

Data sheet

# Motor operated valves and Actuators

## Type ICM and ICAD



ICM motor operated valves belong to the ICV family and are one of two product groups.

### ICV types

- ICS - Pilot operated servo valve
- ICM - Motor operated valve

The motor operated 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.

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.

### Features (valve)

- Designed for Industrial Refrigeration applications for a maximum working pressure of 52 bar g (754 psi g).
- 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 Multi-function 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.

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**Introduction**

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

| 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.

**Please note:** a fail safe supply (battery or UPS) is required.

**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.

|        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|
|        |        |        |        |        |        |
| ICV 20 | ICV 25 | ICV 32 | ICV 40 | ICV 50 | ICV 65 |

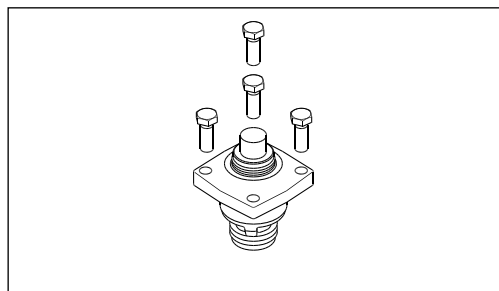
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|---------|---------|---------|
|         |         |         |
| ICV 100 | ICV 125 | ICV 150 |

- Valve bodies in the sizes ICV 20-ICV65 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

| 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 |

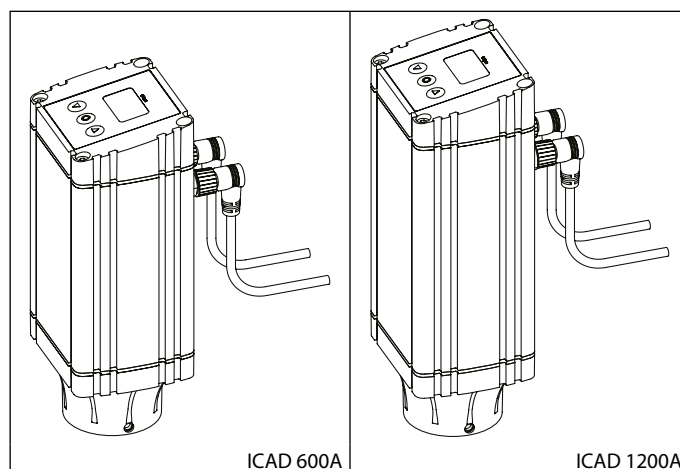
**The ICM Concept**  
(continued)

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



| Type       | Valve body size | K <sub>v</sub><br>(m <sup>3</sup> /h) | C <sub>v</sub><br>(USgal/min) |
|------------|-----------------|---------------------------------------|-------------------------------|
| ICM20A-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                                     | 7.0                           |
| 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                           |

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



**Design (valve)**

*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)

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 Instruction.

*Valve body and top cover material*  
Low temperature steel

*Approvals*

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.



| ICM valves     |                        |                        |                       |
|----------------|------------------------|------------------------|-----------------------|
| Nominal bore   | DN≤ 25 (1 in.)         | DN 32-65 (1¼ - 2½ in.) | DN 80-125 (3 - 5 in.) |
| Classified for | Fluid group I          |                        |                       |
| Category       | Article 3, paragraph 3 | II                     | III                   |

**Technical data (valve)**

• *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.

• *Temperature range:*

Media: -60/+120°C (-76/+248°F).



When used in liquid refrigerant above +75°C (+167°F), please contact Danfoss

• *Pressure*

The valve is designed for:

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

• *Surface protection*

ICM 20-150:

The external surface is zinc-chromated to provide good corrosion protection.

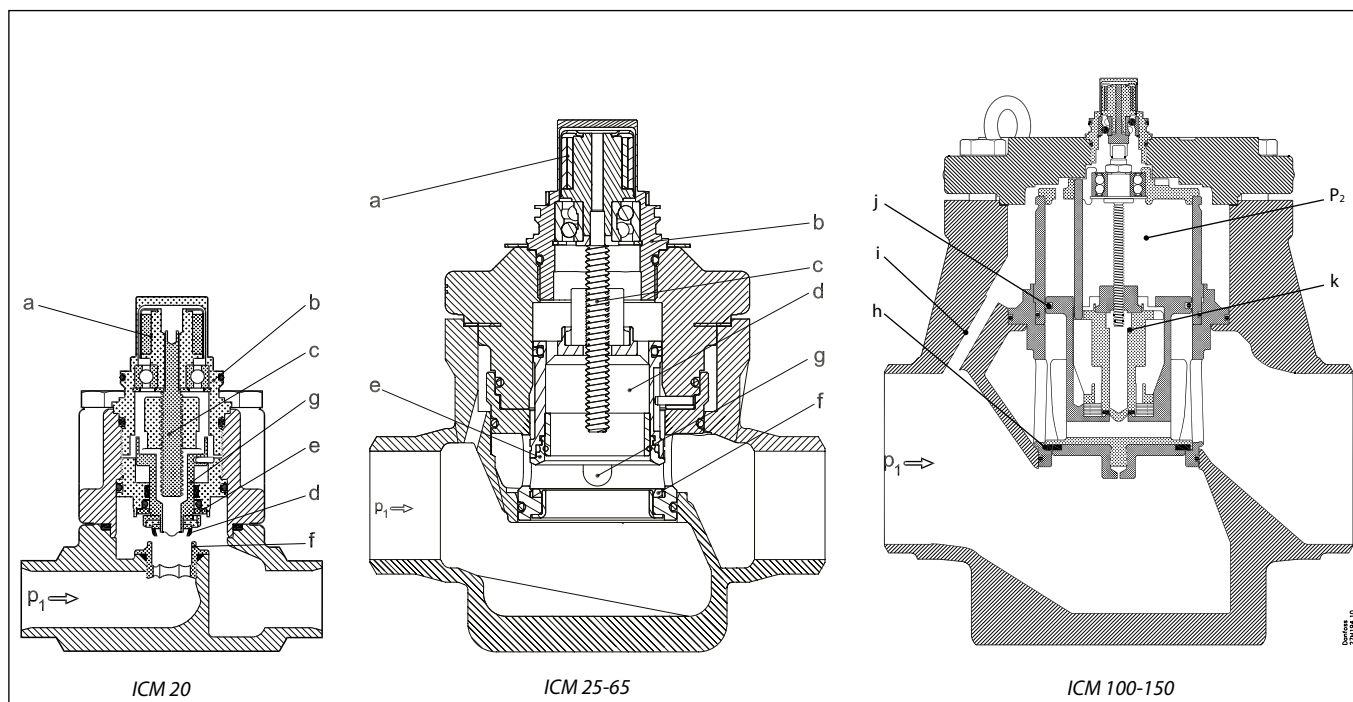
• *Max. opening pressure differential (MOPD)*

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

## Function (valve)



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 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 ( $P_1$ ) 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 ( $P_1$ ) 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  $P_1$  and  $P_2$ . 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  $P_2$  pressure to escape through the servo piston (j) to the outlet of the valve. The pressure  $P_1$  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  $P_1$  and  $P_2$  are equalized again. When there is no pressure difference between  $P_1$  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.

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

### Technical data (actuator)

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

| ICAD 600A | ICAD 1200A |
|-----------|------------|
| ICM 20    | ICM 40     |
| ICM 25    | ICM 50     |
| ICM 32    | ICM 65     |
|           | 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)
- *Temperature range (ambient)*  
 -30°C/+50°C (-22°F/122°F)
- *Enclosure*  
 IP 67 (~NEMA 6)  
*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".



Electrical data



**Please observe cable voltage drop**

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

| Prefabricated ICAD cable length<br>Code number | 1.5 m<br>027H0426 | 3 m<br>027H0438 | 10 m<br>027H0427 | 15 m<br>027H0435 |
|--|-------------------|-----------------|------------------|------------------|
| Voltage ICAD terminal<br>(600A/1200A) [V d.c.] | Min.              | 21              | 22               | 23               |
|  | Max.              | 26.4            |                  |                  |

\* Do not measure inside the ICAD itself.

Supply voltage is galvanic isolated from Input/ Output.

**Supply voltage:** See above table  
**Load:** ICAD 600A: 1.2 A  
 ICAD 1200A: 2.0 A

**Fail safe supply:** See above table  
**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 d.c.  
**Load :** 10 kΩ

**Analogue Output:** 0/4-20 mA  
**Load :** ≤ 250 Ω

**Digital Input** - Digital ON/OFF input by means of volt-free contact (Signal/Telecom relays with gold-plated contacts recommended) – Voltage input used  
**ON:** Contact impedance < 50 Ω )  
**OFF:** Contact impedance > 100 k Ω

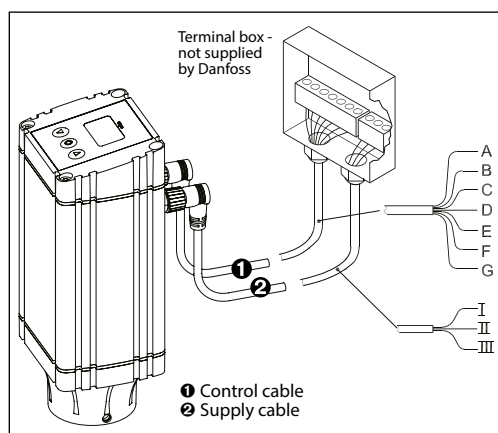
**Digital Output** - 3 pcs. NPN transistor output  
**External supply:** 5-24 V d.c.  
 (Same supply as for ICAD can be used, but please note that the galvanically isolated system will then be spoiled)

**Output load:** 50 Ω  
**Load:** Max. 50 mA

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

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

**Cable connection**  
 Two 1.5 m (60 in) cables pre-mounted

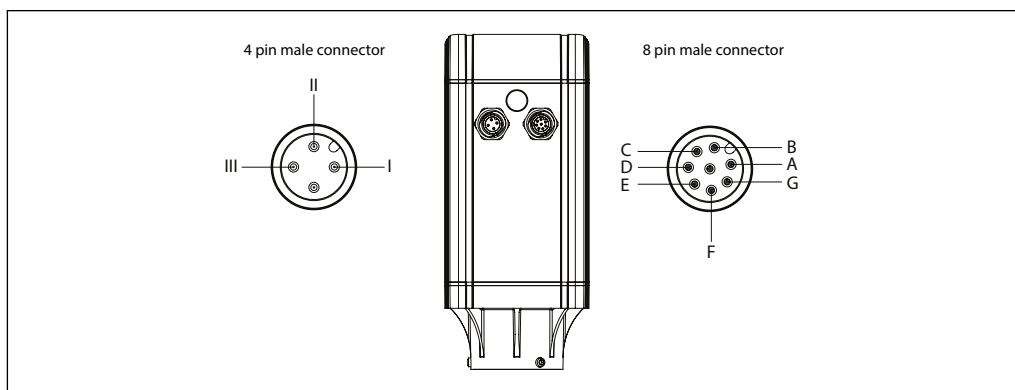


| Ref. | Colour | Description              |                    |
|------|--------|--------------------------|--------------------|
| A    | Black  | - Common Alarm           | Digital Output     |
| B    | Brown  | - ICM fully open         |                    |
| C    | Red    | - ICM fully closed       |                    |
| D    | Orange | - GND ground             |                    |
| E    | Yellow | + 0/4 - 20 mA Input ***  | Analogue In/Output |
| F    | Green  | + 0/2 - 10 V Input **    |                    |
| G    | Blue   | + 0/4 - 20 mA Output *** |                    |

|     |       |   |  |
|-----|-------|---|--|
| I   | Black | + | Fail safe supply<br>Battery / UPS* 19 V d.c. |
| II  | White | + | Supply voltage                               |
| III | Brown | - | 24 V d.c.                                    |

\* Uninterruptable Power Supply  
 \*\* Also used with D (GND, ground) for DI1 - Digital ON-OFF operation.  
 \*\*\* If Neutral zone / 3 point control is selected (parameter i02 = 3) then E and G are used as DI2 - Digital ON/OFF input.  
**Note:** Colour code changed when compared to older colour wiring diagram.

Cable connection  
Two 1.5 m (60 in) cables pre-mounted (continued)



**Approvals**

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



**Function (actuator)**

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.

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

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

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

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-authorized 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.

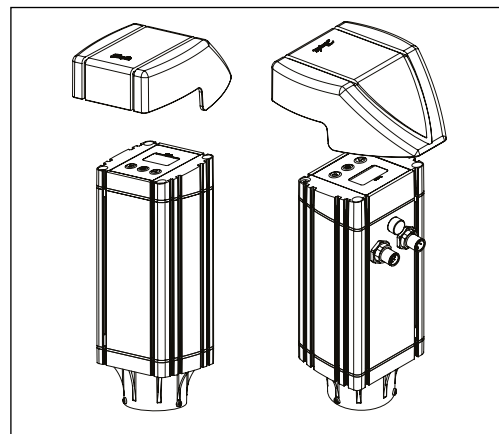
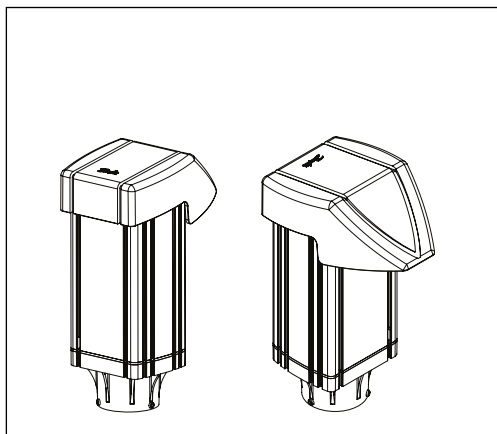
### ICAD protection cap

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.

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.



### 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 ICAD-UPS 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

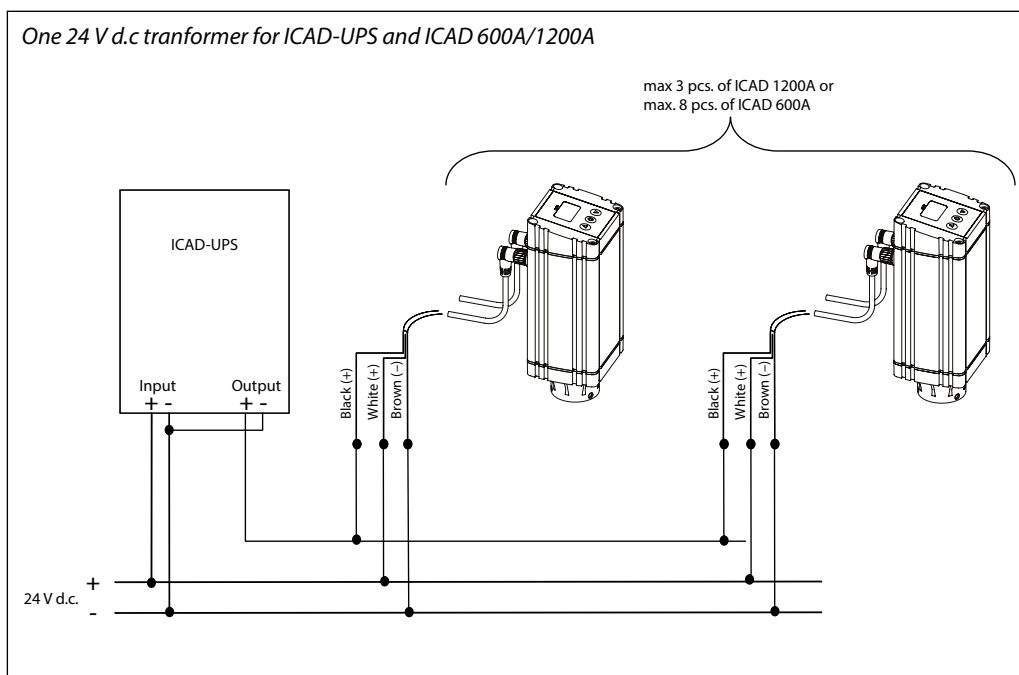
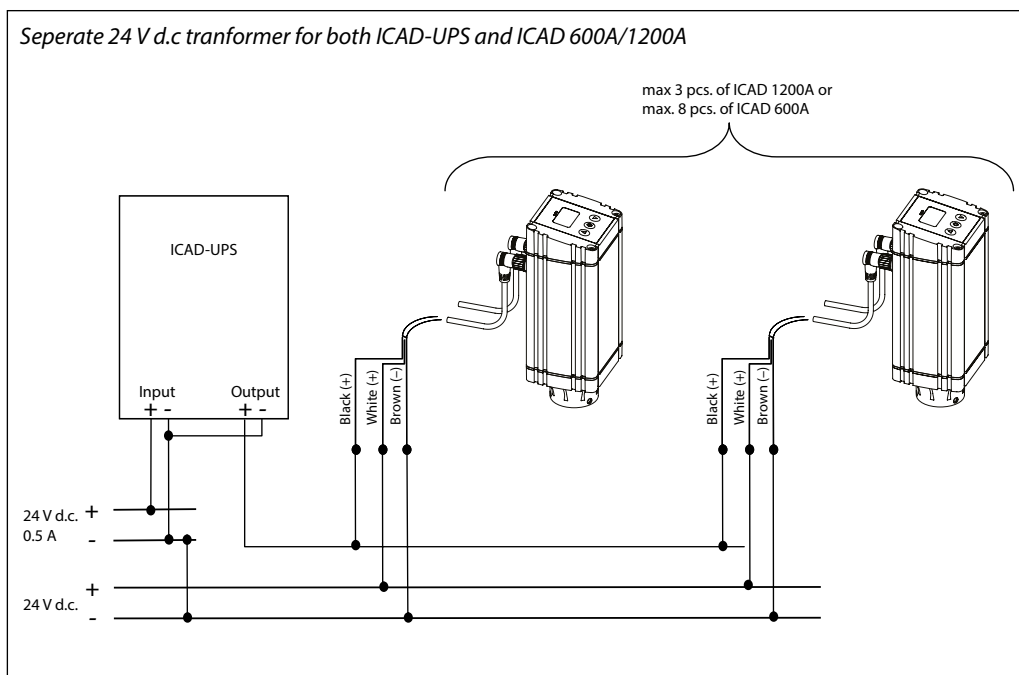
- Industrial product.
- Can support up to
  - 3 pcs. of ICAD 1200A or
  - 8 pcs. of ICAD 600A
- Integrated solution - battery and UPS.
- *Industrial approvals:* CE, UL, GL (Germanischer Lloyd).
- DIN rail mounting.
- *LED indication*
  - Green (Power ON)
  - Yellow (Flashing:charging, Constant: Buffer mode (Failsafe supply to ICAD))
  - Red (Battery fully discharged/Battery faulty)
- 24 V d.c supply → Same transformer as for ICAD can be used. Only +0,5 A extra load on the transformer.
- Check of battery every 60 sec.
- Adjustable buffer time\*. (1, 2, 3, 5, 10, 15, 20, 30 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).

\* 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.

Code number: **027H0182**

For further information please see the instruction PI.HV0.B.

ICAD-UPS applications



Material specification

ICM 20                      ICM 25-65

ICM 100-150

**Bolt sizes (pos. 5)**

| Type   | Screw                  |
|--------|------------------------|
| ICM 20 | M10 × 55 A2-70 DIN 931 |
| ICM 25 | M12 × 30 A2-70 DIN 933 |
| ICM 32 | M14 × 35 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 |

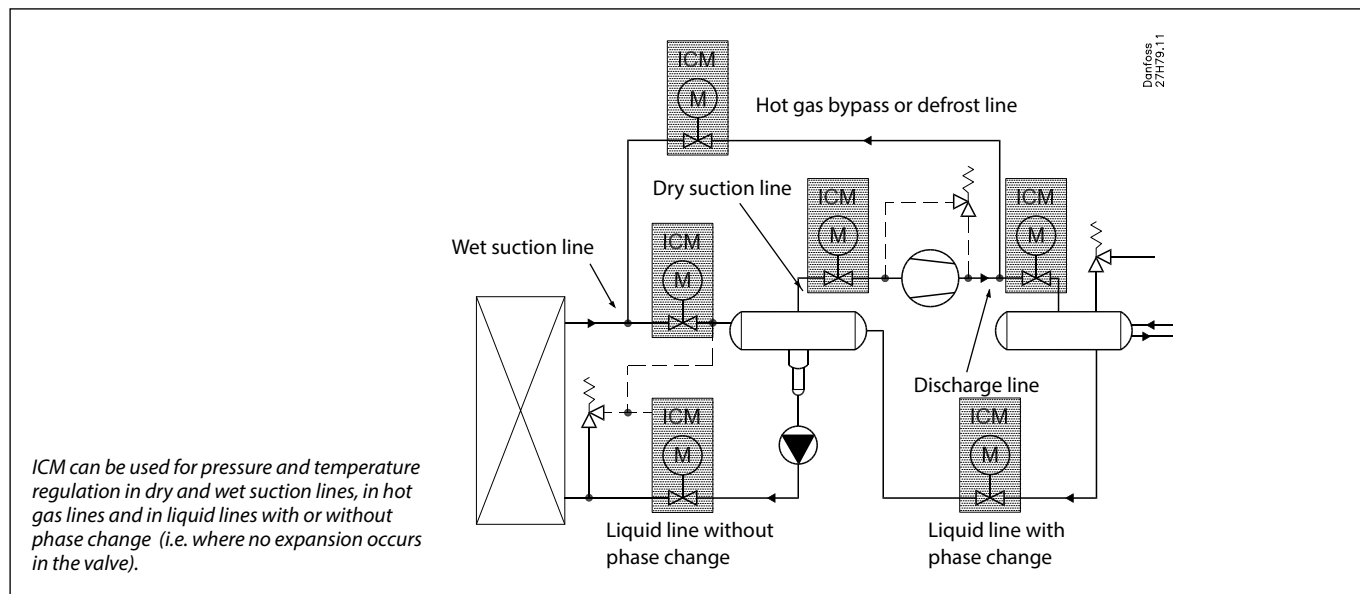
**Bolt sizes (pos. 5)**

| Type    | Screw                  |
|---------|------------------------|
| ICM 100 | M20 × 60 A2-70 DIN 933 |
| ICM 125 | M20 × 60 A2-70 DIN 933 |
| ICM 150 | M20 × 70 A2-70 DIN 933 |

| 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          | Cloroprene (Neoprene) |                      |               |               |
| 2b  | O-ring          | Cloroprene (Neoprene) |                      |               |               |
| 2c  | O-ring          | Cloroprene (Neoprene) |                      |               |               |
| 3   | Function module |                       |                      |               |               |
| 4   | Gasket          | Cloroprene (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          | Cloroprene (Neoprene) |                      |               |               |
| 13  | O-ring          | Cloroprene (Neoprene) |                      |               |               |
| 14  | Seat            | High density polymer  |                      |               |               |

**ICM Application**



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:- ICM-EXP 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.

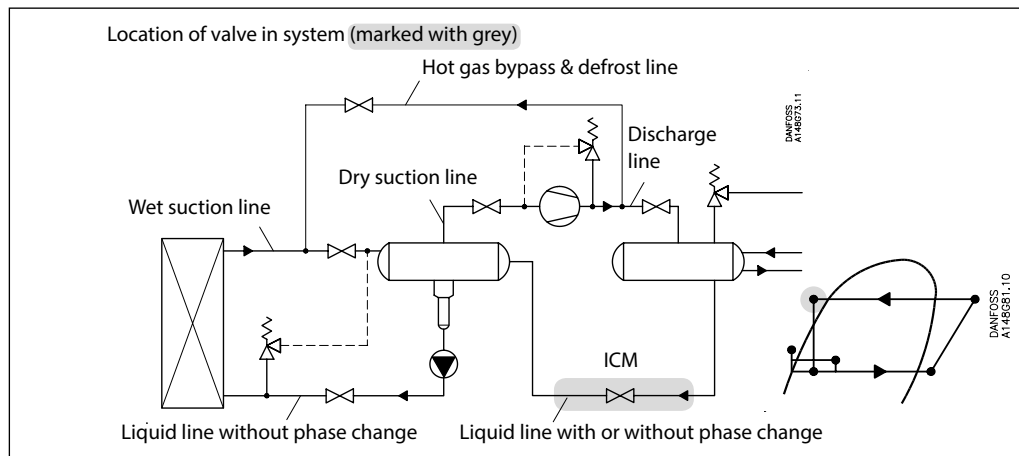
For ICM 20-65 applications it is recommended that the valve opening degree at the minimum operating conditions is greater than 5%.

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

| 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 Straightway | 20 (¾ in.)  | 148B5343 | 148B5347 | 148B5349 | 148B5348 | 148H3122                       | 148H3124 | 148H3126                        | 148H3128 |
|                     | FIA Straightway | 25 (1 in.)  | 148B5443 | 148B5447 | 148B5449 | 148B5448 | 148H3123                       | 148H3125 | 148H3127                        | 148H3129 |
|                     | FIA Straightway | 32 (1¼ in.) | 148B5544 | 148B5552 | 148B5549 | 148B5548 | 148H3123                       | 148H3125 | 148H3127                        | 148H3129 |
|                     | FIA Straightway | 40 (1½ in.) | 148B5625 | 148B5644 |          | 148B5645 | 148H3123                       | 148H3125 | 148H3127                        | 148H3129 |
|                     | FIA Straightway | 50 (2 in.)  | 148B5713 | 148B5716 |          | 148B5717 | 148H3157                       | 148H3130 | 148H3138                        | 148H3144 |
|                     | FIA Straightway | 65 (2½ in.) | 148B5813 | 148B5815 |          |          |                                | 148H3131 | 148H3139                        | 148H3145 |
|                     | FIA Straightway | 80 (3 in.)  | 148B5906 | 148B5908 |          |          |                                | 148H3119 | 148H3120                        | 148H3121 |
|                     | FIA Straightway | 100 (4 in.) | 148B6007 | 148B6009 |          |          |                                | 148H3132 | 148H3140                        | 148H3146 |
|                     | FIA Straightway | 125 (5 in.) | 148B6106 | 148B6108 |          |          |                                | 148H3133 | 148H3141                        | 148H3147 |
| FIA Straightway     | 150 (6 in.)     | 148B6203    | 148B6205 |          |          |          | 148H3134                       | 148H3142 | 148H3148                        |          |

Nominal capacities

Liquid line with/without phase change



SI units

Calculation example (R717 capacities):

An application has following running conditions:

- $T_e = -20^\circ\text{C}$
- $Q_o = 250 \text{ kW}$
- $T_{liq} = 10^\circ\text{C}$
- Max.  $\Delta p = 0.3 \text{ bar}$
- Connection: DN20

The capacity table is based on nominal condition (pressure drop  $\Delta p = 0.2 \text{ bar}$ ,  $T_{liq} = 30^\circ\text{C}$ )

Therefore the actual capacity must be corrected to nominal condition by means of correction factors.  
 Correction factor for  $\Delta p$  0.3 bar  $f_{\Delta p} = 0.82$   
 Correction factor for liquid temperature  $f_{T_{liq}} = 0.92$

$$Q_n = Q_o \times f_{\Delta p} \times f_{T_{liq}} = 250 \times 0.82 \times 0.92 = 189 \text{ kW}$$

From the capacity table a ICM 20-B with  $Q_n$  capacity 249 kW is selected.

US units

Calculation example (R717 capacities):

An application has following running conditions:

- $T_e = -20^\circ\text{F}$
- $Q_o = 130 \text{ TR}$
- $T_{liq} = 50^\circ\text{F}$
- Max.  $\Delta p = 3.5 \text{ psi}$
- Connection:  $3/4''$

The capacity table is based on nominal condition (pressure drop  $\Delta p = 3 \text{ psi}$ ,  $T_{liq} = 90^\circ\text{F}$ )

Therefore the actual capacity must be corrected to nominal condition by means of correction factors.  
 Correction factor for  $\Delta p$  3.5 psi  $f_{\Delta p} = 0.91$   
 Correction factor for liquid temperature  $f_{T_{liq}} = 0.92$

$$Q_n = Q_o \times f_{\Delta p} \times f_{T_{liq}} = 130 \times 0.91 \times 0.92 = 109 \text{ TR}$$

From the capacity table a ICM 20-C with  $Q_n$  capacity 134 TR is selected.

Nominal capacities

Liquid line with/without phase change

SI units

Capacity table for nominal conditions,  $Q_N$  [kW],  
 $T_{liq} = 30^\circ\text{C}$ ,  
 $\Delta P = 0.2 \text{ bar}$

R 717

| Type      | Valve body size | $K_v$<br>( $\text{m}^3/\text{h}$ ) | Evaporating temperature [ $^\circ\text{C}$ ] |       |       |       |       |       |       |       |
|-----------|-----------------|------------------------------------|--|-------|-------|-------|-------|-------|-------|-------|
|           |                 |                                    | -50  | -40   | -30   | -20   | -10   | 0     | 10    | 20    |
| ICM20-A33 | 20              | 0.2                                | 19.8   | 20.2  | 20.5  | 20.7  | 21.0  | 21.1  | 21.3  | 21.4  |
| ICM20-A   |                 | 0.6                                | 59.5   | 60.5  | 61.4  | 62.2  | 62.9  | 63.4  | 63.9  | 64.2  |
| ICM20-B   |                 | 2.4                                | 238  | 242   | 245   | 249   | 251   | 254   | 256   | 257   |
| ICM20-C   |                 | 4.6                                | 457  | 464   | 471   | 477   | 482   | 486   | 490   | 493   |
| ICM25-A   | 25              | 6                                  | 595  | 605   | 614   | 622   | 629   | 634   | 639   | 642   |
| ICM25-B   |                 | 12                                 | 1191   | 1210  | 1227  | 1243  | 1257  | 1269  | 1278  | 1285  |
| ICM32-A   | 32              | 9                                  | 893  | 907   | 921   | 933   | 943   | 952   | 959   | 964   |
| ICM32-B   |                 | 17                                 | 1687   | 1714  | 1739  | 1761  | 1781  | 1797  | 1811  | 1820  |
| ICM40-A   | 40              | 15                                 | 1489   | 1512  | 1534  | 1554  | 1571  | 1586  | 1598  | 1606  |
| ICM40-B   |                 | 26                                 | 2580   | 2622  | 2659  | 2694  | 2724  | 2749  | 2769  | 2784  |
| ICM50-A   | 50              | 23                                 | 2283   | 2319  | 2353  | 2383  | 2409  | 2432  | 2450  | 2463  |
| ICM50-B   |                 | 40                                 | 3970   | 4033  | 4091  | 4145  | 4190  | 4229  | 4260  | 4283  |
| ICM65-A   | 65              | 35                                 | 3473   | 3529  | 3580  | 3627  | 3666  | 3700  | 3728  | 3748  |
| ICM65-B   |                 | 70                                 | 6947   | 7058  | 7160  | 7253  | 7333  | 7401  | 7455  | 7495  |
| ICM100    | 100             | 142                                | 14091  | 14318 | 14524 | 14717 | 14875 | 15013 | 15127 | 15205 |
| ICM125    | 125             | 223                                | 22129  | 22485 | 22810 | 23112 | 23361 | 23577 | 23756 | 23877 |
| ICM150    | 150             | 370                                | 36717  | 37306 | 37845 | 38347 | 38760 | 39119 | 39415 | 39617 |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature                   | Correction factor |
|--------------------------------------|-------------------|
| -20 $^\circ\text{C}$                 | 0.82              |
| -10 $^\circ\text{C}$                 | 0.86              |
| 0 $^\circ\text{C}$                   | 0.88              |
| 10 $^\circ\text{C}$                  | 0.92              |
| 20 $^\circ\text{C}$                  | 0.96              |
| <b>30<math>^\circ\text{C}</math></b> | <b>1.00</b>       |
| 40 $^\circ\text{C}$                  | 1.04              |
| 50 $^\circ\text{C}$                  | 1.09              |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| 0.05             | 2.00              |
| 0.1              | 1.41              |
| <b>0.2</b>       | <b>1.00</b>       |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |

US units

Capacity table for nominal conditions,  $Q_N$  [Tons of Refrigeration],  
 $T_{liq} = 90^\circ\text{F}$ ,  
 $\Delta P = 3 \text{ psi}$

R 717

| Type      | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature [ $^\circ\text{F}$ ] |       |       |       |       |       |       |       |
|-----------|-----------------|----------------------|--|-------|-------|-------|-------|-------|-------|-------|
|           |                 |                      | -60  | -40   | -20   | 0     | 20    | 40    | 60    | 80    |
| ICM20-A33 | 20              | 0.23                 | 5.6  | 5.7   | 5.8   | 5.9   | 6.0   | 6.0   | 6.1   | 6.1   |
| ICM20-A   |                 | 0.7                  | 17.1   | 17.4  | 17.7  | 17.9  | 18.1  | 18.3  | 18.4  | 18.5  |
| ICM20-B   |                 | 2.8                  | 68.3   | 69.5  | 70.7  | 71.7  | 72.5  | 73.2  | 73.7  | 74.0  |
| ICM20-C   |                 | 5.3                  | 129  | 132   | 134   | 136   | 137   | 139   | 140   | 140   |
| ICM25-A   | 25              | 7                    | 171  | 174   | 177   | 179   | 181   | 183   | 184   | 185   |
| ICM25-B   |                 | 14                   | 342  | 348   | 353   | 358   | 363   | 366   | 369   | 370   |
| ICM32-A   | 32              | 10                   | 244  | 248   | 252   | 256   | 259   | 261   | 263   | 264   |
| ICM32-B   |                 | 20                   | 488  | 497   | 505   | 512   | 518   | 523   | 527   | 529   |
| ICM40-A   | 40              | 17                   | 415  | 422   | 429   | 435   | 440   | 445   | 448   | 450   |
| ICM40-B   |                 | 30                   | 732  | 745   | 757   | 768   | 777   | 784   | 790   | 793   |
| ICM50-A   | 50              | 27                   | 659  | 670   | 681   | 691   | 699   | 706   | 711   | 714   |
| ICM50-B   |                 | 46                   | 1122   | 1142  | 1161  | 1177  | 1191  | 1203  | 1211  | 1216  |
| ICM65-A   | 65              | 41                   | 1000   | 1018  | 1035  | 1049  | 1061  | 1072  | 1080  | 1084  |
| ICM65-B   |                 | 81                   | 1976   | 2011  | 2044  | 2073  | 2098  | 2118  | 2133  | 2142  |
| ICM100    | 100             | 165                  | 4026   | 4099  | 4165  | 4223  | 4271  | 4315  | 4345  | 4362  |
| ICM125    | 125             | 259                  | 6320   | 6433  | 6538  | 6629  | 6705  | 6773  | 6820  | 6846  |
| ICM150    | 150             | 430                  | 10493  | 10681 | 10855 | 11006 | 11132 | 11245 | 11323 | 11367 |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature                   | Correction factor |
|--------------------------------------|-------------------|
| -10 $^\circ\text{F}$                 | 0.82              |
| 10 $^\circ\text{F}$                  | 0.85              |
| 30 $^\circ\text{F}$                  | 0.88              |
| 50 $^\circ\text{F}$                  | 0.92              |
| 70 $^\circ\text{F}$                  | 0.96              |
| <b>90<math>^\circ\text{F}</math></b> | <b>1.00</b>       |
| 110 $^\circ\text{F}$                 | 1.04              |
| 130 $^\circ\text{F}$                 | 1.09              |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| 0.75             | 1.97              |
| 1.5              | 1.39              |
| <b>3</b>         | <b>1.00</b>       |
| 3.5              | 0.91              |
| 4                | 0.85              |
| 4.5              | 0.81              |



Nominal capacities

Liquid line with/without phase change

SI units

Capacity table for nominal conditions,  $Q_N$  [kW],  
 $T_{liq} = 10^\circ\text{C}$ ,  
 $\Delta P = 0.2 \text{ bar}$

R 744

| Type      | Valve body size | $K_v$<br>( $\text{m}^3/\text{h}$ ) | Evaporating temperature [ $^\circ\text{C}$ ] |       |       |       |       |       |       |       |
|-----------|-----------------|------------------------------------|--|-------|-------|-------|-------|-------|-------|-------|
|           |                 |                                    | -50  | -40   | -30   | -20   | -10   | 0     | 10    | 20    |
| ICM20-A33 | 20              | 0.2                                | 19.8   | 20.2  | 20.5  | 20.7  | 21.0  | 21.1  | 21.3  | 21.4  |
| ICM20-A   |                 | 0.6                                | 14.4   | 14.6  | 14.8  | 14.8  | 14.7  | 14.4  | 13.8  | 12.8  |
| ICM20-B   |                 | 2.4                                | 57.8   | 58.6  | 59.0  | 59.1  | 58.7  | 57.5  | 55.3  | 51.1  |
| ICM20-C   |                 | 4.6                                | 111  | 112   | 113   | 113   | 112   | 110   | 106   | 97.8  |
| ICM25-A   | 25              | 6                                  | 144  | 146   | 148   | 148   | 147   | 144   | 138   | 128   |
| ICM25-B   |                 | 12                                 | 289  | 293   | 295   | 296   | 293   | 288   | 277   | 255   |
| ICM32-A   | 32              | 9                                  | 217  | 220   | 221   | 222   | 220   | 216   | 207   | 191   |
| ICM32-B   |                 | 17                                 | 409  | 415   | 418   | 419   | 416   | 408   | 392   | 362   |
| ICM40-A   | 40              | 15                                 | 361  | 366   | 369   | 369   | 367   | 360   | 346   | 319   |
| ICM40-B   |                 | 26                                 | 626  | 634   | 640   | 640   | 636   | 623   | 599   | 553   |
| ICM50-A   | 50              | 23                                 | 554  | 561   | 566   | 566   | 562   | 551   | 530   | 489   |
| ICM50-B   |                 | 40                                 | 963  | 976   | 984   | 985   | 978   | 959   | 922   | 851   |
| ICM65-A   | 65              | 35                                 | 3473   | 3529  | 3580  | 3627  | 3666  | 3700  | 3728  | 3748  |
| ICM65-B   |                 | 70                                 | 1685   | 1708  | 1722  | 1724  | 1711  | 1678  | 1613  | 1489  |
| ICM100    | 100             | 142                                | 14091  | 14318 | 14524 | 14717 | 14875 | 15013 | 15127 | 15205 |
| ICM125    | 125             | 223                                | 22129  | 22485 | 22810 | 23112 | 23361 | 23577 | 23756 | 23877 |
| ICM150    | 150             | 370                                | 36717  | 37306 | 37845 | 38347 | 38760 | 39119 | 39415 | 39617 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| 0.05             | 2.00              |
| 0.1              | 1.41              |
| <b>0.2</b>       | <b>1.00</b>       |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature                   | Correction factor |
|--------------------------------------|-------------------|
| -20 $^\circ\text{C}$                 | 0.52              |
| -10 $^\circ\text{C}$                 | 0.67              |
| 0 $^\circ\text{C}$                   | 0.91              |
| <b>10<math>^\circ\text{C}</math></b> | <b>1.00</b>       |
| 15 $^\circ\text{C}$                  | 1.09              |

