

**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 (CO<sub>2</sub>)
- 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

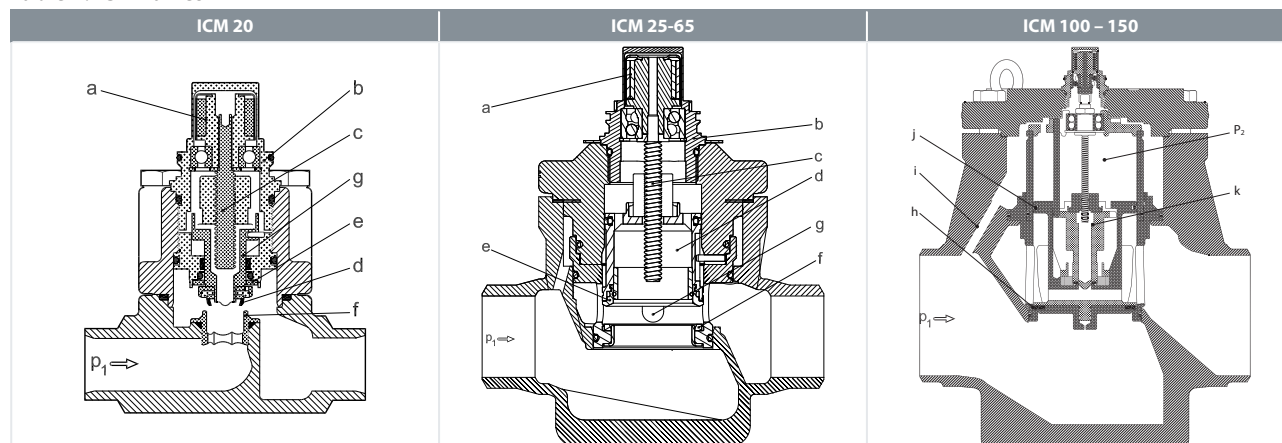
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- Approvals: CE, UL, CRN
- Connectors for easy installation and servicing
- ICAD 600A / 1200A ensures an accurate feedback on the valve position

## 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

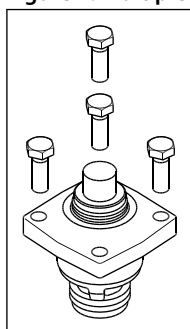


Table 2: Multiple function / top cover with capacities

| Type       | Valve body size | $k_v$ (m <sup>3</sup> /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.

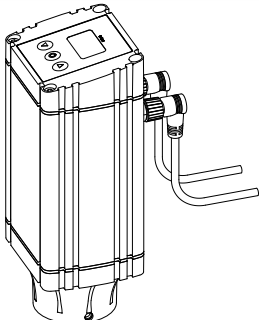
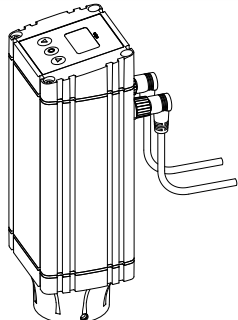
Any active alarm will activate the common digital alarm output. All alarms will automatically reset when disappearing.

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**

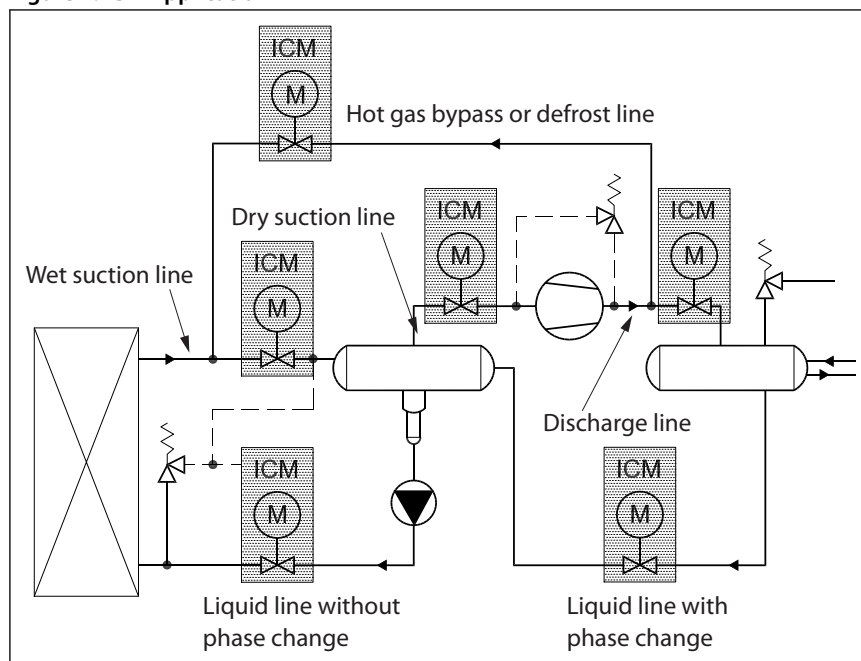
Table 3: ICAD 600A and ICAD 1200A

| 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 capacities for different refrigerants and applications are given in the following tables. Selection of ICM / ICS valves will be available with the DIRcalc ver. 1.3 selection program and later. The resultant valve selections will be: ICMEXP for expansion valve functions and where the selection criteria has been predefined for expansion valve application: ICM will be for control valve functions and will include for all available function modules as valve pressure drop is the main consideration for valve selection.

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

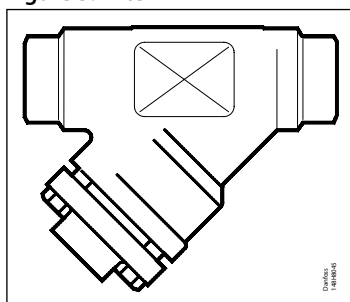
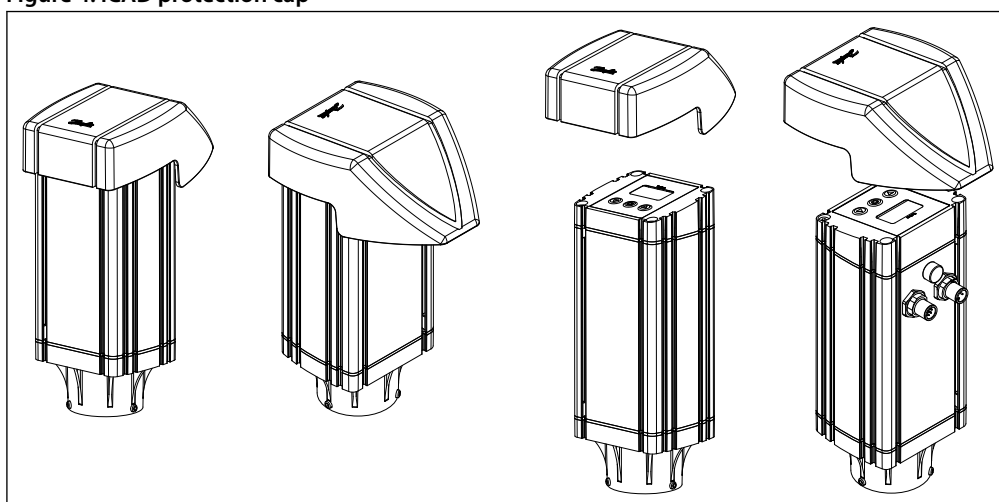


Table 4: Recommended filters

| 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 <sup>(1)</sup>. (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](#)

