	Alarm ON	Temperature for stepper motor component too high Ventilate/lower ambient ICAD temperature
Valve locked	A9	Alarm ON	Only active if i16 = 1 If the valve is locked in more than 15 seconds ICM stopped and hold position A9 flashing in display A9 alarm can only be reset by Power OFF / ON of ICAD

NOTE:

If an alarm has been detected the ICAD display (fig. 2) will alternate between showing Actual alarm and present Opening Degree. If more than one alarm is active at the same time the alarm with the highest priority will take preference. **A1** has the highest priority, **A9** the lowest.

Any active alarm will activate the Common Digital Alarm output (Normally Open). All alarms will automatically reset them-selves when they physically disappear.Old alarms (alarms that have been active, but have physically disappeared again) can be found in parameter **i11**.

Parameter list - Valid from: (i58:11, i59:36) and onwards

Table 98: The first parameter to be entered shall be: **i26**

Description	ICAD parameter	Min	Max	Factory Setting	Stored	Unit	Pass-word	Comments
OD (Opening degree)	-	0	100			%	-	ICM/ICMST valve Opening Degree is displayed during normal operation. Running display value (see i01 , i05).
Main Switch	i01	1	2	1	√	-	No	Internal main switch 1: Normal operation 2: Manual operation. Valve Opening Degree will be flashing. With the down arrow and the up arrow push buttons the OD can be entered manually
Mode	i02	1	2	1	√	-	No	Operation mode 1: Modulating – ICM positioning according to Analog Input (see i03) 2: ON / OFF - operating the ICM valve like an ON / OFF solenoid valve controlled via Digital Input. See also i09 3: Neutralzone / 3 point control. Increase/Decrease Opening Degree by Digital Input. See fig. 9
AI signal	i03	1	4	2	√	-	No	Type of AI signal from external controller 1: 0 – 20 mA 2: 4 – 20 mA 3: 0 – 10 V 4: 2 – 10 V
Speed In Modulating Mode Opening/closing speed In ON / OFF Mode Opening speed	i04	1	100	50/ 100	√	-	No	Speed can be decreased. Max. speed is 100 % - Not active in manual operation (i01 = 2) If i26 = 1 – 3 then factory setting = 100 If i26 = 4 – 9 then factory setting = 50 If ICM is opening and (i04 < = 33) or ICM is closing and (i14 < = 33) => Low is displayed If ICM is opening and (33 < i04 < = 66) or ICM is closing and (33 < i14 < = 66) => Med is displayed If ICM is opening and (i04 > = 67) or ICM is closing and (i14 > = 67) => High is displayed"
Automatic calibration	i05	0	2	0	-	-	No	Not active before i26 has been operated Always auto reset to 0 CA will flash in the display during calibration, if Enter push button has been activated for two seconds 0: No Calibration 1: Normal forced calibration - CA flashing slowly 2: Extended calibration – CA flashing rapidly"
AO signal	i06	0	2	2	√	-	No	Type of AO signal for ICV valve position 0: No signal 1: 0 – 20 mA 2: 4 – 20 mA
Failsafe	i07	1	4	1	√	-	No	Define condition at power cut and fail safe supply is installed 1: Close valve 2: Open Valve 3: Maintain valve position 4: Go to OD given by i12 "
Fail safe supply	i08	0	1	0	√	-	Yes	Fail safe supply connected and enable of A4 alarm: 0: No 1: Yes