US units

Capacity table for nominal conditions,  $Q_N$  [Tons of Refrigeration],  
 $T_{liq} = 50^\circ\text{F}$ ,  
 $\Delta P = 3 \text{ psi}$

R 744

| Type      | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature [ $^\circ\text{F}$ ] |      |      |      |      |      |      |     |
|-----------|-----------------|----------------------|--|------|------|------|------|------|------|-----|
|           |                 |                      | -60  | -40  | -20  | 0    | 20   | 40   | 60   |     |
| ICM20-A33 | 20              | 0.23                 | 1.4  | 1.4  | 1.4  | 1.4  | 1.4  | 1.4  | 1.4  | 1.3 |
| ICM20-A   |                 | 0.7                  | 4.2  | 4.2  | 4.3  | 4.3  | 4.2  | 4.1  | 3.9  |     |
| ICM20-B   |                 | 2.8                  | 16.7   | 17.0 | 17.1 | 17.1 | 16.9 | 16.5 | 15.5 |     |
| ICM20-C   |                 | 5.3                  | 31.7   | 32.2 | 32.5 | 32.5 | 32.1 | 31.1 | 29.3 |     |
| ICM25-A   | 25              | 7                    | 41.8   | 42.5 | 42.9 | 42.9 | 42.3 | 41.1 | 38.7 |     |
| ICM25-B   |                 | 14                   | 83.7   | 85.0 | 85.7 | 85.7 | 84.7 | 82.3 | 77.3 |     |
| ICM32-A   | 32              | 10                   | 59.8   | 60.7 | 61.2 | 61.2 | 60.5 | 58.8 | 55.2 |     |
| ICM32-B   |                 | 20                   | 120  | 121  | 122  | 122  | 121  | 118  | 110  |     |
| ICM40-A   | 40              | 17                   | 102  | 103  | 104  | 104  | 103  | 100  | 94   |     |
| ICM40-B   |                 | 30                   | 179  | 182  | 184  | 184  | 181  | 176  | 166  |     |
| ICM50-A   | 50              | 27                   | 161  | 164  | 165  | 165  | 163  | 159  | 149  |     |
| ICM50-B   |                 | 46                   | 275  | 279  | 282  | 282  | 278  | 270  | 254  |     |
| ICM65-A   | 65              | 41                   | 245  | 249  | 251  | 251  | 248  | 241  | 227  |     |
| ICM65-B   |                 | 81                   | 484  | 492  | 496  | 496  | 490  | 476  | 448  |     |
| ICM100    | 100             | 165                  | 987  | 1000 | 1010 | 1010 | 997  | 970  | 912  |     |
| ICM125    | 125             | 259                  | 1549   | 1570 | 1586 | 1586 | 1565 | 1522 | 1432 |     |
| ICM150    | 150             | 430                  | 2571   | 2607 | 2633 | 2633 | 2598 | 2527 | 2377 |     |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| 0.75             | 1.97              |
| 1.5              | 1.39              |
| <b>3</b>         | <b>1.00</b>       |
| 3.5              | 0.91              |
| 4                | 0.85              |
| 4.5              | 0.81              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature                   | Correction factor |
|--------------------------------------|-------------------|
| -10 $^\circ\text{F}$                 | 0.48              |
| 10 $^\circ\text{F}$                  | 0.64              |
| 30 $^\circ\text{F}$                  | 0.88              |
| <b>50<math>^\circ\text{F}</math></b> | <b>1.00</b>       |

Nominal capacities

Liquid line with/without phase change

SI units

Capacity table for nominal conditions,  $Q_N$  [kW],  $T_{liq} = 30^\circ\text{C}$ ,  $\Delta P = 0.2$  bar

R 134a

| Type      | Valve body size | $K_v$<br>(m <sup>3</sup> /h) | Evaporating temperature [°C] |      |      |      |      |      |      |
|-----------|-----------------|------------------------------|------------------------------|------|------|------|------|------|------|
|           |                 |                              | -40                          | -30  | -20  | -10  | 0    | 10   | 20   |
| ICM20-A33 | 20              | 0.2                          | 3.6                          | 3.7  | 3.9  | 4.1  | 4.2  | 4.4  | 4.5  |
| ICM20-A   |                 | 0.6                          | 10.7                         | 11.2 | 11.7 | 12.2 | 12.7 | 13.1 | 13.6 |
| ICM20-B   |                 | 2.4                          | 42.7                         | 44.7 | 46.7 | 48.7 | 50.6 | 52.5 | 54.2 |
| ICM20-C   |                 | 4.6                          | 81.9                         | 85.8 | 89.6 | 93.3 | 97.0 | 101  | 104  |
| ICM25-A   | 25              | 6                            | 107                          | 112  | 117  | 122  | 127  | 131  | 136  |
| ICM25-B   |                 | 12                           | 214                          | 224  | 234  | 243  | 253  | 262  | 271  |
| ICM32-A   | 32              | 9                            | 160                          | 168  | 175  | 183  | 190  | 197  | 203  |
| ICM32-B   |                 | 17                           | 303                          | 317  | 331  | 345  | 358  | 372  | 384  |
| ICM40-A   | 40              | 15                           | 267                          | 280  | 292  | 304  | 316  | 328  | 339  |
| ICM40-B   |                 | 26                           | 463                          | 485  | 506  | 527  | 548  | 568  | 588  |
| ICM50-A   | 50              | 23                           | 409                          | 429  | 448  | 467  | 485  | 503  | 520  |
| ICM50-B   |                 | 40                           | 712                          | 746  | 779  | 811  | 843  | 874  | 904  |
| ICM65-A   | 65              | 35                           | 623                          | 653  | 682  | 710  | 738  | 765  | 791  |
| ICM65-B   |                 | 70                           | 1246                         | 1305 | 1363 | 1420 | 1476 | 1530 | 1582 |
| ICM100    | 100             | 142                          | 2529                         | 2649 | 2766 | 2882 | 2996 | 3105 | 3210 |
| ICM125    | 125             | 223                          | 3971                         | 4160 | 4343 | 4525 | 4704 | 4876 | 5041 |
| ICM150    | 150             | 370                          | 6589                         | 6902 | 7206 | 7509 | 7805 | 8090 | 8364 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| 0.05             | 2.00              |
| 0.1              | 1.41              |
| <b>0.2</b>       | <b>1.00</b>       |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature | Correction factor |
|--------------------|-------------------|
| -20°C              | 0.66              |
| -10°C              | 0.70              |
| 0°C                | 0.76              |
| 10°C               | 0.82              |
| 20°C               | 0.90              |
| <b>30°C</b>        | <b>1.00</b>       |
| 40°C               | 1.13              |
| 50°C               | 1.29              |

US units

Capacity table for nominal conditions,  $Q_N$  [Tons of Refrigeration],  $T_{liq} = 90^\circ\text{F}$ ,  $\Delta P = 3$  psi

R 134a

| Type      | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature [°F] |      |      |      |      |      |      |
|-----------|-----------------|----------------------|------------------------------|------|------|------|------|------|------|
|           |                 |                      | -40                          | -20  | 0    | 20   | 40   | 60   | 80   |
| ICM20-A33 | 20              | 0.23                 | 1.0                          | 1.0  | 1.1  | 1.2  | 1.2  | 1.2  | 1.3  |
| ICM20-A   |                 | 0.7                  | 3.0                          | 3.2  | 3.3  | 3.5  | 3.7  | 3.8  | 3.9  |
| ICM20-B   |                 | 2.8                  | 12.1                         | 12.7 | 13.4 | 14.0 | 14.6 | 15.2 | 15.8 |
| ICM20-C   |                 | 5.3                  | 22.9                         | 24.1 | 25.3 | 26.5 | 27.7 | 28.8 | 29.8 |
| ICM25-A   | 25              | 7                    | 30.2                         | 31.8 | 33.4 | 35.0 | 36.6 | 38.0 | 39.4 |
| ICM25-B   |                 | 14                   | 60.4                         | 63.7 | 66.9 | 70.1 | 73.1 | 76.0 | 78.8 |
| ICM32-A   | 32              | 10                   | 43.1                         | 45.5 | 47.8 | 50.1 | 52.2 | 54.3 | 56.3 |
| ICM32-B   |                 | 20                   | 86.3                         | 91.0 | 95.6 | 100  | 104  | 109  | 113  |
| ICM40-A   | 40              | 17                   | 73.4                         | 77.3 | 81.2 | 85.1 | 88.8 | 92.3 | 95.7 |
| ICM40-B   |                 | 30                   | 129                          | 136  | 143  | 150  | 157  | 163  | 169  |
| ICM50-A   | 50              | 27                   | 117                          | 123  | 129  | 135  | 141  | 147  | 152  |
| ICM50-B   |                 | 46                   | 198                          | 209  | 220  | 230  | 240  | 250  | 259  |
| ICM65-A   | 65              | 41                   | 177                          | 186  | 196  | 205  | 214  | 223  | 231  |
| ICM65-B   |                 | 81                   | 350                          | 369  | 387  | 406  | 423  | 440  | 456  |
| ICM100    | 100             | 165                  | 712                          | 751  | 787  | 825  | 862  | 897  | 928  |
| ICM125    | 125             | 259                  | 1117                         | 1178 | 1236 | 1296 | 1354 | 1407 | 1457 |
| ICM150    | 150             | 430                  | 1855                         | 1956 | 2052 | 2151 | 2247 | 2336 | 2420 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| 0.75             | 1.97              |
| 1.5              | 1.39              |
| <b>3</b>         | <b>1.00</b>       |
| 3.5              | 0.91              |
| 4                | 0.85              |
| 4.5              | 0.81              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature | Correction factor |
|--------------------|-------------------|
| -10°F              | 0.64              |
| 10°F               | 0.68              |
| 30°F               | 0.74              |
| 50°F               | 0.81              |
| 70°F               | 0.89              |
| <b>90°F</b>        | <b>1.00</b>       |
| 110°F              | 1.15              |
| 130°F              | 1.35              |

Nominal capacities

Liquid line with/without phase change

SI units

Capacity table for nominal conditions,  $Q_N$  [kW],  
 $T_{liq} = 30^\circ\text{C}$ ,  
 $\Delta P = 0.2 \text{ bar}$

R 404A

| Type      | Valve body size | $K_v$<br>( $\text{m}^3/\text{h}$ ) | Evaporating temperature [ $^\circ\text{C}$ ] |      |      |      |      |      |      |      |
|-----------|-----------------|------------------------------------|--|------|------|------|------|------|------|------|
|           |                 |                                    | -50  | -40  | -30  | -20  | -10  | 0    | 10   | 20   |
| ICM20-A33 | 20              | 0.2                                | 2.3  | 2.5  | 2.6  | 2.8  | 2.9  | 3.1  | 3.2  | 3.3  |
| ICM20-A   |                 | 0.6                                | 6.9  | 7.4  | 7.9  | 8.3  | 8.8  | 9.2  | 9.6  | 10.0 |
| ICM20-B   |                 | 2.4                                | 27.7   | 29.6 | 31.5 | 33.4 | 35.2 | 36.9 | 38.5 | 39.9 |
| ICM20-C   |                 | 4.6                                | 53.0   | 56.7 | 60.4 | 64.0 | 67.5 | 70.8 | 73.8 | 76.5 |
| ICM25-A   | 25              | 6                                  | 69.2   | 74.0 | 78.8 | 83.5 | 88.0 | 92.3 | 96.3 | 100  |
| ICM25-B   |                 | 12                                 | 138  | 148  | 158  | 167  | 176  | 185  | 193  | 200  |
| ICM32-A   | 32              | 9                                  | 104  | 111  | 118  | 125  | 132  | 138  | 144  | 150  |
| ICM32-B   |                 | 17                                 | 196  | 210  | 223  | 237  | 249  | 262  | 273  | 283  |
| ICM40-A   | 40              | 15                                 | 173  | 185  | 197  | 209  | 220  | 231  | 241  | 249  |
| ICM40-B   |                 | 26                                 | 300  | 321  | 341  | 362  | 381  | 400  | 417  | 432  |
| ICM50-A   | 50              | 23                                 | 265  | 284  | 302  | 320  | 337  | 354  | 369  | 382  |
| ICM50-B   |                 | 40                                 | 461  | 493  | 525  | 557  | 587  | 615  | 642  | 665  |
| ICM65-A   | 65              | 35                                 | 403  | 432  | 460  | 487  | 513  | 538  | 562  | 582  |
| ICM65-B   |                 | 70                                 | 807  | 863  | 919  | 974  | 1027 | 1077 | 1123 | 1164 |
| ICM100    | 100             | 142                                | 1637   | 1752 | 1865 | 1975 | 2082 | 2184 | 2278 | 2362 |
| ICM125    | 125             | 223                                | 2571   | 2751 | 2928 | 3102 | 3270 | 3430 | 3578 | 3710 |
| ICM150    | 150             | 370                                | 4265   | 4564 | 4859 | 5147 | 5426 | 5691 | 5936 | 6156 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| 0.05             | 2.00              |
| 0.1              | 1.41              |
| <b>0.2</b>       | <b>1.00</b>       |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature                   | Correction factor |
|--------------------------------------|-------------------|
| -20 $^\circ\text{C}$                 | 0.55              |
| -10 $^\circ\text{C}$                 | 0.60              |
| 0 $^\circ\text{C}$                   | 0.66              |
| 10 $^\circ\text{C}$                  | 0.74              |
| 20 $^\circ\text{C}$                  | 0.85              |
| <b>30<math>^\circ\text{C}</math></b> | <b>1.00</b>       |
| 40 $^\circ\text{C}$                  | 1.23              |
| 50 $^\circ\text{C}$                  | 1.68              |

US units

Capacity table for nominal conditions,  $Q_N$  [Tons of Refrigeration],  
 $T_{liq} = 90^\circ\text{F}$ ,  
 $\Delta P = 3 \text{ psi}$

R 404A

| Type      | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature [ $^\circ\text{F}$ ] |      |      |      |      |      |      |      |
|-----------|-----------------|----------------------|--|------|------|------|------|------|------|------|
|           |                 |                      | -60  | -40  | -20  | 0    | 20   | 40   | 60   | 80   |
| ICM20-A33 | 20              | 0.23                 | 0.6  | 0.7  | 0.7  | 0.8  | 0.8  | 0.9  | 0.9  | 0.9  |
| ICM20-A   |                 | 0.7                  | 1.9  | 2.1  | 2.2  | 2.4  | 2.5  | 2.6  | 2.8  | 2.9  |
| ICM20-B   |                 | 2.8                  | 7.6  | 8.2  | 8.8  | 9.5  | 10.0 | 10.6 | 11.0 | 11.4 |
| ICM20-C   |                 | 5.3                  | 14.4   | 15.6 | 16.8 | 17.9 | 19.0 | 20.0 | 20.9 | 21.7 |
| ICM25-A   | 25              | 7                    | 19.0   | 20.6 | 22.1 | 23.6 | 25.1 | 26.4 | 27.6 | 28.6 |
| ICM25-B   |                 | 14                   | 38.0   | 41.1 | 44.2 | 47.3 | 50.1 | 52.8 | 55.2 | 57.2 |
| ICM32-A   | 32              | 10                   | 27.2   | 29.4 | 31.6 | 33.8 | 35.8 | 37.7 | 39.4 | 40.9 |
| ICM32-B   |                 | 20                   | 54.3   | 58.8 | 63.2 | 67.5 | 71.6 | 75.5 | 78.9 | 81.7 |
| ICM40-A   | 40              | 17                   | 46.2   | 50.0 | 53.7 | 57.4 | 60.9 | 64.1 | 67.1 | 69.5 |
| ICM40-B   |                 | 30                   | 81.5   | 88.1 | 94.8 | 101  | 107  | 113  | 118  | 123  |
| ICM50-A   | 50              | 27                   | 73.3   | 79.3 | 85.3 | 91.2 | 96.7 | 102  | 107  | 110  |
| ICM50-B   |                 | 46                   | 125  | 135  | 145  | 155  | 165  | 174  | 181  | 188  |
| ICM65-A   | 65              | 41                   | 111  | 121  | 129  | 139  | 147  | 155  | 162  | 168  |
| ICM65-B   |                 | 81                   | 220  | 238  | 256  | 274  | 290  | 306  | 320  | 331  |
| ICM100    | 100             | 165                  | 448  | 486  | 521  | 558  | 591  | 622  | 651  | 675  |
| ICM125    | 125             | 259                  | 703  | 762  | 818  | 876  | 927  | 976  | 1022 | 1060 |
| ICM150    | 150             | 430                  | 1168   | 1266 | 1357 | 1454 | 1539 | 1621 | 1697 | 1759 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| 0.75             | 1.97              |
| 1.5              | 1.39              |
| <b>3</b>         | <b>1.00</b>       |
| 3.5              | 0.91              |
| 4                | 0.85              |
| 4.5              | 0.81              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature                   | Correction factor |
|--------------------------------------|-------------------|
| -10 $^\circ\text{F}$                 | 0.52              |
| 10 $^\circ\text{F}$                  | 0.57              |
| 30 $^\circ\text{F}$                  | 0.63              |
| 50 $^\circ\text{F}$                  | 0.72              |
| 70 $^\circ\text{F}$                  | 0.83              |
| <b>90<math>^\circ\text{F}</math></b> | <b>1.00</b>       |
| 110 $^\circ\text{F}$                 | 1.29              |
| 130 $^\circ\text{F}$                 | 1.92              |

Nominal capacities

Liquid line with/without phase change

SI units

Capacity table for nominal conditions,  $Q_N$  [kW],  
 $T_{liq} = 30^\circ\text{C}$ ,  
 $\Delta P = 0.2 \text{ bar}$

R 22

| Type      | Valve body size | $K_v$<br>(m <sup>3</sup> /h) | Evaporating temperature [°C] |      |      |      |      |      |      |      |
|-----------|-----------------|------------------------------|------------------------------|------|------|------|------|------|------|------|
|           |                 |                              | -50                          | -40  | -30  | -20  | -10  | 0    | 10   | 20   |
| ICM20-A33 | 20              | 0.2                          | 4.0                          | 4.1  | 4.2  | 4.3  | 4.4  | 4.5  | 4.6  | 4.7  |
| ICM20-A   |                 | 0.6                          | 11.9                         | 12.3 | 12.7 | 13.0 | 13.3 | 13.6 | 13.9 | 14.2 |
| ICM20-B   |                 | 2.4                          | 47.6                         | 49.1 | 50.6 | 52.0 | 53.3 | 54.5 | 55.7 | 56.7 |
| ICM20-C   |                 | 4.6                          | 91.3                         | 94.2 | 97.0 | 100  | 102  | 105  | 107  | 109  |
| ICM25-A   | 25              | 6                            | 119                          | 123  | 127  | 130  | 133  | 136  | 139  | 142  |
| ICM25-B   |                 | 12                           | 238                          | 246  | 253  | 260  | 267  | 273  | 278  | 283  |
| ICM32-A   | 32              | 9                            | 179                          | 184  | 190  | 195  | 200  | 205  | 209  | 213  |
| ICM32-B   |                 | 17                           | 337                          | 348  | 358  | 368  | 378  | 386  | 394  | 401  |
| ICM40-A   | 40              | 15                           | 298                          | 307  | 316  | 325  | 333  | 341  | 348  | 354  |
| ICM40-B   |                 | 26                           | 516                          | 532  | 548  | 563  | 578  | 591  | 603  | 614  |
| ICM50-A   | 50              | 23                           | 456                          | 471  | 485  | 498  | 511  | 523  | 534  | 543  |
| ICM50-B   |                 | 40                           | 794                          | 819  | 843  | 866  | 889  | 909  | 928  | 945  |
| ICM65-A   | 65              | 35                           | 695                          | 717  | 738  | 758  | 777  | 796  | 812  | 827  |
| ICM65-B   |                 | 70                           | 1389                         | 1433 | 1476 | 1516 | 1555 | 1591 | 1624 | 1653 |
| ICM100    | 100             | 142                          | 2818                         | 2908 | 2996 | 3077 | 3154 | 3228 | 3294 | 3355 |
| ICM125    | 125             | 223                          | 4425                         | 4566 | 4704 | 4832 | 4953 | 5069 | 5173 | 5269 |
| ICM150    | 150             | 370                          | 7342                         | 7576 | 7805 | 8017 | 8217 | 8410 | 8583 | 8743 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| <b>0.2</b>       | <b>1.00</b>       |
| 0.25             | 0.89              |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |
| 0.6              | 0.58              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature | Correction factor |
|--------------------|-------------------|
| -20°C              | 0.71              |
| -10°C              | 0.75              |
| 0°C                | 0.80              |
| 10°C               | 0.86              |
| 20°C               | 0.92              |
| <b>30°C</b>        | <b>1.00</b>       |
| 40°C               | 1.09              |
| 50°C               | 1.22              |

US units

Capacity table for nominal conditions,  $Q_N$  [Tons of Refrigeration],  
 $T_{liq} = 90^\circ\text{F}$ ,  
 $\Delta P = 3 \text{ psi}$

R 22

| Type      | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature [°F] |      |      |      |      |      |      |      |
|-----------|-----------------|----------------------|------------------------------|------|------|------|------|------|------|------|
|           |                 |                      | -60                          | -40  | -20  | 0    | 20   | 40   | 60   | 80   |
| ICM20-A33 | 20              | 0.23                 | 1.1                          | 1.1  | 1.2  | 1.2  | 1.3  | 1.3  | 1.3  | 1.3  |
| ICM20-A   |                 | 0.7                  | 3.4                          | 3.5  | 3.6  | 3.7  | 3.8  | 3.9  | 4.0  | 4.1  |
| ICM20-B   |                 | 2.8                  | 13.5                         | 14.0 | 14.4 | 14.9 | 15.3 | 15.7 | 16.0 | 16.3 |
| ICM20-C   |                 | 5.3                  | 25.5                         | 26.4 | 27.4 | 28.2 | 29.0 | 29.7 | 30.4 | 30.9 |
| ICM25-A   | 25              | 7                    | 33.7                         | 34.9 | 36.1 | 37.2 | 38.3 | 39.2 | 40.1 | 40.8 |
| ICM25-B   |                 | 14                   | 67.4                         | 69.8 | 72.2 | 74.5 | 76.6 | 78.5 | 80.2 | 81.6 |
| ICM32-A   | 32              | 10                   | 48.1                         | 49.9 | 51.6 | 53.2 | 54.7 | 56.0 | 57.3 | 58.3 |
| ICM32-B   |                 | 20                   | 96.3                         | 100  | 103  | 106  | 109  | 112  | 115  | 117  |
| ICM40-A   | 40              | 17                   | 81.9                         | 84.8 | 87.7 | 90.5 | 93.0 | 95.3 | 97.4 | 99.1 |
| ICM40-B   |                 | 30                   | 144                          | 150  | 155  | 160  | 164  | 168  | 172  | 175  |
| ICM50-A   | 50              | 27                   | 130                          | 135  | 139  | 144  | 148  | 151  | 155  | 157  |
| ICM50-B   |                 | 46                   | 221                          | 229  | 237  | 245  | 252  | 258  | 264  | 268  |
| ICM65-A   | 65              | 41                   | 197                          | 205  | 211  | 218  | 224  | 230  | 235  | 239  |
| ICM65-B   |                 | 81                   | 390                          | 404  | 418  | 431  | 443  | 454  | 464  | 472  |
| ICM100    | 100             | 165                  | 795                          | 824  | 851  | 878  | 902  | 924  | 946  | 962  |
| ICM125    | 125             | 259                  | 1247                         | 1293 | 1335 | 1377 | 1416 | 1450 | 1484 | 1510 |
| ICM150    | 150             | 430                  | 2071                         | 2146 | 2217 | 2287 | 2350 | 2408 | 2464 | 2507 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

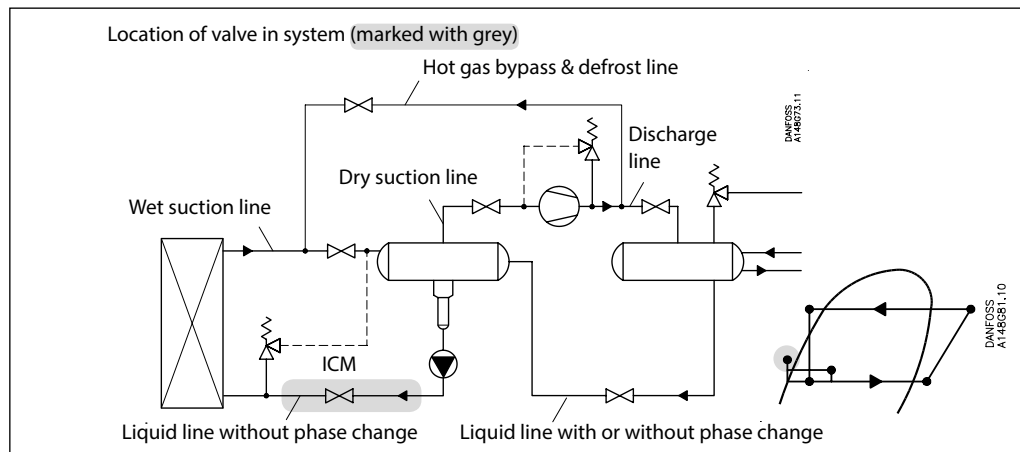
| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| <b>3</b>         | <b>1.00</b>       |
| 4                | 0.87              |
| 5                | 0.79              |
| 6                | 0.72              |
| 7                | 0.66              |
| 8                | 0.62              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature | Correction factor |
|--------------------|-------------------|
| -10°F              | 0.73              |
| 10°F               | 0.77              |
| 30°F               | 0.82              |
| 50°F               | 0.87              |
| 70°F               | 0.93              |
| <b>90°F</b>        | <b>1.00</b>       |
| 110°F              | 1.09              |
| 130°F              | 1.20              |

Nominal capacities

Liquid line without phase change



SI units

Calculation example (R717 capacities):

An application has following running conditions:

- $T_e = -20^\circ\text{C}$
- $Q_o = 180 \text{ kW}$
- Circulation rate = 3
- Max.  $\Delta p = 0.3 \text{ bar}$
- Connection: DN20

The capacity table is based on nominal condition (pressure drop  $\Delta p = 0.2 \text{ bar}$ , circulation rate = 4)

Therefore the actual capacity must be corrected to nominal condition by means of correction factors.

- Correction factor for  $\Delta p \text{ } 0.3 \text{ bar } f_{\Delta p} = 0.82$
- Correction factor for circulation rate  $f_{rec} = 0.75$

$$Q_n = Q_o \times f_{\Delta p} \times f_{rec} = 180 \times 0.82 \times 0.75 = 111 \text{ kW}$$

From the capacity table a ICM 20-C with  $Q_n$  capacity 153 kW is selected.

US units

Calculation example (R717 capacities):

An application has following running conditions:

- $T_e = -20^\circ\text{F}$
- $Q_o = 130 \text{ TR}$
- Circulation rate = 3
- Max.  $\Delta p = 3.5 \text{ psi}$
- Connection:  $1\frac{1}{4}''$

The capacity table is based on nominal condition (pressure drop  $\Delta p = 3 \text{ psi}$ , circulation rate = 4)

Therefore the actual capacity must be corrected to nominal condition by means of correction factors.

- Correction factor for  $\Delta p \text{ } 3.5 \text{ psi } f_{\Delta p} = 0.91$
- Correction factor for circulation rate  $f_{rec} = 0.75$

$$Q_n = Q_o \times f_{\Delta p} \times f_{rec} = 130 \times 0.91 \times 0.75 = 89 \text{ TR}$$

From the capacity table a ICM 32-B with  $Q_n$  capacity 171 TR is selected.

Nominal capacities

Liquid line without phase change

SI units

Capacity table at nominal conditions,  $Q_N$  [kW], Circulation rate = 4,  $\Delta p = 0.2$  bar

R 717

| Type      | Valve body size | $K_v$<br>(m <sup>3</sup> /h) | Evaporating temperature [°C] |       |       |       |       |       |       |       |
|-----------|-----------------|------------------------------|------------------------------|-------|-------|-------|-------|-------|-------|-------|
|           |                 |                              | -50                          | -40   | -30   | -20   | -10   | 0     | 10    | 20    |
| ICM20A-33 | 20              | 0.2                          | 7.3                          | 7.1   | 6.9   | 6.7   | 6.4   | 6.2   | 5.9   | 5.6   |
| ICM20-A   |                 | 0.6                          | 21.9                         | 21.3  | 20.7  | 20.0  | 19.3  | 18.5  | 17.8  | 16.9  |
| ICM20-B   |                 | 2.4                          | 87.6                         | 85.2  | 82.7  | 80.0  | 77.1  | 74.2  | 71.0  | 67.8  |
| ICM20-C   |                 | 4.6                          | 168                          | 163   | 159   | 153   | 148   | 142   | 136   | 130   |
| ICM25-A   | 25              | 6                            | 219                          | 213   | 207   | 200   | 193   | 185   | 178   | 169   |
| ICM25-B   |                 | 12                           | 438                          | 426   | 413   | 400   | 386   | 371   | 355   | 339   |
| ICM32-A   | 32              | 9                            | 329                          | 320   | 310   | 300   | 289   | 278   | 266   | 254   |
| ICM32-B   |                 | 17                           | 621                          | 604   | 586   | 567   | 546   | 525   | 503   | 480   |
| ICM40-A   | 40              | 15                           | 548                          | 533   | 517   | 500   | 482   | 464   | 444   | 424   |
| ICM40-B   |                 | 26                           | 949                          | 923   | 896   | 867   | 836   | 803   | 770   | 734   |
| ICM50-A   | 50              | 23                           | 840                          | 817   | 793   | 767   | 739   | 711   | 681   | 650   |
| ICM50-B   |                 | 40                           | 1460                         | 1421  | 1378  | 1333  | 1286  | 1236  | 1184  | 1130  |
| ICM65-A   | 65              | 35                           | 1278                         | 1243  | 1207  | 1167  | 1125  | 1081  | 1036  | 988   |
| ICM65-B   |                 | 70                           | 2555                         | 2486  | 2412  | 2333  | 2250  | 2163  | 2072  | 1977  |
| ICM100    | 100             | 142                          | 5185                         | 5042  | 4895  | 4733  | 4565  | 4386  | 4204  | 4009  |
| ICM125    | 125             | 223                          | 8143                         | 7919  | 7687  | 7433  | 7168  | 6888  | 6601  | 6296  |
| ICM150    | 150             | 370                          | 13510                        | 13139 | 12755 | 12332 | 11894 | 11429 | 10953 | 10446 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| 0.05             | 2.00              |
| 0.1              | 1.41              |
| <b>0.2</b>       | <b>1.00</b>       |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |

Correction factor for circulation rate ( $f_{rec}$ )

| Circulation rate | Correction factor |
|------------------|-------------------|
| 2                | 0.5               |
| 3                | 0.75              |
| <b>4</b>         | <b>1</b>          |
| 6                | 1.5               |
| 8                | 2                 |
| 10               | 2.5               |

US units

Capacity table at nominal conditions,  $Q_N$  [Tons of Refrigeration], Circulation rate = 4,  $\Delta p = 3$  psi

R 717

| Type      | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature [°F] |      |      |      |      |      |      |      |
|-----------|-----------------|----------------------|------------------------------|------|------|------|------|------|------|------|
|           |                 |                      | -60                          | -40  | -20  | 0    | 20   | 40   | 60   | 80   |
| ICM20-A33 | 20              | 0.23                 | 2.1                          | 2.0  | 2.0  | 1.9  | 1.8  | 1.7  | 1.7  | 1.6  |
| ICM20-A   |                 | 0.7                  | 6.4                          | 6.2  | 6.0  | 5.8  | 5.5  | 5.3  | 5.0  | 4.8  |
| ICM20-B   |                 | 2.8                  | 25.6                         | 24.8 | 24.0 | 23.1 | 22.2 | 21.2 | 20.2 | 19.1 |
| ICM20-C   |                 | 5.3                  | 48.4                         | 46.9 | 45.3 | 43.7 | 41.9 | 40.1 | 38.1 | 36.1 |
| ICM25-A   | 25              | 7                    | 64.0                         | 62.0 | 59.9 | 57.7 | 55.4 | 53.0 | 50.4 | 47.7 |
| ICM25-B   |                 | 14                   | 128                          | 124  | 120  | 115  | 111  | 106  | 101  | 95.4 |
| ICM32-A   | 32              | 10                   | 91.4                         | 88.5 | 85.6 | 82.5 | 79.1 | 75.7 | 72.0 | 68.1 |
| ICM32-B   |                 | 20                   | 183                          | 177  | 171  | 165  | 158  | 151  | 144  | 136  |
| ICM40-A   | 40              | 17                   | 155                          | 150  | 145  | 140  | 135  | 129  | 122  | 116  |
| ICM40-B   |                 | 30                   | 274                          | 266  | 257  | 247  | 237  | 227  | 216  | 204  |
| ICM50-A   | 50              | 27                   | 247                          | 239  | 231  | 223  | 214  | 204  | 194  | 184  |
| ICM50-B   |                 | 46                   | 420                          | 407  | 394  | 379  | 364  | 348  | 331  | 313  |
| ICM65-A   | 65              | 41                   | 375                          | 363  | 351  | 338  | 324  | 310  | 295  | 279  |
| ICM65-B   |                 | 81                   | 740                          | 717  | 693  | 668  | 641  | 613  | 583  | 552  |
| ICM100    | 100             | 165                  | 1508                         | 1461 | 1412 | 1361 | 1305 | 1249 | 1187 | 1125 |
| ICM125    | 125             | 259                  | 2367                         | 2293 | 2217 | 2136 | 2049 | 1960 | 1863 | 1765 |
| ICM150    | 150             | 430                  | 3929                         | 3806 | 3680 | 3546 | 3402 | 3254 | 3093 | 2931 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| 0.75             | 1.97              |
| 1.5              | 1.39              |
| <b>3</b>         | <b>1.00</b>       |
| 3.5              | 0.91              |
| 4                | 0.85              |
| 4.5              | 0.81              |

Correction factor for circulation rate ( $f_{rec}$ )

| Circulation rate | Correction factor |
|------------------|-------------------|
| 2                | 0.5               |
| 3                | 0.75              |
| <b>4</b>         | <b>1</b>          |
| 6                | 1.5               |
| 8                | 2                 |
| 10               | 2.5               |

Nominal capacities

Liquid line without phase change

SI units

Capacity table at nominal conditions,  $Q_N$  [kW], Circulation rate = 4,  $\Delta p = 0.2$  bar

R 744

| Type      | Valve body size | $K_v$<br>(m <sup>3</sup> /h) | Evaporating temperature [°C] |       |       |       |      |      |      |
|-----------|-----------------|------------------------------|------------------------------|-------|-------|-------|------|------|------|
|           |                 |                              | -50                          | -40   | -30   | -20   | -10  | 0    | 10   |
| ICM20A-33 | 20              | 0.2                          | 2.2                          | 2.1   | 2.0   | 1.8   | 1.6  | 1.4  | 1.1  |
| ICM20-A   |                 | 0.6                          | 6.7                          | 6.3   | 5.9   | 5.4   | 4.8  | 4.2  | 3.4  |
| ICM20-B   |                 | 2.4                          | 27.0                         | 25.3  | 23.5  | 21.5  | 19.2 | 16.7 | 13.7 |
| ICM20-C   |                 | 4.6                          | 51.7                         | 48.5  | 45.0  | 41.1  | 36.8 | 32.0 | 26.4 |
| ICM25-A   | 25              | 6                            | 67.5                         | 63.3  | 58.7  | 53.7  | 48.0 | 41.7 | 34.4 |
| ICM25-B   |                 | 12                           | 134.9                        | 126.5 | 117.4 | 107.3 | 96.0 | 83.5 | 68.7 |
| ICM32-A   | 32              | 9                            | 101.2                        | 94.9  | 88.1  | 80.5  | 72.0 | 62.6 | 51.6 |
| ICM32-B   |                 | 17                           | 191                          | 179   | 166   | 152   | 136  | 118  | 97.4 |
| ICM40-A   | 40              | 15                           | 169                          | 158   | 147   | 134   | 120  | 104  | 85.9 |
| ICM40-B   |                 | 26                           | 292                          | 274   | 254   | 233   | 208  | 181  | 149  |
| ICM50-A   | 50              | 23                           | 259                          | 242   | 225   | 206   | 184  | 160  | 132  |
| ICM50-B   |                 | 40                           | 450                          | 422   | 391   | 358   | 320  | 278  | 229  |
| ICM65-A   | 65              | 35                           | 393                          | 369   | 343   | 313   | 280  | 243  | 200  |
| ICM65-B   |                 | 70                           | 787                          | 738   | 685   | 626   | 560  | 487  | 401  |
| ICM100    | 100             | 142                          | 1596                         | 1496  | 1390  | 1271  | 1136 | 988  | 813  |
| ICM125    | 125             | 223                          | 2506                         | 2350  | 2182  | 1996  | 1784 | 1551 | 1276 |
| ICM150    | 150             | 370                          | 4159                         | 3898  | 3621  | 3312  | 2960 | 2574 | 2118 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| 0.05             | 2.00              |
| 0.1              | 1.41              |
| <b>0.2</b>       | <b>1.00</b>       |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |

Correction factor for circulation rate ( $f_{rec}$ )

| Circulation rate | Correction factor |
|------------------|-------------------|
| 2                | 0.77              |
| 3                | 0.90              |
| <b>4</b>         | <b>1</b>          |
| 6                | 1.13              |
| 8                | 1.20              |
| 10               | 1.25              |

US units

Capacity table at nominal conditions,  $Q_N$  [Tons of Refrigeration], Circulation rate = 4,  $\Delta p = 3$  psi

R 744

| Type      | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature [°F] |      |      |      |      |      |      |
|-----------|-----------------|----------------------|------------------------------|------|------|------|------|------|------|
|           |                 |                      | -60                          | -40  | -20  | 0    | 20   | 40   | 60   |
| ICM20-A33 | 20              | 0.23                 | 0.7                          | 0.6  | 0.6  | 0.5  | 0.4  | 0.4  | 0.3  |
| ICM20-A   |                 | 0.7                  | 2.0                          | 1.8  | 1.7  | 1.5  | 1.3  | 1.1  | 0.9  |
| ICM20-B   |                 | 2.8                  | 7.9                          | 7.4  | 6.8  | 6.1  | 5.4  | 4.5  | 3.4  |
| ICM20-C   |                 | 5.3                  | 15.0                         | 13.9 | 12.8 | 11.6 | 10.1 | 8.5  | 6.5  |
| ICM25-A   | 25              | 7                    | 19.8                         | 18.4 | 16.9 | 15.3 | 13.4 | 11.2 | 8.6  |
| ICM25-B   |                 | 14                   | 39.5                         | 36.8 | 33.9 | 30.5 | 26.8 | 22.5 | 17.2 |
| ICM32-A   | 32              | 10                   | 28.2                         | 26.3 | 24.2 | 21.8 | 19.1 | 16.1 | 12.3 |
| ICM32-B   |                 | 20                   | 56.4                         | 52.6 | 48.4 | 43.6 | 38.3 | 32.1 | 24.6 |
| ICM40-A   | 40              | 17                   | 48.0                         | 44.7 | 41.1 | 37.1 | 32.5 | 27.3 | 20.9 |
| ICM40-B   |                 | 30                   | 84.7                         | 78.9 | 72.6 | 65.4 | 57.4 | 48.2 | 37.0 |
| ICM50-A   | 50              | 27                   | 76.2                         | 71.0 | 65.3 | 58.9 | 51.7 | 43.4 | 33.3 |
| ICM50-B   |                 | 46                   | 130                          | 121  | 111  | 100  | 88.0 | 73.9 | 56.7 |
| ICM65-A   | 65              | 41                   | 116                          | 108  | 99   | 89   | 78   | 66   | 51   |
| ICM65-B   |                 | 81                   | 229                          | 213  | 196  | 177  | 155  | 130  | 100  |
| ICM100    | 100             | 165                  | 466                          | 433  | 399  | 359  | 315  | 264  | 204  |
| ICM125    | 125             | 259                  | 732                          | 680  | 627  | 564  | 495  | 415  | 320  |
| ICM150    | 150             | 430                  | 1216                         | 1129 | 1040 | 937  | 821  | 689  | 531  |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| 0.75             | 1.97              |
| 1.5              | 1.39              |
| <b>3</b>         | <b>1.00</b>       |
| 3.5              | 0.91              |
| 4                | 0.85              |
| 4.5              | 0.81              |

Correction factor for circulation rate ( $f_{rec}$ )

| Circulation rate | Correction factor |
|------------------|-------------------|
| 2                | 0.5               |
| 3                | 0.75              |
| <b>4</b>         | <b>1</b>          |
| 6                | 1.5               |
| 8                | 2                 |
| 10               | 2.5               |

Nominal capacities

Liquid line without phase change

SI units

Capacity table at nominal conditions,  $Q_N$  [kW], Circulation rate = 4,  $\Delta p = 0.2$  bar

R 134a

| Type      | Valve body size | $K_v$<br>(m <sup>3</sup> /h) | Evaporating temperature [°C] |      |      |      |      |      |      |
|-----------|-----------------|------------------------------|------------------------------|------|------|------|------|------|------|
|           |                 |                              | -40                          | -30  | -20  | -10  | 0    | 10   | 20   |
| ICM20A-33 | 20              | 0.2                          | 1.6                          | 1.6  | 1.5  | 1.5  | 1.4  | 1.3  | 1.2  |
| ICM20-A   |                 | 0.6                          | 4.9                          | 4.8  | 4.6  | 4.4  | 4.2  | 4.0  | 3.7  |
| ICM20-B   |                 | 2.4                          | 19.8                         | 19.1 | 18.3 | 17.6 | 16.7 | 15.9 | 14.9 |
| ICM20-C   |                 | 4.6                          | 37.9                         | 36.6 | 35.2 | 33.6 | 32.1 | 30.4 | 28.7 |
| ICM25-A   | 25              | 6                            | 49.5                         | 47.7 | 45.9 | 43.9 | 41.8 | 39.7 | 37.4 |
| ICM25-B   |                 | 12                           | 98.9                         | 95.5 | 91.7 | 87.8 | 83.7 | 79.4 | 74.7 |
| ICM32-A   | 32              | 9                            | 74.2                         | 71.6 | 68.8 | 65.8 | 62.7 | 59.5 | 56.1 |
| ICM32-B   |                 | 17                           | 140                          | 135  | 130  | 124  | 119  | 112  | 106  |
| ICM40-A   | 40              | 15                           | 124                          | 119  | 115  | 110  | 105  | 99.2 | 93.4 |
| ICM40-B   |                 | 26                           | 214                          | 207  | 199  | 190  | 181  | 172  | 162  |
| ICM50-A   | 50              | 23                           | 190                          | 183  | 176  | 168  | 160  | 152  | 143  |
| ICM50-B   |                 | 40                           | 330                          | 318  | 306  | 293  | 279  | 265  | 249  |
| ICM65-A   | 65              | 35                           | 288                          | 278  | 268  | 256  | 244  | 232  | 218  |
| ICM65-B   |                 | 70                           | 577                          | 557  | 535  | 512  | 488  | 463  | 436  |
| ICM100    | 100             | 142                          | 1170                         | 1130 | 1086 | 1039 | 991  | 940  | 884  |
| ICM125    | 125             | 223                          | 1837                         | 1774 | 1706 | 1632 | 1556 | 1476 | 1388 |
| ICM150    | 150             | 370                          | 3049                         | 2944 | 2830 | 2707 | 2581 | 2448 | 2302 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| <b>0.2</b>       | <b>1.00</b>       |
| 0.25             | 0.89              |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |
| 0.6              | 0.58              |

Correction factor for circulation rate ( $f_{rec}$ )

| Circulation rate | Correction factor |
|------------------|-------------------|
| 2                | 0.5               |
| 3                | 0.75              |
| <b>4</b>         | <b>1</b>          |
| 6                | 1.5               |
| 8                | 2                 |
| 10               | 2.5               |

US units

Capacity table at nominal conditions,  $Q_N$  [Tons of Refrigeration], Circulation rate = 4,  $\Delta p = 3$  psi

R 134a

| Type      | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature [°F] |      |      |      |      |      |      |
|-----------|-----------------|----------------------|------------------------------|------|------|------|------|------|------|
|           |                 |                      | -40                          | -20  | -0   | 20   | 40   | 60   | 80   |
| ICM20-A33 | 20              | 0.23                 | 0.5                          | 0.5  | 0.4  | 0.4  | 0.4  | 0.4  | 0.3  |
| ICM20-A   |                 | 0.7                  | 1.4                          | 1.4  | 1.3  | 1.3  | 1.2  | 1.1  | 1.0  |
| ICM20-B   |                 | 2.8                  | 5.8                          | 5.5  | 5.3  | 5.0  | 4.8  | 4.5  | 4.2  |
| ICM20-C   |                 | 5.3                  | 10.9                         | 10.5 | 10.0 | 9.5  | 9.0  | 8.5  | 7.9  |
| ICM25-A   | 25              | 7                    | 14.4                         | 13.8 | 13.2 | 12.6 | 11.9 | 11.2 | 10.4 |
| ICM25-B   |                 | 14                   | 28.8                         | 27.7 | 26.4 | 25.1 | 23.8 | 22.4 | 20.8 |
| ICM32-A   | 32              | 10                   | 20.6                         | 19.8 | 18.9 | 18.0 | 17.0 | 16.0 | 14.9 |
| ICM32-B   |                 | 20                   | 41.1                         | 39.5 | 37.8 | 35.9 | 34.0 | 32.0 | 29.8 |
| ICM40-A   | 40              | 17                   | 35.0                         | 33.6 | 32.1 | 30.5 | 28.9 | 27.2 | 25.3 |
| ICM40-B   |                 | 30                   | 61.7                         | 59.3 | 56.7 | 53.9 | 51.0 | 48.0 | 44.6 |
| ICM50-A   | 50              | 27                   | 55.5                         | 53.3 | 51.0 | 48.5 | 45.9 | 43.2 | 40.2 |
| ICM50-B   |                 | 46                   | 94.6                         | 90.9 | 86.9 | 82.6 | 78.2 | 73.5 | 68.4 |
| ICM65-A   | 65              | 41                   | 84                           | 81   | 77   | 74   | 70   | 66   | 61   |
| ICM65-B   |                 | 81                   | 167                          | 160  | 153  | 146  | 138  | 130  | 121  |
| ICM100    | 100             | 165                  | 339                          | 326  | 311  | 297  | 281  | 264  | 245  |
| ICM125    | 125             | 259                  | 532                          | 512  | 489  | 466  | 441  | 414  | 385  |
| ICM150    | 150             | 430                  | 883                          | 850  | 811  | 774  | 732  | 687  | 638  |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| <b>3</b>         | <b>1.00</b>       |
| 4                | 0.87              |
| 5                | 0.79              |
| 6                | 0.72              |
| 7                | 0.66              |
| 8                | 0.62              |

Correction factor for circulation rate ( $f_{rec}$ )

| Circulation rate | Correction factor |
|------------------|-------------------|
| 2                | 0.5               |
| 3                | 0.75              |
| <b>4</b>         | <b>1</b>          |
| 6                | 1.5               |
| 8                | 2                 |
| 10               | 2.5               |



Nominal capacities

Liquid line without phase change

SI units

Capacity table at nominal conditions,  $Q_N$  [kW], Circulation rate = 4,  $\Delta p = 0.2$  bar

R 404A

| Type      | Valve body size | $K_v$<br>(m <sup>3</sup> /h) | Evaporating temperature [°C] |      |      |      |       |      |      |      |
|-----------|-----------------|------------------------------|------------------------------|------|------|------|-------|------|------|------|
|           |                 |                              | -50                          | -40  | -30  | -20  | -10   | 0    | 10   | 20   |
| ICM20A-33 | 20              | 0.2                          | 1.5                          | 1.4  | 1.3  | 1.3  | 1.8   | 1.1  | 1.0  | 1.0  |
| ICM20-A   |                 | 0.6                          | 4.4                          | 4.2  | 4.0  | 3.8  | 5.3   | 3.4  | 3.1  | 2.9  |
| ICM20-B   |                 | 2.4                          | 17.5                         | 16.7 | 15.9 | 15.1 | 21.2  | 13.5 | 12.5 | 11.5 |
| ICM20-C   |                 | 4.6                          | 33.4                         | 32.1 | 30.4 | 29.0 | 40.6  | 25.8 | 24.0 | 21.9 |
| ICM25-A   | 25              | 6                            | 43.6                         | 41.8 | 39.7 | 37.8 | 53.0  | 33.7 | 31.3 | 28.6 |
| ICM25-B   |                 | 12                           | 87.3                         | 83.7 | 79.4 | 75.6 | 105.9 | 67.4 | 62.6 | 57.3 |
| ICM32-A   | 32              | 9                            | 65.4                         | 62.7 | 59.5 | 56.7 | 79.5  | 50.5 | 46.9 | 42.9 |
| ICM32-B   |                 | 17                           | 124                          | 119  | 112  | 107  | 150   | 95.4 | 88.6 | 81.1 |
| ICM40-A   | 40              | 15                           | 109                          | 105  | 99.2 | 94.5 | 132.4 | 84.2 | 78.2 | 71.6 |
| ICM40-B   |                 | 26                           | 189                          | 181  | 172  | 164  | 230   | 146  | 136  | 124  |
| ICM50-A   | 50              | 23                           | 167                          | 160  | 152  | 145  | 203   | 129  | 120  | 110  |
| ICM50-B   |                 | 40                           | 291                          | 279  | 265  | 252  | 353   | 225  | 209  | 191  |
| ICM65-A   | 65              | 35                           | 255                          | 244  | 232  | 221  | 309   | 197  | 182  | 167  |
| ICM65-B   |                 | 70                           | 509                          | 488  | 463  | 441  | 618   | 393  | 365  | 334  |
| ICM100    | 100             | 142                          | 1033                         | 991  | 940  | 895  | 1254  | 798  | 740  | 678  |
| ICM125    | 125             | 223                          | 1623                         | 1556 | 1476 | 1406 | 1969  | 1253 | 1162 | 1066 |
| ICM150    | 150             | 370                          | 2693                         | 2581 | 2448 | 2332 | 3267  | 2079 | 1929 | 1768 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| 0.05             | 2.00              |
| 0.1              | 1.41              |
| <b>0.2</b>       | <b>1.00</b>       |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |

Correction factor for circulation rate ( $f_{rec}$ )

| Circulation rate | Correction factor |
|------------------|-------------------|
| 2                | 0.5               |
| 3                | 0.75              |
| <b>4</b>         | <b>1</b>          |
| 6                | 1.5               |
| 8                | 1.2               |
| 10               | 2.5               |

US units

Capacity table at nominal conditions,  $Q_N$  [Tons of Refrigeration], Circulation rate = 4,  $\Delta p = 3$  psi

R 404A

| Type      | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature [°F] |      |      |      |      |      |      |      |
|-----------|-----------------|----------------------|------------------------------|------|------|------|------|------|------|------|
|           |                 |                      | -60                          | -40  | -20  | 0    | 20   | 40   | 60   | 80   |
| ICM20-A33 | 20              | 0.23                 | 0.4                          | 0.4  | 0.4  | 0.4  | 0.3  | 0.3  | 0.3  | 0.3  |
| ICM20-A   |                 | 0.7                  | 1.3                          | 1.2  | 1.1  | 1.1  | 1.0  | 1.0  | 0.9  | 0.8  |
| ICM20-B   |                 | 2.8                  | 5.1                          | 4.9  | 4.6  | 4.4  | 4.1  | 3.8  | 3.5  | 3.1  |
| ICM20-C   |                 | 5.3                  | 9.7                          | 9.2  | 8.7  | 8.2  | 7.7  | 7.2  | 6.6  | 5.9  |
| ICM25-A   | 25              | 7                    | 12.7                         | 12.2 | 11.5 | 10.9 | 10.2 | 9.5  | 8.7  | 7.8  |
| ICM25-B   |                 | 14                   | 25.5                         | 24.4 | 23.0 | 21.8 | 20.4 | 19.0 | 17.4 | 15.5 |
| ICM32-A   | 32              | 10                   | 18.2                         | 17.4 | 16.4 | 15.6 | 14.6 | 13.6 | 12.4 | 11.1 |
| ICM32-B   |                 | 20                   | 36.4                         | 34.8 | 32.8 | 31.1 | 29.2 | 27.2 | 24.8 | 22.2 |
| ICM40-A   | 40              | 17                   | 31.0                         | 29.6 | 27.9 | 26.4 | 24.8 | 23.1 | 21.1 | 18.8 |
| ICM40-B   |                 | 30                   | 54.6                         | 52.2 | 49.3 | 46.7 | 43.8 | 40.7 | 37.2 | 33.3 |
| ICM50-A   | 50              | 27                   | 49.2                         | 47.0 | 44.3 | 42.0 | 39.4 | 36.7 | 33.5 | 29.9 |
| ICM50-B   |                 | 46                   | 83.8                         | 80.1 | 75.5 | 71.6 | 67.2 | 62.5 | 57.1 | 51.0 |
| ICM65-A   | 65              | 41                   | 75                           | 71   | 67   | 64   | 60   | 56   | 51   | 46   |
| ICM65-B   |                 | 81                   | 148                          | 141  | 133  | 126  | 118  | 110  | 101  | 89.8 |
| ICM100    | 100             | 165                  | 301                          | 287  | 270  | 257  | 240  | 225  | 206  | 183  |
| ICM125    | 125             | 259                  | 473                          | 450  | 424  | 404  | 377  | 353  | 323  | 288  |
| ICM150    | 150             | 430                  | 785                          | 748  | 703  | 670  | 626  | 587  | 536  | 478  |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| 0.75             | 1.97              |
| 1.5              | 1.39              |
| <b>3</b>         | <b>1.00</b>       |
| 3.5              | 0.91              |
| 4                | 0.85              |
| 4.5              | 0.81              |

Correction factor for circulation rate ( $f_{rec}$ )

| Circulation rate | Correction factor |
|------------------|-------------------|
| 2                | 0.5               |
| 3                | 0.75              |
| <b>4</b>         | <b>1</b>          |
| 6                | 1.5               |
| 8                | 2                 |
| 10               | 2.5               |

Nominal capacities

Liquid line without phase change

SI units

Capacity table at nominal conditions,  $Q_N$  [kW], Circulation rate = 4,  $\Delta p = 0.2$  bar

R 22

| Type      | Valve body size | $K_v$<br>(m <sup>3</sup> /h) | Evaporating temperature [°C] |      |      |      |      |      |      |      |
|-----------|-----------------|------------------------------|------------------------------|------|------|------|------|------|------|------|
|           |                 |                              | -50                          | -40  | -30  | -20  | -10  | 0    | 10   | 20   |
| ICM20A-33 | 20              | 0.2                          | 1.8                          | 1.7  | 1.7  | 1.6  | 1.5  | 1.4  | 1.4  | 1.3  |
| ICM20-A   |                 | 0.6                          | 5.3                          | 5.2  | 5.0  | 4.8  | 4.6  | 4.3  | 4.1  | 3.9  |
| ICM20-B   |                 | 2.4                          | 21.4                         | 20.6 | 19.9 | 19.1 | 18.2 | 17.3 | 16.4 | 15.4 |
| ICM20-C   |                 | 4.6                          | 40.9                         | 39.6 | 38.1 | 36.5 | 35.0 | 33.3 | 31.5 | 29.6 |
| ICM25-A   | 25              | 6                            | 53.4                         | 51.6 | 49.7 | 47.7 | 45.6 | 43.4 | 41.1 | 38.6 |
| ICM25-B   |                 | 12                           | 107                          | 103  | 99.4 | 95.3 | 91.2 | 86.7 | 82.1 | 77.1 |
| ICM32-A   | 32              | 9                            | 80.1                         | 77.4 | 74.6 | 71.5 | 68.4 | 65.1 | 61.6 | 57.9 |
| ICM32-B   |                 | 17                           | 151                          | 146  | 141  | 135  | 129  | 123  | 116  | 109  |
| ICM40-A   | 40              | 15                           | 134                          | 129  | 124  | 119  | 114  | 108  | 103  | 96   |
| ICM40-B   |                 | 26                           | 231                          | 224  | 215  | 207  | 198  | 188  | 178  | 167  |
| ICM50-A   | 50              | 23                           | 205                          | 198  | 191  | 183  | 175  | 166  | 157  | 148  |
| ICM50-B   |                 | 40                           | 356                          | 344  | 331  | 318  | 304  | 289  | 274  | 257  |
| ICM65-A   | 65              | 35                           | 311                          | 301  | 290  | 278  | 266  | 253  | 239  | 225  |
| ICM65-B   |                 | 70                           | 623                          | 602  | 580  | 556  | 532  | 506  | 479  | 450  |
| ICM100    | 100             | 142                          | 1263                         | 1222 | 1177 | 1129 | 1080 | 1025 | 972  | 913  |
| ICM125    | 125             | 223                          | 1984                         | 1919 | 1848 | 1773 | 1696 | 1610 | 1526 | 1434 |
| ICM150    | 150             | 370                          | 3292                         | 3184 | 3067 | 2942 | 2814 | 2671 | 2532 | 2379 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| <b>0.2</b>       | <b>1.00</b>       |
| 0.25             | 0.89              |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |
| 0.6              | 0.58              |

Correction factor for circulation rate ( $f_{rec}$ )

| Circulation rate | Correction factor |
|------------------|-------------------|
| 2                | 0.5               |
| 3                | 0.75              |
| <b>4</b>         | <b>1</b>          |
| 6                | 1.5               |
| 8                | 2                 |
| 10               | 2.5               |

US units

Capacity table at nominal conditions,  $Q_N$  [Tons of Refrigeration], Circulation rate = 4,  $\Delta p = 3$  psi

R 22

| Type      | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature [°F] |      |      |      |      |      |      |      |
|-----------|-----------------|----------------------|------------------------------|------|------|------|------|------|------|------|
|           |                 |                      | -60                          | -40  | -20  | 0    | 20   | 40   | 60   | 80   |
| ICM20-A33 | 20              | 0.23                 | 0.5                          | 0.5  | 0.5  | 0.5  | 0.4  | 0.4  | 0.4  | 0.4  |
| ICM20-A   |                 | 0.7                  | 1.6                          | 1.5  | 1.4  | 1.4  | 1.3  | 1.2  | 1.2  | 1.1  |
| ICM20-B   |                 | 2.8                  | 6.2                          | 6.0  | 5.8  | 5.5  | 5.2  | 4.9  | 4.6  | 4.3  |
| ICM20-C   |                 | 5.3                  | 11.8                         | 11.4 | 10.9 | 10.4 | 9.9  | 9.3  | 8.7  | 8.1  |
| ICM25-A   | 25              | 7                    | 15.6                         | 15.0 | 14.4 | 13.7 | 13.1 | 12.3 | 11.6 | 10.7 |
| ICM25-B   |                 | 14                   | 31.2                         | 30.1 | 28.8 | 27.5 | 26.1 | 24.7 | 23.1 | 21.4 |
| ICM32-A   | 32              | 10                   | 22.3                         | 21.5 | 20.6 | 19.6 | 18.7 | 17.6 | 16.5 | 15.3 |
| ICM32-B   |                 | 20                   | 44.6                         | 43.0 | 41.2 | 39.3 | 37.3 | 35.2 | 33.0 | 30.6 |
| ICM40-A   | 40              | 17                   | 37.9                         | 36.5 | 35.0 | 33.4 | 31.7 | 29.9 | 28.1 | 26.0 |
| ICM40-B   |                 | 30                   | 66.9                         | 64.4 | 61.7 | 58.9 | 56.0 | 52.9 | 49.5 | 45.9 |
| ICM50-A   | 50              | 27                   | 60.2                         | 58.0 | 55.6 | 53.0 | 50.4 | 47.6 | 44.6 | 41.3 |
| ICM50-B   |                 | 46                   | 103                          | 98.8 | 94.7 | 90.4 | 85.8 | 81.0 | 75.9 | 70.4 |
| ICM65-A   | 65              | 41                   | 92                           | 88   | 84   | 81   | 76   | 72   | 68   | 63   |
| ICM65-B   |                 | 81                   | 181                          | 174  | 167  | 159  | 151  | 143  | 134  | 124  |
| ICM100    | 100             | 165                  | 369                          | 354  | 339  | 324  | 308  | 290  | 273  | 253  |
| ICM125    | 125             | 259                  | 579                          | 556  | 532  | 509  | 483  | 455  | 429  | 397  |
| ICM150    | 150             | 430                  | 961                          | 923  | 884  | 845  | 802  | 755  | 712  | 659  |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

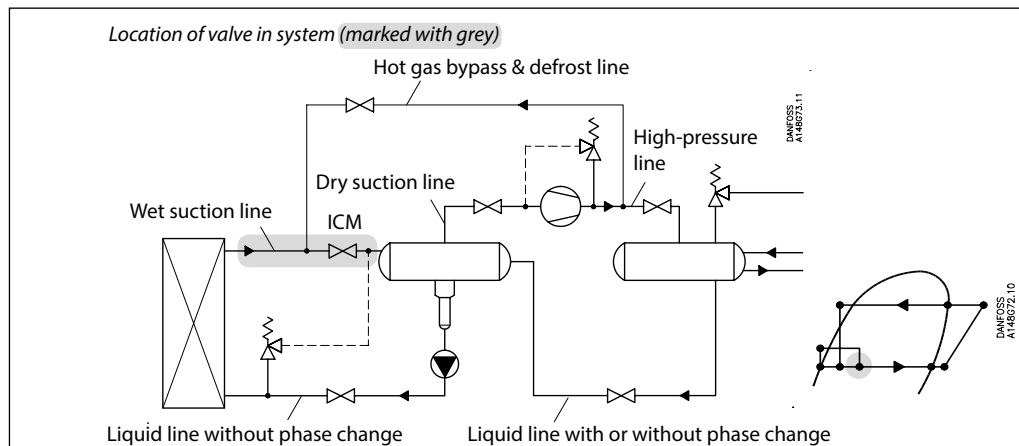
| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| <b>3</b>         | <b>1.00</b>       |
| 4                | 0.87              |
| 5                | 0.79              |
| 6                | 0.72              |
| 7                | 0.66              |
| 8                | 0.62              |

Correction factor for circulation rate ( $f_{rec}$ )

| Circulation rate | Correction factor |
|------------------|-------------------|
| 2                | 0.5               |
| 3                | 0.75              |
| <b>4</b>         | <b>1</b>          |
| 6                | 1.5               |
| 8                | 2                 |
| 10               | 2.5               |

Nominal capacities

Wet suction line



SI units

Calculation example (R717 capacities):

An application has following running conditions:

- $T_e = -20\text{ C}$
- $Q_o = 80\text{ kW}$
- Circulation rate = 3
- Max.  $\Delta p = 0.3\text{ bar}$
- Connection: DN32

The capacity table is based on nominal condition (pressure drop  $\Delta p = 0.2\text{ bar}$ , recirculation rate = 4)

Therefore the actual capacity must be corrected to nominal condition by means of correction factors.

- Correction factor for  $\Delta p\ 0.3\text{ bar } f_{\Delta p} = 0.82$
- Correction factor for circulation rate  $f_{rec} = 0.9$

$$Q_n = Q_o \times f_{\Delta p} \times f_{rec} = 80 \times 0.82 \times 0.9 = 59\text{ kW}$$

From the capacity table a ICM 32-B with  $Q_n$  capacity 60.1 kW is selected.

US units

Calculation example (R717 capacities):

An application has following running conditions:

- $T_e = -20\text{ F}$
- $Q_o = 8\text{ TR}$
- Circulation rate = 3
- Max.  $\Delta p = 3.5\text{ psi}$
- Connection: 1"

The capacity table is based on nominal condition (pressure drop  $\Delta p = 3\text{ psi}$ , recirculation rate = 4)

Therefore the actual capacity must be corrected to nominal condition by means of correction factors.

- Correction factor for  $\Delta p\ 3.5\text{ psi } f_{\Delta p} = 0.91$
- Correction factor for circulation rate  $f_{rec} = 0.9$

$$Q_n = Q_o \times f_{\Delta p} \times f_{rec} = 8 \times 0.91 \times 0.9 = 6.6\text{ TR}$$

From the capacity table a ICM 25-B with  $Q_n$  capacity 10.2 TR is selected.

Nominal capacities

SI units

Capacity table at nominal conditions,  $Q_N$  [kW], Circulation rate = 4,  $\Delta p = 0.2$  bar

R 717

Wet suction line

| Type      | Valve body size | $K_v$<br>(m <sup>3</sup> /h) | Evaporating temperature [°C] |      |      |      |      |      |      |      |
|-----------|-----------------|------------------------------|------------------------------|------|------|------|------|------|------|------|
|           |                 |                              | -50                          | -40  | -30  | -20  | -10  | 0    | 10   | 20   |
| ICM20A-33 | 20              | 0.2                          | 0.3                          | 0.4  | 0.6  | 0.7  | 0.8  | 1.0  | 1.1  | 1.3  |
| ICM20-A   |                 | 0.6                          | 0.9                          | 1.3  | 1.7  | 2.1  | 2.5  | 3.0  | 3.4  | 3.9  |
| ICM20-B   |                 | 2.4                          | 3.4                          | 5.2  | 6.8  | 8.5  | 10.2 | 11.9 | 13.7 | 15.6 |
| ICM20-C   |                 | 4.6                          | 6.6                          | 10.0 | 13.1 | 16.3 | 19.5 | 22.9 | 26.4 | 29.9 |
| ICM25-A   | 25              | 6                            | 8.6                          | 13.0 | 17.1 | 21.2 | 25.5 | 29.8 | 34.4 | 39.0 |
| ICM25-B   |                 | 12                           | 17.2                         | 26.0 | 34.2 | 42.4 | 50.9 | 59.7 | 68.7 | 78.0 |
| ICM32-A   | 32              | 9                            | 12.9                         | 19.5 | 25.7 | 31.8 | 38.2 | 44.7 | 51.6 | 58.5 |
| ICM32-B   |                 | 17                           | 24.4                         | 36.8 | 48.5 | 60.1 | 72.1 | 84.5 | 97.4 | 111  |
| ICM40-A   | 40              | 15                           | 21.5                         | 32.5 | 42.8 | 53.0 | 63.6 | 74.6 | 85.9 | 97.5 |
| ICM40-B   |                 | 26                           | 37.3                         | 56.3 | 74.1 | 91.9 | 110  | 129  | 149  | 169  |
| ICM50-A   | 50              | 23                           | 33.0                         | 49.8 | 65.6 | 81.3 | 97.6 | 114  | 132  | 150  |
| ICM50-B   |                 | 40                           | 57.4                         | 86.6 | 114  | 141  | 170  | 199  | 229  | 260  |
| ICM65-A   | 65              | 35                           | 50                           | 76   | 100  | 124  | 148  | 174  | 200  | 228  |
| ICM65-B   |                 | 70                           | 101                          | 152  | 200  | 248  | 297  | 348  | 401  | 455  |
| ICM100    | 100             | 142                          | 204                          | 308  | 405  | 502  | 602  | 706  | 813  | 924  |
| ICM125    | 125             | 223                          | 321                          | 483  | 635  | 788  | 945  | 1109 | 1276 | 1450 |
| ICM150    | 150             | 370                          | 532                          | 802  | 1054 | 1307 | 1568 | 1839 | 2118 | 2407 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| 0.05             | 2.00              |
| 0.1              | 1.41              |
| <b>0.2</b>       | <b>1.00</b>       |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |

Correction factor for circulation rate ( $f_{rec}$ )

| Circulation rate | Correction factor |
|------------------|-------------------|
| 2                | 0.77              |
| 3                | 0.90              |
| <b>4</b>         | <b>1</b>          |
| 6                | 1.13              |
| 8                | 1.20              |
| 10               | 1.25              |

US units

Capacity table at nominal conditions,  $Q_N$  [Tons of Refrigeration], Circulation rate = 4,  $\Delta p = 3$  psi

R 717

| Type      | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature [°F] |      |      |      |      |      |      |      |
|-----------|-----------------|----------------------|------------------------------|------|------|------|------|------|------|------|
|           |                 |                      | -60                          | -40  | -20  | 0    | 20   | 40   | 60   | 80   |
| ICM20-A33 | 20              | 0.23                 | 0.08                         | 0.12 | 0.17 | 0.21 | 0.26 | 0.30 | 0.35 | 0.40 |
| ICM20-A   |                 | 0.7                  | 0.2                          | 0.4  | 0.5  | 0.6  | 0.8  | 0.9  | 1.1  | 1.2  |
| ICM20-B   |                 | 2.8                  | 0.9                          | 1.5  | 2.0  | 2.6  | 3.1  | 3.7  | 4.3  | 4.9  |
| ICM20-C   |                 | 5.3                  | 1.8                          | 2.8  | 3.9  | 4.9  | 5.9  | 7.0  | 8.1  | 9.3  |
| ICM25-A   | 25              | 7                    | 2.3                          | 3.8  | 5.1  | 6.4  | 7.8  | 9.3  | 10.8 | 12.3 |
| ICM25-B   |                 | 14                   | 4.6                          | 7.5  | 10.2 | 12.9 | 15.7 | 18.5 | 21.5 | 24.5 |
| ICM32-A   | 32              | 10                   | 3.3                          | 5.4  | 7.3  | 9.2  | 11.2 | 13.2 | 15.4 | 17.5 |
| ICM32-B   |                 | 20                   | 6.6                          | 10.7 | 14.6 | 18.4 | 22.4 | 26.5 | 30.7 | 35.0 |
| ICM40-A   | 40              | 17                   | 5.6                          | 9.1  | 12.4 | 15.6 | 19.0 | 22.5 | 26.1 | 29.8 |
| ICM40-B   |                 | 30                   | 9.9                          | 16.1 | 21.9 | 27.6 | 33.5 | 39.7 | 46.1 | 52.5 |
| ICM50-A   | 50              | 27                   | 8.9                          | 14.5 | 19.7 | 24.8 | 30.2 | 35.8 | 41.5 | 47.3 |
| ICM50-B   |                 | 46                   | 15.2                         | 24.7 | 33.5 | 42.3 | 51.4 | 60.9 | 70.7 | 80.5 |
| ICM65-A   | 65              | 41                   | 13                           | 22   | 30   | 38   | 46   | 54   | 63   | 72   |
| ICM65-B   |                 | 81                   | 26.8                         | 43.5 | 59.0 | 74.5 | 90.6 | 107  | 125  | 142  |
| ICM100    | 100             | 165                  | 54                           | 89   | 120  | 151  | 185  | 218  | 254  | 289  |
| ICM125    | 125             | 259                  | 84                           | 140  | 188  | 237  | 290  | 342  | 399  | 453  |
| ICM150    | 150             | 430                  | 140                          | 232  | 313  | 394  | 481  | 568  | 662  | 752  |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| 0.75             | 1.97              |
| 1.5              | 1.39              |
| <b>3</b>         | <b>1.00</b>       |
| 3.5              | 0.91              |
| 4                | 0.85              |
| 4.5              | 0.81              |

Correction factor for circulation rate ( $f_{rec}$ )

| Circulation rate | Correction factor |
|------------------|-------------------|
| 2                | 0.77              |
| 3                | 0.90              |
| <b>4</b>         | <b>1</b>          |
| 6                | 1.13              |
| 8                | 1.20              |
| 10               | 1.25              |

Nominal capacities

Wet suction line

SI units

Capacity table at nominal conditions,  $Q_N$  [kW], Circulation rate = 4,  $\Delta p = 0.2$  bar

R 744

| Type      | Valve body size | $K_v$<br>(m <sup>3</sup> /h) | Evaporating temperature [°C] |      |      |      |      |      |      |
|-----------|-----------------|------------------------------|------------------------------|------|------|------|------|------|------|
|           |                 |                              | -50                          | -40  | -30  | -20  | -10  | 0    | 10   |
| ICM20A-33 | 20              | 0.2                          | 0.6                          | 0.7  | 0.8  | 0.9  | 0.9  | 1.0  | 1.0  |
| ICM20-A   |                 | 0.6                          | 1.8                          | 2.1  | 2.4  | 2.6  | 2.8  | 2.9  | 2.9  |
| ICM20-B   |                 | 2.4                          | 7.3                          | 8.4  | 9.4  | 10.4 | 11.2 | 11.7 | 11.8 |
| ICM20-C   |                 | 4.6                          | 14.0                         | 16.1 | 18.1 | 19.9 | 21.5 | 22.5 | 22.6 |
| ICM25-A   | 25              | 6                            | 18.3                         | 21.0 | 23.6 | 26.0 | 28.0 | 29.3 | 29.5 |
| ICM25-B   |                 | 12                           | 36.5                         | 41.9 | 47.1 | 51.9 | 56.0 | 58.6 | 59.0 |
| ICM32-A   | 32              | 9                            | 27.4                         | 31.4 | 35.4 | 39.0 | 42.0 | 44.0 | 44.2 |
| ICM32-B   |                 | 17                           | 51.7                         | 59.4 | 66.8 | 73.6 | 79.3 | 83.1 | 83.5 |
| ICM40-A   | 40              | 15                           | 45.6                         | 52.4 | 58.9 | 64.9 | 70.0 | 73.3 | 73.7 |
| ICM40-B   |                 | 26                           | 79.1                         | 90.8 | 102  | 113  | 121  | 127  | 128  |
| ICM50-A   | 50              | 23                           | 70.0                         | 80.3 | 90.4 | 100  | 107  | 112  | 113  |
| ICM50-B   |                 | 40                           | 122                          | 140  | 157  | 173  | 187  | 195  | 197  |
| ICM65-A   | 65              | 35                           | 106                          | 122  | 138  | 152  | 163  | 171  | 172  |
| ICM65-B   |                 | 70                           | 213                          | 245  | 275  | 303  | 327  | 342  | 344  |
| ICM100    | 100             | 142                          | 432                          | 496  | 559  | 615  | 663  | 693  | 697  |
| ICM125    | 125             | 223                          | 678                          | 780  | 877  | 966  | 1041 | 1088 | 1095 |
| ICM150    | 150             | 370                          | 1125                         | 1294 | 1456 | 1603 | 1726 | 1805 | 1816 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| 0.05             | 2.00              |
| 0.1              | 1.41              |
| <b>0.2</b>       | <b>1.00</b>       |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |

Correction factor for circulation rate ( $f_{rec}$ )

| Circulation rate | Correction factor |
|------------------|-------------------|
| 2                | 0.77              |
| 3                | 0.90              |
| <b>4</b>         | <b>1</b>          |
| 6                | 1.13              |
| 8                | 1.20              |
| 10               | 1.25              |

US units

Capacity table at nominal conditions,  $Q_N$  [Tons of Refrigeration], Circulation rate = 4,  $\Delta p = 3$  psi

R 744

| Type      | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature [°F] |      |      |      |      |      |      |
|-----------|-----------------|----------------------|------------------------------|------|------|------|------|------|------|
|           |                 |                      | -60                          | -40  | -20  | 0    | 20   | 40   | 60   |
| ICM20-A33 | 20              | 0.23                 | 0.17                         | 0.20 | 0.23 | 0.25 | 0.27 | 0.28 | 0.27 |
| ICM20-A   |                 | 0.7                  | 0.5                          | 0.6  | 0.7  | 0.8  | 0.8  | 0.9  | 0.8  |
| ICM20-B   |                 | 2.8                  | 2.1                          | 2.4  | 2.8  | 3.1  | 3.3  | 3.4  | 3.3  |
| ICM20-C   |                 | 5.3                  | 4.0                          | 4.6  | 5.3  | 5.8  | 6.3  | 6.5  | 6.3  |
| ICM25-A   | 25              | 7                    | 5.2                          | 6.1  | 7.0  | 7.7  | 8.3  | 8.6  | 8.4  |
| ICM25-B   |                 | 14                   | 10.5                         | 12.2 | 13.9 | 15.4 | 16.6 | 17.2 | 16.7 |
| ICM32-A   | 32              | 10                   | 7.5                          | 8.7  | 9.9  | 11.0 | 11.9 | 12.3 | 11.9 |
| ICM32-B   |                 | 20                   | 14.9                         | 17.4 | 19.9 | 22.0 | 23.7 | 24.6 | 23.9 |
| ICM40-A   | 40              | 17                   | 12.7                         | 14.8 | 16.9 | 18.7 | 20.1 | 20.9 | 20.3 |
| ICM40-B   |                 | 30                   | 22.4                         | 26.1 | 29.8 | 33.0 | 35.6 | 36.9 | 35.8 |
| ICM50-A   | 50              | 27                   | 20.2                         | 23.5 | 26.8 | 29.7 | 32.0 | 33.2 | 32.2 |
| ICM50-B   |                 | 46                   | 34.4                         | 40.1 | 45.7 | 50.7 | 54.5 | 56.6 | 54.9 |
| ICM65-A   | 65              | 41                   | 31                           | 36   | 41   | 45   | 48   | 51   | 49   |
| ICM65-B   |                 | 81                   | 60.5                         | 70.6 | 80.5 | 89.2 | 96.0 | 100  | 97   |
| ICM100    | 100             | 165                  | 123                          | 143  | 164  | 182  | 195  | 203  | 196  |
| ICM125    | 125             | 259                  | 193                          | 225  | 258  | 286  | 306  | 319  | 308  |
| ICM150    | 150             | 430                  | 320                          | 373  | 428  | 475  | 508  | 530  | 511  |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| 0.75             | 1.97              |
| 1.5              | 1.39              |
| <b>3</b>         | <b>1.00</b>       |
| 3.5              | 0.91              |
| 4                | 0.85              |
| 4.5              | 0.81              |

Correction factor for circulation rate ( $f_{rec}$ )

| Circulation rate | Correction factor |
|------------------|-------------------|
| 2                | 0.77              |
| 3                | 0.90              |
| <b>4</b>         | <b>1</b>          |
| 6                | 1.13              |
| 8                | 1.20              |
| 10               | 1.25              |

Nominal capacities

Wet suction line

SI units

Capacity table at nominal conditions,  $Q_N$  [kW], Circulation rate = 4,  $\Delta p = 0.2$  bar

R 134a

| Type      | Valve body size | $K_v$<br>(m <sup>3</sup> /h) | Evaporating temperature [°C] |      |      |      |      |      |      |
|-----------|-----------------|------------------------------|------------------------------|------|------|------|------|------|------|
|           |                 |                              | -40                          | -30  | -20  | -10  | 0    | 10   | 20   |
| ICM20A-33 | 20              | 0.2                          | 0.1                          | 0.2  | 0.2  | 0.3  | 0.3  | 0.4  | 0.4  |
| ICM20-A   |                 | 0.6                          | 0.4                          | 0.5  | 0.7  | 0.8  | 1.0  | 1.1  | 1.2  |
| ICM20-B   |                 | 2.4                          | 1.6                          | 2.2  | 2.7  | 3.3  | 3.8  | 4.3  | 4.9  |
| ICM20-C   |                 | 4.6                          | 3.1                          | 4.2  | 5.3  | 6.3  | 7.3  | 8.3  | 9.4  |
| ICM25-A   | 25              | 6                            | 4.0                          | 5.5  | 6.8  | 8.2  | 9.5  | 10.9 | 12.2 |
| ICM25-B   |                 | 12                           | 8.0                          | 11.0 | 13.7 | 16.4 | 19.1 | 21.7 | 24.4 |
| ICM32-A   | 32              | 9                            | 6.0                          | 8.2  | 10.3 | 12.3 | 14.3 | 16.3 | 18.3 |
| ICM32-B   |                 | 17                           | 11.4                         | 15.5 | 19.4 | 23.2 | 27.0 | 30.8 | 34.6 |
| ICM40-A   | 40              | 15                           | 10.1                         | 13.7 | 17.1 | 20.5 | 23.9 | 27.2 | 30.5 |
| ICM40-B   |                 | 26                           | 17.4                         | 23.7 | 29.7 | 35.5 | 41.3 | 47.1 | 52.9 |
| ICM50-A   | 50              | 23                           | 15.4                         | 21.0 | 26.3 | 31.4 | 36.6 | 41.6 | 46.8 |
| ICM50-B   |                 | 40                           | 26.8                         | 36.5 | 45.7 | 54.6 | 63.6 | 72.4 | 81.4 |
| ICM65-A   | 65              | 35                           | 23                           | 32   | 40   | 48   | 56   | 63   | 71   |
| ICM65-B   |                 | 70                           | 47.0                         | 63.9 | 79.9 | 95.5 | 111  | 127  | 142  |
| ICM100    | 100             | 142                          | 95                           | 129  | 162  | 194  | 226  | 257  | 289  |
| ICM125    | 125             | 223                          | 149                          | 202  | 255  | 304  | 356  | 404  | 453  |
| ICM150    | 150             | 370                          | 248                          | 336  | 423  | 505  | 590  | 670  | 752  |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| <b>0.2</b>       | <b>1.00</b>       |
| 0.25             | 0.89              |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |
| 0.6              | 0.58              |

Correction factor for circulation rate ( $f_{rec}$ )

| Circulation rate | Correction factor |
|------------------|-------------------|
| 2                | 0.77              |
| 3                | 0.90              |
| <b>4</b>         | <b>1</b>          |
| 6                | 1.13              |
| 8                | 1.20              |
| 10               | 1.25              |

US units

Capacity table at nominal conditions,  $Q_N$  [Tons of Refrigeration], Circulation rate = 4,  $\Delta p = 3$  psi

R 134a

| Type      | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature [°F] |      |      |      |      |      |      |
|-----------|-----------------|----------------------|------------------------------|------|------|------|------|------|------|
|           |                 |                      | -40                          | -20  | 0    | 20   | 40   | 60   | 80   |
| ICM20-A33 | 20              | 0.23                 | 0.04                         | 0.05 | 0.07 | 0.08 | 0.10 | 0.11 | 0.13 |
| ICM20-A   |                 | 0.7                  | 0.1                          | 0.2  | 0.2  | 0.3  | 0.3  | 0.3  | 0.4  |
| ICM20-B   |                 | 2.8                  | 0.5                          | 0.7  | 0.8  | 1.0  | 1.2  | 1.4  | 1.5  |
| ICM20-C   |                 | 5.3                  | 0.9                          | 1.2  | 1.6  | 1.9  | 2.2  | 2.6  | 2.9  |
| ICM25-A   | 25              | 7                    | 1.2                          | 1.6  | 2.1  | 2.5  | 2.9  | 3.4  | 3.8  |
| ICM25-B   |                 | 14                   | 2.3                          | 3.3  | 4.1  | 5.0  | 5.9  | 6.8  | 7.6  |
| ICM32-A   | 32              | 10                   | 1.7                          | 2.3  | 3.0  | 3.6  | 4.2  | 4.8  | 5.4  |
| ICM32-B   |                 | 20                   | 3.3                          | 4.7  | 5.9  | 7.2  | 8.4  | 9.7  | 10.9 |
| ICM40-A   | 40              | 17                   | 2.8                          | 4.0  | 5.0  | 6.1  | 7.2  | 8.2  | 9.2  |
| ICM40-B   |                 | 30                   | 5.0                          | 7.0  | 8.9  | 10.8 | 12.6 | 14.5 | 16.3 |
| ICM50-A   | 50              | 27                   | 4.5                          | 6.3  | 8.0  | 9.7  | 11.4 | 13.0 | 14.7 |
| ICM50-B   |                 | 46                   | 7.6                          | 10.7 | 13.6 | 16.5 | 19.4 | 22.2 | 25.0 |
| ICM65-A   | 65              | 41                   | 7                            | 10   | 12   | 15   | 17   | 20   | 22   |
| ICM65-B   |                 | 81                   | 13.4                         | 18.9 | 24.0 | 29.1 | 34.1 | 39.1 | 44.0 |
| ICM100    | 100             | 165                  | 27                           | 39   | 49   | 60   | 70   | 79   | 90   |
| ICM125    | 125             | 259                  | 43                           | 62   | 76   | 94   | 109  | 124  | 141  |
| ICM150    | 150             | 430                  | 71                           | 102  | 127  | 157  | 181  | 207  | 234  |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| <b>3</b>         | <b>1.00</b>       |
| 4                | 0.87              |
| 5                | 0.79              |
| 6                | 0.72              |
| 7                | 0.66              |
| 8                | 0.62              |

Correction factor for circulation rate ( $f_{rec}$ )

| Circulation rate | Correction factor |
|------------------|-------------------|
| 2                | 0.77              |
| 3                | 0.90              |
| <b>4</b>         | <b>1</b>          |
| 6                | 1.13              |
| 8                | 1.20              |
| 10               | 1.25              |

Nominal capacities

Wet suction line

SI units

Capacity table at nominal conditions,  $Q_N$  [kW], Circulation rate = 4,  $\Delta p = 0.2$  bar

R 404A

| Type      | Valve body size | $K_v$<br>(m <sup>3</sup> /h) | Evaporating temperature [°C] |      |      |      |      |      |      |      |
|-----------|-----------------|------------------------------|------------------------------|------|------|------|------|------|------|------|
|           |                 |                              | -50                          | -40  | -30  | -20  | -10  | 0    | 10   | 20   |
| ICM20A-33 | 20              | 0.2                          | 0.2                          | 0.2  | 0.3  | 0.3  | 0.3  | 0.4  | 0.4  | 0.5  |
| ICM20-A   |                 | 0.6                          | 0.5                          | 0.7  | 0.8  | 0.9  | 1.0  | 1.2  | 1.3  | 1.4  |
| ICM20-B   |                 | 2.4                          | 2.1                          | 2.6  | 3.1  | 3.7  | 4.2  | 4.7  | 5.2  | 5.6  |
| ICM20-C   |                 | 4.6                          | 4.0                          | 5.0  | 6.0  | 7.0  | 8.0  | 9.0  | 10.0 | 10.8 |
| ICM25-A   | 25              | 6                            | 5.2                          | 6.5  | 7.8  | 9.1  | 10.5 | 11.7 | 13.0 | 14.1 |
| ICM25-B   |                 | 12                           | 10.4                         | 13.0 | 15.6 | 18.3 | 20.9 | 23.5 | 26.0 | 28.2 |
| ICM32-A   | 32              | 9                            | 7.8                          | 9.8  | 11.7 | 13.7 | 15.7 | 17.6 | 19.5 | 21.1 |
| ICM32-B   |                 | 17                           | 14.7                         | 18.5 | 22.1 | 25.9 | 29.6 | 33.3 | 36.8 | 39.9 |
| ICM40-A   | 40              | 15                           | 12.9                         | 16.3 | 19.5 | 22.8 | 26.1 | 29.4 | 32.5 | 35.2 |
| ICM40-B   |                 | 26                           | 22.4                         | 28.3 | 33.7 | 39.6 | 45.3 | 50.9 | 56.3 | 61.1 |
| ICM50-A   | 50              | 23                           | 19.8                         | 25.0 | 29.8 | 35.0 | 40.1 | 45.0 | 49.8 | 54.0 |
| ICM50-B   |                 | 40                           | 34.5                         | 43.5 | 51.9 | 60.9 | 69.7 | 78.3 | 86.6 | 93.9 |
| ICM65-A   |                 | 35                           | 30                           | 38   | 46   | 53   | 61   | 69   | 76   | 82   |
| ICM65-B   | 65              | 70                           | 60.4                         | 76.1 | 90.8 | 107  | 122  | 137  | 152  | 164  |
| ICM100    | 100             | 142                          | 122                          | 155  | 185  | 216  | 247  | 278  | 308  | 333  |
| ICM125    | 125             | 223                          | 192                          | 244  | 290  | 339  | 387  | 437  | 483  | 523  |
| ICM150    | 150             | 370                          | 319                          | 404  | 481  | 563  | 643  | 725  | 802  | 868  |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| 0.05             | 2.00              |
| 0.1              | 1.41              |
| <b>0.2</b>       | <b>1.00</b>       |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |

Correction factor for circulation rate ( $f_{rec}$ )

| Circulation rate | Correction factor |
|------------------|-------------------|
| 2                | 0.77              |
| 3                | 0.90              |
| <b>4</b>         | <b>1</b>          |
| 6                | 1.13              |
| 8                | 1.20              |
| 10               | 1.25              |

US units

Capacity table at nominal conditions,  $Q_N$  [Tons of Refrigeration], Circulation rate = 4,  $\Delta p = 3$  psi

R 404A

| Type      | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature [°F] |      |      |      |      |      |      |      |
|-----------|-----------------|----------------------|------------------------------|------|------|------|------|------|------|------|
|           |                 |                      | -60                          | -40  | -20  | 0    | 20   | 40   | 60   | 80   |
| ICM20-A33 | 20              | 0.23                 | 0.05                         | 0.06 | 0.07 | 0.09 | 0.10 | 0.12 | 0.13 | 0.14 |
| ICM20-A   |                 | 0.7                  | 0.1                          | 0.2  | 0.2  | 0.3  | 0.3  | 0.4  | 0.4  | 0.4  |
| ICM20-B   |                 | 2.8                  | 0.6                          | 0.8  | 0.9  | 1.1  | 1.3  | 1.4  | 1.6  | 1.7  |
| ICM20-C   |                 | 5.3                  | 1.1                          | 1.4  | 1.7  | 2.1  | 2.4  | 2.7  | 3.0  | 3.2  |
| ICM25-A   | 25              | 7                    | 1.5                          | 1.9  | 2.3  | 2.7  | 3.2  | 3.6  | 4.0  | 4.3  |
| ICM25-B   |                 | 14                   | 2.9                          | 3.8  | 4.6  | 5.5  | 6.3  | 7.2  | 7.9  | 8.6  |
| ICM32-A   | 32              | 10                   | 2.1                          | 2.7  | 3.3  | 3.9  | 4.5  | 5.1  | 5.7  | 6.1  |
| ICM32-B   |                 | 20                   | 4.2                          | 5.4  | 6.6  | 7.8  | 9.1  | 10.2 | 11.3 | 12.2 |
| ICM40-A   | 40              | 17                   | 3.5                          | 4.6  | 5.6  | 6.7  | 7.7  | 8.7  | 9.6  | 10.4 |
| ICM40-B   |                 | 30                   | 6.2                          | 8.1  | 9.9  | 11.7 | 13.6 | 15.4 | 17.0 | 18.3 |
| ICM50-A   | 50              | 27                   | 5.6                          | 7.3  | 8.9  | 10.6 | 12.2 | 13.8 | 15.3 | 16.5 |
| ICM50-B   |                 | 46                   | 9.6                          | 12.4 | 15.2 | 18.0 | 20.8 | 23.6 | 26.1 | 28.1 |
| ICM65-A   |                 | 41                   | 8                            | 11   | 13   | 16   | 19   | 21   | 23   | 25   |
| ICM65-B   | 65              | 81                   | 16.9                         | 21.9 | 26.7 | 31.7 | 36.7 | 41.5 | 45.9 | 49.5 |
| ICM100    | 100             | 165                  | 34                           | 45   | 54   | 65   | 75   | 85   | 94   | 100  |
| ICM125    | 125             | 259                  | 53                           | 71   | 84   | 102  | 117  | 134  | 147  | 157  |
| ICM150    | 150             | 430                  | 88                           | 117  | 140  | 170  | 194  | 222  | 244  | 261  |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| 0.75             | 1.97              |
| 1.5              | 1.39              |
| <b>3</b>         | <b>1.00</b>       |
| 3.5              | 0.91              |
| 4                | 0.85              |
| 4.5              | 0.81              |

Correction factor for circulation rate ( $f_{rec}$ )

| Circulation rate | Correction factor |
|------------------|-------------------|
| 2                | 0.77              |
| 3                | 0.90              |
| <b>4</b>         | <b>1</b>          |
| 6                | 1.13              |
| 8                | 1.20              |
| 10               | 1.25              |

Nominal capacities

Wet suction line

SI units

Capacity table at nominal conditions,  $Q_N$  [kW], Circulation rate = 4,  $\Delta p = 0.2$  bar

R 22

| Type      | Valve body size | $K_v$<br>(m <sup>3</sup> /h) | Evaporating temperature [°C] |      |      |      |      |      |      |      |
|-----------|-----------------|------------------------------|------------------------------|------|------|------|------|------|------|------|
|           |                 |                              | -50                          | -40  | -30  | -20  | -10  | 0    | 10   | 20   |
| ICM20A-33 | 20              | 0.2                          | 0.2                          | 0.2  | 0.3  | 0.3  | 0.4  | 0.4  | 0.4  | 0.5  |
| ICM20-A   |                 | 0.6                          | 0.5                          | 0.6  | 0.8  | 0.9  | 1.1  | 1.2  | 1.3  | 1.5  |
| ICM20-B   |                 | 2.4                          | 1.9                          | 2.5  | 3.1  | 3.7  | 4.2  | 4.8  | 5.4  | 5.9  |
| ICM20-C   |                 | 4.6                          | 3.7                          | 4.8  | 5.9  | 7.0  | 8.1  | 9.2  | 10.3 | 11.4 |
| ICM25-A   | 25              | 6                            | 4.8                          | 6.3  | 7.7  | 9.1  | 10.6 | 12.0 | 13.5 | 14.9 |
| ICM25-B   |                 | 12                           | 9.6                          | 12.6 | 15.4 | 18.3 | 21.2 | 24.1 | 26.9 | 29.7 |
| ICM32-A   | 32              | 9                            | 7.2                          | 9.4  | 11.6 | 13.7 | 15.9 | 18.1 | 20.2 | 22.3 |
| ICM32-B   |                 | 17                           | 13.6                         | 17.8 | 21.9 | 25.9 | 30.0 | 34.1 | 38.1 | 42.1 |
| ICM40-A   | 40              | 15                           | 12.0                         | 15.7 | 19.3 | 22.8 | 26.5 | 30.1 | 33.6 | 37.2 |
| ICM40-B   |                 | 26                           | 20.7                         | 27.2 | 33.4 | 39.6 | 45.9 | 52.2 | 58.3 | 64.4 |
| ICM50-A   | 50              | 23                           | 18.3                         | 24.1 | 29.6 | 35.0 | 40.6 | 46.2 | 51.6 | 57.0 |
| ICM50-B   |                 | 40                           | 31.9                         | 41.9 | 51.4 | 60.9 | 70.6 | 80.3 | 89.7 | 99.1 |
| ICM65-A   | 65              | 35                           | 28                           | 36   | 45   | 53   | 62   | 70   | 78   | 87   |
| ICM65-B   |                 | 70                           | 55.8                         | 73.3 | 90.0 | 107  | 124  | 141  | 157  | 173  |
| ICM100    | 100             | 142                          | 114                          | 148  | 183  | 216  | 251  | 285  | 318  | 352  |
| ICM125    | 125             | 223                          | 179                          | 233  | 288  | 339  | 395  | 447  | 499  | 553  |
| ICM150    | 150             | 370                          | 296                          | 386  | 477  | 563  | 655  | 742  | 828  | 917  |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| <b>0.2</b>       | <b>1.00</b>       |
| 0.25             | 0.89              |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |
| 0.6              | 0.58              |

Correction factor for circulation rate ( $f_{rec}$ )

| Circulation rate | Correction factor |
|------------------|-------------------|
| 2                | 0.77              |
| 3                | 0.90              |
| <b>4</b>         | <b>1</b>          |
| 6                | 1.13              |
| 8                | 1.20              |
| 10               | 1.25              |

US units

Capacity table at nominal conditions,  $Q_N$  [Tons of Refrigeration], Circulation rate = 4,  $\Delta p = 3$  psi

R 22

| Type      | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature [°F] |      |      |      |      |      |      |      |
|-----------|-----------------|----------------------|------------------------------|------|------|------|------|------|------|------|
|           |                 |                      | -60                          | -40  | -20  | 0    | 20   | 40   | 60   | 80   |
| ICM20-A33 | 20              | 0.23                 | 0.04                         | 0.06 | 0.07 | 0.09 | 0.11 | 0.12 | 0.14 | 0.15 |
| ICM20-A   |                 | 0.7                  | 0.1                          | 0.2  | 0.2  | 0.3  | 0.3  | 0.4  | 0.4  | 0.5  |
| ICM20-B   |                 | 2.8                  | 0.5                          | 0.7  | 0.9  | 1.1  | 1.3  | 1.5  | 1.7  | 1.8  |
| ICM20-C   |                 | 5.3                  | 1.0                          | 1.4  | 1.7  | 2.1  | 2.4  | 2.8  | 3.1  | 3.5  |
| ICM25-A   | 25              | 7                    | 1.3                          | 1.8  | 2.3  | 2.8  | 3.2  | 3.7  | 4.1  | 4.6  |
| ICM25-B   |                 | 14                   | 2.7                          | 3.6  | 4.6  | 5.5  | 6.4  | 7.4  | 8.3  | 9.2  |
| ICM32-A   | 32              | 10                   | 1.9                          | 2.6  | 3.3  | 3.9  | 4.6  | 5.3  | 5.9  | 6.5  |
| ICM32-B   |                 | 20                   | 3.8                          | 5.2  | 6.5  | 7.9  | 9.2  | 10.5 | 11.9 | 13.1 |
| ICM40-A   | 40              | 17                   | 3.2                          | 4.4  | 5.6  | 6.7  | 7.8  | 9.0  | 10.1 | 11.1 |
| ICM40-B   |                 | 30                   | 5.7                          | 7.8  | 9.8  | 11.8 | 13.8 | 15.8 | 17.8 | 19.6 |
| ICM50-A   | 50              | 27                   | 5.1                          | 7.0  | 8.8  | 10.6 | 12.4 | 14.2 | 16.0 | 17.7 |
| ICM50-B   |                 | 46                   | 8.7                          | 12.0 | 15.0 | 18.1 | 21.2 | 24.2 | 27.3 | 30.1 |
| ICM65-A   | 65              | 41                   | 8                            | 11   | 13   | 16   | 19   | 22   | 24   | 27   |
| ICM65-B   |                 | 81                   | 15.4                         | 21.1 | 26.5 | 31.9 | 37.3 | 42.7 | 48.0 | 53.0 |
| ICM100    | 100             | 165                  | 30                           | 43   | 53   | 65   | 75   | 88   | 98   | 109  |
| ICM125    | 125             | 259                  | 48                           | 68   | 84   | 103  | 118  | 138  | 153  | 171  |
| ICM150    | 150             | 430                  | 79                           | 112  | 139  | 171  | 196  | 229  | 254  | 283  |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| <b>3</b>         | <b>1.00</b>       |
| 4                | 0.87              |
| 5                | 0.79              |
| 6                | 0.72              |
| 7                | 0.66              |
| 8                | 0.62              |

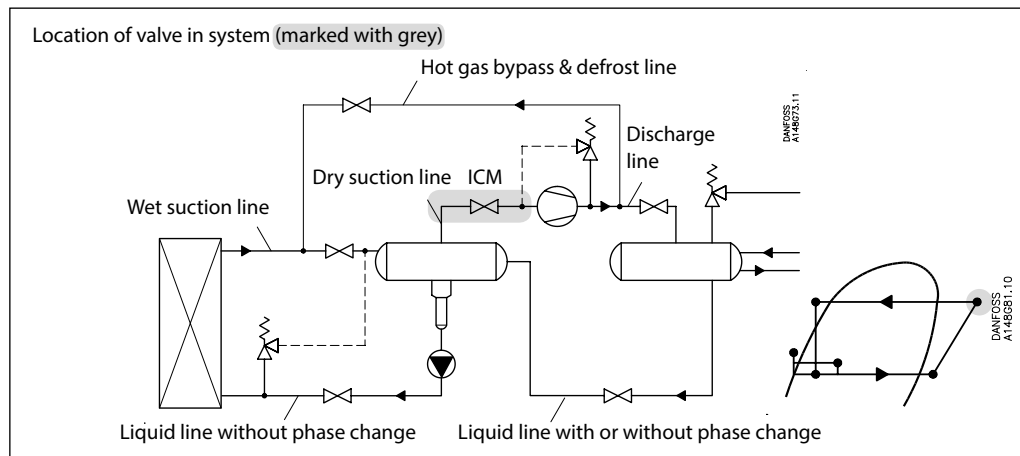
Correction factor for circulation rate ( $f_{rec}$ )

| Circulation rate | Correction factor |
|------------------|-------------------|
| 2                | 0.77              |
| 3                | 0.90              |
| <b>4</b>         | <b>1</b>          |
| 6                | 1.13              |
| 8                | 1.20              |
| 10               | 1.25              |



Nominal capacities

Dry suction line



SI units

Calculation example (R717 capacities):

An application has following running conditions:

- $T_e = -20^{\circ}\text{C}$
- $Q_o = 90 \text{ kW}$
- $T_{liq} = 10^{\circ}\text{C}$
- Max.  $\Delta p = 0.3 \text{ bar}$
- Connection: DN32

The capacity table is based on nominal condition ( $\Delta p = 0.2 \text{ bar}$ ,  $T_{liq} = 30^{\circ}\text{C}$ )

Therefore the actual capacity must be corrected to nominal condition by means of correction factors.

- Correction factor for  $\Delta p$  0.3 bar  $f_{\Delta p} = 0.82$
- Correction factor for liquid temperature  $f_{T_{liq}} = 0.92$

$$Q_n = Q_o \times f_{\Delta p} \times f_{T_{liq}} = 90 \times 0.82 \times 0.92 = 68 \text{ kW}$$

From the capacity table a ICM 32-B with  $Q_n$  capacity 92.3 kW is selected.

US units

Calculation example (R717 capacities):

An application has following running conditions:

- $T_e = 0^{\circ}\text{F}$
- $Q_o = 20 \text{ TR}$
- $T_{liq} = 50^{\circ}\text{F}$
- Max.  $\Delta p = 3.5 \text{ psi}$
- Connection: 1 1/4"

The capacity table is based on nominal condition ( $\Delta p = 3 \text{ psi}$ ,  $T_{liq} = 90^{\circ}\text{F}$ )

Therefore the actual capacity must be corrected to nominal condition by means of correction factors.

- Correction factor for  $\Delta p$  3.5 psi  $f_{\Delta p} = 0.91$
- Correction factor for liquid temperature  $f_{T_{liq}} = 0.92$

$$Q_n = Q_o \times f_{\Delta p} \times f_{T_{liq}} = 20 \times 0.91 \times 0.92 = 16.7 \text{ TR}$$

From the capacity table a ICM 32-B with  $Q_n$  capacity 28.2 TR is selected.

Nominal capacities

SI units

Capacity table at nominal conditions,  $Q_N$  [kW],  
 $T_{liq} = 30^\circ\text{C}$ ,  
 $\Delta p = 0.2$  bar  
 Superheating =  $8^\circ\text{C}$

R 717

Dry suction line

| Type      | Valve body size | $K_v$<br>( $\text{m}^3/\text{h}$ ) | Evaporating temperature [ $^\circ\text{C}$ ] |      |      |      |      |      |      |      |
|-----------|-----------------|------------------------------------|--|------|------|------|------|------|------|------|
|           |                 |                                    | -50  | -40  | -30  | -20  | -10  | 0    | 10   | 20   |
| ICM20A-33 | 20              | 0.2                                | 0.5  | 0.7  | 0.9  | 1.1  | 1.3  | 1.6  | 2.0  | 2.3  |
| ICM20-A   |                 | 0.6                                | 1.6  | 2.0  | 2.6  | 3.3  | 4.0  | 4.9  | 5.9  | 6.9  |
| ICM20-B   |                 | 2.4                                | 6.2  | 8.0  | 10.3 | 13.0 | 16.1 | 19.5 | 23.4 | 27.7 |
| ICM20-C   |                 | 4.6                                | 11.9   | 15.3 | 19.8 | 25.0 | 30.9 | 37.5 | 44.9 | 53.0 |
| ICM25-A   | 25              | 6                                  | 15.5   | 20.0 | 25.8 | 32.6 | 40.3 | 48.9 | 58.5 | 69.2 |
| ICM25-B   |                 | 12                                 | 31.0   | 40.0 | 51.6 | 65.1 | 80.6 | 97.7 | 117  | 138  |
| ICM32-A   | 32              | 9                                  | 23.3   | 30.0 | 38.7 | 48.9 | 60.4 | 73.3 | 87.8 | 104  |
| ICM32-B   |                 | 17                                 | 44.0   | 56.7 | 73.1 | 92.3 | 114  | 138  | 166  | 196  |
| ICM40-A   | 40              | 15                                 | 38.8   | 50.0 | 64.5 | 81.4 | 101  | 122  | 146  | 173  |
| ICM40-B   |                 | 26                                 | 67.2   | 86.7 | 112  | 141  | 175  | 212  | 254  | 300  |
| ICM50-A   | 50              | 23                                 | 59.5   | 76.7 | 98.9 | 125  | 154  | 187  | 224  | 265  |
| ICM50-B   |                 | 40                                 | 103  | 133  | 172  | 217  | 269  | 326  | 390  | 461  |
| ICM65-A   | 65              | 35                                 | 91   | 117  | 151  | 190  | 235  | 285  | 342  | 403  |
| ICM65-B   |                 | 70                                 | 181  | 234  | 301  | 380  | 470  | 570  | 683  | 807  |
| ICM100    | 100             | 142                                | 368  | 473  | 611  | 772  | 953  | 1156 | 1386 | 1637 |
| ICM125    | 125             | 223                                | 578  | 743  | 960  | 1212 | 1497 | 1816 | 2176 | 2571 |
| ICM150    | 150             | 370                                | 959  | 1233 | 1592 | 2011 | 2483 | 3013 | 3611 | 4265 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| 0.05             | 2.00              |
| 0.1              | 1.41              |
| <b>0.2</b>       | <b>1.00</b>       |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature                   | Correction factor |
|--------------------------------------|-------------------|
| -20 $^\circ\text{C}$                 | 0.82              |
| -10 $^\circ\text{C}$                 | 0.86              |
| 0 $^\circ\text{C}$                   | 0.88              |
| 10 $^\circ\text{C}$                  | 0.92              |
| 20 $^\circ\text{C}$                  | 0.96              |
| <b>30<math>^\circ\text{C}</math></b> | <b>1.00</b>       |
| 40 $^\circ\text{C}$                  | 1.04              |
| 50 $^\circ\text{C}$                  | 1.09              |

US units

Capacity table at nominal conditions,  $Q_N$  [Tons of Refrigeration],  
 $T_{liq} = 90^\circ\text{F}$ ,  
 $\Delta p = 3$  psi  
 Superheating =  $12^\circ\text{F}$

R 717

| Type      | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature [ $^\circ\text{F}$ ] |      |      |      |      |      |      |      |
|-----------|-----------------|----------------------|--|------|------|------|------|------|------|------|
|           |                 |                      | -60  | -40  | -20  | 0    | 20   | 40   | 60   | 80   |
| ICM20-A33 | 20              | 0.23                 | 0.15   | 0.19 | 0.25 | 0.32 | 0.41 | 0.50 | 0.61 | 0.73 |
| ICM20-A   |                 | 0.7                  | 0.5  | 0.6  | 0.8  | 1.0  | 1.2  | 1.5  | 1.9  | 2.2  |
| ICM20-B   |                 | 2.8                  | 1.9  | 2.3  | 3.1  | 3.9  | 5.0  | 6.1  | 7.4  | 8.8  |
| ICM20-C   |                 | 5.3                  | 3.5  | 4.4  | 5.8  | 7.5  | 9.4  | 11.6 | 14.0 | 16.8 |
| ICM25-A   | 25              | 7                    | 4.7  | 5.8  | 7.6  | 9.9  | 12.4 | 15.3 | 18.5 | 22.1 |
| ICM25-B   |                 | 14                   | 9.3  | 11.6 | 15.3 | 19.7 | 24.8 | 30.6 | 37.1 | 44.2 |
| ICM32-A   | 32              | 10                   | 6.7  | 8.3  | 10.9 | 14.1 | 17.7 | 21.9 | 26.5 | 31.6 |
| ICM32-B   |                 | 20                   | 13.3   | 16.5 | 21.9 | 28.2 | 35.5 | 43.8 | 53.0 | 63.2 |
| ICM40-A   | 40              | 17                   | 11.3   | 14.0 | 18.6 | 23.9 | 30.1 | 37.2 | 45.0 | 53.7 |
| ICM40-B   |                 | 30                   | 20.0   | 24.8 | 32.8 | 42.3 | 53.2 | 65.6 | 79.4 | 94.8 |
| ICM50-A   | 50              | 27                   | 18.0   | 22.3 | 29.5 | 38.0 | 47.9 | 59.1 | 71.5 | 85.3 |
| ICM50-B   |                 | 46                   | 30.7   | 38.0 | 50.3 | 64.8 | 81.6 | 101  | 122  | 145  |
| ICM65-A   | 65              | 41                   | 28   | 34   | 45   | 58   | 73   | 90   | 109  | 129  |
| ICM65-B   |                 | 81                   | 54.0   | 66.9 | 88.5 | 114  | 144  | 177  | 215  | 256  |
| ICM100    | 100             | 165                  | 111  | 137  | 181  | 233  | 292  | 360  | 438  | 521  |
| ICM125    | 125             | 259                  | 174  | 215  | 284  | 365  | 458  | 566  | 687  | 818  |
| ICM150    | 150             | 430                  | 289  | 357  | 472  | 606  | 761  | 939  | 1141 | 1357 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| 0.75             | 1.97              |
| 1.5              | 1.39              |
| <b>3</b>         | <b>1.00</b>       |
| 3.5              | 0.91              |
| 4                | 0.85              |
| 4.5              | 0.81              |

Correction factor for superheat ( $T_s$ )

| $T_s$               | Correction factor |
|---------------------|-------------------|
| 10 $^\circ\text{F}$ | 1.00              |
| 14 $^\circ\text{F}$ | 1.00              |
| 18 $^\circ\text{F}$ | 1.00              |
| 20 $^\circ\text{F}$ | 1.00              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature                   | Correction factor |
|--------------------------------------|-------------------|
| -10 $^\circ\text{F}$                 | 0.82              |
| 10 $^\circ\text{F}$                  | 0.85              |
| 30 $^\circ\text{F}$                  | 0.88              |
| 50 $^\circ\text{F}$                  | 0.92              |
| 70 $^\circ\text{F}$                  | 0.96              |
| <b>90<math>^\circ\text{F}</math></b> | <b>1.00</b>       |
| 110 $^\circ\text{F}$                 | 1.04              |
| 130 $^\circ\text{F}$                 | 1.09              |

Nominal capacities

Dry suction line

SI units

Capacity table at nominal conditions,  $Q_N$  [kW],  
 $T_{liq} = 10^\circ\text{C}$ ,  
 $\Delta p = 0.2 \text{ bar}$   
 Superheating =  $8^\circ\text{C}$

R 744

| Type      | Valve body size | $K_v$<br>(m <sup>3</sup> /h) | Evaporating temperature [°C] |      |      |      |      |      |      |
|-----------|-----------------|------------------------------|------------------------------|------|------|------|------|------|------|
|           |                 |                              | -50                          | -40  | -30  | -20  | -10  | 0    | 10   |
| ICM20A-33 | 20              | 0.2                          | 0.7                          | 0.9  | 1.0  | 1.2  | 1.4  | 1.6  | 1.9  |
| ICM20-A   |                 | 0.6                          | 2.1                          | 2.6  | 3.1  | 3.7  | 4.3  | 4.9  | 5.6  |
| ICM20-B   |                 | 2.4                          | 8.4                          | 10.3 | 12.4 | 14.6 | 17.1 | 19.6 | 22.3 |
| ICM20-C   |                 | 4.6                          | 16.1                         | 19.7 | 23.7 | 28.1 | 32.7 | 37.7 | 42.8 |
| ICM25-A   | 25              | 6                            | 21.0                         | 25.8 | 30.9 | 36.6 | 42.7 | 49.1 | 55.8 |
| ICM25-B   |                 | 12                           | 42.1                         | 51.5 | 61.9 | 73.2 | 85.4 | 98.2 | 112  |
| ICM32-A   | 32              | 9                            | 31.6                         | 38.6 | 46.4 | 54.9 | 64.0 | 73.7 | 83.7 |
| ICM32-B   |                 | 17                           | 59.6                         | 73.0 | 87.7 | 104  | 121  | 139  | 158  |
| ICM40-A   | 40              | 15                           | 52.6                         | 64.4 | 77.4 | 91.5 | 107  | 123  | 140  |
| ICM40-B   |                 | 26                           | 91.2                         | 112  | 134  | 159  | 185  | 213  | 242  |
| ICM50-A   | 50              | 23                           | 80.7                         | 98.7 | 119  | 140  | 164  | 188  | 214  |
| ICM50-B   |                 | 40                           | 140                          | 172  | 206  | 244  | 285  | 327  | 372  |
| ICM65-A   | 65              | 35                           | 123                          | 150  | 181  | 214  | 249  | 286  | 326  |
| ICM65-B   |                 | 70                           | 246                          | 301  | 361  | 427  | 498  | 573  | 651  |
| ICM100    | 100             | 142                          | 498                          | 610  | 733  | 867  | 1012 | 1162 | 1322 |
| ICM125    | 125             | 223                          | 782                          | 958  | 1150 | 1362 | 1589 | 1825 | 2076 |
| ICM150    | 150             | 370                          | 1297                         | 1590 | 1909 | 2259 | 2636 | 3027 | 3444 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| 0.05             | 2.00              |
| 0.1              | 1.41              |
| <b>0.2</b>       | <b>1.00</b>       |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature | Correction factor |
|--------------------|-------------------|
| -20°C              | 0.52              |
| -10°C              | 0.67              |
| 0°C                | 0.91              |
| <b>10°C</b>        | <b>1.00</b>       |
| 15°C               | 1.09              |