<sup>1</sup> 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

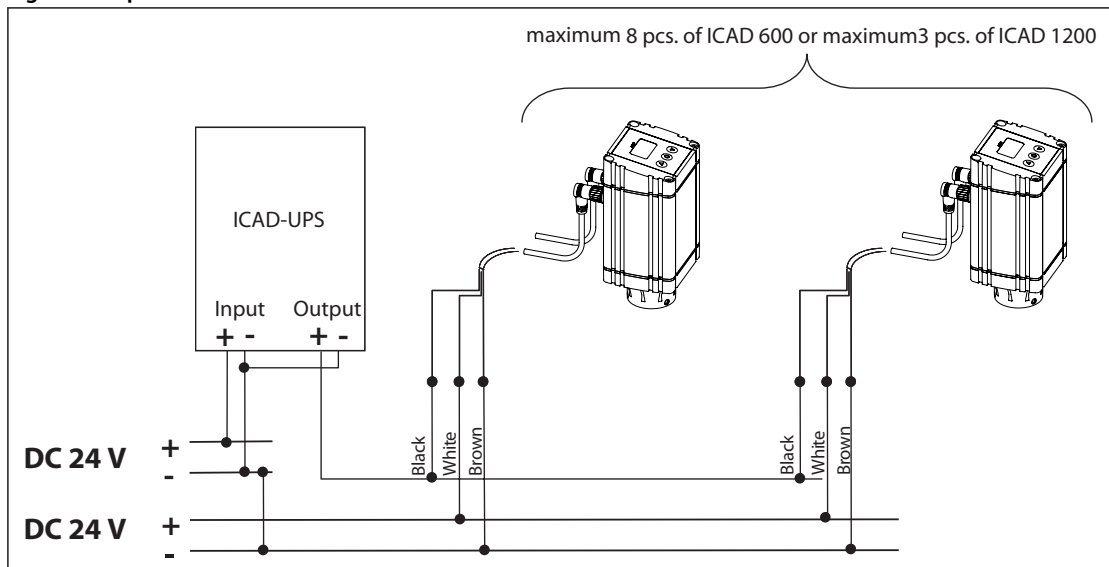
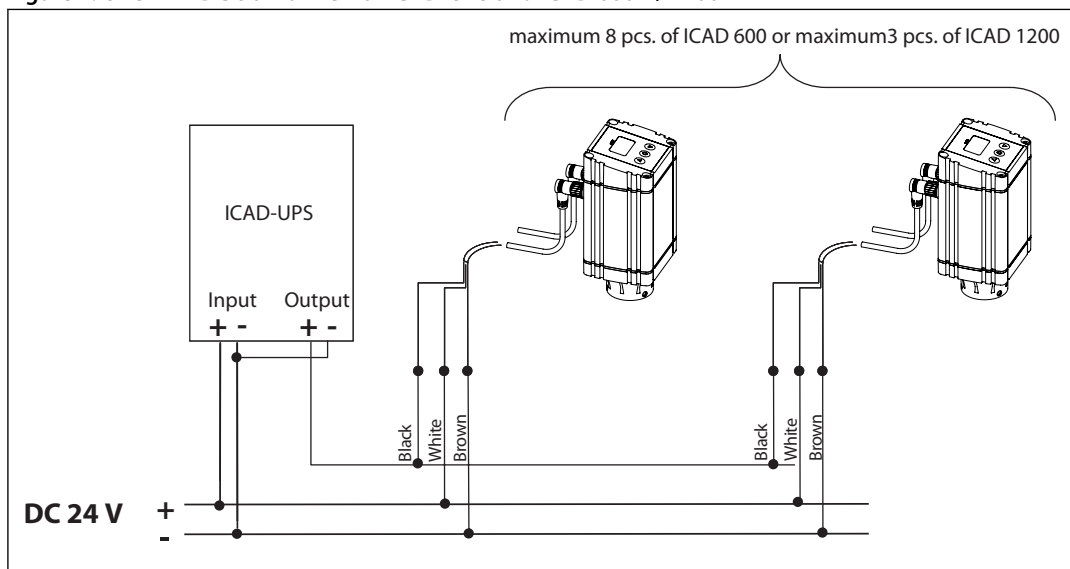


Figure 7: One 24 V DC tranformer for ICAD-UPS and ICAD 600A / 1200A



## Media

### **Refrigerants**

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

Applicable to HCFC, non flammable HFC, R717 (Ammonia) and R744 (CO<sub>2</sub>).

#### **ICM 25-65:**

Applicable to HCFC, non flammable HFC, R717 (Ammonia), R744 (CO<sub>2</sub>) 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/](https://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)<br>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

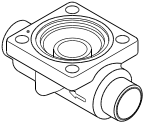
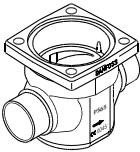
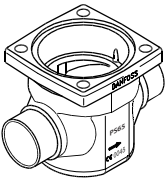
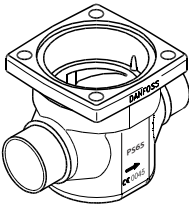
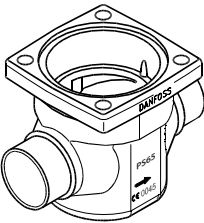
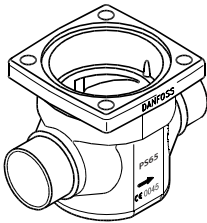
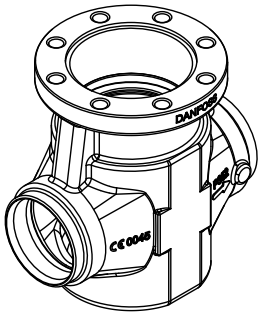
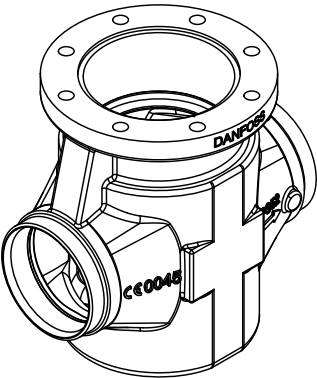
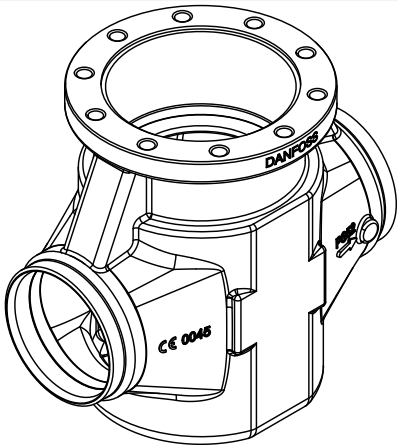
| ICV 20                                                                              | ICV 25                                                                              | ICV 32                                                                              | ICV 40                                                                              | 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 mm<sup>2</sup> (3 x ~22 AWG)

Control cable with 8 poled M12 female connector: 7 x 0.25 mm<sup>2</sup> (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** <sup>(2)</sup>, 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<br>027H0426 | 3 m<br>027H0438 | 10 m<br>027H0427 | 15 m<br>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

<sup>2</sup> Do not measure inside the ICAD itself

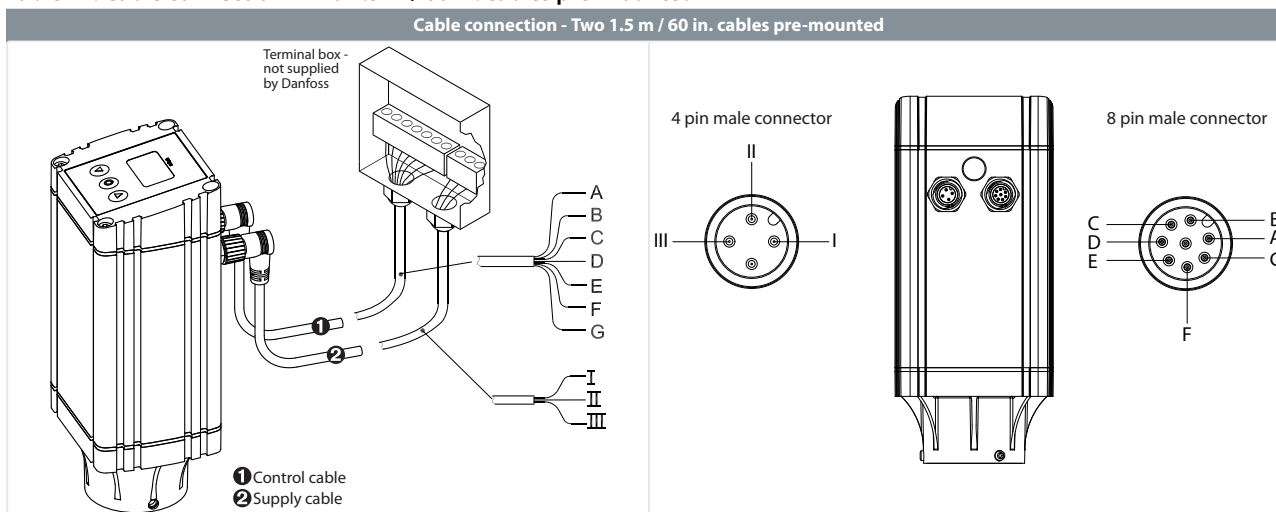
## Motor operated valves and Actuators, type ICM and ICAD