Motor operated valves and Actuators, type ICM and ICAD

Description	ICAD parameter	Min	Max	Factory Setting	Stored	Unit	Password	Comments
DI function	i09	1	2	1	✓	-	No	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	-	-	-	No	Old alarms will be listed with the latest shown first. Alarm list can be reset by means of activating down arrow and up arrow at the same time for 2 seconds.
OD at power cut.	i12	0	100	50	✓	-	No	Only active if i07 = 4 If fail safe supply is connected and power cut occurs, the ICM will go to the specified OD.
Inverse operation	i13	0	1	0	✓	-	No	When i02 = 1 0: Increasing Analog Input signal => Increasing ICM Opening Degree 1: Increasing Analog Input signal => Decreasing ICM Opening Degree When i02 = 3 0: DI1 = ON, DI2 = OFF => Increasing ICM Opening Degree DI1 = OFF, DI2 = ON => Decreasing ICM Opening Degree DI1 = DI2 = OFF => ICAD / ICM maintain current position DI1 = DI2 = ON => ICAD / ICM maintain current position 1: DI1 = ON, DI2 = OFF => Decreasing ICM Opening Degree DI1 = OFF, DI2 = ON => Increasing ICM Opening Degree DI1 = DI2 = OFF => ICAD / ICM maintain current position DI1 = DI2 = ON => ICAD / ICM maintain current position
In ON / OFF Mode Closing speed	i14	0	100	50 / 100	✓	-	No	See i04 If i26 = 1 – 3 then factory setting = 100 If i26 = 4 – 9 then factory setting = 50
Manual set point	i15	0	100	0		-	No	When i01 = 2, i15 determine the start up value.
Encoder operation	i16	0	1	1	✓		Yes	NB: Password protected. Password = 7 0: Encoder disabled. Means ICAD operation as ICAD 600A / ICAD 600A-TS / 1200A without encoder 1: Encoder enabled
Forced closing when ICM valve Opening Degree < 3%	i17	0	1	0	✓		No	Enable/Disable forced closing 0: When ICM valve Opening Degree < 3% it will be forced to close regardless of requested ICM valve Opening Degree 1: When ICM valve Opening Degree < 3% no forced to closing will take place
ICM configuration	i26	0	9	0	✓		Yes	NB: Password protected. Password = 11 0: No valve selected. Alarm A1 will become active 1: ICM 20 with ICAD 600A / ICMTS 20 with ICAD 600A-TS 2: ICM 25 with ICAD 600A 3: ICM 32 with ICAD 600A 4: ICM 40 with ICAD 1200A 5: ICM 50 with ICAD 1200A 6: ICM 65 with ICAD 1200A 7: ICM 100 with ICAD 1200A 8: ICM 125 with ICAD 1200A 9: ICM 150 with ICAD 1200A

Service

Table 99: Service

Description	ICAD parameter	Min	Max	Factory Setting	Stored	Unit	Password	Comments
OD %	i50	0	100	-		%	-	ICM valve Opening Degree
AI [mA]	i51	0	100	-		mA	-	AI signal
AI [V]	i52	0	100	-		V	-	AI signal
AO [mA]	i53	0	100	-		mA	-	A0 signal
DI	i54	0	1	-		-	-	DI signals. Depending of i02 If i02 = 2, one digits are shown. See fig. 8 0 : DI1 = OFF 1 : DI1 = ON If i02 = 3, two digits are shown. See fig. 9 00 : DI1 = OFF, DI2 = OFF 10 : DI1 = ON, DI2 = OFF 01 : DI1 = OFF, DI2 = ON 11 : DI1 = ON, DI2 = ON
DO Close	i55	0	1	-		-	-	DO Closed status. ON when OD < 3 %
DO Open	i56	0	1	-		-	-	DO Open status. ON when OD > 97 %
DO Alarm	i57	0	1	-		-	-	DO alarm status. ON when a Alarm is detected
Display mP SW ver.	i58	0	100	-		-	-	Software version for display microprocessor
Motor mP SW ver.	i59	0	100	-		-	-	Software version for motor microprocessor

Reset to factory setting:

1. Remove the power supply
2. Activate down arrow and up arrow push buttons at the same time
3. Connect the power supply
4. Release down arrow and up arrow push buttons
5. When the display on ICAD (**Figure 78**) is alternating between showing: CA and A1 the factory resetting is complete

Certificates, declarations, and approvals

The list contains all certificates, declarations, and approvals for this product type. Individual code number may have some or all of these approvals, and certain local approvals may not appear on the list.

Some approvals may change over time. You can check the most current status at danfoss.com or contact your local Danfoss representative if you have any questions.

ICM


The ICV valve concept is designed to fulfil global refrigeration requirements.

ICM is CE, UL and CRN approved.

For specific approval information, please contact Danfoss.

The ICM valves are approved in accordance with the European standard specified in the Pressure Equipment Directive and are CE marked. For further details / restrictions - see Installation guide.

Table 100: Conformity approvals

ICM valves				
	Nominal bore	DN ≤ 25 (1 in.)	DN 32 – 65 (1 1/4 – 2 1/2 in.)	DN 80 – 125 (3 – 5 in.)
	Classified for	Fluid group I		
	Category	Article 3, paragraph 3	II	III

ICAD



CE according to 89/336 EEC (EMC)

Emission : EN61000-6-3

Immunity: EN61000-6-2

REACH requirements

All Danfoss products fulfill the requirements in REACH. One of the obligations in REACH is to inform customers about presence of Candidate list substances if any, we hereby inform you about one substance on the candidate list: An O-ring used in ICAD 600A actuator contains 6,6'-di-tert-butyl-2,2'-metylenodi-p-krezol (CAS no: 119-47-1) in a concentration above 0.1% w/w.

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