US units

Capacity table at nominal conditions,  $Q_N$  [Tons of Refrigeration],  
 $T_{liq} = 50^\circ\text{F}$ ,  
 $\Delta p = 3 \text{ psi}$   
 Superheating =  $12^\circ\text{F}$

R 744

| Type      | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature [°F] |      |      |      |      |      |      |
|-----------|-----------------|----------------------|------------------------------|------|------|------|------|------|------|
|           |                 |                      | -60                          | -40  | -20  | 0    | 20   | 40   | 60   |
| ICM20-A33 | 20              | 0.23                 | 0.20                         | 0.24 | 0.30 | 0.36 | 0.43 | 0.50 | 0.57 |
| ICM20-A   |                 | 0.7                  | 0.6                          | 0.7  | 0.9  | 1.1  | 1.3  | 1.5  | 1.7  |
| ICM20-B   |                 | 2.8                  | 2.4                          | 3.0  | 3.7  | 4.4  | 5.2  | 6.0  | 6.9  |
| ICM20-C   |                 | 5.3                  | 4.5                          | 5.7  | 6.9  | 8.3  | 9.8  | 11.4 | 13.0 |
| ICM25-A   | 25              | 7                    | 6.0                          | 7.5  | 9.1  | 11.0 | 13.0 | 15.1 | 17.2 |
| ICM25-B   |                 | 14                   | 11.9                         | 14.9 | 18.3 | 22.0 | 26.0 | 30.2 | 34.5 |
| ICM32-A   | 32              | 10                   | 8.5                          | 10.7 | 13.1 | 15.7 | 18.5 | 21.5 | 24.6 |
| ICM32-B   |                 | 20                   | 17.0                         | 21.3 | 26.1 | 31.4 | 37.1 | 43.1 | 49.2 |
| ICM40-A   | 40              | 17                   | 14.5                         | 18.1 | 22.2 | 26.7 | 31.5 | 36.6 | 41.8 |
| ICM40-B   |                 | 30                   | 25.5                         | 32.0 | 39.2 | 47.1 | 55.6 | 64.6 | 73.9 |
| ICM50-A   | 50              | 27                   | 23.0                         | 28.8 | 35.3 | 42.4 | 50.1 | 58.2 | 66.5 |
| ICM50-B   |                 | 46                   | 39.1                         | 49.1 | 60.1 | 72.2 | 85.3 | 99.1 | 113  |
| ICM65-A   | 65              | 41                   | 35                           | 44   | 54   | 64   | 76   | 88   | 101  |
| ICM65-B   |                 | 81                   | 68.9                         | 86.4 | 106  | 127  | 150  | 175  | 199  |
| ICM100    | 100             | 165                  | 141                          | 175  | 215  | 259  | 306  | 355  | 405  |
| ICM125    | 125             | 259                  | 221                          | 275  | 338  | 407  | 480  | 558  | 636  |
| ICM150    | 150             | 430                  | 366                          | 457  | 561  | 675  | 797  | 926  | 1057 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| 0.75             | 1.97              |
| 1.5              | 1.39              |
| <b>3</b>         | <b>1.00</b>       |
| 3.5              | 0.91              |
| 4                | 0.85              |
| 4.5              | 0.81              |

Correction factor for superheat ( $T_s$ )

| $T_s$ | Correction factor |
|-------|-------------------|
| 10°F  | 1.00              |
| 14°F  | 1.00              |
| 18°F  | 1.00              |
| 20°F  | 1.00              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature | Correction factor |
|--------------------|-------------------|
| -10°F              | 0.48              |
| 10°F               | 0.64              |
| 30°F               | 0.88              |
| <b>50°F</b>        | <b>1.00</b>       |

Nominal capacities

Dry suction line

SI units

Capacity table at nominal conditions,  $Q_N$  [kW],  
 $T_{liq} = 30^\circ\text{C}$ ,  
 $\Delta p = 0.2$  bar  
 Superheating =  $8^\circ\text{C}$

R 134a

| Type      | Valve body size | $K_v$<br>(m <sup>3</sup> /h) | Evaporating temperature [°C] |      |      |      |      |      |      |
|-----------|-----------------|------------------------------|------------------------------|------|------|------|------|------|------|
|           |                 |                              | -40                          | -30  | -20  | -10  | 0    | 10   | 20   |
| ICM20A-33 | 20              | 0.2                          | 0.2                          | 0.2  | 0.3  | 0.4  | 0.5  | 0.6  | 0.7  |
| ICM20-A   |                 | 0.6                          | 0.5                          | 0.7  | 0.9  | 1.2  | 1.4  | 1.8  | 2.1  |
| ICM20-B   |                 | 2.4                          | 2.1                          | 2.8  | 3.6  | 4.6  | 5.7  | 7.0  | 8.5  |
| ICM20-C   |                 | 4.6                          | 4.1                          | 5.4  | 7.0  | 8.8  | 11.0 | 13.5 | 16.3 |
| ICM25-A   | 25              | 6                            | 5.3                          | 7.0  | 9.1  | 11.5 | 14.4 | 17.6 | 21.3 |
| ICM25-B   |                 | 12                           | 10.6                         | 14.1 | 18.2 | 23.1 | 28.7 | 35.2 | 42.6 |
| ICM32-A   | 32              | 9                            | 8.0                          | 10.5 | 13.6 | 17.3 | 21.5 | 26.4 | 32.0 |
| ICM32-B   |                 | 17                           | 15.1                         | 19.9 | 25.7 | 32.7 | 40.7 | 49.9 | 60.4 |
| ICM40-A   | 40              | 15                           | 13.3                         | 17.6 | 22.7 | 28.8 | 35.9 | 44.0 | 53.3 |
| ICM40-B   |                 | 26                           | 23.1                         | 30.5 | 39.4 | 50.0 | 62.2 | 76.3 | 92.3 |
| ICM50-A   | 50              | 23                           | 20.4                         | 26.9 | 34.8 | 44.2 | 55.0 | 67.5 | 81.7 |
| ICM50-B   |                 | 40                           | 35.5                         | 46.9 | 60.6 | 76.9 | 95.7 | 117  | 142  |
| ICM65-A   | 65              | 35                           | 31                           | 41   | 53   | 67   | 84   | 103  | 124  |
| ICM65-B   |                 | 70                           | 62.1                         | 82.0 | 106  | 135  | 168  | 206  | 249  |
| ICM100    | 100             | 142                          | 125                          | 166  | 215  | 274  | 339  | 417  | 504  |
| ICM125    | 125             | 223                          | 197                          | 261  | 337  | 430  | 532  | 655  | 791  |
| ICM150    | 150             | 370                          | 326                          | 433  | 560  | 713  | 883  | 1087 | 1312 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| 0.05             | 2.00              |
| 0.1              | 1.41              |
| <b>0.2</b>       | <b>1.00</b>       |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature | Correction factor |
|--------------------|-------------------|
| -20°C              | 0.66              |
| -10°C              | 0.70              |
| 0°C                | 0.76              |
| 10°C               | 0.82              |
| 20°C               | 0.90              |
| <b>30°C</b>        | <b>1.00</b>       |
| 40°C               | 1.13              |
| 50°C               | 1.29              |

US units

Capacity table at nominal conditions,  $Q_N$  [Tons of Refrigeration],  
 $T_{liq} = 90^\circ\text{F}$ ,  
 $\Delta p = 3$  psi  
 Superheating =  $12^\circ\text{F}$

R 134a

| Type      | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature [°F] |      |      |      |      |      |      |
|-----------|-----------------|----------------------|------------------------------|------|------|------|------|------|------|
|           |                 |                      | -40                          | -20  | 0    | 20   | 40   | 60   | 80   |
| ICM20-A33 | 20              | 0.23                 | 0.05                         | 0.07 | 0.09 | 0.12 | 0.15 | 0.18 | 0.23 |
| ICM20-A   |                 | 0.7                  | 0.2                          | 0.2  | 0.3  | 0.4  | 0.4  | 0.6  | 0.7  |
| ICM20-B   |                 | 2.8                  | 0.6                          | 0.8  | 1.1  | 1.4  | 1.8  | 2.2  | 2.7  |
| ICM20-C   |                 | 5.3                  | 1.1                          | 1.6  | 2.1  | 2.7  | 3.4  | 4.2  | 5.2  |
| ICM25-A   | 25              | 7                    | 1.5                          | 2.1  | 2.7  | 3.5  | 4.5  | 5.6  | 6.9  |
| ICM25-B   |                 | 14                   | 3.0                          | 4.1  | 5.4  | 7.1  | 9.0  | 11.2 | 13.7 |
| ICM32-A   | 32              | 10                   | 2.2                          | 2.9  | 3.9  | 5.0  | 6.4  | 8.0  | 9.8  |
| ICM32-B   |                 | 20                   | 4.3                          | 5.9  | 7.8  | 10.1 | 12.8 | 16.0 | 19.6 |
| ICM40-A   | 40              | 17                   | 3.7                          | 5.0  | 6.6  | 8.6  | 10.9 | 13.6 | 16.6 |
| ICM40-B   |                 | 30                   | 6.5                          | 8.8  | 11.7 | 15.1 | 19.2 | 23.9 | 29.4 |
| ICM50-A   | 50              | 27                   | 5.8                          | 7.9  | 10.5 | 13.6 | 17.3 | 21.5 | 26.4 |
| ICM50-B   |                 | 46                   | 9.9                          | 13.5 | 17.9 | 23.2 | 29.4 | 36.7 | 45.0 |
| ICM65-A   | 65              | 41                   | 9                            | 12   | 16   | 21   | 26   | 33   | 40   |
| ICM65-B   |                 | 81                   | 17.4                         | 23.8 | 31.5 | 40.8 | 51.8 | 64.6 | 79.3 |
| ICM100    | 100             | 165                  | 36                           | 48   | 65   | 84   | 105  | 132  | 162  |
| ICM125    | 125             | 259                  | 57                           | 76   | 102  | 132  | 165  | 208  | 254  |
| ICM150    | 150             | 430                  | 95                           | 126  | 169  | 219  | 273  | 345  | 421  |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| 0.75             | 1.97              |
| 1.5              | 1.39              |
| <b>3</b>         | <b>1.00</b>       |
| 3.5              | 0.91              |
| 4                | 0.85              |
| 4.5              | 0.81              |

Correction factor for superheat ( $T_s$ )

| $T_s$ | Correction factor |
|-------|-------------------|
| 10°F  | 1.00              |
| 14°F  | 1.00              |
| 18°F  | 1.00              |
| 20°F  | 1.00              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature | Correction factor |
|--------------------|-------------------|
| -10°F              | 0.64              |
| 10°F               | 0.68              |
| 30°F               | 0.74              |
| 50°F               | 0.81              |
| 70°F               | 0.89              |
| <b>90°F</b>        | <b>1.00</b>       |
| 110°F              | 1.15              |
| 130°F              | 1.35              |

Nominal capacities

Dry suction line

SI units

Capacity table at nominal conditions,  $Q_N$  [kW],  
 $T_{liq} = 30^\circ\text{C}$ ,  
 $\Delta p = 0.2$  bar  
 Superheating =  $8^\circ\text{C}$

R 404A

| Type      | Valve body size | $K_v$<br>( $\text{m}^3/\text{h}$ ) | Evaporating temperature [ $^\circ\text{C}$ ] |      |      |      |      |      |      |      |
|-----------|-----------------|------------------------------------|--|------|------|------|------|------|------|------|
|           |                 |                                    | -50  | -40  | -30  | -20  | -10  | 0    | 10   | 20   |
| ICM20A-33 | 20              | 0.2                                | 0.2  | 0.2  | 0.3  | 0.4  | 0.4  | 0.5  | 0.7  | 0.8  |
| ICM20-A   |                 | 0.6                                | 0.5  | 0.6  | 0.8  | 1.1  | 1.3  | 1.6  | 2.0  | 2.4  |
| ICM20-B   |                 | 2.4                                | 1.9  | 2.5  | 3.3  | 4.2  | 5.3  | 6.5  | 8.0  | 9.6  |
| ICM20-C   |                 | 4.6                                | 3.6  | 4.9  | 6.3  | 8.1  | 10.2 | 12.5 | 15.2 | 18.3 |
| ICM25-A   | 25              | 6                                  | 4.8  | 6.4  | 8.3  | 10.6 | 13.2 | 16.3 | 19.9 | 23.9 |
| ICM25-B   |                 | 12                                 | 9.5  | 12.7 | 16.5 | 21.1 | 26.5 | 32.7 | 39.8 | 47.8 |
| ICM32-A   | 32              | 9                                  | 7.1  | 9.5  | 12.4 | 15.9 | 19.9 | 24.5 | 29.8 | 35.9 |
| ICM32-B   |                 | 17                                 | 13.5   | 18.0 | 23.4 | 29.9 | 37.5 | 46.3 | 56.3 | 67.8 |
| ICM40-A   | 40              | 15                                 | 11.9   | 15.9 | 20.7 | 26.4 | 33.1 | 40.8 | 49.7 | 59.8 |
| ICM40-B   |                 | 26                                 | 20.6   | 27.5 | 35.8 | 45.8 | 57.4 | 70.8 | 86.2 | 104  |
| ICM50-A   | 50              | 23                                 | 18.2   | 24.3 | 31.7 | 40.5 | 50.8 | 62.6 | 76.2 | 91.7 |
| ICM50-B   |                 | 40                                 | 31.7   | 42.3 | 55.1 | 70.5 | 88.3 | 109  | 133  | 159  |
| ICM65-A   | 65              | 35                                 | 28   | 37   | 48   | 62   | 77   | 95   | 116  | 140  |
| ICM65-B   |                 | 70                                 | 55.5   | 74.1 | 96.5 | 123  | 155  | 191  | 232  | 279  |
| ICM100    | 100             | 142                                | 113  | 150  | 195  | 251  | 313  | 386  | 471  | 566  |
| ICM125    | 125             | 223                                | 177  | 235  | 306  | 394  | 492  | 606  | 740  | 889  |
| ICM150    | 150             | 370                                | 294  | 390  | 508  | 654  | 816  | 1005 | 1227 | 1476 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| 0.05             | 2.00              |
| 0.1              | 1.41              |
| <b>0.2</b>       | <b>1.00</b>       |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature                   | Correction factor |
|--------------------------------------|-------------------|
| -20 $^\circ\text{C}$                 | 0.55              |
| -10 $^\circ\text{C}$                 | 0.60              |
| 0 $^\circ\text{C}$                   | 0.66              |
| 10 $^\circ\text{C}$                  | 0.74              |
| 20 $^\circ\text{C}$                  | 0.85              |
| <b>30<math>^\circ\text{C}</math></b> | <b>1.00</b>       |
| 40 $^\circ\text{C}$                  | 1.23              |
| 50 $^\circ\text{C}$                  | 1.68              |

US units

Capacity table at nominal conditions,  $Q_N$  [Tons of Refrigeration],  
 $T_{liq} = 90^\circ\text{F}$ ,  
 $\Delta p = 3$  psi  
 Superheating =  $12^\circ\text{F}$

R 404A

| Type      | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature [ $^\circ\text{F}$ ] |      |      |      |      |      |      |      |
|-----------|-----------------|----------------------|--|------|------|------|------|------|------|------|
|           |                 |                      | -60  | -40  | -20  | 0    | 20   | 40   | 60   | 80   |
| ICM20-A33 | 20              | 0.23                 | 0.04   | 0.06 | 0.08 | 0.10 | 0.13 | 0.16 | 0.20 | 0.25 |
| ICM20-A   |                 | 0.7                  | 0.1  | 0.2  | 0.2  | 0.3  | 0.4  | 0.5  | 0.6  | 0.8  |
| ICM20-B   |                 | 2.8                  | 0.5  | 0.7  | 1.0  | 1.2  | 1.6  | 2.0  | 2.5  | 3.0  |
| ICM20-C   |                 | 5.3                  | 1.0  | 1.3  | 1.8  | 2.4  | 3.0  | 3.8  | 4.7  | 5.7  |
| ICM25-A   | 25              | 7                    | 1.3  | 1.8  | 2.4  | 3.1  | 4.0  | 5.0  | 6.2  | 7.6  |
| ICM25-B   |                 | 14                   | 2.6  | 3.5  | 4.8  | 6.2  | 8.0  | 10.0 | 12.4 | 15.2 |
| ICM32-A   | 32              | 10                   | 1.8  | 2.5  | 3.4  | 4.5  | 5.7  | 7.2  | 8.9  | 10.8 |
| ICM32-B   |                 | 20                   | 3.7  | 5.1  | 6.8  | 8.9  | 11.4 | 14.3 | 17.8 | 21.7 |
| ICM40-A   | 40              | 17                   | 3.1  | 4.3  | 5.8  | 7.6  | 9.7  | 12.2 | 15.1 | 18.4 |
| ICM40-B   |                 | 30                   | 5.5  | 7.6  | 10.2 | 13.4 | 17.1 | 21.5 | 26.6 | 32.5 |
| ICM50-A   | 50              | 27                   | 4.9  | 6.8  | 9.2  | 12.0 | 15.4 | 19.4 | 24.0 | 29.3 |
| ICM50-B   |                 | 46                   | 8.4  | 11.6 | 15.7 | 20.5 | 26.2 | 33.0 | 40.8 | 49.9 |
| ICM65-A   | 65              | 41                   | 7  | 10   | 14   | 18   | 23   | 29   | 36   | 45   |
| ICM65-B   |                 | 81                   | 14.8   | 20.5 | 27.6 | 36.1 | 46.2 | 58.1 | 71.9 | 87.8 |
| ICM100    | 100             | 165                  | 30   | 42   | 56   | 73   | 94   | 118  | 146  | 179  |
| ICM125    | 125             | 259                  | 47   | 66   | 87   | 115  | 148  | 186  | 229  | 282  |
| ICM150    | 150             | 430                  | 77   | 110  | 145  | 191  | 245  | 308  | 381  | 467  |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| 0.75             | 1.97              |
| 1.5              | 1.39              |
| <b>3</b>         | <b>1.00</b>       |
| 3.5              | 0.91              |
| 4                | 0.85              |
| 4.5              | 0.81              |

Correction factor for superheat ( $T_s$ )

| $T_s$               | Correction factor |
|---------------------|-------------------|
| 10 $^\circ\text{F}$ | 1.00              |
| 14 $^\circ\text{F}$ | 1.00              |
| 18 $^\circ\text{F}$ | 1.00              |
| 20 $^\circ\text{F}$ | 1.00              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature                   | Correction factor |
|--------------------------------------|-------------------|
| -10 $^\circ\text{F}$                 | 0.52              |
| 10 $^\circ\text{F}$                  | 0.57              |
| 30 $^\circ\text{F}$                  | 0.63              |
| 50 $^\circ\text{F}$                  | 0.72              |
| 70 $^\circ\text{F}$                  | 0.83              |
| <b>90<math>^\circ\text{F}</math></b> | <b>1.00</b>       |
| 110 $^\circ\text{F}$                 | 1.29              |
| 130 $^\circ\text{F}$                 | 1.92              |

Nominal capacities

SI units

Capacity table at nominal conditions,  $Q_N$  [kW],  
 $T_{liq} = 30^\circ\text{C}$ ,  
 $\Delta p = 0.2$  bar  
 Superheating =  $8^\circ\text{C}$

R 22

Dry suction line

| Type      | Valve body size | $K_v$<br>( $\text{m}^3/\text{h}$ ) | Evaporating temperature [ $^\circ\text{C}$ ] |      |      |      |      |      |      |      |
|-----------|-----------------|------------------------------------|--|------|------|------|------|------|------|------|
|           |                 |                                    | -50  | -40  | -30  | -20  | -10  | 0    | 10   | 20   |
| ICM20A-33 | 20              | 0.2                                | 0.2  | 0.3  | 0.3  | 0.4  | 0.5  | 0.6  | 0.7  | 0.9  |
| ICM20-A   |                 | 0.6                                | 0.6  | 0.8  | 1.0  | 1.3  | 1.5  | 1.9  | 2.2  | 2.6  |
| ICM20-B   |                 | 2.4                                | 2.5  | 3.2  | 4.1  | 5.0  | 6.2  | 7.4  | 8.8  | 10.4 |
| ICM20-C   |                 | 4.6                                | 4.7  | 6.1  | 7.8  | 9.7  | 11.8 | 14.2 | 16.9 | 19.9 |
| ICM25-A   | 25              | 6                                  | 6.2  | 8.0  | 10.1 | 12.6 | 15.4 | 18.6 | 22.1 | 26.0 |
| ICM25-B   |                 | 12                                 | 12.3   | 16.0 | 20.3 | 25.2 | 30.8 | 37.1 | 44.1 | 51.9 |
| ICM32-A   | 32              | 9                                  | 9.3  | 12.0 | 15.2 | 18.9 | 23.1 | 27.8 | 33.1 | 39.0 |
| ICM32-B   |                 | 17                                 | 17.5   | 22.6 | 28.7 | 35.7 | 43.6 | 52.6 | 62.5 | 73.6 |
| ICM40-A   | 40              | 15                                 | 15.4   | 20.0 | 25.4 | 31.5 | 38.5 | 46.4 | 55.2 | 64.9 |
| ICM40-B   |                 | 26                                 | 26.7   | 34.6 | 43.9 | 54.6 | 66.7 | 80.4 | 95.6 | 113  |
| ICM50-A   | 50              | 23                                 | 23.7   | 30.6 | 38.9 | 48.3 | 59.0 | 71.1 | 84.6 | 100  |
| ICM50-B   |                 | 40                                 | 41.1   | 53.3 | 67.6 | 84.0 | 103  | 124  | 147  | 173  |
| ICM65-A   | 65              | 35                                 | 36   | 47   | 59   | 74   | 90   | 108  | 129  | 152  |
| ICM65-B   |                 | 70                                 | 72.0   | 93.2 | 118  | 147  | 180  | 217  | 258  | 303  |
| ICM100    | 100             | 142                                | 146  | 189  | 240  | 299  | 364  | 440  | 522  | 615  |
| ICM125    | 125             | 223                                | 229  | 297  | 377  | 469  | 572  | 691  | 820  | 966  |
| ICM150    | 150             | 370                                | 380  | 493  | 625  | 779  | 948  | 1147 | 1360 | 1603 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| <b>0.2</b>       | <b>1.00</b>       |
| 0.25             | 0.89              |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |
| 0.6              | 0.58              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature                   | Correction factor |
|--------------------------------------|-------------------|
| -20 $^\circ\text{C}$                 | 0.71              |
| -10 $^\circ\text{C}$                 | 0.75              |
| 0 $^\circ\text{C}$                   | 0.80              |
| 10 $^\circ\text{C}$                  | 0.86              |
| 20 $^\circ\text{C}$                  | 0.92              |
| <b>30<math>^\circ\text{C}</math></b> | <b>1.00</b>       |
| 40 $^\circ\text{C}$                  | 1.09              |
| 50 $^\circ\text{C}$                  | 1.22              |

US units

Capacity table at nominal conditions,  $Q_N$  [Tons of Refrigeration],  
 $T_{liq} = 90^\circ\text{F}$ ,  
 $\Delta p = 3$  psi  
 Superheating =  $12^\circ\text{F}$

R 22

| Type      | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature [ $^\circ\text{F}$ ] |      |      |      |      |      |      |      |
|-----------|-----------------|----------------------|--|------|------|------|------|------|------|------|
|           |                 |                      | -60  | -40  | -20  | 0    | 20   | 40   | 60   | 80   |
| ICM20-A33 | 20              | 0.23                 | 0.06   | 0.07 | 0.10 | 0.12 | 0.16 | 0.19 | 0.23 | 0.27 |
| ICM20-A   |                 | 0.7                  | 0.2  | 0.2  | 0.3  | 0.4  | 0.5  | 0.6  | 0.7  | 0.8  |
| ICM20-B   |                 | 2.8                  | 0.7  | 0.9  | 1.2  | 1.5  | 1.9  | 2.3  | 2.8  | 3.3  |
| ICM20-C   |                 | 5.3                  | 1.3  | 1.7  | 2.2  | 2.9  | 3.6  | 4.3  | 5.2  | 6.2  |
| ICM25-A   | 25              | 7                    | 1.7  | 2.3  | 3.0  | 3.8  | 4.7  | 5.7  | 6.9  | 8.2  |
| ICM25-B   |                 | 14                   | 3.4  | 4.6  | 5.9  | 7.5  | 9.4  | 11.5 | 13.8 | 16.4 |
| ICM32-A   | 32              | 10                   | 2.4  | 3.3  | 4.2  | 5.4  | 6.7  | 8.2  | 9.9  | 11.7 |
| ICM32-B   |                 | 20                   | 4.9  | 6.5  | 8.5  | 10.8 | 13.4 | 16.4 | 19.8 | 23.5 |
| ICM40-A   | 40              | 17                   | 4.1  | 5.5  | 7.2  | 9.2  | 11.4 | 13.9 | 16.8 | 20.0 |
| ICM40-B   |                 | 30                   | 7.3  | 9.8  | 12.7 | 16.1 | 20.1 | 24.6 | 29.6 | 35.2 |
| ICM50-A   | 50              | 27                   | 6.6  | 8.8  | 11.4 | 14.5 | 18.1 | 22.1 | 26.7 | 31.7 |
| ICM50-B   |                 | 46                   | 11.2   | 15.0 | 19.5 | 24.8 | 30.8 | 37.7 | 45.4 | 54.0 |
| ICM65-A   | 65              | 41                   | 10   | 13   | 17   | 22   | 28   | 34   | 41   | 48   |
| ICM65-B   |                 | 81                   | 19.7   | 26.4 | 34.3 | 43.6 | 54.3 | 66.4 | 80.0 | 95.1 |
| ICM100    | 100             | 165                  | 41   | 53   | 70   | 89   | 111  | 136  | 163  | 193  |
| ICM125    | 125             | 259                  | 64   | 83   | 110  | 140  | 175  | 213  | 256  | 303  |
| ICM150    | 150             | 430                  | 106  | 139  | 182  | 233  | 290  | 353  | 425  | 503  |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| <b>3</b>         | <b>1.00</b>       |
| 4                | 0.87              |
| 5                | 0.79              |
| 6                | 0.72              |
| 7                | 0.66              |
| 8                | 0.62              |

Correction factor for superheat ( $T_s$ )

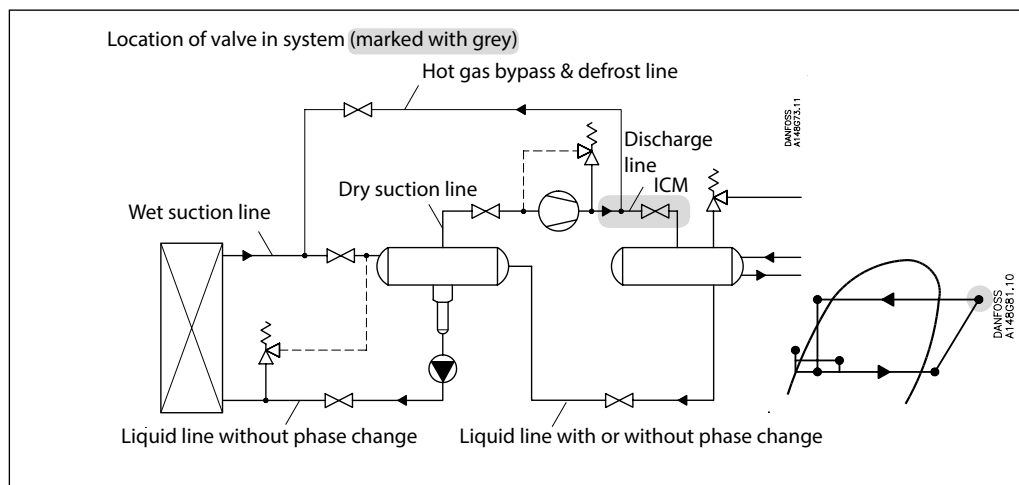
| $T_s$               | Correction factor |
|---------------------|-------------------|
| 10 $^\circ\text{F}$ | 1.00              |
| 14 $^\circ\text{F}$ | 1.00              |
| 18 $^\circ\text{F}$ | 1.00              |
| 20 $^\circ\text{F}$ | 1.00              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature                   | Correction factor |
|--------------------------------------|-------------------|
| -10 $^\circ\text{F}$                 | 0.73              |
| 10 $^\circ\text{F}$                  | 0.77              |
| 30 $^\circ\text{F}$                  | 0.82              |
| 50 $^\circ\text{F}$                  | 0.87              |
| 70 $^\circ\text{F}$                  | 0.93              |
| <b>90<math>^\circ\text{F}</math></b> | <b>1.00</b>       |
| 110 $^\circ\text{F}$                 | 1.09              |
| 130 $^\circ\text{F}$                 | 1.20              |

Nominal capacities

Discharge line



SI units

Calculation example (R717 capacities):

An application has following running conditions:

- $T_e = -20^{\circ}\text{C}$
- $Q_o = 90 \text{ kW}$
- $T_{liq} = 10^{\circ}\text{C}$
- Max.  $\Delta p = 0.4 \text{ bar}$
- $T_{disch.} = 60^{\circ}\text{C}$
- Connection: DN25

The capacity table is based on nominal condition ( $\Delta p = 0.2 \text{ bar}$ ,  $T_{liq} = 30^{\circ}\text{C}$ ,  $P_{disch.} = 12 \text{ bar}$ ,  $T_{disch.} = 80^{\circ}\text{C}$ )

Therefore the actual capacity must be corrected to nominal condition by means of correction factors.

- Correction factor for  $\Delta p$  0.4 bar  $f_{\Delta p} = 0.72$
- Correction factor for liquid temperature  $f_{T_{liq}} = 0.92$
- Correction factor for  $T_{disch.}$  60°C,  $f_{T_{disch.}} = 0.97$

$$Q_n = Q_o \times f_{\Delta p} \times f_{T_{liq}} \times f_{T_{disch.}} = 90 \times 0.72 \times 0.92 \times 0.97 = 58 \text{ kW}$$

From the capacity table a ICM 25-A with  $Q_n$  capacity 73.2 kW is selected.

US units

Calculation example (R717 capacities):

An application has following running conditions:

- $T_e = 0^{\circ}\text{F}$
- $Q_o = 8 \text{ TR}$
- $T_{liq} = 50^{\circ}\text{F}$
- Max.  $\Delta p = 4.5 \text{ psi}$
- $T_{disch.} = 120^{\circ}\text{F}$
- Connection: 3/4"

The capacity table is based on nominal condition ( $\Delta p = 3 \text{ psi}$ ,  $T_{liq} = 90^{\circ}\text{F}$ ,  $P_{disch.} = 185 \text{ psi}$ ,  $T_{disch.} = 180^{\circ}\text{F}$ )

Therefore the actual capacity must be corrected to nominal condition by means of correction factors.

- Correction factor for  $\Delta p$  4.5 psi  $f_{\Delta p} = 0.81$
- Correction factor for liquid temperature  $f_{T_{liq}} = 0.92$
- Correction factor for  $T_{disch.}$  120°F,  $f_{T_{disch.}} = 0.95$

$$Q_n = Q_o \times f_{\Delta p} \times f_{T_{liq}} \times f_{T_{disch.}} = 8 \times 0.81 \times 0.92 \times 0.95 = 5.7 \text{ TR}$$

From the capacity table a ICM 20-B with  $Q_n$  capacity 8.4 TR is selected.