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

| Type       |                            |                |                |                |
|------------|----------------------------|----------------|----------------|----------------|
| ICAD 600A  | <b>Speed Parameter i04</b> | <b>ICM 20</b>  | <b>ICM 25</b>  | <b>ICM 32</b>  |
|            | Max. (i04 = 100)           | 2 mAh          | 5 mAh          | 5 mAh          |
|            | Min. (i04 = 1)             | 200 mAh        | 467 mAh        | 533 mAh        |
| ICAD 1200A | <b>Speed Parameter i04</b> | <b>ICM 40</b>  | <b>ICM 50</b>  | <b>ICM 65</b>  |
|            | Max. (i04 = 100)           | 17 mAh         | 22 mAh         | 22 mAh         |
|            | Min. (i04 = 1)             | 1667 mAh       | 2167 mAh       | 2167 mAh       |
| ICAD 1200A | <b>Speed Parameter i04</b> | <b>ICM 100</b> | <b>ICM 125</b> | <b>ICM 150</b> |
|            | 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 <sup>(2)</sup>                         | Analogue In/Output |  |
| F    | Green  | + | 0/2 – 10 V Input <sup>(3)</sup>                          |                    |  |
| G    | Blue   | + | 0/4 – 20 mA Output <sup>(2)</sup>                        |                    |  |
| I    | Black  | + | Fail safe supply Battery / UPS <sup>(4)</sup><br>19 V DC |                    |  |
| II   | White  | + | Supply voltage 24 V DC                                   |                    |  |
| III  | Brown  | – |                                                          |                    |  |

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

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

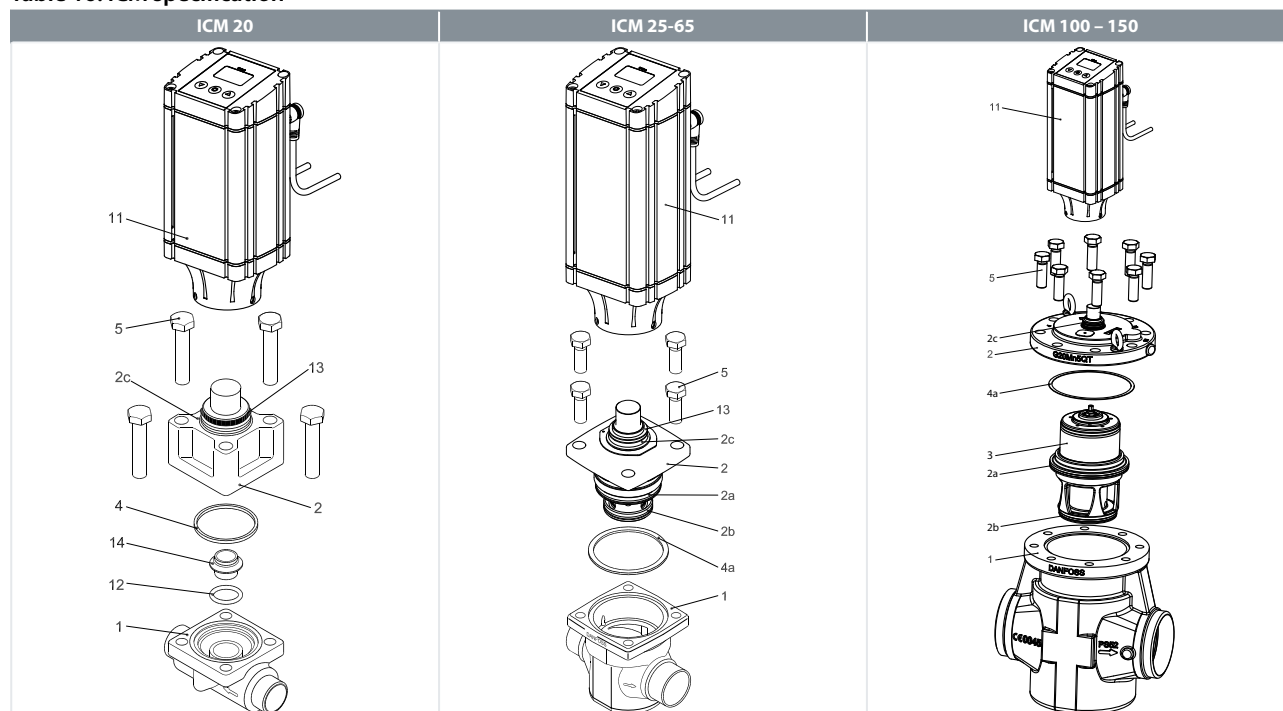
<sup>(4)</sup> Uninterruptable Power Supply

### 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   |

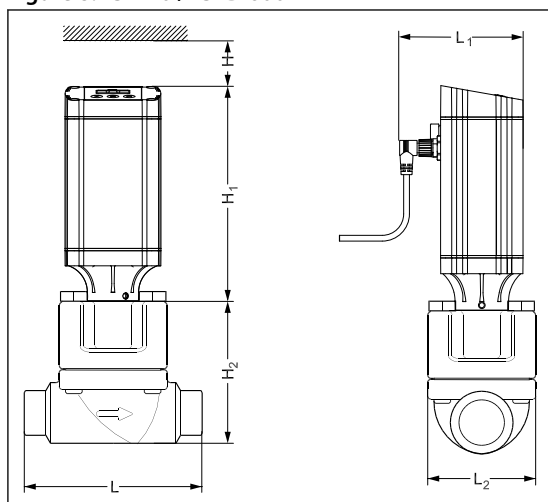
Table 25: FPT: Female pipe thread, (ANSI/ASME B 1.20.1)

| 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

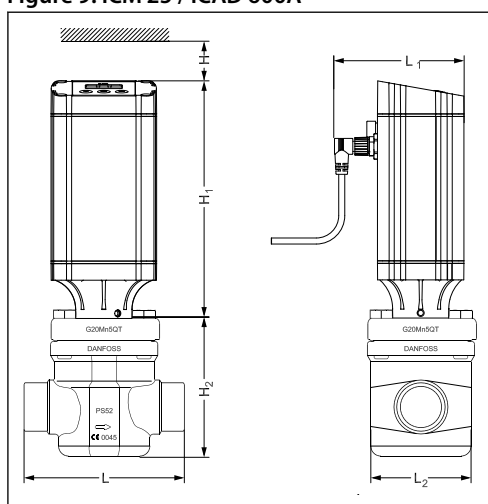


**Table 26: ICM 20 / ICAD 600A**

| Connection     |     | H    | H <sub>1</sub> | H <sub>2</sub> | L    | L <sub>1</sub> | L <sub>2</sub> | 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 <sub>1</sub> | H <sub>2</sub> | L    | L <sub>1</sub> | L <sub>2</sub> | 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 <sub>1</sub> | H <sub>2</sub> | L    | L <sub>1</sub> | L <sub>2</sub> | 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 ½ 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 ½ 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 ¾ 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

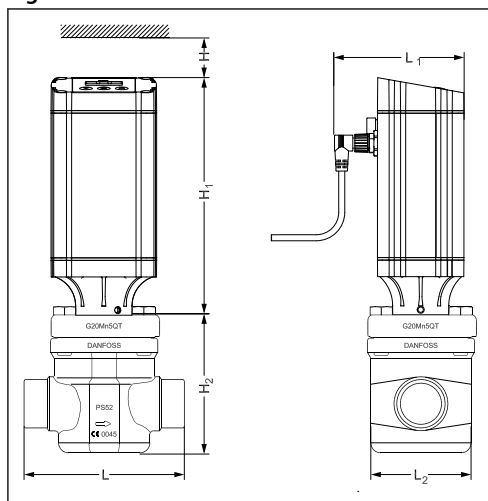


Table 28: ICM 32 / ICAD 600A

| Connection     |     | H    | H <sub>1</sub> | H <sub>2</sub> | L    | L <sub>1</sub> | L <sub>2</sub> | 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 <sub>1</sub> | H <sub>2</sub> | L    | L <sub>1</sub> | L <sub>2</sub> | Weight ICM incl. ICAD |
|----------------------|-----|------|----------------|----------------|------|----------------|----------------|-----------------------|
| 32 SOC (1 1/4 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 3/8 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 5/8 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 5/8 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

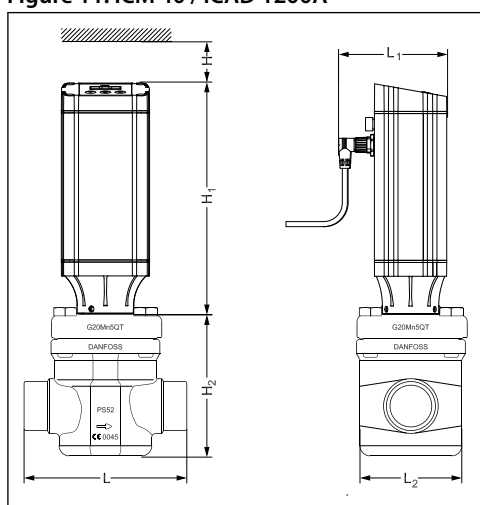


Table 29: ICM 40 / ICAD 1200A

| Connection         |     | H    | H <sub>1</sub> | H <sub>2</sub> | L    | L <sub>1</sub> | L <sub>2</sub> | Weight ICM incl. ICAD |
|--------------------|-----|------|----------------|----------------|------|----------------|----------------|-----------------------|
| 40 D (1 1/2 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 1/2 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 1/2 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.              |
| 42 SD (1 5/8 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 5/8 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