Nominal capacities

Discharge line

SI units

Capacity table at nominal conditions,  $Q_N$  [kW],  
 $T_{liq} = 30^\circ\text{C}$ ,  
 $\Delta p = 0.2 \text{ bar}$ ,  
 $P_{disch.} = 12 \text{ bar}$ ,  
 $T_{disch.} = 80^\circ\text{C}$   
 Superheating =  $8^\circ\text{C}$

R 717

| Type      | Valve body size | $K_v$<br>( $\text{m}^3/\text{h}$ ) | Evaporating temperature [ $^\circ\text{C}$ ] |      |      |      |      |      |      |      |
|-----------|-----------------|------------------------------------|--|------|------|------|------|------|------|------|
|           |                 |                                    | -50  | -40  | -30  | -20  | -10  | 0    | 10   | 20   |
| ICM20A-33 | 20              | 0.2                                | 2.3  | 2.4  | 2.4  | 2.4  | 2.5  | 2.5  | 2.5  | 2.5  |
| ICM20-A   |                 | 0.6                                | 7.0  | 7.1  | 7.2  | 7.3  | 7.4  | 7.5  | 7.5  | 7.6  |
| ICM20-B   |                 | 2.4                                | 28.0   | 28.5 | 28.9 | 29.3 | 29.6 | 29.9 | 30.1 | 30.3 |
| ICM20-C   |                 | 4.6                                | 53.7   | 54.5 | 55.4 | 56.1 | 56.8 | 57.3 | 57.8 | 58.1 |
| ICM25-A   | 25              | 6                                  | 70.0   | 71.1 | 72.3 | 73.2 | 74.1 | 74.7 | 75.3 | 75.8 |
| ICM25-B   |                 | 12                                 | 140  | 142  | 145  | 146  | 148  | 149  | 151  | 152  |
| ICM32-A   | 32              | 9                                  | 105  | 107  | 108  | 110  | 111  | 112  | 113  | 114  |
| ICM32-B   |                 | 17                                 | 198  | 202  | 205  | 207  | 210  | 212  | 213  | 215  |
| ICM40-A   | 40              | 15                                 | 175  | 178  | 181  | 183  | 185  | 187  | 188  | 189  |
| ICM40-B   |                 | 26                                 | 303  | 308  | 313  | 317  | 321  | 324  | 326  | 328  |
| ICM50-A   | 50              | 23                                 | 268  | 273  | 277  | 281  | 284  | 287  | 289  | 290  |
| ICM50-B   |                 | 40                                 | 467  | 474  | 482  | 488  | 494  | 498  | 502  | 505  |
| ICM65-A   | 65              | 35                                 | 408  | 415  | 422  | 427  | 432  | 436  | 439  | 442  |
| ICM65-B   |                 | 70                                 | 817  | 830  | 843  | 854  | 864  | 872  | 879  | 884  |
| ICM100    | 100             | 142                                | 1656   | 1684 | 1710 | 1732 | 1753 | 1769 | 1782 | 1794 |
| ICM125    | 125             | 223                                | 2601   | 2644 | 2686 | 2720 | 2752 | 2778 | 2798 | 2817 |
| ICM150    | 150             | 370                                | 4316   | 4388 | 4456 | 4512 | 4567 | 4610 | 4643 | 4675 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| 0.05             | 2.00              |
| 0.1              | 1.41              |
| <b>0.2</b>       | <b>1.00</b>       |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |

Correction factor for discharge temperature ( $T_{disch.}$ )

| Discharge temperature                | Correction factor |
|--------------------------------------|-------------------|
| 50 $^\circ\text{C}$                  | 0.96              |
| 60 $^\circ\text{C}$                  | 0.97              |
| <b>80<math>^\circ\text{C}</math></b> | <b>1.00</b>       |
| 90 $^\circ\text{C}$                  | 1.01              |
| 100 $^\circ\text{C}$                 | 1.03              |
| 110 $^\circ\text{C}$                 | 1.04              |
| 120 $^\circ\text{C}$                 | 1.06              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature                   | Correction factor |
|--------------------------------------|-------------------|
| -20 $^\circ\text{C}$                 | 0.82              |
| -10 $^\circ\text{C}$                 | 0.86              |
| 0 $^\circ\text{C}$                   | 0.88              |
| 10 $^\circ\text{C}$                  | 0.92              |
| 20 $^\circ\text{C}$                  | 0.96              |
| <b>30<math>^\circ\text{C}</math></b> | <b>1.00</b>       |
| 40 $^\circ\text{C}$                  | 1.04              |
| 50 $^\circ\text{C}$                  | 1.09              |

US units

Capacity table at nominal conditions,  $Q_N$  [Tons of Refrigeration],  
 $T_{liq} = 90^\circ\text{F}$ ,  
 $\Delta p = 2.9 \text{ psi}$ ,  
 $P_{disch.} = 185 \text{ psi}$ ,  
 $T_{disch.} = 180^\circ\text{F}$   
 Superheating =  $12^\circ\text{F}$

R 717

| Type      | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature [ $^\circ\text{F}$ ] |      |      |      |      |      |      |      |
|-----------|-----------------|----------------------|--|------|------|------|------|------|------|------|
|           |                 |                      | -60  | -40  | -20  | 0    | 20   | 40   | 60   | 80   |
| ICM20-A33 | 20              | 0.23                 | 0.66   | 0.67 | 0.68 | 0.69 | 0.70 | 0.71 | 0.71 | 0.72 |
| ICM20-A   |                 | 0.7                  | 2.0  | 2.0  | 2.1  | 2.1  | 2.1  | 2.2  | 2.2  | 2.2  |
| ICM20-B   |                 | 2.8                  | 8.0  | 8.2  | 8.3  | 8.4  | 8.5  | 8.6  | 8.7  | 8.7  |
| ICM20-C   |                 | 5.3                  | 15.2   | 15.4 | 15.7 | 15.9 | 16.1 | 16.3 | 16.4 | 16.5 |
| ICM25-A   | 25              | 7                    | 20.0   | 20.4 | 20.7 | 21.0 | 21.3 | 21.5 | 21.7 | 21.8 |
| ICM25-B   |                 | 14                   | 40.1   | 40.8 | 41.5 | 42.0 | 42.6 | 43.0 | 43.4 | 43.6 |
| ICM32-A   | 32              | 10                   | 28.6   | 29.1 | 29.6 | 30.0 | 30.4 | 30.7 | 31.0 | 31.2 |
| ICM32-B   |                 | 20                   | 57.3   | 58.3 | 59.3 | 60.0 | 60.9 | 61.5 | 62.0 | 62.3 |
| ICM40-A   | 40              | 17                   | 48.7   | 49.5 | 50.4 | 51.0 | 51.7 | 52.3 | 52.7 | 53.0 |
| ICM40-B   |                 | 30                   | 85.9   | 87.4 | 88.9 | 90.0 | 91.3 | 92.2 | 93.0 | 93.5 |
| ICM50-A   | 50              | 27                   | 77.3   | 78.7 | 80.0 | 81.0 | 82.2 | 83.0 | 83.7 | 84.2 |
| ICM50-B   |                 | 46                   | 132  | 134  | 136  | 138  | 140  | 141  | 143  | 143  |
| ICM65-A   | 65              | 41                   | 117  | 119  | 122  | 123  | 125  | 126  | 127  | 128  |
| ICM65-B   |                 | 81                   | 232  | 236  | 240  | 243  | 247  | 249  | 251  | 253  |
| ICM100    | 100             | 165                  | 472  | 480  | 489  | 495  | 501  | 508  | 512  | 514  |
| ICM125    | 125             | 259                  | 741  | 754  | 768  | 777  | 787  | 797  | 804  | 807  |
| ICM150    | 150             | 430                  | 1231   | 1251 | 1275 | 1290 | 1307 | 1324 | 1335 | 1341 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| 0.75             | 1.97              |
| 1.5              | 1.39              |
| <b>3</b>         | <b>1.00</b>       |
| 3.5              | 0.91              |
| 4                | 0.85              |
| 4.5              | 0.81              |

Correction factor for discharge temperature ( $T_{disch.}$ )

| Discharge temperature                 | Correction factor |
|---------------------------------------|-------------------|
| 120 $^\circ\text{F}$                  | 0.95              |
| 140 $^\circ\text{F}$                  | 0.97              |
| <b>180<math>^\circ\text{F}</math></b> | <b>1.00</b>       |
| 200 $^\circ\text{F}$                  | 1.02              |
| 210 $^\circ\text{F}$                  | 1.02              |
| 230 $^\circ\text{F}$                  | 1.04              |
| 250 $^\circ\text{F}$                  | 1.05              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature                   | Correction factor |
|--------------------------------------|-------------------|
| -10 $^\circ\text{F}$                 | 0.82              |
| 10 $^\circ\text{F}$                  | 0.85              |
| 30 $^\circ\text{F}$                  | 0.88              |
| 50 $^\circ\text{F}$                  | 0.92              |
| 70 $^\circ\text{F}$                  | 0.96              |
| <b>90<math>^\circ\text{F}</math></b> | <b>1.00</b>       |
| 110 $^\circ\text{F}$                 | 1.04              |
| 130 $^\circ\text{F}$                 | 1.09              |



Nominal capacities

Discharge line

SI units

Capacity table at nominal conditions,  $Q_N$  [kW],  
 $T_{liq} = 10^\circ\text{C}$ ,  
 $\Delta p = 0.2 \text{ bar}$ ,  
 $P_{disch.} = 10 \text{ bar}$ ,  
 $T_{disch.} = 80^\circ\text{C}$   
 Superheating =  $8^\circ\text{C}$

R 744

| Type      | Valve body size | $K_v$<br>( $\text{m}^3/\text{h}$ ) | Evaporating temperature [ $^\circ\text{C}$ ] |      |      |      |      |      |      |
|-----------|-----------------|------------------------------------|--|------|------|------|------|------|------|
|           |                 |                                    | -50  | -40  | -30  | -20  | -10  | 0    | 10   |
| ICM20A-33 | 20              | 0.2                                | 1.5  | 2.4  | 2.4  | 2.4  | 2.5  | 2.5  | 2.5  |
| ICM20-A   |                 | 0.6                                | 4.4  | 4.5  | 4.5  | 4.6  | 4.6  | 4.5  | 4.4  |
| ICM20-B   |                 | 2.4                                | 17.7   | 17.9 | 18.1 | 18.2 | 18.2 | 18.0 | 17.7 |
| ICM20-C   |                 | 4.6                                | 33.8   | 34.4 | 34.8 | 34.9 | 34.9 | 34.6 | 33.9 |
| ICM25-A   | 25              | 6                                  | 44.1   | 44.8 | 45.3 | 45.5 | 45.5 | 45.1 | 44.2 |
| ICM25-B   |                 | 12                                 | 88.3   | 89.7 | 90.7 | 91.0 | 91.0 | 90.2 | 88.5 |
| ICM32-A   | 32              | 9                                  | 66.2   | 67.2 | 68.0 | 68.3 | 68.3 | 67.6 | 66.3 |
| ICM32-B   |                 | 17                                 | 125  | 127  | 128  | 129  | 129  | 128  | 125  |
| ICM40-A   | 40              | 15                                 | 110  | 112  | 113  | 114  | 114  | 113  | 111  |
| ICM40-B   |                 | 26                                 | 191  | 194  | 196  | 197  | 197  | 195  | 192  |
| ICM50-A   | 50              | 23                                 | 169  | 172  | 174  | 174  | 174  | 173  | 170  |
| ICM50-B   |                 | 40                                 | 294  | 299  | 302  | 303  | 303  | 301  | 295  |
| ICM65-A   | 65              | 35                                 | 257  | 262  | 264  | 266  | 266  | 263  | 258  |
| ICM65-B   |                 | 70                                 | 515  | 523  | 529  | 531  | 531  | 526  | 516  |
| ICM100    | 100             | 142                                | 1044   | 1061 | 1071 | 1078 | 1078 | 1067 | 1047 |
| ICM125    | 125             | 223                                | 1639   | 1666 | 1683 | 1693 | 1693 | 1676 | 1644 |
| ICM150    | 150             | 370                                | 2720   | 2765 | 2792 | 2808 | 2808 | 2781 | 2728 |

Correction factor for discharge temperature ( $T_{disch.}$ ).

| Discharge temperature                | Correction factor |
|--------------------------------------|-------------------|
| 50 $^\circ\text{C}$                  | 0.96              |
| 60 $^\circ\text{C}$                  | 0.97              |
| <b>80<math>^\circ\text{C}</math></b> | <b>1.00</b>       |
| 90 $^\circ\text{C}$                  | 1.01              |
| 100 $^\circ\text{C}$                 | 1.03              |
| 110 $^\circ\text{C}$                 | 1.04              |
| 120 $^\circ\text{C}$                 | 1.06              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature                   | Correction factor |
|--------------------------------------|-------------------|
| -20 $^\circ\text{C}$                 | 0.52              |
| -10 $^\circ\text{C}$                 | 0.67              |
| 0 $^\circ\text{C}$                   | 0.91              |
| <b>10<math>^\circ\text{C}</math></b> | <b>1.00</b>       |
| 15 $^\circ\text{C}$                  | 1.09              |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| 0.05             | 2.00              |
| 0.1              | 1.41              |
| <b>0.2</b>       | <b>1.00</b>       |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |

US units

Capacity table at nominal conditions,  $Q_N$  [Tons of Refrigeration],  
 $T_{liq} = 90^\circ\text{F}$ ,  
 $\Delta p = 3 \text{ psi}$ ,  
 $P_{disch.} = 120 \text{ psi}$ ,  
 $T_{disch.} = 180^\circ\text{F}$   
 Superheating =  $12^\circ\text{F}$

R 744

| Type      | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature [ $^\circ\text{F}$ ] |      |      |      |      |      |      |
|-----------|-----------------|----------------------|--|------|------|------|------|------|------|
|           |                 |                      | -60  | -40  | -20  | 0    | 20   | 40   | 60   |
| ICM20-A33 | 20              | 0.23                 | 0.40   | 0.41 | 0.42 | 0.42 | 0.42 | 0.41 | 0.41 |
| ICM20-A   |                 | 0.7                  | 1.2  | 1.3  | 1.3  | 1.3  | 1.3  | 1.2  | 1.2  |
| ICM20-B   |                 | 2.8                  | 4.9  | 5.0  | 5.1  | 5.1  | 5.1  | 5.0  | 5.0  |
| ICM20-C   |                 | 5.3                  | 9.3  | 9.5  | 9.6  | 9.7  | 9.6  | 9.5  | 9.5  |
| ICM25-A   | 25              | 7                    | 12.3   | 12.6 | 12.7 | 12.8 | 12.7 | 12.5 | 12.5 |
| ICM25-B   |                 | 14                   | 24.7   | 25.1 | 25.4 | 25.5 | 25.4 | 25.0 | 25.0 |
| ICM32-A   | 32              | 10                   | 17.6   | 18.0 | 18.1 | 18.2 | 18.1 | 17.8 | 17.8 |
| ICM32-B   |                 | 20                   | 35.3   | 35.9 | 36.3 | 36.5 | 36.3 | 35.7 | 35.7 |
| ICM40-A   | 40              | 17                   | 30.0   | 30.5 | 30.9 | 31.0 | 30.9 | 30.3 | 30.3 |
| ICM40-B   |                 | 30                   | 52.9   | 53.9 | 54.4 | 54.7 | 54.4 | 53.5 | 53.5 |
| ICM50-A   | 50              | 27                   | 47.6   | 48.5 | 49.0 | 49.2 | 49.0 | 48.2 | 48.2 |
| ICM50-B   |                 | 46                   | 81.1   | 82.6 | 83.5 | 83.9 | 83.5 | 82.1 | 82.1 |
| ICM65-A   | 65              | 41                   | 72   | 74   | 75   | 75   | 75   | 73   | 73   |
| ICM65-B   |                 | 81                   | 143  | 145  | 147  | 148  | 147  | 145  | 145  |
| ICM100    | 100             | 165                  | 290  | 297  | 300  | 301  | 300  | 294  | 294  |
| ICM125    | 125             | 259                  | 455  | 466  | 471  | 473  | 471  | 461  | 461  |
| ICM150    | 150             | 430                  | 756  | 774  | 782  | 786  | 782  | 765  | 765  |

Correction factor for discharge temperature ( $T_{disch.}$ ).

| Discharge temperature                 | Correction factor |
|---------------------------------------|-------------------|
| 120 $^\circ\text{F}$                  | 0.95              |
| 140 $^\circ\text{F}$                  | 0.97              |
| <b>180<math>^\circ\text{F}</math></b> | <b>1.00</b>       |
| 200 $^\circ\text{F}$                  | 1.02              |
| 210 $^\circ\text{F}$                  | 1.02              |
| 230 $^\circ\text{F}$                  | 1.04              |
| 250 $^\circ\text{F}$                  | 1.05              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature                   | Correction factor |
|--------------------------------------|-------------------|
| -10 $^\circ\text{F}$                 | 0.48              |
| 10 $^\circ\text{F}$                  | 0.64              |
| 30 $^\circ\text{F}$                  | 0.88              |
| <b>50<math>^\circ\text{F}</math></b> | <b>1.00</b>       |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| 0.75             | 1.97              |
| 1.5              | 1.39              |
| <b>3</b>         | <b>1.00</b>       |
| 3.5              | 0.91              |
| 4                | 0.85              |
| 4.5              | 0.81              |

Nominal capacities

Discharge line

SI units

Capacity table at nominal conditions,  $Q_N$  [kW],  
 $T_{liq} = 30^\circ\text{C}$ ,  
 $\Delta p = 0.2$  bar,  
 $P_{disch.} = 8$  bar,  
 $T_{disch.} = 80^\circ\text{C}$   
 Superheating =  $8^\circ\text{C}$

R 134a

| Type      | Valve body size | $K_v$<br>( $\text{m}^3/\text{h}$ ) | Evaporating temperature [ $^\circ\text{C}$ ] |      |      |      |      |      |      |
|-----------|-----------------|------------------------------------|--|------|------|------|------|------|------|
|           |                 |                                    | -40  | -30  | -20  | -10  | 0    | 10   | 20   |
| ICM20A-33 | 20              | 0.2                                | 1.9  | 2.0  | 2.1  | 2.2  | 2.3  | 2.3  | 2.4  |
| ICM20-A   |                 | 0.6                                | 5.7  | 6.0  | 6.3  | 6.5  | 6.8  | 7.0  | 7.3  |
| ICM20-B   |                 | 2.4                                | 22.9   | 24.0 | 25.1 | 26.1 | 27.2 | 28.2 | 29.1 |
| ICM20-C   |                 | 4.6                                | 43.8   | 45.9 | 48.0 | 50.1 | 52.0 | 54.0 | 55.9 |
| ICM25-A   | 25              | 6                                  | 57.2   | 59.9 | 62.7 | 65.3 | 67.9 | 70.5 | 72.9 |
| ICM25-B   |                 | 12                                 | 114  | 120  | 125  | 131  | 136  | 141  | 146  |
| ICM32-A   | 32              | 9                                  | 85.8   | 89.9 | 94.0 | 98.0 | 102  | 106  | 109  |
| ICM32-B   |                 | 17                                 | 162  | 170  | 178  | 185  | 192  | 200  | 206  |
| ICM40-A   | 40              | 15                                 | 143  | 150  | 157  | 163  | 170  | 176  | 182  |
| ICM40-B   |                 | 26                                 | 248  | 260  | 272  | 283  | 294  | 305  | 316  |
| ICM50-A   | 50              | 23                                 | 219  | 230  | 240  | 250  | 260  | 270  | 279  |
| ICM50-B   |                 | 40                                 | 381  | 399  | 418  | 435  | 453  | 470  | 486  |
| ICM65-A   | 65              | 35                                 | 333  | 350  | 366  | 381  | 396  | 411  | 425  |
| ICM65-B   |                 | 70                                 | 667  | 699  | 731  | 762  | 792  | 822  | 850  |
| ICM100    | 100             | 142                                | 1353   | 1419 | 1484 | 1545 | 1607 | 1667 | 1724 |
| ICM125    | 125             | 223                                | 2124   | 2228 | 2331 | 2426 | 2524 | 2618 | 2708 |
| ICM150    | 150             | 370                                | 3524   | 3697 | 3867 | 4025 | 4188 | 4344 | 4492 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| 0.05             | 2.00              |
| 0.1              | 1.41              |
| <b>0.2</b>       | <b>1.00</b>       |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |

Correction factor for discharge temperature ( $T_{disch.}$ )

| Discharge temperature                | Correction factor |
|--------------------------------------|-------------------|
| 50 $^\circ\text{C}$                  | 0.96              |
| 60 $^\circ\text{C}$                  | 0.97              |
| <b>80<math>^\circ\text{C}</math></b> | <b>1.00</b>       |
| 90 $^\circ\text{C}$                  | 1.01              |
| 100 $^\circ\text{C}$                 | 1.03              |
| 110 $^\circ\text{C}$                 | 1.04              |
| 120 $^\circ\text{C}$                 | 1.06              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature                   | Correction factor |
|--------------------------------------|-------------------|
| -20 $^\circ\text{C}$                 | 0.66              |
| -10 $^\circ\text{C}$                 | 0.70              |
| 0 $^\circ\text{C}$                   | 0.76              |
| 10 $^\circ\text{C}$                  | 0.82              |
| 20 $^\circ\text{C}$                  | 0.90              |
| <b>30<math>^\circ\text{C}</math></b> | <b>1.00</b>       |
| 40 $^\circ\text{C}$                  | 1.13              |
| 50 $^\circ\text{C}$                  | 1.29              |

US units

Capacity table at nominal conditions,  $Q_N$  [Tons of Refrigeration],  
 $T_{liq} = 90^\circ\text{F}$ ,  
 $\Delta p = 3$  psi,  
 $P_{disch.} = 120$  psi,  
 $T_{disch.} = 180^\circ\text{F}$   
 Superheating =  $12^\circ\text{F}$

R 134a

| Type      | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature [ $^\circ\text{F}$ ] |      |      |      |      |      |      |
|-----------|-----------------|----------------------|--|------|------|------|------|------|------|
|           |                 |                      | -40  | -20  | 0    | 20   | 40   | 60   | 80   |
| ICM20-A33 | 20              | 0.23                 | 0.17   | 0.18 | 0.19 | 0.19 | 0.20 | 0.21 | 0.22 |
| ICM20-A   |                 | 0.7                  | 0.5  | 0.5  | 0.6  | 0.6  | 0.6  | 0.6  | 0.7  |
| ICM20-B   |                 | 2.8                  | 2.0  | 2.1  | 2.3  | 2.4  | 2.5  | 2.6  | 2.7  |
| ICM20-C   |                 | 5.3                  | 3.9  | 4.1  | 4.3  | 4.5  | 4.7  | 4.9  | 5.0  |
| ICM25-A   | 25              | 7                    | 5.1  | 5.4  | 5.6  | 5.9  | 6.2  | 6.4  | 6.7  |
| ICM25-B   |                 | 14                   | 10.2   | 10.7 | 11.3 | 11.8 | 12.3 | 12.8 | 13.3 |
| ICM32-A   | 32              | 10                   | 7.3  | 7.7  | 8.0  | 8.4  | 8.8  | 9.2  | 9.5  |
| ICM32-B   |                 | 20                   | 14.5   | 15.3 | 16.1 | 16.9 | 17.6 | 18.3 | 19.0 |
| ICM40-A   | 40              | 17                   | 12.4   | 13.0 | 13.7 | 14.3 | 15.0 | 15.6 | 16.2 |
| ICM40-B   |                 | 30                   | 21.8   | 23.0 | 24.1 | 25.3 | 26.4 | 27.5 | 28.5 |
| ICM50-A   | 50              | 27                   | 19.6   | 20.7 | 21.7 | 22.8 | 23.8 | 24.7 | 25.7 |
| ICM50-B   |                 | 46                   | 33.4   | 35.3 | 37.0 | 38.8 | 40.5 | 42.1 | 43.7 |
| ICM65-A   | 65              | 41                   | 30   | 31   | 33   | 35   | 36   | 37   | 39   |
| ICM65-B   |                 | 81                   | 58.9   | 62.1 | 65.2 | 68.3 | 71.3 | 74.2 | 77.0 |
| ICM100    | 100             | 165                  | 120  | 126  | 134  | 140  | 145  | 151  | 158  |
| ICM125    | 125             | 259                  | 188  | 197  | 210  | 219  | 228  | 236  | 248  |
| ICM150    | 150             | 430                  | 312  | 328  | 348  | 364  | 379  | 393  | 411  |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| 0.75             | 1.97              |
| 1.5              | 1.39              |
| <b>3</b>         | <b>1.00</b>       |
| 3.5              | 0.91              |
| 4                | 0.85              |
| 4.5              | 0.81              |

Correction factor for discharge temperature ( $T_{disch.}$ )

| Discharge temperature                 | Correction factor |
|---------------------------------------|-------------------|
| 120 $^\circ\text{F}$                  | 0.95              |
| 140 $^\circ\text{F}$                  | 0.97              |
| <b>180<math>^\circ\text{F}</math></b> | <b>1.00</b>       |
| 200 $^\circ\text{F}$                  | 1.02              |
| 210 $^\circ\text{F}$                  | 1.02              |
| 230 $^\circ\text{F}$                  | 1.04              |
| 250 $^\circ\text{F}$                  | 1.05              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature                   | Correction factor |
|--------------------------------------|-------------------|
| -10 $^\circ\text{F}$                 | 0.64              |
| 10 $^\circ\text{F}$                  | 0.68              |
| 30 $^\circ\text{F}$                  | 0.74              |
| 50 $^\circ\text{F}$                  | 0.81              |
| 70 $^\circ\text{F}$                  | 0.89              |
| <b>90<math>^\circ\text{F}</math></b> | <b>1.00</b>       |
| 110 $^\circ\text{F}$                 | 1.15              |
| 130 $^\circ\text{F}$                 | 1.35              |

Nominal capacities

SI units

Capacity table at nominal conditions,  $Q_N$  [kW],  
 $T_{liq} = 30^\circ\text{C}$ ,  
 $\Delta p = 0.2 \text{ bar}$ ,  
 $P_{disch.} = 12 \text{ bar}$ ,  
 $T_{disch.} = 80^\circ\text{C}$   
 Superheating =  $8^\circ\text{C}$

R 404A

Discharge line

| Type      | Valve body size | $K_v$<br>( $\text{m}^3/\text{h}$ ) | Evaporating temperature $^\circ\text{C}$ |      |      |      |      |      |      |      |
|-----------|-----------------|------------------------------------|--|------|------|------|------|------|------|------|
|           |                 |                                    | -50                                      | -40  | -30  | -20  | -10  | 0    | 10   | 20   |
| ICM20A-33 | 20              | 0.2                                | 1.8                                      | 1.9  | 2.0  | 2.1  | 2.2  | 2.4  | 2.5  | 2.5  |
| ICM20-A   |                 | 0.6                                | 5.3                                      | 5.7  | 6.0  | 6.4  | 6.7  | 7.1  | 7.4  | 7.6  |
| ICM20-B   |                 | 2.4                                | 21.2                                     | 22.6 | 24.1 | 25.5 | 26.9 | 28.2 | 29.5 | 30.5 |
| ICM20-C   |                 | 4.6                                | 40.6                                     | 43.4 | 46.2 | 48.9 | 51.5 | 54.1 | 56.4 | 58.6 |
| ICM25-A   | 25              | 6                                  | 53.0                                     | 56.6 | 60.3 | 63.8 | 67.2 | 70.5 | 73.6 | 76.4 |
| ICM25-B   |                 | 12                                 | 106                                      | 113  | 121  | 128  | 134  | 141  | 147  | 153  |
| ICM32-A   | 32              | 9                                  | 79.5                                     | 84.9 | 90.4 | 95.7 | 101  | 106  | 110  | 115  |
| ICM32-B   |                 | 17                                 | 150                                      | 160  | 171  | 181  | 190  | 200  | 209  | 216  |
| ICM40-A   | 40              | 15                                 | 132                                      | 141  | 151  | 159  | 168  | 176  | 184  | 191  |
| ICM40-B   |                 | 26                                 | 230                                      | 245  | 261  | 276  | 291  | 306  | 319  | 331  |
| ICM50-A   | 50              | 23                                 | 203                                      | 217  | 231  | 244  | 258  | 270  | 282  | 293  |
| ICM50-B   |                 | 40                                 | 353                                      | 377  | 402  | 425  | 448  | 470  | 491  | 509  |
| ICM65-A   | 65              | 35                                 | 309                                      | 330  | 352  | 372  | 392  | 412  | 430  | 445  |
| ICM65-B   |                 | 70                                 | 618                                      | 660  | 703  | 744  | 784  | 823  | 859  | 891  |
| ICM100    | 100             | 142                                | 1254                                     | 1339 | 1427 | 1510 | 1590 | 1670 | 1743 | 1807 |
| ICM125    | 125             | 223                                | 1969                                     | 2103 | 2240 | 2371 | 2497 | 2623 | 2737 | 2838 |
| ICM150    | 150             | 370                                | 3267                                     | 3489 | 3717 | 3934 | 4142 | 4352 | 4541 | 4709 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| 0.05             | 2.00              |
| 0.1              | 1.41              |
| <b>0.2</b>       | <b>1.00</b>       |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |

Correction factor for discharge temperature ( $T_{disch.}$ )

| Discharge temperature                | Correction factor |
|--------------------------------------|-------------------|
| 50 $^\circ\text{C}$                  | 0.96              |
| 60 $^\circ\text{C}$                  | 0.97              |
| <b>80<math>^\circ\text{C}</math></b> | <b>1.00</b>       |
| 90 $^\circ\text{C}$                  | 1.01              |
| 100 $^\circ\text{C}$                 | 1.03              |
| 110 $^\circ\text{C}$                 | 1.04              |
| 120 $^\circ\text{C}$                 | 1.06              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature                   | Correction factor |
|--------------------------------------|-------------------|
| -20 $^\circ\text{C}$                 | 0.55              |
| -10 $^\circ\text{C}$                 | 0.60              |
| 0 $^\circ\text{C}$                   | 0.66              |
| 10 $^\circ\text{C}$                  | 0.74              |
| 20 $^\circ\text{C}$                  | 0.85              |
| <b>30<math>^\circ\text{C}</math></b> | <b>1.00</b>       |
| 40 $^\circ\text{C}$                  | 1.23              |
| 50 $^\circ\text{C}$                  | 1.68              |

US units

Capacity table at nominal conditions,  $Q_N$  [Tons of Refrigeration],  
 $T_{liq} = 90^\circ\text{F}$ ,  
 $\Delta p = 3 \text{ psi}$ ,  
 $P_{disch.} = 120 \text{ psi}$ ,  
 $T_{disch.} = 180^\circ\text{F}$   
 Superheating =  $12^\circ\text{F}$

R 404A

| Typ       | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature $^\circ\text{F}$ |      |      |      |      |      |      |      |
|-----------|-----------------|----------------------|--|------|------|------|------|------|------|------|
|           |                 |                      | -60                                      | -40  | -20  | 0    | 20   | 40   | 60   | 80   |
| ICM20-A33 | 20              | 0.23                 | 0.15                                     | 0.16 | 0.17 | 0.19 | 0.20 | 0.21 | 0.22 | 0.23 |
| ICM20-A   |                 | 0.7                  | 0.5                                      | 0.5  | 0.5  | 0.6  | 0.6  | 0.6  | 0.7  | 0.7  |
| ICM20-B   |                 | 2.8                  | 1.8                                      | 2.0  | 2.1  | 2.3  | 2.4  | 2.5  | 2.7  | 2.8  |
| ICM20-C   |                 | 5.3                  | 3.5                                      | 3.7  | 4.0  | 4.3  | 4.6  | 4.8  | 5.0  | 5.2  |
| ICM25-A   | 25              | 7                    | 4.6                                      | 5.0  | 5.3  | 5.7  | 6.0  | 6.4  | 6.6  | 6.9  |
| ICM25-B   |                 | 14                   | 9.2                                      | 9.9  | 10.6 | 11.4 | 12.0 | 12.7 | 13.3 | 13.8 |
| ICM32-A   | 32              | 10                   | 6.5                                      | 7.1  | 7.6  | 8.1  | 8.6  | 9.1  | 9.5  | 9.9  |
| ICM32-B   |                 | 20                   | 13.1                                     | 14.1 | 15.2 | 16.2 | 17.2 | 18.1 | 19.0 | 19.7 |
| ICM40-A   | 40              | 17                   | 11.1                                     | 12.0 | 12.9 | 13.8 | 14.6 | 15.4 | 16.1 | 16.8 |
| ICM40-B   |                 | 30                   | 19.6                                     | 21.2 | 22.8 | 24.3 | 25.8 | 27.2 | 28.5 | 29.6 |
| ICM50-A   | 50              | 27                   | 17.7                                     | 19.1 | 20.5 | 21.9 | 23.2 | 24.5 | 25.6 | 26.6 |
| ICM50-B   |                 | 46                   | 30.1                                     | 32.5 | 35.0 | 37.3 | 39.6 | 41.7 | 43.7 | 45.4 |
| ICM65-A   | 65              | 41                   | 27                                       | 29   | 31   | 33   | 35   | 37   | 39   | 41   |
| ICM65-B   |                 | 81                   | 53.0                                     | 57.3 | 61.6 | 65.7 | 69.7 | 73.5 | 76.9 | 79.9 |
| ICM100    | 100             | 165                  | 109                                      | 117  | 124  | 135  | 142  | 149  | 157  | 163  |
| ICM125    | 125             | 259                  | 171                                      | 183  | 195  | 211  | 223  | 234  | 247  | 256  |
| ICM150    | 150             | 430                  | 283                                      | 304  | 324  | 351  | 370  | 388  | 410  | 425  |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| 0.75             | 1.97              |
| 1.5              | 1.39              |
| <b>3</b>         | <b>1.00</b>       |
| 3.5              | 0.91              |
| 4                | 0.85              |
| 4.5              | 0.81              |

Correction factor for discharge temperature ( $T_{disch.}$ )

| Discharge temperature                 | Correction factor |
|---------------------------------------|-------------------|
| 120 $^\circ\text{F}$                  | 0.95              |
| 140 $^\circ\text{F}$                  | 0.97              |
| <b>180<math>^\circ\text{F}</math></b> | <b>1.00</b>       |
| 200 $^\circ\text{F}$                  | 1.02              |
| 210 $^\circ\text{F}$                  | 1.02              |
| 230 $^\circ\text{F}$                  | 1.04              |
| 250 $^\circ\text{F}$                  | 1.05              |

Correction factor for liquid temperature ( $T_{liq}$ )

| Liquid temperature                   | Correction factor |
|--------------------------------------|-------------------|
| -10 $^\circ\text{F}$                 | 0.52              |
| 10 $^\circ\text{F}$                  | 0.57              |
| 30 $^\circ\text{F}$                  | 0.63              |
| 50 $^\circ\text{F}$                  | 0.72              |
| 70 $^\circ\text{F}$                  | 0.83              |
| <b>90<math>^\circ\text{F}</math></b> | <b>1.00</b>       |
| 110 $^\circ\text{F}$                 | 1.29              |
| 130 $^\circ\text{F}$                 | 1.92              |

Nominal capacities

SI units

Capacity table at nominal conditions,  $Q_N$  [kW],  
 $T_{liq} = 30^\circ\text{C}$ ,  
 $\Delta p = 0.2 \text{ bar}$ ,  
 $P_{disch.} = 12 \text{ bar}$ ,  
 $T_{disch.} = 80^\circ\text{C}$   
 Superheating =  $8^\circ\text{C}$

R 22

Discharge line

| Type      | Valve body size | $K_v$<br>( $\text{m}^3/\text{h}$ ) | Evaporating temperature $^\circ\text{C}$ |      |      |      |      |      |      |      |
|-----------|-----------------|------------------------------------|--|------|------|------|------|------|------|------|
|           |                 |                                    | -50                                      | -40  | -30  | -20  | -10  | 0    | 10   | 20   |
| ICM20A-33 | 20              | 0.2                                | 0.76                                     | 0.78 | 0.80 | 0.83 | 0.84 | 0.87 | 0.89 | 0.90 |
| ICM20-A   |                 | 0.6                                | 2.3                                      | 2.3  | 2.4  | 2.5  | 2.5  | 2.6  | 2.7  | 2.7  |
| ICM20-B   |                 | 2.4                                | 9.1                                      | 9.3  | 9.6  | 9.9  | 10.1 | 10.4 | 10.6 | 10.8 |
| ICM20-C   |                 | 4.6                                | 17.3                                     | 17.9 | 18.4 | 19.0 | 19.5 | 19.9 | 20.4 | 20.8 |
| ICM25-A   | 25              | 6                                  | 22.6                                     | 23.4 | 24.0 | 24.7 | 25.4 | 26.0 | 26.6 | 27.1 |
| ICM25-B   |                 | 12                                 | 45.3                                     | 46.7 | 48.1 | 49.5 | 50.7 | 51.9 | 53.1 | 54.2 |
| ICM32-A   | 32              | 9                                  | 33.9                                     | 35.0 | 36.1 | 37.1 | 38.1 | 39.0 | 39.9 | 40.6 |
| ICM32-B   |                 | 17                                 | 64.1                                     | 66.2 | 68.1 | 70.1 | 71.9 | 73.6 | 75.3 | 76.7 |
| ICM40-A   | 40              | 15                                 | 56.6                                     | 58.4 | 60.1 | 61.8 | 63.4 | 64.9 | 66.4 | 67.7 |
| ICM40-B   |                 | 26                                 | 98.1                                     | 101  | 104  | 107  | 110  | 113  | 115  | 117  |
| ICM50-A   | 50              | 23                                 | 86.7                                     | 89.5 | 92.2 | 94.8 | 97.3 | 100  | 102  | 104  |
| ICM50-B   |                 | 40                                 | 151                                      | 156  | 160  | 165  | 169  | 173  | 177  | 181  |
| ICM65-A   | 65              | 35                                 | 132                                      | 136  | 140  | 144  | 148  | 152  | 155  | 158  |
| ICM65-B   |                 | 70                                 | 264                                      | 273  | 281  | 289  | 296  | 303  | 310  | 316  |
| ICM100    | 100             | 142                                | 536                                      | 552  | 569  | 586  | 600  | 615  | 630  | 641  |
| ICM125    | 125             | 223                                | 842                                      | 867  | 893  | 920  | 942  | 966  | 989  | 1006 |
| ICM150    | 150             | 370                                | 1398                                     | 1438 | 1482 | 1527 | 1563 | 1603 | 1641 | 1670 |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (bar) | Correction factor |
|------------------|-------------------|
| <b>0.2</b>       | <b>1.00</b>       |
| 0.25             | 0.89              |
| 0.3              | 0.82              |
| 0.4              | 0.71              |
| 0.5              | 0.63              |
| 0.6              | 0.58              |

Correction factor for discharge temperature ( $T_{disch.}$ )

| Discharge temperature                | Correction factor |
|--------------------------------------|-------------------|
| 50 $^\circ\text{C}$                  | 0.96              |
| 60 $^\circ\text{C}$                  | 0.97              |
| <b>80<math>^\circ\text{C}</math></b> | <b>1.00</b>       |
| 90 $^\circ\text{C}$                  | 1.01              |
| 100 $^\circ\text{C}$                 | 1.03              |
| 110 $^\circ\text{C}$                 | 1.04              |
| 120 $^\circ\text{C}$                 | 1.06              |

Correction factor for liquid temperature ( $T_{liq.}$ )

| Liquid temperature                   | Correction factor |
|--------------------------------------|-------------------|
| -20 $^\circ\text{C}$                 | 0.71              |
| -10 $^\circ\text{C}$                 | 0.75              |
| 0 $^\circ\text{C}$                   | 0.80              |
| 10 $^\circ\text{C}$                  | 0.86              |
| 20 $^\circ\text{C}$                  | 0.92              |
| <b>30<math>^\circ\text{C}</math></b> | <b>1.00</b>       |
| 40 $^\circ\text{C}$                  | 1.09              |
| 50 $^\circ\text{C}$                  | 1.22              |

US units

Capacity table at nominal conditions,  $Q_N$  [Tons of Refrigeration],  
 $T_{liq} = 90^\circ\text{F}$ ,  
 $\Delta p = 3 \text{ psi}$ ,  
 $P_{disch.} = 120 \text{ psi}$ ,  
 $T_{disch.} = 180^\circ\text{F}$   
 Superheating =  $12^\circ\text{F}$

R 22

| Typ       | Valve body size | $C_v$<br>(USgal/min) | Evaporating temperature $^\circ\text{F}$ |      |      |      |      |      |      |      |
|-----------|-----------------|----------------------|--|------|------|------|------|------|------|------|
|           |                 |                      | -60                                      | -40  | -20  | 0    | 20   | 40   | 60   | 80   |
| ICM20-A33 | 20              | 0.23                 | 0.21                                     | 0.22 | 0.23 | 0.23 | 0.24 | 0.24 | 0.25 | 0.26 |
| ICM20-A   |                 | 0.7                  | 0.6                                      | 0.7  | 0.7  | 0.7  | 0.7  | 0.7  | 0.8  | 0.8  |
| ICM20-B   |                 | 2.8                  | 2.6                                      | 2.6  | 2.7  | 2.8  | 2.9  | 3.0  | 3.0  | 3.1  |
| ICM20-C   |                 | 5.3                  | 4.8                                      | 5.0  | 5.2  | 5.3  | 5.5  | 5.6  | 5.8  | 5.9  |
| ICM25-A   | 25              | 7                    | 6.4                                      | 6.6  | 6.8  | 7.1  | 7.3  | 7.4  | 7.6  | 7.8  |
| ICM25-B   |                 | 14                   | 12.8                                     | 13.2 | 13.7 | 14.1 | 14.5 | 14.9 | 15.2 | 15.6 |
| ICM32-A   | 32              | 10                   | 9.1                                      | 9.5  | 9.8  | 10.1 | 10.4 | 10.6 | 10.9 | 11.1 |
| ICM32-B   |                 | 20                   | 18.2                                     | 18.9 | 19.6 | 20.2 | 20.7 | 21.3 | 21.8 | 22.2 |
| ICM40-A   | 40              | 17                   | 15.5                                     | 16.1 | 16.6 | 17.1 | 17.6 | 18.1 | 18.5 | 18.9 |
| ICM40-B   |                 | 30                   | 27.4                                     | 28.4 | 29.3 | 30.3 | 31.1 | 31.9 | 32.7 | 33.3 |
| ICM50-A   | 50              | 27                   | 24.6                                     | 25.5 | 26.4 | 27.2 | 28.0 | 28.7 | 29.4 | 30.0 |
| ICM50-B   |                 | 46                   | 42.0                                     | 43.5 | 45.0 | 46.4 | 47.7 | 49.0 | 50.1 | 51.1 |
| ICM65-A   | 65              | 41                   | 37                                       | 39   | 40   | 41   | 42   | 43   | 45   | 46   |
| ICM65-B   |                 | 81                   | 73.9                                     | 76.6 | 79.2 | 81.7 | 84.0 | 86.2 | 88.2 | 90.0 |
| ICM100    | 100             | 165                  | 150                                      | 157  | 161  | 166  | 171  | 175  | 180  | 184  |
| ICM125    | 125             | 259                  | 235                                      | 246  | 253  | 261  | 268  | 274  | 283  | 288  |
| ICM150    | 150             | 430                  | 391                                      | 408  | 421  | 433  | 445  | 455  | 470  | 479  |

Correction factor for  $\Delta P$  ( $f_{\Delta P}$ )

| $\Delta P$ (psi) | Correction factor |
|------------------|-------------------|
| <b>3</b>         | <b>1.00</b>       |
| 4                | 0.87              |
| 5                | 0.79              |
| 6                | 0.72              |
| 7                | 0.66              |
| 8                | 0.62              |

Correction factor for discharge temperature ( $T_{disch.}$ )

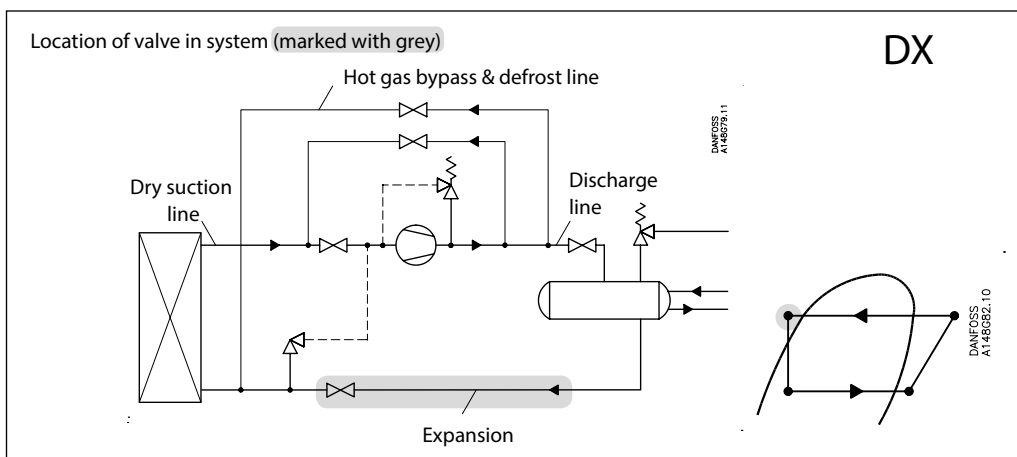
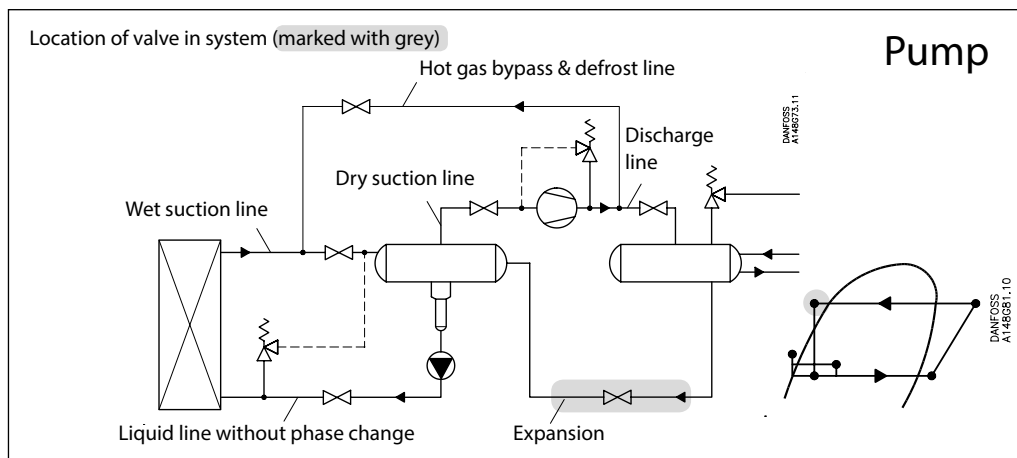
| Discharge temperature                 | Correction factor |
|---------------------------------------|-------------------|
| 120 $^\circ\text{F}$                  | 0.95              |
| 140 $^\circ\text{F}$                  | 0.97              |
| <b>180<math>^\circ\text{F}</math></b> | <b>1.00</b>       |
| 200 $^\circ\text{F}$                  | 1.02              |
| 210 $^\circ\text{F}$                  | 1.02              |
| 230 $^\circ\text{F}$                  | 1.04              |
| 250 $^\circ\text{F}$                  | 1.05              |

Correction factor for liquid temperature ( $T_{liq.}$ )

| Liquid temperature                   | Correction factor |
|--------------------------------------|-------------------|
| -10 $^\circ\text{F}$                 | 0.73              |
| 10 $^\circ\text{F}$                  | 0.77              |
| 30 $^\circ\text{F}$                  | 0.82              |
| 50 $^\circ\text{F}$                  | 0.87              |
| 70 $^\circ\text{F}$                  | 0.93              |
| <b>90<math>^\circ\text{F}</math></b> | <b>1.00</b>       |
| 110 $^\circ\text{F}$                 | 1.09              |
| 130 $^\circ\text{F}$                 | 1.20              |

Nominal capacities

Expansion - ICM



Correction factors

When dimensioning, multiply the evaporator capacity by a correction factor  $k$  dependent on the subcooling  $\Delta t_{sub}$  just ahead of the valve. The corrected capacity\* can then be found in the capacity table.

Correction factors for subcooling

| Subcooling K | 2    | 4 | 10   | 15   | 20   | 25   | 30   | 35   | 40   |
|--------------|------|---|------|------|------|------|------|------|------|
| R717         | 1.01 | 1 | 0.98 | 0.96 | 0.94 | 0.92 | 0.91 | 0.89 | 0.87 |
| R744         | 1.02 | 1 | 0.95 | 0.90 | 0.86 | 0.82 | 0.79 | 0.75 | 0.73 |
| R134a        | 1.03 | 1 | 0.93 | 0.88 | 0.84 | 0.80 | 0.76 | 0.73 | 0.70 |
| R404A        | 1.04 | 1 | 0.91 | 0.83 | 0.78 | 0.73 | 0.68 | 0.65 | 0.61 |
| R22          | 1.03 | 1 | 0.94 | 0.90 | 0.87 | 0.83 | 0.80 | 0.77 | 0.74 |

\* The capacity table is based on nominal conditions of subcooling just ahead of the valve of 4°K.

Calculation example:

An application has the following operating conditions:

Refrigerant R717  
 $T_e = -10^\circ\text{C}$   
 $T_c = +30^\circ\text{C}$   
 $Q_0 = 1500 \text{ kW}$   
 $\Delta t_{sub} = 20^\circ\text{K}$

Correction factor for subcooling: 0.94

Pressure drop across the valve:  
 $11.7 \text{ bar} - 2.9 \text{ bar} = 8.8 \text{ bar}$

Corrected capacity:  $1500 \times 0.94 = 1410 \text{ kW}$

From the R717 capacity table ICM 20-C is selected with  $Q_{nom}$  capacity 1990 kW at 8 bar.

**Expansion**

Capacities for nominal conditions,  $Q_n$  (kW)

| Type                                 | Pressure drop across valve $\Delta p$ bar |       |       |       |       |       |       |       |
|--------------------------------------|---|-------|-------|-------|-------|-------|-------|-------|
|                                      | 1   | 2     | 4     | 8     | 12    | 16    |       |       |
| <b>K<sub>v</sub></b>                 |   |       |       |       |       |       |       |       |
| <b>Evaporating temperature 10°C</b>  |   |       |       |       |       |       |       |       |
| ICM20-A33                            | DN20                                      | 0.2   | 28.5  | 39.5  | 53.9  | 71.8  | 83.5  | 92.2  |
| ICM20-A                              | DN20                                      | 0.6   | 85.9  | 119   | 163   | 217   | 253   | 279   |
| ICM20-B                              | DN20                                      | 2.4   | 498   | 686   | 930   | 1230  | 1435  | 1587  |
| ICM20-C                              | DN20                                      | 4.6   | 824   | 1124  | 1507  | 1990  | 2310  | 2550  |
| ICM25-A                              | DN25                                      | 6     | 1274  | 1739  | 2337  | 3080  | 3575  | 3970  |
| ICM32-A                              | DN32                                      | 9     | 1834  | 2515  | 3400  | 4490  | 5220  | 5775  |
| ICM40-A                              | DN40                                      | 15    | 3410  | 4630  | 6200  | 8150  | 9450  | 10450 |
| ICM50-A                              | DN50                                      | 23    | 5960  | 8050  | 10750 | 14100 | 16300 | 18100 |
| ICM65-A                              | DN65                                      | 35    | 9793  | 13270 | 17686 | 23178 | 26940 | 29745 |
| <b>Evaporating temperature 0°C</b>   |   |       |       |       |       |       |       |       |
|                                      |   | 29.6  | 40.8  | 55.4  | 73.1  | 84.7  | 93.3  |       |
|                                      |   | 89    | 123   | 167   | 221   | 256   | 282   |       |
|                                      |   | 515   | 705   | 950   | 1245  | 1450  | 1594  |       |
|                                      |   | 850   | 1145  | 1525  | 2000  | 2320  | 2560  |       |
|                                      |   | 1310  | 1773  | 2370  | 3100  | 3600  | 3980  |       |
|                                      |   | 1890  | 2580  | 3450  | 4530  | 5250  | 5790  |       |
|                                      |   | 3500  | 4700  | 6250  | 8170  | 9480  | 10450 |       |
|                                      |   | 6100  | 8150  | 10800 | 14100 | 16300 | 18100 |       |
|                                      |   | 10034 | 13431 | 17749 | 23194 | 26914 | 29749 |       |
| <b>Evaporating temperature -10°C</b> |   |       |       |       |       |       |       |       |
| ICM20-A33                            | DN20                                      | 0.2   | 30.5  | 41.9  | 56.4  | 74    | 85.4  | 93.8  |
| ICM20-A                              | DN20                                      | 0.6   | 92    | 127   | 170   | 224   | 258   | 284   |
| ICM20-B                              | DN20                                      | 2.4   | 527   | 715   | 955   | 1253  | 1452  | 1594  |
| ICM20-C                              | DN20                                      | 4.6   | 859   | 1152  | 1520  | 1990  | 2310  | 2550  |
| ICM25-A                              | DN25                                      | 6     | 1332  | 1780  | 2360  | 3090  | 3590  | 3960  |
| ICM32-A                              | DN32                                      | 9     | 1930  | 2600  | 3450  | 4520  | 5240  | 5780  |
| ICM40-A                              | DN40                                      | 15    | 3550  | 4715  | 6220  | 8140  | 9450  | 10430 |
| ICM50-A                              | DN50                                      | 23    | 6150  | 8150  | 10700 | 14000 | 16300 | 18000 |
| ICM65-A                              | DN65                                      | 35    | 10118 | 13393 | 17640 | 23065 | 26784 | 29613 |
| <b>Evaporating temperature -20°C</b> |   |       |       |       |       |       |       |       |
|                                      |   | 31.3  | 42.7  | 57.2  | 74.5  | 85.6  | 93.8  |       |
|                                      |   | 94.5  | 129   | 172   | 224   | 258   | 284   |       |
|                                      |   | 535   | 718   | 957   | 1250  | 1450  | 1594  |       |
|                                      |   | 860   | 1140  | 1505  | 1975  | 2290  | 2525  |       |
|                                      |   | 1332  | 1770  | 2345  | 3070  | 3570  | 3940  |       |
|                                      |   | 1935  | 2590  | 3440  | 4510  | 5220  | 5750  |       |
|                                      |   | 3520  | 4650  | 6140  | 8050  | 9350  | 10350 |       |
|                                      |   | 6070  | 8000  | 10550 | 13850 | 16100 | 17800 |       |
|                                      |   | 29353 | 13181 | 17379 | 22806 | 26524 | 29354 |       |
| <b>Evaporating temperature -30°C</b> |   |       |       |       |       |       |       |       |
| ICM20-A33                            | DN20                                      | 0.2   | 31.8  | 43.2  | 57.5  | 74.5  | 85.4  | 93.3  |
| ICM20-A                              | DN20                                      | 0.6   | 96    | 130   | 173   | 225   | 258   | 282   |
| ICM20-B                              | DN20                                      | 2.4   | 532   | 716   | 950   | 1240  | 1435  | 1580  |
| ICM20-C                              | DN20                                      | 4.6   | 840   | 1111  | 1480  | 1950  | 2270  | 2505  |
| ICM25-A                              | DN25                                      | 6     | 1310  | 1740  | 2310  | 3030  | 3530  | 3880  |
| ICM32-A                              | DN32                                      | 9     | 1920  | 2560  | 3400  | 4460  | 5150  | 5700  |
| ICM40-A                              | DN40                                      | 15    | 3430  | 4530  | 6030  | 7950  | 9250  | 10200 |
| ICM50-A                              | DN50                                      | 23    | 5900  | 7800  | 10350 | 13650 | 15900 | 17600 |
| ICM65-A                              | DN65                                      | 35    | 9732  | 12842 | 17045 | 22491 | 26193 | 28997 |
| <b>Evaporating temperature -40°C</b> |   |       |       |       |       |       |       |       |
|                                      |   | 32.3  | 43.5  | 57.5  | 74.2  | 84.8  | 92.5  |       |
|                                      |   | 97    | 131   | 173   | 224   | 256   | 280   |       |
|                                      |   | 527   | 705   | 940   | 1230  | 1420  | 1555  |       |
|                                      |   | 815   | 1085  | 1448  | 1920  | 2230  | 2470  |       |
|                                      |   | 1270  | 1690  | 2270  | 2990  | 3480  | 3830  |       |
|                                      |   | 1870  | 2500  | 3350  | 4400  | 5100  | 5630  |       |
|                                      |   | 3300  | 4400  | 5900  | 7820  | 9120  | 10100 |       |
|                                      |   | 5670  | 7550  | 10150 | 13400 | 15700 | 17400 |       |
|                                      |   | 9364  | 12465 | 16707 | 22144 | 25832 | 28581 |       |
| <b>Evaporating temperature -50°C</b> |   |       |       |       |       |       |       |       |
| ICM20-A33                            | DN20                                      | 0.2   | 32.5  | 43.5  | 57.3  | 73.5  | 83.9  | 91.4  |
| ICM20-A                              | DN20                                      | 0.6   | 97.5  | 131   | 172   | 222   | 253   | 276   |
| ICM20-B                              | DN20                                      | 2.4   | 512   | 690   | 925   | 1210  | 1400  | 1535  |
| ICM20-C                              | DN20                                      | 4.6   | 780   | 1055  | 1425  | 1890  | 2200  | 2430  |
| ICM25-A                              | DN25                                      | 6     | 1220  | 1650  | 2220  | 2950  | 3420  | 3780  |
| ICM32-A                              | DN32                                      | 9     | 1810  | 2450  | 3280  | 4325  | 5030  | 5540  |
| ICM40-A                              | DN40                                      | 15    | 3170  | 4280  | 5800  | 7710  | 8950  | 9900  |
| ICM50-A                              | DN50                                      | 23    | 5430  | 7350  | 9900  | 13200 | 15400 | 17100 |
| ICM65-A                              | DN65                                      | 35    | 8659  | 12096 | 16354 | 21774 | 25423 | 28137 |

**Expansion**

Capacities for nominal conditions,  $Q_n$  (TR)

| Type      |      | Pressure drop across valve $\Delta p$ psi |      |      |      |      |      |      |
|-----------|------|---|------|------|------|------|------|------|
|           |      | 15  | 30   | 60   | 120  | 180  | 240  |      |
|           |      | <b><math>C_v</math></b>                   |      |      |      |      |      |      |
|           |      | <b>Evaporating temperature 60°F</b>       |      |      |      |      |      |      |
| ICM20-A33 | DN20 | 0.2                                       | 8.1  | 11.2 | 15.3 | 20.4 | 23.8 | 26.3 |
| ICM20-A   | DN20 | 0.7                                       | 24.5 | 33.9 | 46.3 | 61.8 | 72   | 79.3 |
| ICM20-B   | DN20 | 2.8                                       | 142  | 196  | 265  | 352  | 410  | 451  |
| ICM20-C   | DN20 | 5.3                                       | 235  | 321  | 432  | 570  | 660  | 730  |
| ICM25-A   | DN25 | 7   | 363  | 497  | 670  | 880  | 1025 | 1130 |
| ICM32-A   | DN32 | 10  | 523  | 720  | 970  | 1280 | 1490 | 1645 |
| ICM40-A   | DN40 | 17  | 975  | 1325 | 1780 | 2330 | 2705 | 3000 |
| ICM50-A   | DN50 | 27  | 1695 | 2310 | 3070 | 4030 | 4690 | 5170 |
| ICM65-A   | DN65 | 41  | 2790 | 3789 | 5061 | 6643 | 7708 | 8517 |
|           |      | <b>Evaporating temperature 40°F</b>       |      |      |      |      |      |      |
|           |      | 8.4                                       | 11.6 | 15.8 | 20.9 | 24.2 | 26.7 |      |
|           |      | 25.3                                      | 35   | 47.6 | 63   | 73   | 80.4 |      |
|           |      | 147                                       | 201  | 271  | 358  | 415  | 458  |      |
|           |      | 243                                       | 328  | 438  | 574  | 665  | 735  |      |
|           |      | 375                                       | 510  | 680  | 888  | 1030 | 1140 |      |
|           |      | 539                                       | 735  | 985  | 1294 | 1500 | 1655 |      |
|           |      | 1000                                      | 1350 | 1800 | 2344 | 2715 | 3010 |      |
|           |      | 1745                                      | 2350 | 3100 | 4050 | 4700 | 5200 |      |
|           |      | 2863                                      | 3852 | 5104 | 6671 | 7736 | 8545 |      |
|           |      | <b>Evaporating temperature 20°F</b>       |      |      |      |      |      |      |
| ICM20-A33 | DN20 | 0.2                                       | 8.7  | 12   | 16.2 | 21.2 | 24.5 | 26.9 |
| ICM20-A   | DN20 | 0.7                                       | 26.3 | 36.2 | 48.8 | 64   | 74   | 81.4 |
| ICM20-B   | DN20 | 2.8                                       | 151  | 206  | 275  | 360  | 416  | 459  |
| ICM20-C   | DN20 | 5.3                                       | 248  | 332  | 439  | 574  | 665  | 734  |
| ICM25-A   | DN25 | 7   | 383  | 515  | 681  | 888  | 1030 | 1135 |
| ICM32-A   | DN32 | 10  | 553  | 746  | 993  | 1299 | 1510 | 1657 |
| ICM40-A   | DN40 | 17  | 1020 | 1360 | 1795 | 2346 | 2715 | 3005 |
| ICM50-A   | DN50 | 27  | 1770 | 2350 | 3100 | 4040 | 4680 | 5170 |
| ICM65-A   | DN65 | 41  | 2907 | 3862 | 5089 | 6647 | 7711 | 8518 |
|           |      | <b>Evaporating temperature 0°F</b>        |      |      |      |      |      |      |
|           |      | 9   | 12.3 | 16.4 | 21.4 | 24.6 | 26.9 |      |
|           |      | 27.1                                      | 37   | 49.5 | 64.5 | 74.3 | 81.5 |      |
|           |      | 154                                       | 207  | 276  | 360  | 416  | 458  |      |
|           |      | 249                                       | 330  | 435  | 570  | 660  | 728  |      |
|           |      | 385                                       | 513  | 678  | 884  | 1025 | 1130 |      |
|           |      | 560                                       | 747  | 990  | 1293 | 1500 | 1650 |      |
|           |      | 1022                                      | 1345 | 1775 | 2325 | 2700 | 2970 |      |
|           |      | 1770                                      | 2320 | 3050 | 4000 | 4650 | 5130 |      |
|           |      | 2895                                      | 3812 | 5019 | 6576 | 7639 | 8446 |      |
|           |      | <b>Evaporating temperature -20°F</b>      |      |      |      |      |      |      |
| ICM20-A33 | DN20 | 0.2                                       | 9.2  | 12.5 | 16.6 | 21.4 | 24.6 | 26.8 |
| ICM20-A   | DN20 | 0.7                                       | 27.7 | 37.5 | 50   | 64.5 | 74   | 81   |
| ICM20-B   | DN20 | 2.8                                       | 154  | 206  | 274  | 357  | 413  | 454  |
| ICM20-C   | DN20 | 5.3                                       | 244  | 323  | 428  | 560  | 653  | 720  |
| ICM25-A   | DN25 | 7   | 380  | 503  | 665  | 875  | 1015 | 1120 |
| ICM32-A   | DN32 | 10  | 555  | 740  | 978  | 1285 | 1485 | 1635 |
| ICM40-A   | DN40 | 17  | 995  | 1315 | 1740 | 2290 | 2660 | 2945 |
| ICM50-A   | DN50 | 27  | 1720 | 2255 | 2985 | 3930 | 4570 | 5050 |
| ICM65-A   | DN65 | 41  | 2817 | 3712 | 4921 | 6481 | 7539 | 8338 |
|           |      | <b>Evaporating temperature -40°F</b>      |      |      |      |      |      |      |
|           |      | 9.3                                       | 12.6 | 16.6 | 21.3 | 24.4 | 26.6 |      |
|           |      | 28  | 37.8 | 50   | 64.3 | 73.5 | 79.9 |      |
|           |      | 152                                       | 203  | 270  | 353  | 408  | 446  |      |
|           |      | 235                                       | 313  | 418  | 553  | 642  | 710  |      |
|           |      | 366                                       | 488  | 653  | 860  | 1000 | 1100 |      |
|           |      | 540                                       | 723  | 965  | 1265 | 1465 | 1610 |      |
|           |      | 955                                       | 1270 | 1700 | 2250 | 2615 | 2900 |      |
|           |      | 1640                                      | 2180 | 2920 | 3870 | 4500 | 4990 |      |
|           |      | 2696                                      | 3590 | 4809 | 6368 | 7422 | 8209 |      |
|           |      | <b>Evaporating temperature -60°F</b>      |      |      |      |      |      |      |
| ICM20-A33 | DN20 | 0.2                                       | 9.4  | 12.6 | 16.5 | 21.1 | 24.1 | 26.2 |
| ICM20-A   | DN20 | 0.7                                       | 28.1 | 37.6 | 49.5 | 63.7 | 72.5 | 79   |
| ICM20-B   | DN20 | 2.8                                       | 147  | 199  | 266  | 347  | 400  | 440  |
| ICM20-C   | DN20 | 5.3                                       | 225  | 304  | 410  | 544  | 630  | 695  |
| ICM25-A   | DN25 | 7   | 352  | 475  | 640  | 845  | 980  | 1080 |
| ICM32-A   | DN32 | 10  | 520  | 703  | 943  | 1246 | 1440 | 1585 |
| ICM40-A   | DN40 | 17  | 910  | 1230 | 1660 | 2210 | 2570 | 2850 |
| ICM50-A   | DN50 | 27  | 1560 | 2110 | 2850 | 3800 | 4430 | 4900 |
| ICM65-A   | DN65 | 41  | 2567 | 3474 | 4699 | 6251 | 7292 | 8063 |

**Expansion**

Capacities for nominal conditions,  $Q_n$  (kW)

R 744

| Type | Pressure drop across valve $\Delta p$ bar |   |   |   |    |    |
|------|---|---|---|---|----|----|
|      | 1   | 2 | 4 | 8 | 12 | 16 |

| Pressure drop across valve $\Delta p$ bar |   |   |   |    |    |
|---|---|---|---|----|----|
| 1   | 2 | 4 | 8 | 12 | 16 |

|           |      | $K_v$ | Evaporating temperature 10°C |      |      |      |      |      |
|-----------|------|-------|------------------------------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2   | 6.1                          | 8.6  | 11.9 | 15.9 | 18.4 | 20   |
| ICM20-A   | DN20 | 0.6   | 18.7                         | 26.2 | 36.1 | 48.3 | 56   | 61   |
| ICM20-B   | DN20 | 2.4   | 109                          | 152  | 209  | 280  | 324  | 353  |
| ICM20-C   | DN20 | 4.6   | 180                          | 251  | 347  | 465  | 535  | 583  |
| ICM25-A   | DN25 | 6     | 277                          | 389  | 535  | 718  | 826  | 900  |
| ICM32-A   | DN32 | 9     | 400                          | 560  | 770  | 1030 | 1190 | 1300 |
| ICM40-A   | DN40 | 15    | 743                          | 1040 | 1435 | 1920 | 2215 | 2400 |
| ICM50-A   | DN50 | 23    | 1295                         | 1810 | 2500 | 3340 | 3850 | 4180 |
| ICM65-A   | DN65 | 35    | 2116                         | 2964 | 4086 | 5458 | 6297 | 6836 |

| Evaporating temperature 0°C |      |      |      |      |      |
|-----------------------------|------|------|------|------|------|
| 7.4                         | 10.2 | 14   | 18.7 | 21.7 | 23.7 |
| 22.4                        | 31   | 42.5 | 56.8 | 66   | 72   |
| 130                         | 179  | 246  | 329  | 381  | 417  |
| 215                         | 297  | 408  | 542  | 630  | 686  |
| 333                         | 460  | 630  | 838  | 975  | 1065 |
| 478                         | 660  | 905  | 1210 | 1400 | 1530 |
| 890                         | 1230 | 1680 | 2250 | 2600 | 2830 |
| 1550                        | 2140 | 2940 | 3900 | 4530 | 4750 |
| 2541                        | 3509 | 4808 | 6407 | 7408 | 8084 |

|           |      | $K_v$ | Evaporating temperature -10°C |      |      |      |      |      |
|-----------|------|-------|-------------------------------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2   | 8.1                           | 11.4 | 15.7 | 21   | 24.4 | 27   |
| ICM20-A   | DN20 | 0.6   | 24.7                          | 34.5 | 47.5 | 63.6 | 74   | 81   |
| ICM20-B   | DN20 | 2.4   | 143                           | 200  | 275  | 368  | 428  | 470  |
| ICM20-C   | DN20 | 4.6   | 238                           | 331  | 455  | 608  | 705  | 770  |
| ICM25-A   | DN25 | 6     | 368                           | 513  | 705  | 940  | 1090 | 1195 |
| ICM32-A   | DN32 | 9     | 528                           | 735  | 1015 | 1355 | 1570 | 1720 |
| ICM40-A   | DN40 | 15    | 980                           | 1370 | 1880 | 2510 | 2910 | 3180 |
| ICM50-A   | DN50 | 23    | 1710                          | 2380 | 3280 | 4380 | 5050 | 5550 |
| ICM65-A   | DN65 | 35    | 2808                          | 3916 | 5383 | 7173 | 8306 | 9083 |

| Evaporating temperature -20°C |      |      |      |      |      |
|-------------------------------|------|------|------|------|------|
| 9                             | 12.5 | 17.1 | 23   | 26.7 | 29.3 |
| 27.1                          | 37.8 | 52   | 69.6 | 81   | 88.5 |
| 157                           | 219  | 302  | 402  | 468  | 512  |
| 260                           | 363  | 497  | 665  | 770  | 840  |
| 402                           | 563  | 770  | 1025 | 1190 | 1300 |
| 580                           | 810  | 1110 | 1480 | 1715 | 1880 |
| 1075                          | 1500 | 2060 | 2740 | 3160 | 3470 |
| 1870                          | 2620 | 3580 | 4750 | 5500 | 6030 |
| 3080                          | 4300 | 5890 | 7821 | 9039 | 9880 |

|           |      | $K_v$ | Evaporating temperature -30°C |      |      |      |      |       |
|-----------|------|-------|-------------------------------|------|------|------|------|-------|
| ICM20-A33 | DN20 | 0.2   | 9.8                           | 13.6 | 18.6 | 24.8 | 28.7 | 31.3  |
| ICM20-A   | DN20 | 0.6   | 29.7                          | 41   | 56.3 | 75   | 86.8 | 95    |
| ICM20-B   | DN20 | 2.4   | 172                           | 238  | 325  | 432  | 500  | 545   |
| ICM20-C   | DN20 | 4.6   | 285                           | 395  | 536  | 710  | 820  | 895   |
| ICM25-A   | DN25 | 6     | 440                           | 610  | 828  | 1100 | 1270 | 1380  |
| ICM32-A   | DN32 | 9     | 632                           | 880  | 1195 | 1585 | 1830 | 2000  |
| ICM40-A   | DN40 | 15    | 1175                          | 1630 | 2220 | 2920 | 3370 | 3680  |
| ICM50-A   | DN50 | 23    | 2050                          | 2850 | 3850 | 5080 | 5850 | 6400  |
| ICM65-A   | DN65 | 35    | 3369                          | 4673 | 6337 | 8350 | 9616 | 10492 |

| Evaporating temperature -40°C |      |      |      |       |       |
|-------------------------------|------|------|------|-------|-------|
| 10.7                          | 14.6 | 19.8 | 26.2 | 30.2  | 32.9  |
| 32.1                          | 44   | 60   | 79   | 91.2  | 99.5  |
| 186                           | 256  | 345  | 455  | 525   | 571   |
| 308                           | 422  | 570  | 745  | 855   | 930   |
| 478                           | 655  | 880  | 1155 | 1325  | 1444  |
| 685                           | 940  | 1270 | 1670 | 1915  | 2090  |
| 1275                          | 1750 | 2350 | 3060 | 3530  | 3830  |
| 2220                          | 3050 | 4080 | 5330 | 6100  | 6650  |
| 3657                          | 5003 | 6705 | 8751 | 10040 | 10934 |

|           |      | $K_v$ | Evaporating temperature -50°C |      |      |      |       |       |
|-----------|------|-------|-------------------------------|------|------|------|-------|-------|
| ICM20-A33 | DN20 | 0.2   | 11                            | 15.2 | 20.7 | 27.2 | 31.3  | 34    |
| ICM20-A   | DN20 | 0.6   | 33.3                          | 46   | 62.5 | 82.5 | 94.8  | 103   |
| ICM20-B   | DN20 | 2.4   | 193                           | 266  | 359  | 472  | 540   | 588   |
| ICM20-C   | DN20 | 4.6   | 319                           | 438  | 587  | 765  | 880   | 955   |
| ICM25-A   | DN25 | 6     | 494                           | 678  | 910  | 1190 | 1360  | 1480  |
| ICM32-A   | DN32 | 9     | 710                           | 980  | 1320 | 1720 | 1980  | 2155  |
| ICM40-A   | DN40 | 15    | 1320                          | 1810 | 2420 | 3150 | 3610  | 3940  |
| ICM50-A   | DN50 | 23    | 2300                          | 3150 | 4210 | 5450 | 6250  | 6800  |
| ICM65-A   | DN65 | 35    | 3781                          | 5179 | 6917 | 8989 | 10290 | 11193 |



**Expansion**

Capacities for nominal conditions,  $Q_n$  (TR)

R 744

| Type | Pressure drop across valve $\Delta p$ psi |    |    |     |     |     |
|------|---|----|----|-----|-----|-----|
|      | 15  | 30 | 60 | 120 | 180 | 240 |

| Pressure drop across valve $\Delta p$ psi |    |    |     |     |     |
|---|----|----|-----|-----|-----|
| 15  | 30 | 60 | 120 | 180 | 240 |

|           |      | <b><math>C_v</math> Evaporating temperature 60°F</b> |      |      |      |      |      |      |
|-----------|------|--|------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2  | 1.58 | 2.21 | 3.05 | 4.05 | 4.64 | 5    |
| ICM20-A   | DN20 | 0.7  | 4.8  | 6.7  | 9.2  | 12.3 | 14.2 | 15.3 |
| ICM20-B   | DN20 | 2.8  | 27.8 | 39   | 53.7 | 71.5 | 82   | 88.8 |
| ICM20-C   | DN20 | 5.3  | 46   | 64.5 | 89   | 118  | 136  | 146  |
| ICM25-A   | DN25 | 7  | 71.1 | 100  | 137  | 183  | 210  | 226  |
| ICM32-A   | DN32 | 10   | 102  | 144  | 198  | 264  | 303  | 327  |
| ICM40-A   | DN40 | 17   | 191  | 267  | 368  | 490  | 561  | 605  |
| ICM50-A   | DN50 | 27   | 332  | 465  | 640  | 855  | 976  | 1055 |
| ICM65-A   | DN65 | 41   | 543  | 762  | 1048 | 1393 | 1594 | 1713 |

| <b>Evaporating temperature 40°F</b> |      |      |      |      |      |
|-------------------------------------|------|------|------|------|------|
| 1.93                                | 2.71 | 3.74 | 5.01 | 5.8  | 6.32 |
| 5.8                                 | 8.2  | 11.3 | 15.2 | 17.6 | 19.2 |
| 33.9                                | 47.6 | 66   | 88.3 | 102  | 111  |
| 56                                  | 79   | 109  | 146  | 169  | 184  |
| 87                                  | 122  | 169  | 226  | 261  | 285  |
| 125                                 | 176  | 242  | 325  | 376  | 410  |
| 232                                 | 326  | 450  | 603  | 699  | 760  |
| 405                                 | 570  | 785  | 1050 | 1215 | 1320 |
| 664                                 | 933  | 1288 | 1720 | 1986 | 2159 |

|           |      | <b>Evaporating temperature 20°F</b> |      |      |      |      |      |      |
|-----------|------|-------------------------------------|------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2                                 | 2.27 | 3.16 | 4.35 | 5.82 | 6.75 | 7.38 |
| ICM20-A   | DN20 | 0.7                                 | 6.8  | 9.6  | 13.2 | 17.7 | 20.5 | 22.4 |
| ICM20-B   | DN20 | 2.8                                 | 39.9 | 55.7 | 76.5 | 102  | 118  | 130  |
| ICM20-C   | DN20 | 5.3                                 | 66   | 92   | 126  | 169  | 195  | 214  |
| ICM25-A   | DN25 | 7                                   | 102  | 142  | 196  | 261  | 303  | 330  |
| ICM32-A   | DN32 | 10                                  | 147  | 205  | 281  | 376  | 437  | 476  |
| ICM40-A   | DN40 | 17                                  | 273  | 381  | 524  | 699  | 805  | 880  |
| ICM50-A   | DN50 | 27                                  | 475  | 663  | 910  | 1215 | 1400 | 1535 |
| ICM65-A   | DN65 | 41                                  | 781  | 1088 | 1495 | 1990 | 2300 | 2510 |

| <b>Evaporating temperature 0°F</b> |      |      |      |      |      |
|------------------------------------|------|------|------|------|------|
| 2.55                               | 3.55 | 4.86 | 6.49 | 7.53 | 8.23 |
| 7.7                                | 10.7 | 14.7 | 19.7 | 22.8 | 25   |
| 44.7                               | 62.3 | 85.5 | 114  | 132  | 144  |
| 74.3                               | 103  | 141  | 188  | 217  | 237  |
| 115                                | 159  | 218  | 290  | 335  | 367  |
| 165                                | 230  | 315  | 418  | 485  | 528  |
| 307                                | 426  | 585  | 775  | 895  | 975  |
| 535                                | 745  | 1015 | 1350 | 1555 | 1700 |
| 879                                | 1221 | 1668 | 2210 | 2551 | 2783 |

|           |      | <b>Evaporating temperature -20°F</b> |      |      |      |      |      |      |
|-----------|------|--------------------------------------|------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2                                  | 2.78 | 3.87 | 5.3  | 7.05 | 8.15 | 8.9  |
| ICM20-A   | DN20 | 0.7                                  | 8.4  | 11.7 | 16   | 21.4 | 24.7 | 27   |
| ICM20-B   | DN20 | 2.8                                  | 48.9 | 68   | 93   | 123  | 142  | 155  |
| ICM20-C   | DN20 | 5.3                                  | 81   | 112  | 153  | 203  | 233  | 255  |
| ICM25-A   | DN25 | 7                                    | 125  | 174  | 237  | 313  | 362  | 395  |
| ICM32-A   | DN32 | 10                                   | 180  | 250  | 341  | 453  | 523  | 570  |
| ICM40-A   | DN40 | 17                                   | 335  | 464  | 633  | 835  | 960  | 1050 |
| ICM50-A   | DN50 | 27                                   | 584  | 810  | 1100 | 1450 | 1670 | 1820 |
| ICM65-A   | DN65 | 41                                   | 958  | 1332 | 1809 | 2383 | 2741 | 2987 |

| <b>Evaporating temperature -40°F</b> |      |      |      |      |      |
|--------------------------------------|------|------|------|------|------|
| 3.02                                 | 4.17 | 5.68 | 7.52 | 8.64 | 9.41 |
| 9.1                                  | 12.6 | 17.2 | 22.7 | 26.2 | 28.5 |
| 53                                   | 73.3 | 99   | 131  | 150  | 164  |
| 87.8                                 | 121  | 163  | 214  | 245  | 267  |
| 135                                  | 187  | 253  | 331  | 380  | 414  |
| 195                                  | 270  | 365  | 480  | 549  | 600  |
| 362                                  | 500  | 675  | 878  | 1010 | 1100 |
| 633                                  | 870  | 1170 | 1530 | 1750 | 1900 |
| 1040                                 | 1431 | 1923 | 2510 | 2877 | 3129 |

|           |      | <b>Evaporating temperature -60°F</b> |      |      |      |      |      |      |
|-----------|------|--------------------------------------|------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2                                  | 3.19 | 4.41 | 5.97 | 7.84 | 8.99 | 9.76 |
| ICM20-A   | DN20 | 0.7                                  | 9.6  | 13.3 | 18.1 | 23.7 | 27.3 | 29.5 |
| ICM20-B   | DN20 | 2.8                                  | 56   | 77   | 104  | 136  | 156  | 169  |
| ICM20-C   | DN20 | 5.3                                  | 92.8 | 127  | 170  | 221  | 253  | 275  |
| ICM25-A   | DN25 | 7                                    | 143  | 197  | 263  | 342  | 391  | 425  |
| ICM32-A   | DN32 | 10                                   | 206  | 284  | 380  | 496  | 568  | 618  |
| ICM40-A   | DN40 | 17                                   | 383  | 524  | 700  | 907  | 1040 | 1130 |
| ICM50-A   | DN50 | 27                                   | 667  | 915  | 1215 | 1570 | 1800 | 1950 |
| ICM65-A   | DN65 | 41                                   | 1099 | 1499 | 1996 | 2587 | 2956 | 3211 |