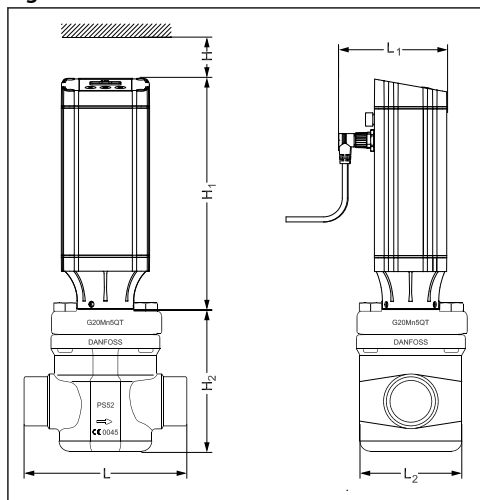


Table 30: ICM 50 / ICAD 1200A

| Connection         |     | H    | H <sub>1</sub> | H <sub>2</sub> | L    | L <sub>1</sub> | L <sub>2</sub> | 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

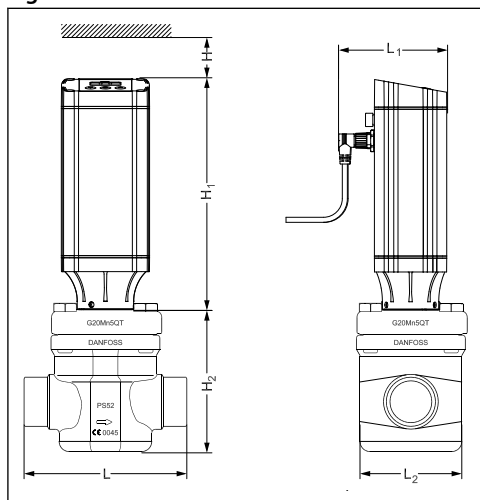


Table 31: ICM 65 / ICAD 1200A

| Connection         |     | H    | H <sub>1</sub> | H <sub>2</sub> | L    | L <sub>1</sub> | L <sub>2</sub> | Weight ICM incl. ICAD |
|--------------------|-----|------|----------------|----------------|------|----------------|----------------|-----------------------|
| 65 D (2 1/2 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 1/2 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 1/2 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 1/2 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 5/8 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

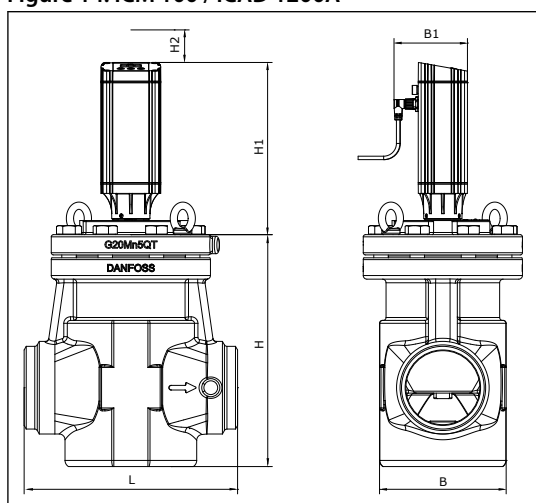


Table 32: ICM 100 / ICAD 1200A

| Connection      |     | H     | H <sub>1</sub> | H <sub>2</sub> | L     | B    | B <sub>2</sub> | 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

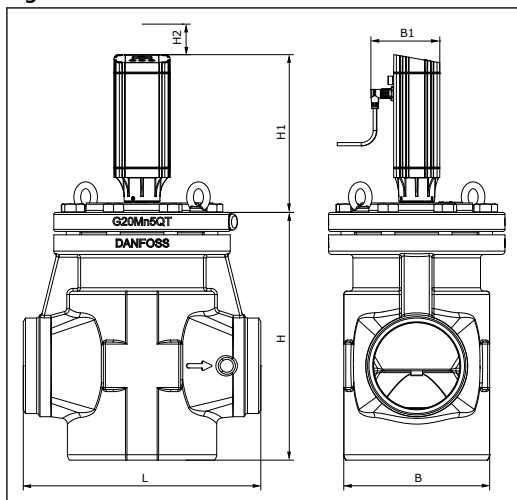


Table 33: ICM 125 / ICAD 1200A

| Connection      |     | H     | H <sub>1</sub> | H <sub>2</sub> | L     | B    | B <sub>2</sub> | 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

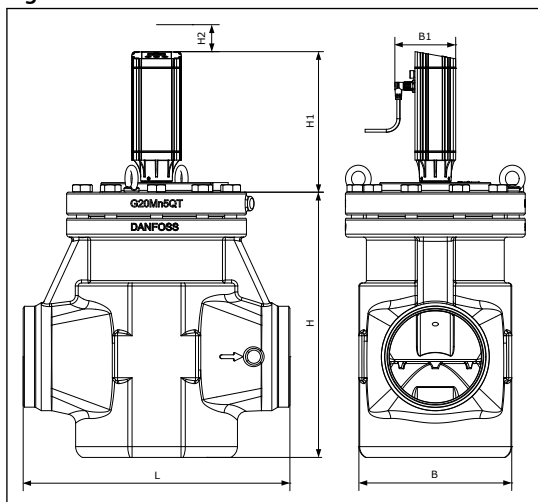


Table 34: ICM 150 / ICAD 1200A

| Connection      |     | H     | H <sub>1</sub> | H <sub>2</sub> | L     | B     | B <sub>1</sub> | 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)

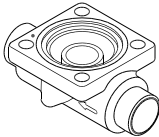
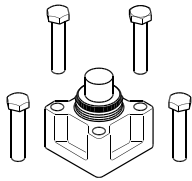
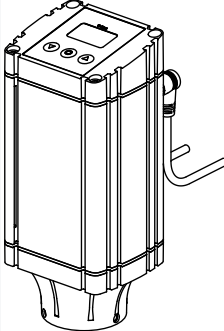
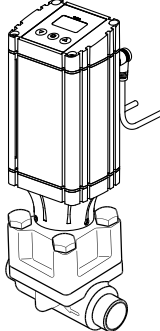
| Valve body 22 SD (7/8 in.)<br>027H1154<br>Table 36                                |   | Top cover/function module<br>ICM 20-B<br>027H1181<br>Table 37                     |   | Actuator<br>027H9075<br>Table 38                                                   |   |                                  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

Figure 17: ICV 20 valve body

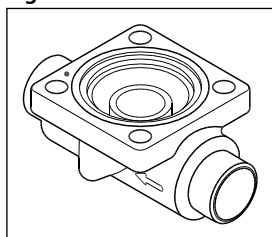


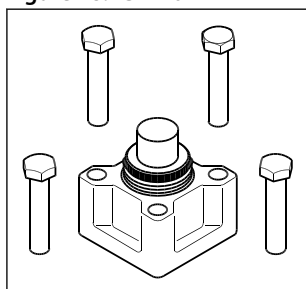
Table 36: ICV 20 valve body w/different connections Table I

| 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



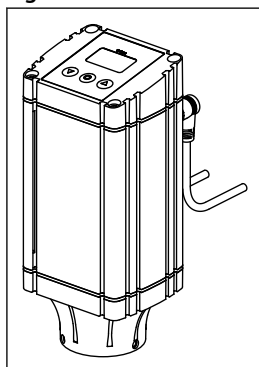
## Motor operated valves and Actuators, type ICM and ICAD

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

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

<sup>(1)</sup> 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**

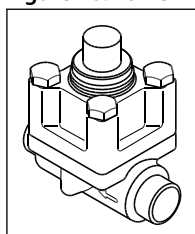


**Table 38: Actuator ICAD 600A Table III**

| 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     |

<sup>(2)</sup> Select from parts programme

## ICM 25 / ICAD 600A

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

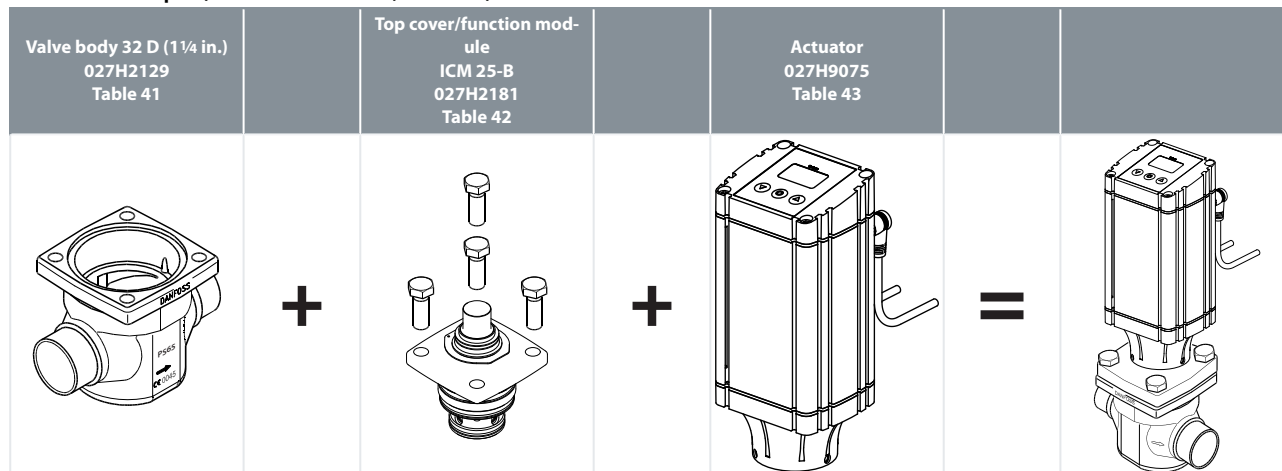


Figure 21: ICM 25 valve body

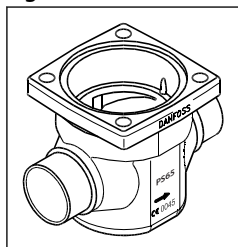


Table 41: ICM 25 valve body w/different connections Table I

| 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

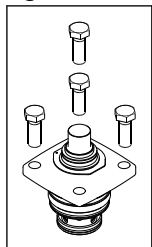


Table 42: ICM 25 Function module / top cover Table II

| Description | Code Number             |
|-------------|-------------------------|
| ICM 25-A    | 027H2180 <sup>(1)</sup> |
| ICM 25-A33  | 027H2190 <sup>(1)</sup> |
| ICM 25-B    | 027H2181 <sup>(1)</sup> |

<sup>(1)</sup> Including gasket and O-rings

Figure 23: Actuator ICAD 600A

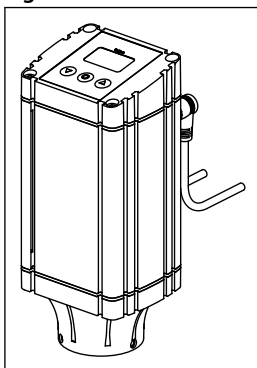


Table 43: Actuator ICAD 600A Table III

| 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

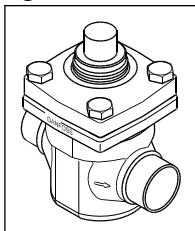


Table 44: Body, function module / top cover Table A

| 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.)<br>027H3125<br>Table 46 |   | Top cover/function module<br>ICM 32-A<br>027H3180<br>Table 47 |   | Actuator<br>027H9075<br>Table 48 |   |  |
|-----------------------------------------------------|---|---------------------------------------------------------------|---|----------------------------------|---|--|
|                                                     | + |                                                               | + |                                  | = |  |

Figure 25: ICV 32 valve body

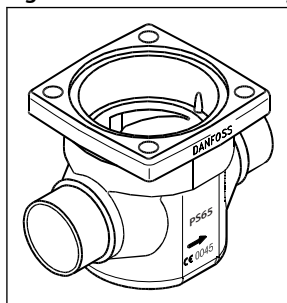


Table 46: ICV 32 valve body w/different connections Table I

| 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

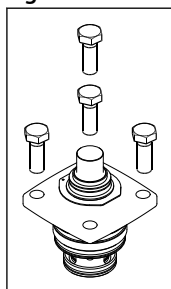


Table 47: ICM 32 Function module / top cover Table II

| Description | Code Number             |
|-------------|-------------------------|
| ICM 32-A    | 027H3180 <sup>(1)</sup> |
| ICM 32-B    | 027H3181 <sup>(1)</sup> |

<sup>(1)</sup> Including gasket and O-rings

Figure 27: Actuator ICAD 600A

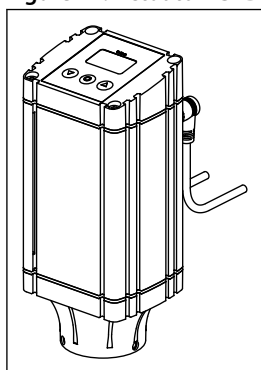


Table 48: Actuator ICAD 600A Table III

| 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

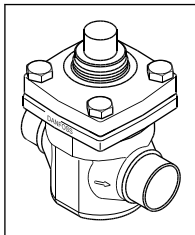


Table 49: Body, function module / top cover Table A

| 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)              |

<sup>(2)</sup> 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.)<br>027H4121<br>Table 51 |   | Top cover/function module<br>ICM 40-A<br>027H4180<br>Table 52 |   | Actuator<br>027H9077<br>Table 53 |   |  |
|-----------------------------------------------------|---|---------------------------------------------------------------|---|----------------------------------|---|--|
|                                                     | + |                                                               | + |                                  | = |  |

Figure 29: ICV 40 valve body

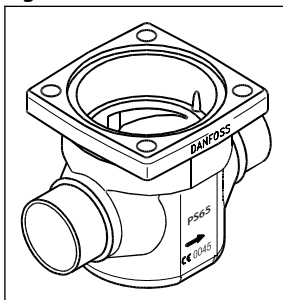


Table 51: ICV 40 valve body w/different connections Table I

| 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

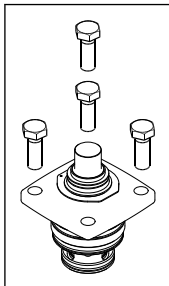


Table 52: ICM 40 Function module / top cover Table II

| Description | Code Number             |
|-------------|-------------------------|
| ICM 32-A    | 027H3180 <sup>(1)</sup> |
| ICM 32-B    | 027H3181                |

<sup>(1)</sup> Including gasket and O-rings

Figure 31: Actuator ICAD 1200A

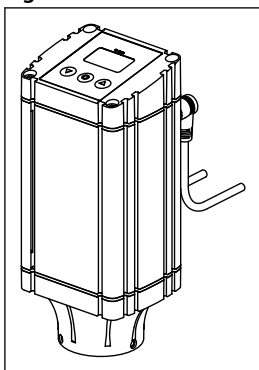


Table 53: Actuator ICAD 1200A Table III

| 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

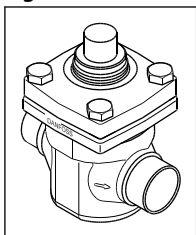


Table 54: Body, function module/top cover Table A

| 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           | <sup>(2)</sup> |
| ICM 40-B | 027H4001              | <sup>(2)</sup> | 027H4007          | 027H4009          | 027H4003         | 027H4005           | <sup>(2)</sup> |

<sup>(2)</sup> Select from parts programme

## ICM 50 / ICAD 1200A

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

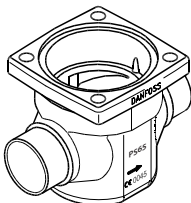
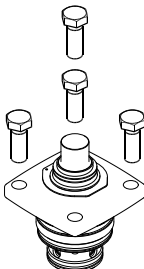
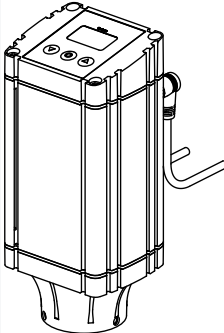
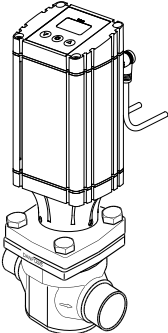
| Valve body 65 D (1½ in.)<br>027H5124<br>Table 56                                  |   | Top cover/function mod-<br>ule<br>ICM 50-A<br>027H4180<br>Table 57                |   | Actuator<br>027H9077<br>Table 58                                                   |   |                                  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

Figure 33: ICV 50 valve body

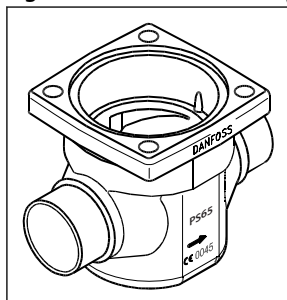


Table 56: ICV 50 valve body w/different connections Table I

| 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

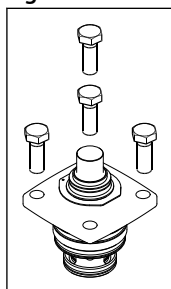


Table 57: ICM 50 Function module / top cover Table II

| Description | Code Number             |
|-------------|-------------------------|
| ICM 50-A    | 027H5180 <sup>(1)</sup> |
| ICM 50-B    | 027H5181 <sup>(1)</sup> |

<sup>(1)</sup> Including gasket and O-rings

Figure 35: Actuator ICAD 1200A

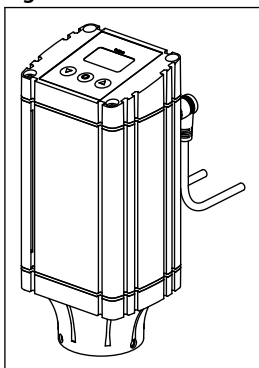


Table 58: Actuator ICAD 1200A Table III

| 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

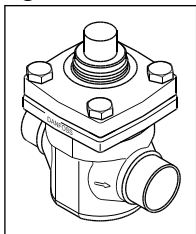


Table 59: Body, function module / top cover Table A

| Type     | Available connections |                  |                      |              |                |                  |
|----------|-----------------------|------------------|----------------------|--------------|----------------|------------------|
|          | 50 D (2 in.)          | 65 D (2 1/2 in.) | 54 SD (2 1/8 in. SA) | 50 A (2 in.) | 50 SOC (2 in.) | 65 A (2 1/2 in.) |
| ICM 50-A | 027H5000              | 027H5008         | 027H5006             | 027H5002     | 027H5004       | (2)              |
| ICM 50-B | 027H5001              | (2)              | 027H5007             | 027H5003     | 027H5005       | (2)              |

<sup>(2)</sup> Select from parts programme

## ICM 65 / ICAD 1200A

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

| Valve body 65 J (2 1/2 in.)<br>027H6122<br>Table 61 |   | Top cover/function module<br>ICM 65-B<br>027H6181<br>Table 62 |   | Actuator<br>027H9077<br>Table 63 |   |  |
|-----------------------------------------------------|---|---------------------------------------------------------------|---|----------------------------------|---|--|
|                                                     | + |                                                               | + |                                  | = |  |

Figure 37: ICV 65 valve body

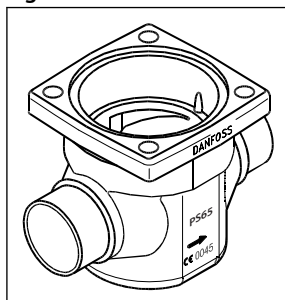


Table 61: ICV 65 valve body w/different connections Table I

| 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

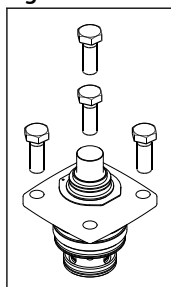


Table 62: ICM 65 Function module / top cover Table II

| Description | Code Number             |
|-------------|-------------------------|
| ICM 65-A    | 027H6180 <sup>(1)</sup> |
| ICM 65-B    | 027H6181 <sup>(1)</sup> |

<sup>(1)</sup> Including gasket and O-rings

Figure 39: Actuator ICAD 1200A

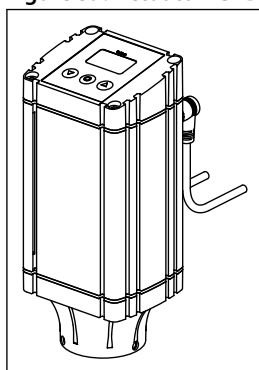


Table 63: Actuator ICAD 1200A Table III

| 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

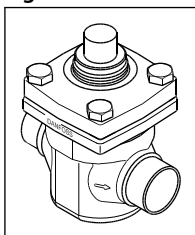


Table 64: Body, function module / top cover Table A

| 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           |

<sup>(2)</sup> 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

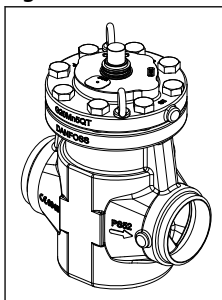
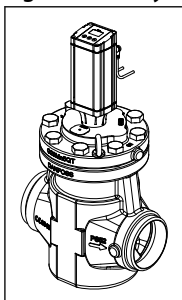


Table 65: Body, function module / top cover

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

Figure 43: Actuator ICAD 1200A

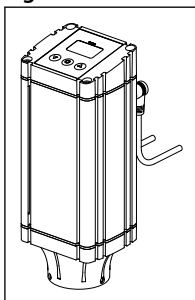


Table 66: Actuator ICAD 1200A

| 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

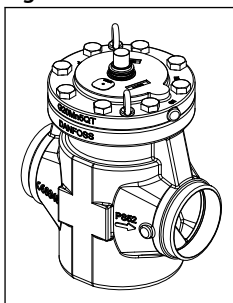
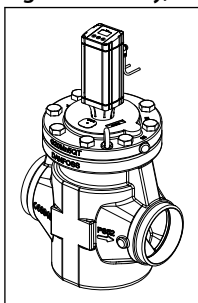


Table 67: Body, function module / top cover

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

Figure 46: Actuator ICAD 1200A

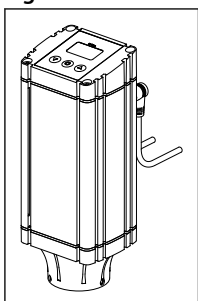


Table 68: Actuator ICAD 1200A

| 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

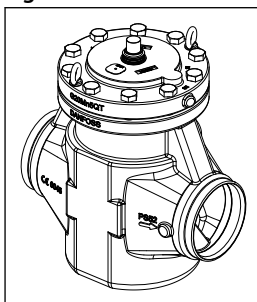
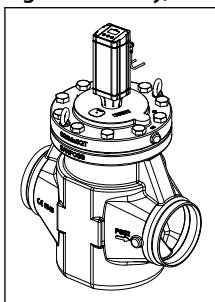


Table 69: Body, function module / top cover

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

Figure 49: Actuator ICAD 1200A

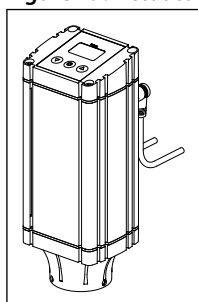


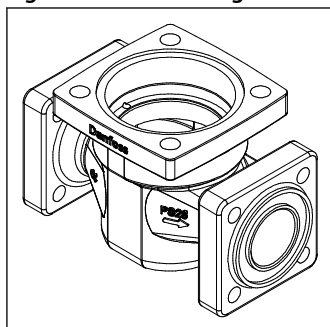
Table 70: Actuator ICAD 1200A

| 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.

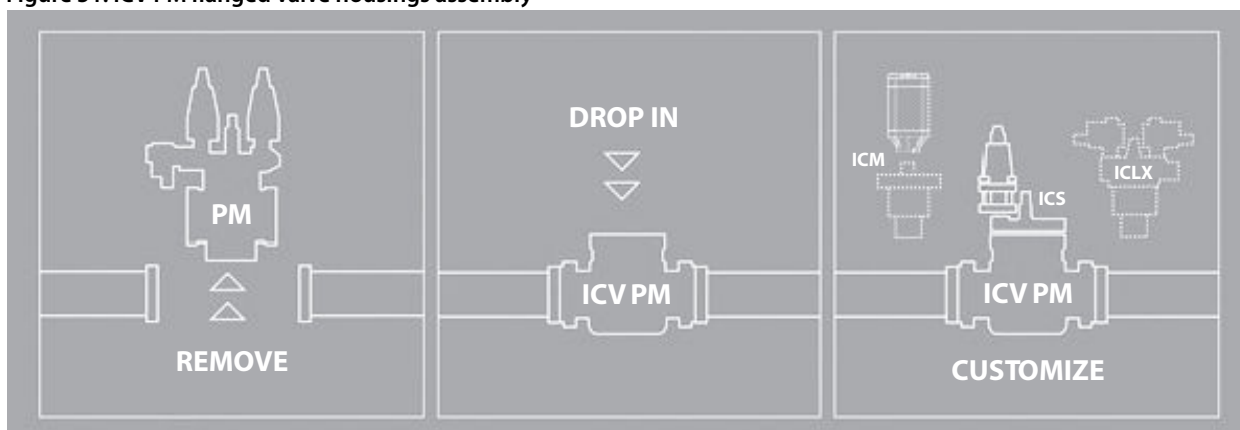
Table 71: ICV PM flanged valve housings

| Description             | Code no.                |
|-------------------------|-------------------------|
| ICV 25 PM Valve housing | 027H2119 <sup>(1)</sup> |
| ICV 32 PM Valve housing | 027H3129 <sup>(1)</sup> |
| ICV 40 PM Valve housing | 027H4128 <sup>(1)</sup> |
| ICV 50 PM Valve housing | 027H5127 <sup>(2)</sup> |
| ICV 65 PM Valve housing | 027H6128 <sup>(2)</sup> |

<sup>(1)</sup> Includes ICV PM valve housing, flange gaskets and flange bolts

<sup>(2)</sup> Includes ICV PM valve housing, flange gaskets, flange bolts and flange nuts

Figure 51: ICV PM flanged valve housings assembly

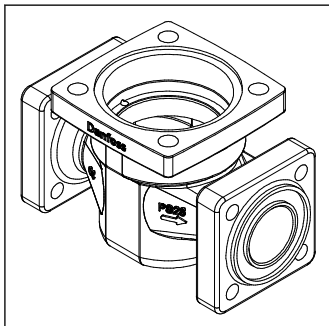


**NOTE:**

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.

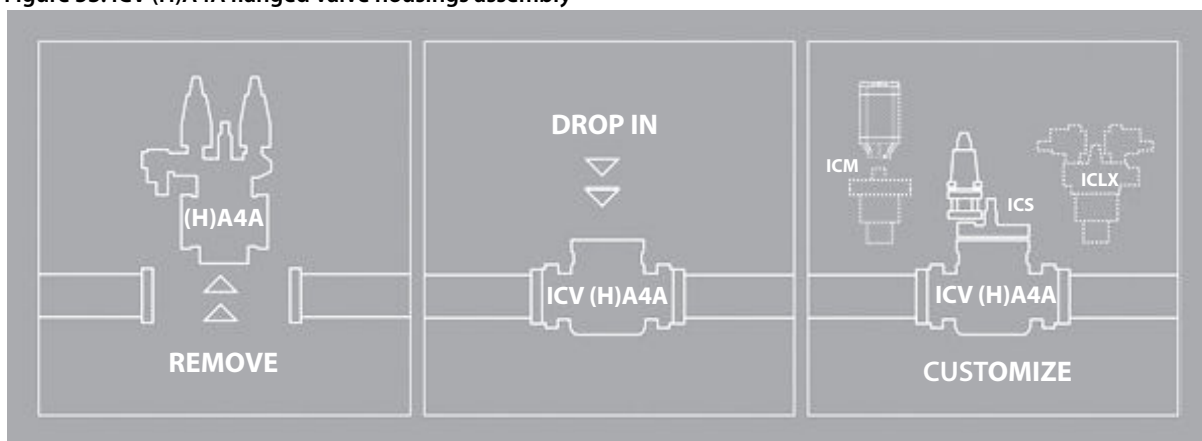
Table 72: ICV (H)A4A flanged valve housings

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

<sup>(1)</sup> Includes ICV PM valve housing, flange gaskets and flange bolts

<sup>(2)</sup> 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

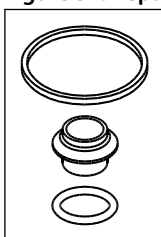


Table 73: Spare parts

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

Figure 55: Connectors

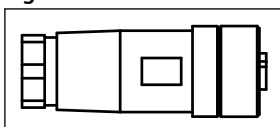


Table 74: Accessories

| Connectors for ICAD 600A / 1200A                                                                        |             |
|---------------------------------------------------------------------------------------------------------|-------------|
| Connector type                                                                                          | Code Number |
| Two Female Connectors with screw terminals:<br>• connector for power<br>• 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    |

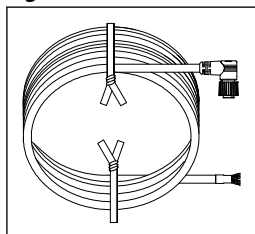
**Figure 57: Multi-function tool**



**Table 76: Accessories**

| Description         | Code Number |
|---------------------|-------------|
| Multi-function tool | 027H0180    |

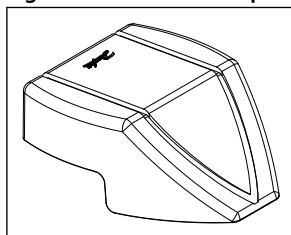
**Figure 58: Cable**



**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    |

**NOTE:**

Please observe, when used in CO<sub>2</sub>, 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

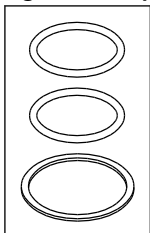


Table 79: Spare parts

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

Figure 61: Connectors

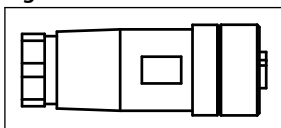


Table 80: Accessories

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

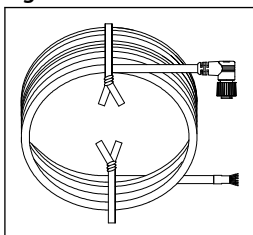


Table 83: Accessories

| 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

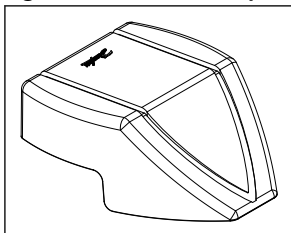


Table 84: Accessories

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

**i NOTE:**

Please observe, when used in CO<sub>2</sub>, 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

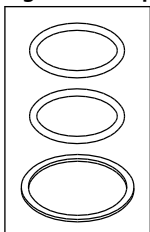
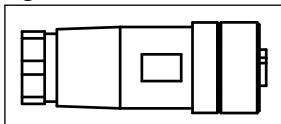


Table 85: Spare parts

| 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"> <li>connector for power</li> <li>connector for control signals</li> </ul> | 027H0430    |

**Figure 68: ICAD-UPS**



**Table 87: Accessories**

| Description | Code Number |
|-------------|-------------|
| ICAD-UPS    | 027H0388    |

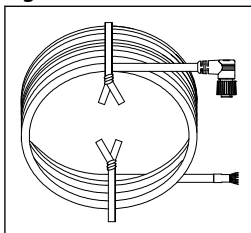
**Figure 69: Multi-function tool**



**Table 88: Accessories**

| Description         | Code Number |
|---------------------|-------------|
| Multi-function tool | 027H0181    |

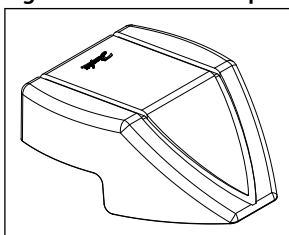
**Figure 70: Cable**



**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**

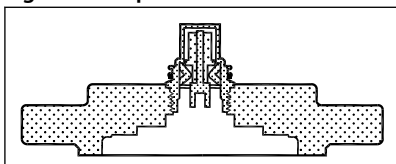
| Protection cap ICAD 600A / 1200A |             |
|----------------------------------|-------------|
| Description                      | Code Number |
| Protection cap                   | 027H0431    |

**NOTE:**

Please observe, when used in CO<sub>2</sub>, 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

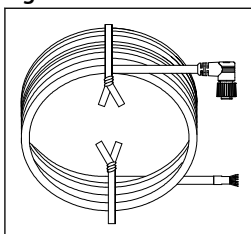
**Figure 73: ICAD-UPS**



**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

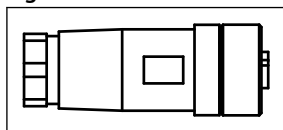


Table 94: Accessories

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

Figure 76: Protection cap

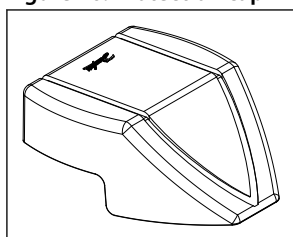


Table 95: Accessories

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

Figure 77: Multi-function tool



Table 96: Accessories

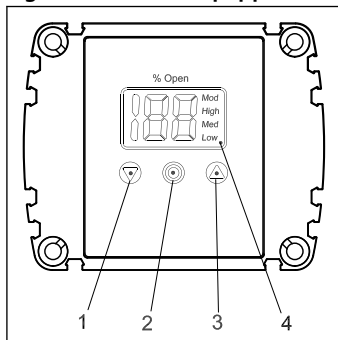
| Description         | Code Number |
|---------------------|-------------|
| Multi-function tool | 027H0181    |

## **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

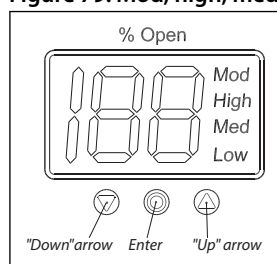


Figure 80: Mod

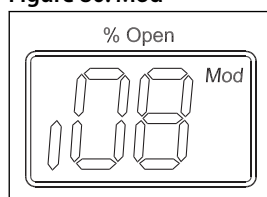


Figure 81: Mod

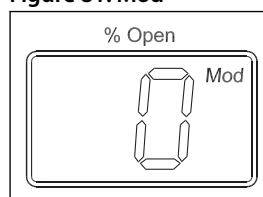
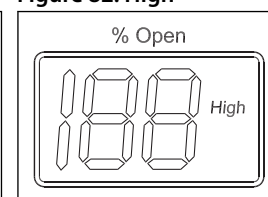


Figure 82: High



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          | <b>A1</b>       | Alarm ON            | At start-up <b>A1</b> will be displayed                                                                                                                                                                                                          |
| Controller fault                | <b>A2</b>       | Alarm ON            | Internal fault inside electronics. Carry out:<br>1) Power OFF and Power ON<br>If <b>A2</b> still active<br>2) Make a Reset to factory setting<br>If <b>A2</b> still active. Return ICAD to Danfoss                                               |
| AI input error                  | <b>A3</b>       | Alarm ON            | Not active if <b>i01</b> = 2, or <b>i02</b> = 2<br>When <b>i03</b> = 1 and AI A > 22 mA<br>When <b>i03</b> = 2 and AI A > 22 mA<br>or AI A < 2 mA<br>When <b>i03</b> = 3 and AI A > 12 V<br>When <b>i03</b> = 4 and AI A > 12 V<br>or AI A < 1 V |
| Low voltage of fail safe Supply | <b>A4</b>       | Alarm ON            | If 5 V < fail safe supply < 18 V Enabled by <b>i08</b>                                                                                                                                                                                           |
| Check supply to ICAD            | <b>A5</b>       | Alarm ON            | If supply voltage < 18 V                                                                                                                                                                                                                         |
| Calibration extended failed     | <b>A6</b>       | Alarm ON            | Check valve type selected<br>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 | <b>A7</b>       | Alarm ON            | Temperature for stepper motor component too high.Ventilate/lower ambient ICAD temperature                                                                                                   |
|                            | <b>A8</b>       | Alarm ON            | Temperature for stepper motor component too high Ventilate/lower ambient ICAD temperature                                                                                                   |
| Valve locked               | <b>A9</b>       | Alarm ON            | Only active if i16 = 1<br>If the valve is locked in more than 15 seconds<br>ICM stopped and hold position<br>A9 flashing in display<br>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 <b>i01</b> , <b>i05</b> ).                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Main Switch                                                                                                     | <b>i01</b>     | 1   | 2   | 1               | √      | -    | No        | Internal main switch<br>1: Normal operation<br>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                                                                                                            | <b>i02</b>     | 1   | 2   | 1               | √      | -    | No        | Operation mode<br>1: Modulating – ICM positioning according to Analog Input (see <b>i03</b> )<br>2: ON / OFF - operating the ICM valve like an ON / OFF solenoid valve controlled via Digital Input. See also <b>i09</b><br>3: Neutralzone / 3 point control. Increase/Decrease Opening Degree by Digital Input. See fig. 9                                                                                                                                                                                                                            |
| AI signal                                                                                                       | <b>i03</b>     | 1   | 4   | 2               | √      | -    | No        | Type of AI signal from external controller<br>1: 0 – 20 mA<br>2: 4 – 20 mA<br>3: 0 – 10 V<br>4: 2 – 10 V                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Speed<br><br>In <b>Modulating Mode</b><br>Opening/closing speed<br><br>In <b>ON / OFF Mode</b><br>Opening speed | <b>i04</b>     | 1   | 100 | 50/ 100         | √      | -    | No        | Speed can be decreased. Max. speed is 100 % - Not active in manual operation ( <b>i01</b> = 2)<br>If <b>i26</b> = 1 – 3 then factory setting = 100<br>If <b>i26</b> = 4 – 9 then factory setting = 50<br>If ICM is opening and ( <b>i04</b> < = 33) or ICM is closing and ( <b>i14</b> < = 33) => Low is displayed<br>If ICM is opening and (33 < <b>i04</b> < = 66) or ICM is closing and (33 < <b>i14</b> < = 66) => Med is displayed<br>If ICM is opening and ( <b>i04</b> > = 67) or ICM is closing and ( <b>i14</b> > = 67) => High is displayed" |
| Automatic calibration                                                                                           | <b>i05</b>     | 0   | 2   | 0               | -      | -    | No        | Not active before <b>i26</b> has been operated<br>Always auto reset to 0<br>CA will flash in the display during calibration, if Enter push button has been activated for two seconds<br>0: No Calibration<br>1: Normal forced calibration - CA flashing slowly<br>2: Extended calibration – CA flashing rapidly"                                                                                                                                                                                                                                       |
| AO signal                                                                                                       | <b>i06</b>     | 0   | 2   | 2               | √      | -    | No        | Type of AO signal for ICV valve position<br>0: No signal<br>1: 0 – 20 mA<br>2: 4 – 20 mA                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Failsafe                                                                                                        | <b>i07</b>     | 1   | 4   | 1               | √      | -    | No        | Define condition at power cut and fail safe supply is installed<br>1: Close valve<br>2: Open Valve<br>3: Maintain valve position<br>4: Go to OD given by <b>i12</b> "                                                                                                                                                                                                                                                                                                                                                                                  |
| Fail safe supply                                                                                                | <b>i08</b>     | 0   | 1   | 0               | √      | -    | Yes       | Fail safe supply connected and enable of A4 alarm:<br>0: No<br>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<br>1: Open ICM valve (DI = OFF => Close ICM valve)<br>2: Close ICM valve (DI = OFF => Open ICM valve)                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Password                                          | i10            | 0   | 199 | 0               | -      | -    |          | Enter number to access password protected parameters: i26<br>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<br>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<br>0: Increasing Analog Input signal => Increasing ICM Opening Degree<br>1: Increasing Analog Input signal => Decreasing ICM Opening Degree<br>When i02 = 3<br>0: DI1 = ON, DI2 = OFF => Increasing ICM Opening Degree<br>DI1 = OFF, DI2 = ON => Decreasing ICM Opening Degree<br>DI1 = DI2 = OFF => ICAD / ICM maintain current position<br>DI1 = DI2 = ON => ICAD / ICM maintain current position<br>1: DI1 = ON, DI2 = OFF => Decreasing ICM Opening Degree<br>DI1 = OFF, DI2 = ON => Increasing ICM Opening Degree<br>DI1 = DI2 = OFF => ICAD / ICM maintain current position<br>DI1 = DI2 = ON => ICAD / ICM maintain current position |
| In ON / OFF Mode Closing speed                    | i14            | 0   | 100 | 50 / 100        | ✓      | -    | No       | See i04<br>If i26 = 1 – 3 then factory setting = 100<br>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<br>0: Encoder disabled. Means ICAD operation as ICAD 600A / ICAD 600A-TS / 1200A without encoder<br>1: Encoder enabled                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Forced closing when ICM valve Opening Degree < 3% | i17            | 0   | 1   | 0               | ✓      |      | No       | Enable/Disable forced closing<br>0: When ICM valve Opening Degree < 3% it will be forced to close regardless of requested ICM valve Opening Degree<br>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<br>0: No valve selected. Alarm A1 will become active<br>1: ICM 20 with ICAD 600A / ICMTS 20 with ICAD 600A-TS<br>2: ICM 25 with ICAD 600A<br>3: ICM 32 with ICAD 600A<br>4: ICM 40 with ICAD 1200A<br>5: ICM 50 with ICAD 1200A<br>6: ICM 65 with ICAD 1200A<br>7: ICM 100 with ICAD 1200A<br>8: ICM 125 with ICAD 1200A<br>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<br>If i02 = 2, one digits are shown. See fig. 8<br>0 : DI1 = OFF<br>1 : DI1 = ON<br>If i02 = 3, two digits are shown. See fig. 9<br>00 : DI1 = OFF, DI2 = OFF<br>10 : DI1 = ON, DI2 = OFF<br>01 : DI1 = OFF, DI2 = ON<br>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](http://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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