**Expansion**

Capacities for nominal conditions,  $Q_n$  (kW)

| Type | Pressure drop across valve $\Delta p$ bar |   |   |   |    |    |
|------|---|---|---|---|----|----|
|      | 1   | 2 | 4 | 8 | 12 | 16 |

| Pressure drop across valve $\Delta p$ bar |   |   |   |    |    |
|---|---|---|---|----|----|
| 1   | 2 | 4 | 8 | 12 | 16 |

|           |      | $K_v$ | Evaporating temperature 10°C |      |      |      |      |      |
|-----------|------|-------|------------------------------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2   | 6.4                          | 8.6  | 11.1 | 13.4 | 14.1 | 14   |
| ICM20-A   | DN20 | 0.6   | 19.4                         | 26   | 33.6 | 40.5 | 42.7 | 42.5 |
| ICM20-B   | DN20 | 2.4   | 112                          | 149  | 192  | 230  | 243  | 242  |
| ICM20-C   | DN20 | 4.6   | 184                          | 243  | 310  | 370  | 392  | 391  |
| ICM25-A   | DN25 | 6     | 285                          | 377  | 480  | 575  | 607  | 606  |
| ICM32-A   | DN32 | 9     | 410                          | 545  | 699  | 835  | 885  | 883  |
| ICM40-A   | DN40 | 15    | 760                          | 1000 | 1270 | 1520 | 1610 | 1605 |
| ICM50-A   | DN50 | 23    | 1320                         | 1730 | 2200 | 2620 | 2770 | 2785 |
| ICM65-A   | DN65 | 35    | 2169                         | 2847 | 3606 | 4304 | 4550 | 4551 |

| Evaporating temperature 0°C |      |      |      |      |      |
|-----------------------------|------|------|------|------|------|
| 6.6                         | 8.9  | 11.3 | 13.5 | 14.1 | 14   |
| 20.1                        | 26.8 | 34.3 | 40.8 | 42.5 | 42.1 |
| 116                         | 153  | 194  | 231  | 242  | 240  |
| 189                         | 247  | 311  | 370  | 389  | 388  |
| 292                         | 383  | 482  | 575  | 604  | 602  |
| 422                         | 555  | 703  | 835  | 880  | 875  |
| 775                         | 1015 | 1270 | 1515 | 1596 | 1590 |
| 1350                        | 1750 | 2200 | 2610 | 2750 | 2740 |
| 2215                        | 2877 | 3612 | 4285 | 4508 | 4492 |

|           |      | $K_v$ | Evaporating temperature -10°C |      |      |      |      |      |
|-----------|------|-------|-------------------------------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2   | 6.9                           | 9.1  | 11.5 | 13.4 | 13.9 | 13.7 |
| ICM20-A   | DN20 | 0.6   | 20.7                          | 27.4 | 34.5 | 40.5 | 42   | 41.5 |
| ICM20-B   | DN20 | 2.4   | 118                           | 154  | 194  | 229  | 238  | 235  |
| ICM20-C   | DN20 | 4.6   | 191                           | 247  | 310  | 365  | 381  | 379  |
| ICM25-A   | DN25 | 6     | 296                           | 383  | 481  | 568  | 593  | 587  |
| ICM32-A   | DN32 | 9     | 430                           | 559  | 702  | 826  | 865  | 855  |
| ICM40-A   | DN40 | 15    | 785                           | 1013 | 1265 | 1490 | 1565 | 1550 |
| ICM50-A   | DN50 | 23    | 1360                          | 1740 | 2180 | 2570 | 2700 | 2670 |
| ICM65-A   | DN65 | 35    | 2229                          | 2866 | 3579 | 4222 | 4420 | 4384 |

| Evaporating temperature -20°C |      |      |      |      |      |
|-------------------------------|------|------|------|------|------|
| 7                             | 9.2  | 11.4 | 13.3 | 13.6 | 13.3 |
| 21.1                          | 27.6 | 34.5 | 40   | 41.1 | 40.1 |
| 119                           | 154  | 193  | 225  | 233  | 228  |
| 190                           | 244  | 305  | 357  | 372  | 365  |
| 295                           | 380  | 474  | 555  | 575  | 568  |
| 430                           | 555  | 695  | 810  | 840  | 826  |
| 775                           | 995  | 1240 | 1460 | 1520 | 1495 |
| 1340                          | 1710 | 2130 | 2510 | 2620 | 2590 |
| 2203                          | 2818 | 3509 | 4124 | 4296 | 4235 |

|           |      | $K_v$ | Evaporating temperature -30°C |      |      |      |      |      |
|-----------|------|-------|-------------------------------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2   | 7.1                           | 9.2  | 11.3 | 13   | 13.2 | 12.8 |
| ICM20-A   | DN20 | 0.6   | 21.3                          | 27.6 | 34.2 | 39.1 | 40   | 38.7 |
| ICM20-B   | DN20 | 2.4   | 118                           | 152  | 189  | 219  | 225  | 218  |
| ICM20-C   | DN20 | 4.6   | 186                           | 238  | 297  | 347  | 357  | 350  |
| ICM25-A   | DN25 | 6     | 290                           | 372  | 463  | 540  | 555  | 545  |
| ICM32-A   | DN32 | 9     | 425                           | 545  | 680  | 790  | 812  | 792  |
| ICM40-A   | DN40 | 15    | 760                           | 970  | 1210 | 1415 | 1465 | 1430 |
| ICM50-A   | DN50 | 23    | 1305                          | 1670 | 2080 | 2440 | 2530 | 2480 |
| ICM65-A   | DN65 | 35    | 2146                          | 2744 | 3417 | 3998 | 4141 | 4054 |

| Evaporating temperature -40°C |      |      |      |      |      |
|-------------------------------|------|------|------|------|------|
| 7.1                           | 9.1  | 11.1 | 12.6 | 12.7 | 12.1 |
| 21.4                          | 27.5 | 33.6 | 38   | 38.3 | 36.8 |
| 116                           | 149  | 184  | 211  | 216  | 208  |
| 180                           | 231  | 288  | 335  | 342  | 333  |
| 280                           | 361  | 448  | 520  | 532  | 516  |
| 415                           | 532  | 660  | 760  | 780  | 755  |
| 730                           | 940  | 1175 | 1360 | 1410 | 1358 |
| 1260                          | 1610 | 2010 | 2350 | 2420 | 2350 |
| 2068                          | 2654 | 3310 | 3853 | 3964 | 3849 |

**Expansion**

Capacities for nominal conditions,  $Q_n$  (TR)

| Type | Pressure drop across valve $\Delta p$ psi |    |    |     |     |     |
|------|---|----|----|-----|-----|-----|
|      | 15  | 30 | 60 | 120 | 180 | 240 |

| Pressure drop across valve $\Delta p$ psi |    |    |     |     |     |
|---|----|----|-----|-----|-----|
| 15  | 30 | 60 | 120 | 180 | 240 |

| $C_v$     |      | Evaporating temperature 60°F |      |      |      |      |      |      |
|-----------|------|------------------------------|------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2                          | 1.8  | 2.42 | 3.13 | 3.76 | 3.96 | 3.93 |
| ICM20-A   | DN20 | 0.7                          | 5.5  | 7.3  | 9.5  | 11.4 | 12   | 11.9 |
| ICM20-B   | DN20 | 2.8                          | 31.5 | 42   | 54.1 | 65   | 68.5 | 68.2 |
| ICM20-C   | DN20 | 5.3                          | 52   | 69   | 88   | 105  | 111  | 111  |
| ICM25-A   | DN25 | 7                            | 80.3 | 106  | 136  | 163  | 172  | 171  |
| ICM32-A   | DN32 | 10                           | 116  | 154  | 198  | 237  | 250  | 249  |
| ICM40-A   | DN40 | 17                           | 214  | 284  | 360  | 431  | 455  | 454  |
| ICM50-A   | DN50 | 27                           | 373  | 493  | 625  | 745  | 787  | 787  |
| ICM65-A   | DN65 | 41                           | 612  | 808  | 1026 | 1225 | 1292 | 1287 |

| Evaporating temperature 40°F |      |      |      |      |      |
|------------------------------|------|------|------|------|------|
| 1.88                         | 2.51 | 3.21 | 3.82 | 3.99 | 3.93 |
| 5.7                          | 7.6  | 9.7  | 11.6 | 12.1 | 11.9 |
| 32.7                         | 43.5 | 55.3 | 65.8 | 68.8 | 68   |
| 53.6                         | 70.5 | 89   | 106  | 111  | 110  |
| 83                           | 109  | 138  | 164  | 172  | 170  |
| 120                          | 158  | 201  | 238  | 250  | 248  |
| 222                          | 289  | 364  | 432  | 455  | 452  |
| 385                          | 500  | 630  | 745  | 785  | 780  |
| 631                          | 823  | 1035 | 1226 | 1287 | 1278 |

| $C_v$     |      | Evaporating temperature 20°F |      |      |      |      |      |      |
|-----------|------|------------------------------|------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2                          | 1.95 | 2.58 | 3.26 | 3.82 | 3.93 | 3.87 |
| ICM20-A   | DN20 | 0.7                          | 5.9  | 7.8  | 9.9  | 11.6 | 12   | 11.8 |
| ICM20-B   | DN20 | 2.8                          | 33.6 | 44.3 | 55.5 | 65.5 | 68   | 66.7 |
| ICM20-C   | DN20 | 5.3                          | 54.8 | 71   | 88.5 | 105  | 109  | 108  |
| ICM25-A   | DN25 | 7                            | 85   | 110  | 138  | 162  | 169  | 167  |
| ICM32-A   | DN32 | 10                           | 123  | 160  | 201  | 237  | 247  | 243  |
| ICM40-A   | DN40 | 17                           | 225  | 291  | 363  | 428  | 447  | 442  |
| ICM50-A   | DN50 | 27                           | 390  | 503  | 625  | 737  | 770  | 760  |
| ICM65-A   | DN65 | 41                           | 640  | 824  | 1029 | 1211 | 1264 | 1249 |

| Evaporating temperature 0°F |      |      |      |      |      |
|-----------------------------|------|------|------|------|------|
| 2                           | 2.62 | 3.27 | 3.78 | 3.87 | 3.75 |
| 6                           | 7.9  | 9.9  | 11.4 | 11.7 | 11.4 |
| 34.1                        | 44.4 | 55.4 | 64.2 | 66.2 | 64.5 |
| 54.8                        | 70.2 | 87.5 | 102  | 106  | 104  |
| 85                          | 109  | 136  | 159  | 164  | 161  |
| 124                         | 160  | 199  | 232  | 240  | 235  |
| 224                         | 287  | 357  | 418  | 433  | 425  |
| 387                         | 495  | 615  | 720  | 747  | 735  |
| 634                         | 813  | 1010 | 1183 | 1227 | 1204 |

| $C_v$     |      | Evaporating temperature -20°F |      |      |      |      |      |      |
|-----------|------|-------------------------------|------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2                           | 2.03 | 2.63 | 3.24 | 3.69 | 3.74 | 3.59 |
| ICM20-A   | DN20 | 0.7                           | 6.1  | 7.9  | 9.8  | 11.2 | 11.3 | 10.9 |
| ICM20-B   | DN20 | 2.8                           | 34   | 43.9 | 54.3 | 62.6 | 64   | 61.8 |
| ICM20-C   | DN20 | 5.3                           | 53.5 | 68.5 | 85.3 | 99   | 102  | 99   |
| ICM25-A   | DN25 | 7                             | 83.5 | 107  | 132  | 154  | 158  | 154  |
| ICM32-A   | DN32 | 10                            | 122  | 157  | 195  | 225  | 231  | 224  |
| ICM40-A   | DN40 | 17                            | 219  | 280  | 347  | 405  | 416  | 405  |
| ICM50-A   | DN50 | 27                            | 377  | 480  | 597  | 695  | 720  | 710  |
| ICM65-A   | DN65 | 41                            | 618  | 790  | 981  | 1144 | 1179 | 1148 |

| Evaporating temperature -40°F |       |      |      |      |      |
|-------------------------------|-------|------|------|------|------|
| 2.04                          | 2.61  | 3.18 | 3.57 | 3.58 | 3.4  |
| 6.1                           | 7.8   | 9.6  | 10.8 | 10.8 | 10.3 |
| 33.3                          | 42.7  | 52.8 | 60.1 | 61   | 58.5 |
| 51.7                          | 66.6  | 82.5 | 95   | 97   | 93.7 |
| 80.7                          | 103.3 | 128  | 148  | 151  | 145  |
| 119                           | 153   | 189  | 217  | 220  | 212  |
| 211                           | 270   | 336  | 388  | 397  | 383  |
| 362                           | 463   | 575  | 667  | 685  | 660  |
| 594                           | 762   | 948  | 1098 | 1123 | 1082 |

**Expansion**

Capacities for nominal conditions,  $Q_n$  (kW)

R 404A

| Type | Pressure drop across valve $\Delta p$ bar |   |   |   |    |    |
|------|---|---|---|---|----|----|
|      | 1   | 2 | 4 | 8 | 12 | 16 |

| Pressure drop across valve $\Delta p$ bar |   |   |   |    |    |
|---|---|---|---|----|----|
| 1   | 2 | 4 | 8 | 12 | 16 |

|           |      | $K_v$ | Evaporating temperature 10°C |      |      |      |      |      |
|-----------|------|-------|------------------------------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2   | 5.2                          | 7.1  | 9.2  | 11.2 | 11.7 | 11.3 |
| ICM20-A   | DN20 | 0.6   | 15.7                         | 21.3 | 27.8 | 33.8 | 35.3 | 34.5 |
| ICM20-B   | DN20 | 2.4   | 91                           | 123  | 160  | 194  | 203  | 198  |
| ICM20-C   | DN20 | 4.6   | 150                          | 203  | 263  | 315  | 330  | 322  |
| ICM25-A   | DN25 | 6     | 233                          | 313  | 406  | 490  | 510  | 500  |
| ICM32-A   | DN32 | 9     | 335                          | 452  | 589  | 710  | 740  | 723  |
| ICM40-A   | DN40 | 15    | 621                          | 835  | 1080 | 1300 | 1360 | 1323 |
| ICM50-A   | DN50 | 23    | 1085                         | 1455 | 1880 | 2250 | 2350 | 2300 |
| ICM65-A   | DN65 | 35    | 1779                         | 2388 | 3075 | 3687 | 3848 | 3755 |

| Evaporating temperature 0°C |      |      |      |      |      |
|-----------------------------|------|------|------|------|------|
| 5.5                         | 7.5  | 9.7  | 11.6 | 12.1 | 11.8 |
| 16.6                        | 22.5 | 29.3 | 35.2 | 36.8 | 35.9 |
| 96.5                        | 130  | 168  | 201  | 210  | 205  |
| 159                         | 213  | 273  | 327  | 341  | 333  |
| 246                         | 329  | 423  | 508  | 528  | 518  |
| 354                         | 475  | 612  | 733  | 766  | 750  |
| 659                         | 876  | 1123 | 1340 | 1400 | 1370 |
| 1145                        | 1525 | 1950 | 2330 | 2430 | 2380 |
| 1881                        | 2503 | 3198 | 3810 | 3973 | 3886 |

|           |      | $K_v$ | Evaporating temperature -10°C |      |      |      |      |      |
|-----------|------|-------|-------------------------------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2   | 5.8                           | 7.8  | 10   | 11.9 | 12.4 | 12   |
| ICM20-A   | DN20 | 0.6   | 17.4                          | 23.5 | 30.3 | 36.1 | 37.5 | 36.5 |
| ICM20-B   | DN20 | 2.4   | 101                           | 135  | 173  | 206  | 214  | 209  |
| ICM20-C   | DN20 | 4.6   | 166                           | 220  | 280  | 333  | 345  | 338  |
| ICM25-A   | DN25 | 6     | 257                           | 340  | 435  | 515  | 535  | 525  |
| ICM32-A   | DN32 | 9     | 370                           | 493  | 629  | 748  | 778  | 760  |
| ICM40-A   | DN40 | 15    | 685                           | 904  | 1150 | 1360 | 1420 | 1390 |
| ICM50-A   | DN50 | 23    | 1190                          | 1570 | 1990 | 2350 | 2450 | 2400 |
| ICM65-A   | DN65 | 35    | 1958                          | 2581 | 3266 | 3864 | 4019 | 3928 |

| Evaporating temperature -20°C |      |      |      |      |      |
|-------------------------------|------|------|------|------|------|
| 6.1                           | 8.1  | 10.3 | 12.1 | 12.4 | 12   |
| 18.2                          | 24.3 | 31   | 36.5 | 37.7 | 36.5 |
| 105                           | 139  | 176  | 207  | 214  | 208  |
| 172                           | 225  | 283  | 333  | 345  | 335  |
| 265                           | 348  | 439  | 515  | 535  | 520  |
| 384                           | 506  | 640  | 750  | 778  | 755  |
| 706                           | 920  | 1160 | 1360 | 1410 | 1375 |
| 1230                          | 1600 | 2000 | 2350 | 2435 | 2380 |
| 2017                          | 2621 | 3284 | 3857 | 3997 | 3896 |

|           |      | $K_v$ | Evaporating temperature -30°C |      |      |      |      |      |
|-----------|------|-------|-------------------------------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2   | 6.2                           | 8.3  | 10.4 | 12   | 12.3 | 11.8 |
| ICM20-A   | DN20 | 0.6   | 18.7                          | 24.7 | 31.3 | 36.5 | 37.3 | 35.8 |
| ICM20-B   | DN20 | 2.4   | 107                           | 140  | 176  | 205  | 211  | 204  |
| ICM20-C   | DN20 | 4.6   | 173                           | 225  | 281  | 329  | 338  | 328  |
| ICM25-A   | DN25 | 6     | 269                           | 349  | 437  | 510  | 525  | 508  |
| ICM32-A   | DN32 | 9     | 389                           | 508  | 637  | 745  | 765  | 742  |
| ICM40-A   | DN40 | 15    | 711                           | 922  | 1150 | 1345 | 1385 | 1340 |
| ICM50-A   | DN50 | 23    | 1235                          | 1590 | 1980 | 2320 | 2390 | 2320 |
| ICM65-A   | DN65 | 35    | 2029                          | 2611 | 3253 | 3801 | 3920 | 3803 |

| Evaporating temperature -40°C |      |      |      |      |      |
|-------------------------------|------|------|------|------|------|
| 6.4                           | 8.3  | 10.4 | 11.9 | 12   | 11.4 |
| 19.2                          | 25   | 31.3 | 35.8 | 36.3 | 34.7 |
| 109                           | 140  | 174  | 202  | 205  | 197  |
| 173                           | 221  | 276  | 320  | 328  | 316  |
| 269                           | 345  | 428  | 499  | 510  | 490  |
| 393                           | 503  | 628  | 730  | 745  | 715  |
| 711                           | 902  | 1130 | 1310 | 1340 | 1295 |
| 1225                          | 1555 | 1940 | 2255 | 2320 | 2240 |
| 2014                          | 2557 | 3190 | 3808 | 3801 | 3662 |

|           |      | $K_v$ | Evaporating temperature -50°C |      |      |      |      |      |
|-----------|------|-------|-------------------------------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2   | 6.5                           | 8.3  | 10.2 | 11.6 | 11.6 | 10.9 |
| ICM20-A   | DN20 | 0.6   | 19.5                          | 25   | 30.9 | 35   | 35.1 | 33.2 |
| ICM20-B   | DN20 | 2.4   | 108                           | 138  | 171  | 196  | 198  | 188  |
| ICM20-C   | DN20 | 4.6   | 170                           | 215  | 268  | 310  | 315  | 301  |
| ICM25-A   | DN25 | 6     | 265                           | 335  | 418  | 484  | 490  | 468  |
| ICM32-A   | DN32 | 9     | 388                           | 493  | 613  | 705  | 715  | 680  |
| ICM40-A   | DN40 | 15    | 695                           | 875  | 1090 | 1270 | 1290 | 1230 |
| ICM50-A   | DN50 | 23    | 1195                          | 1505 | 1880 | 2180 | 2230 | 2130 |
| ICM65-A   | DN65 | 35    | 1968                          | 2475 | 3088 | 3585 | 3650 | 3487 |

**Expansion**

Capacities for nominal conditions,  $Q_n$  (TR)

R 404A

| Type | Pressure drop across valve $\Delta p$ psi |    |    |     |     |     |
|------|---|----|----|-----|-----|-----|
|      | 15  | 30 | 60 | 120 | 180 | 240 |

| Pressure drop across valve $\Delta p$ psi |    |    |     |     |     |
|---|----|----|-----|-----|-----|
| 15  | 30 | 60 | 120 | 180 | 240 |

|           |      | $C_v$ | Evaporating temperature 60°F |      |      |      |      |      |
|-----------|------|-------|------------------------------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2   | 1.44                         | 1.95 | 2.54 | 3.07 | 3.18 | 3.06 |
| ICM20-A   | DN20 | 0.7   | 4.4                          | 5.9  | 7.7  | 9.3  | 9.7  | 9.3  |
| ICM20-B   | DN20 | 2.8   | 25.2                         | 34.1 | 44.5 | 53.5 | 55.5 | 53.8 |
| ICM20-C   | DN20 | 5.3   | 41.8                         | 56.3 | 73   | 87.5 | 91   | 87.5 |
| ICM25-A   | DN25 | 7     | 64.5                         | 87   | 113  | 135  | 141  | 136  |
| ICM32-A   | DN32 | 10    | 93                           | 125  | 163  | 196  | 204  | 197  |
| ICM40-A   | DN40 | 17    | 173                          | 233  | 300  | 360  | 373  | 360  |
| ICM50-A   | DN50 | 27    | 300                          | 405  | 522  | 625  | 647  | 625  |
| ICM65-A   | DN65 | 41    | 494                          | 664  | 856  | 1022 | 1059 | 1021 |

| Evaporating temperature 40°F |      |      |      |      |      |
|------------------------------|------|------|------|------|------|
| 1.55                         | 2.09 | 2.71 | 3.25 | 3.38 | 3.26 |
| 4.7                          | 6.3  | 8.2  | 9.9  | 10.2 | 9.9  |
| 27.2                         | 36.5 | 47.3 | 56.5 | 58.8 | 57   |
| 45                           | 60   | 77   | 92   | 95.5 | 92.5 |
| 69.5                         | 93   | 119  | 143  | 148  | 144  |
| 100                          | 134  | 173  | 207  | 215  | 208  |
| 186                          | 248  | 318  | 377  | 393  | 381  |
| 325                          | 431  | 550  | 655  | 680  | 660  |
| 532                          | 707  | 904  | 1073 | 1113 | 1080 |

|           |      | $C_v$ | Evaporating temperature 20°F |      |      |      |      |      |
|-----------|------|-------|------------------------------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2   | 1.64                         | 2.2  | 2.84 | 3.37 | 3.48 | 3.36 |
| ICM20-A   | DN20 | 0.7   | 4.9                          | 6.6  | 8.6  | 10.2 | 10.6 | 10.2 |
| ICM20-B   | DN20 | 2.8   | 28.7                         | 38.4 | 49.1 | 58.2 | 60.5 | 58.5 |
| ICM20-C   | DN20 | 5.3   | 47.3                         | 62.6 | 79.8 | 94.5 | 97.5 | 94.7 |
| ICM25-A   | DN25 | 7     | 73                           | 97   | 123  | 146  | 151  | 147  |
| ICM32-A   | DN32 | 10    | 105                          | 140  | 179  | 212  | 220  | 213  |
| ICM40-A   | DN40 | 17    | 195                          | 259  | 327  | 387  | 402  | 389  |
| ICM50-A   | DN50 | 27    | 340                          | 448  | 567  | 670  | 694  | 675  |
| ICM65-A   | DN65 | 41    | 558                          | 736  | 931  | 1098 | 1137 | 1104 |

| Evaporating temperature 0°F |      |      |      |      |      |
|-----------------------------|------|------|------|------|------|
| 1.72                        | 2.28 | 2.92 | 3.43 | 3.51 | 3.38 |
| 5.2                         | 6.9  | 8.8  | 10.4 | 10.6 | 10.3 |
| 29.9                        | 39.5 | 50.3 | 59   | 60.6 | 58.5 |
| 49                          | 64.3 | 81   | 95   | 98   | 94.5 |
| 76                          | 99.5 | 125  | 147  | 152  | 147  |
| 109                         | 144  | 183  | 214  | 221  | 214  |
| 202                         | 264  | 332  | 389  | 401  | 389  |
| 352                         | 457  | 573  | 672  | 694  | 672  |
| 577                         | 751  | 940  | 1101 | 1135 | 1099 |

|           |      | $C_v$ | Evaporating temperature -20°F |      |      |      |      |      |
|-----------|------|-------|-------------------------------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2   | 1.78                          | 2.35 | 2.96 | 3.42 | 3.48 | 3.32 |
| ICM20-A   | DN20 | 0.7   | 5.4                           | 7.1  | 8.9  | 10.4 | 10.5 | 10.1 |
| ICM20-B   | DN20 | 2.8   | 30.8                          | 40.2 | 50.5 | 58.7 | 60   | 57.5 |
| ICM20-C   | DN20 | 5.3   | 50                            | 64.5 | 80.5 | 93.5 | 96   | 92.5 |
| ICM25-A   | DN25 | 7     | 77.5                          | 100  | 125  | 145  | 149  | 143  |
| ICM32-A   | DN32 | 10    | 112                           | 146  | 183  | 212  | 217  | 209  |
| ICM40-A   | DN40 | 17    | 205                           | 265  | 330  | 383  | 394  | 380  |
| ICM50-A   | DN50 | 27    | 355                           | 457  | 567  | 660  | 678  | 655  |
| ICM65-A   | DN65 | 41    | 584                           | 751  | 933  | 1085 | 1113 | 1072 |

| Evaporating temperature -40°F |      |      |      |      |      |
|-------------------------------|------|------|------|------|------|
| 1.82                          | 2.38 | 2.95 | 3.37 | 3.39 | 3.2  |
| 5.5                           | 7.2  | 8.9  | 10.2 | 10.3 | 9.7  |
| 31.2                          | 40.2 | 50   | 57.5 | 58   | 55.3 |
| 50                            | 63.6 | 79   | 91.5 | 93   | 89   |
| 77.5                          | 99   | 123  | 142  | 144  | 138  |
| 113                           | 144  | 180  | 207  | 211  | 201  |
| 204                           | 259  | 323  | 373  | 380  | 363  |
| 353                           | 447  | 555  | 643  | 657  | 630  |
| 571                           | 734  | 913  | 1056 | 1076 | 1028 |

|           |      | $C_v$ | Evaporating temperature -60°F |      |      |      |      |      |
|-----------|------|-------|-------------------------------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2   | 1.86                          | 2.38 | 2.91 | 3.27 | 3.25 | 3.04 |
| ICM20-A   | DN20 | 0.7   | 5.6                           | 7.1  | 8.8  | 9.9  | 9.9  | 9.3  |
| ICM20-B   | DN20 | 2.8   | 31.1                          | 39.5 | 48.8 | 55.6 | 55.6 | 52.2 |
| ICM20-C   | DN20 | 5.3   | 49                            | 61.5 | 76.7 | 87.8 | 89   | 84   |
| ICM25-A   | DN25 | 7     | 76.3                          | 96   | 119  | 137  | 138  | 130  |
| ICM32-A   | DN32 | 10    | 111                           | 141  | 175  | 200  | 201  | 190  |
| ICM40-A   | DN40 | 17    | 200                           | 250  | 312  | 360  | 363  | 343  |
| ICM50-A   | DN50 | 27    | 344                           | 430  | 535  | 620  | 628  | 595  |
| ICM65-A   | DN65 | 41    | 564                           | 708  | 881  | 1016 | 1027 | 972  |

**Expansion**

Capacities for nominal conditions,  $Q_n$  (kW)

| Type | Pressure drop across valve $\Delta p$ bar |   |   |   |    |    |
|------|---|---|---|---|----|----|
|      | 1   | 2 | 4 | 8 | 12 | 16 |

| Pressure drop across valve $\Delta p$ bar |   |   |   |    |    |
|---|---|---|---|----|----|
| 1   | 2 | 4 | 8 | 12 | 16 |

|           |      | $K_v$ | Evaporating temperature 10°C |      |      |      |      |      |
|-----------|------|-------|------------------------------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2   | 6.7                          | 9.2  | 12.2 | 15.5 | 17.1 | 18   |
| ICM20-A   | DN20 | 0.6   | 20.1                         | 27.6 | 36.8 | 46.7 | 51.7 | 54.2 |
| ICM20-B   | DN20 | 2.4   | 117                          | 160  | 212  | 268  | 297  | 312  |
| ICM20-C   | DN20 | 4.6   | 193                          | 263  | 346  | 435  | 482  | 505  |
| ICM25-A   | DN25 | 6     | 299                          | 406  | 535  | 675  | 746  | 785  |
| ICM32-A   | DN32 | 9     | 430                          | 585  | 777  | 980  | 1085 | 1140 |
| ICM40-A   | DN40 | 15    | 798                          | 1080 | 1420 | 1790 | 1980 | 2080 |
| ICM50-A   | DN50 | 23    | 1390                         | 1880 | 2470 | 3100 | 3430 | 3600 |
| ICM65-A   | DN65 | 35    | 2286                         | 3090 | 4057 | 5097 | 5638 | 5918 |

| Evaporating temperature 0°C |      |      |      |      |      |
|-----------------------------|------|------|------|------|------|
| 7                           | 9.5  | 12.6 | 15.9 | 17.5 | 18.3 |
| 21.1                        | 28.8 | 38.1 | 48   | 53   | 55.4 |
| 122                         | 166  | 218  | 274  | 303  | 316  |
| 201                         | 271  | 355  | 443  | 490  | 513  |
| 312                         | 420  | 550  | 687  | 760  | 795  |
| 448                         | 606  | 798  | 998  | 1100 | 1155 |
| 830                         | 1115 | 1460 | 1820 | 2005 | 2110 |
| 1450                        | 1940 | 2530 | 3150 | 3480 | 3650 |
| 2378                        | 3187 | 4149 | 5179 | 5714 | 5989 |

|           |      | $K_v$ | Evaporating temperature -10°C |      |      |      |      |      |
|-----------|------|-------|-------------------------------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2   | 7.3                           | 9.9  | 13   | 16.2 | 17.7 | 18.5 |
| ICM20-A   | DN20 | 0.6   | 21.9                          | 29.8 | 39   | 48.8 | 53.7 | 55.8 |
| ICM20-B   | DN20 | 2.4   | 126                           | 170  | 223  | 278  | 305  | 318  |
| ICM20-C   | DN20 | 4.6   | 208                           | 277  | 360  | 448  | 493  | 514  |
| ICM25-A   | DN25 | 6     | 321                           | 430  | 557  | 695  | 764  | 796  |
| ICM32-A   | DN32 | 9     | 463                           | 621  | 809  | 1010 | 1110 | 1157 |
| ICM40-A   | DN40 | 15    | 855                           | 1140 | 1472 | 1830 | 2012 | 2112 |
| ICM50-A   | DN50 | 23    | 1490                          | 1970 | 2550 | 3170 | 3480 | 3650 |
| ICM65-A   | DN65 | 35    | 2449                          | 3247 | 4192 | 5205 | 5730 | 5999 |

| Evaporating temperature -20°C |      |      |      |      |      |
|-------------------------------|------|------|------|------|------|
| 7.5                           | 10.1 | 13.2 | 16.3 | 17.8 | 18.4 |
| 22.7                          | 30.5 | 39.8 | 49.3 | 53.7 | 55.7 |
| 130                           | 174  | 225  | 279  | 305  | 317  |
| 212                           | 280  | 361  | 447  | 490  | 510  |
| 328                           | 435  | 559  | 693  | 760  | 792  |
| 475                           | 630  | 815  | 1012 | 1105 | 1151 |
| 870                           | 1150 | 1475 | 1830 | 2005 | 2100 |
| 1510                          | 1980 | 2550 | 3150 | 3460 | 3630 |
| 2490                          | 3264 | 4190 | 5185 | 5697 | 5952 |

|           |      | $K_v$ | Evaporating temperature -30°C |      |      |      |      |      |
|-----------|------|-------|-------------------------------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2   | 7.7                           | 10.3 | 13.3 | 16.3 | 17.7 | 18.3 |
| ICM20-A   | DN20 | 0.6   | 23.2                          | 31   | 40   | 49.3 | 53.5 | 55.3 |
| ICM20-B   | DN20 | 2.4   | 132                           | 175  | 225  | 277  | 302  | 313  |
| ICM20-C   | DN20 | 4.6   | 212                           | 279  | 357  | 443  | 485  | 505  |
| ICM25-A   | DN25 | 6     | 329                           | 433  | 556  | 685  | 752  | 783  |
| ICM32-A   | DN32 | 9     | 478                           | 631  | 812  | 1000 | 1095 | 1140 |
| ICM40-A   | DN40 | 15    | 873                           | 1140 | 1465 | 1810 | 1980 | 2070 |
| ICM50-A   | DN50 | 23    | 1510                          | 1970 | 2520 | 3110 | 3420 | 3560 |
| ICM65-A   | DN65 | 35    | 2479                          | 3235 | 4147 | 5127 | 5623 | 5865 |

| Evaporating temperature -40°C |      |      |      |      |      |
|-------------------------------|------|------|------|------|------|
| 7.9                           | 10.4 | 13.2 | 16.2 | 17.5 | 18   |
| 23.6                          | 31.3 | 40.1 | 48.8 | 52.8 | 54.3 |
| 133                           | 174  | 223  | 274  | 298  | 308  |
| 210                           | 275  | 353  | 436  | 475  | 495  |
| 327                           | 428  | 550  | 676  | 740  | 765  |
| 478                           | 626  | 805  | 990  | 1075 | 1120 |
| 860                           | 1120 | 1440 | 1780 | 1940 | 2020 |
| 1480                          | 1930 | 2480 | 3070 | 3350 | 3500 |
| 2443                          | 3178 | 4078 | 5041 | 5520 | 5743 |

|           |      | $K_v$ | Evaporating temperature -50°C |      |      |      |      |      |
|-----------|------|-------|-------------------------------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2   | 7.9                           | 10.4 | 13.2 | 15.9 | 17.1 | 17.6 |
| ICM20-A   | DN20 | 0.6   | 23.8                          | 31.3 | 39.8 | 48   | 51.8 | 53   |
| ICM20-B   | DN20 | 2.4   | 131                           | 172  | 220  | 269  | 291  | 300  |
| ICM20-C   | DN20 | 4.6   | 205                           | 269  | 346  | 427  | 465  | 480  |
| ICM25-A   | DN25 | 6     | 320                           | 418  | 540  | 663  | 720  | 747  |
| ICM32-A   | DN32 | 9     | 470                           | 615  | 789  | 970  | 1055 | 1090 |
| ICM40-A   | DN40 | 15    | 835                           | 1095 | 1410 | 1740 | 1900 | 1970 |
| ICM50-A   | DN50 | 23    | 1435                          | 1880 | 2430 | 3000 | 3270 | 3400 |
| ICM65-A   | DN65 | 35    | 2370                          | 3097 | 3989 | 4931 | 5390 | 5593 |

**Expansion**

Capacities for nominal conditions,  $Q_n$  (TR)

| Type | Pressure drop across valve $\Delta p$ psi |    |    |     |     |     |
|------|---|----|----|-----|-----|-----|
|      | 15  | 30 | 60 | 120 | 180 | 240 |

| Pressure drop across valve $\Delta p$ psi |    |    |     |     |     |
|---|----|----|-----|-----|-----|
| 15  | 30 | 60 | 120 | 180 | 240 |

| <b>C<sub>v</sub></b> |      | <b>Evaporating temperature 60°F</b> |      |      |      |      |      |      |
|----------------------|------|-------------------------------------|------|------|------|------|------|------|
| ICM20-A33            | DN20 | 0.2                                 | 1.86 | 2.55 | 3.41 | 4.33 | 4.8  | 5.02 |
| ICM20-A              | DN20 | 0.7                                 | 5.6  | 7.7  | 10.3 | 13.1 | 14.5 | 15.2 |
| ICM20-B              | DN20 | 2.8                                 | 32.5 | 44.6 | 59.5 | 75.5 | 83.6 | 87.5 |
| ICM20-C              | DN20 | 5.3                                 | 54   | 73.5 | 97.5 | 123  | 136  | 142  |
| ICM25-A              | DN25 | 7                                   | 83.2 | 114  | 151  | 190  | 210  | 220  |
| ICM32-A              | DN32 | 10                                  | 120  | 164  | 218  | 275  | 305  | 320  |
| ICM40-A              | DN40 | 17                                  | 223  | 303  | 400  | 505  | 560  | 585  |
| ICM50-A              | DN50 | 27                                  | 388  | 528  | 695  | 878  | 970  | 1015 |
| ICM65-A              | DN65 | 41                                  | 638  | 868  | 1144 | 1439 | 1590 | 1665 |

| <b>Evaporating temperature 40°F</b> |      |      |      |      |      |
|-------------------------------------|------|------|------|------|------|
| 1.97                                | 2.96 | 3.57 | 4.49 | 4.95 | 5.16 |
| 6                                   | 8.2  | 10.8 | 13.6 | 15   | 15.6 |
| 34.5                                | 47   | 62   | 77.8 | 85.5 | 89.5 |
| 57                                  | 77   | 101  | 126  | 139  | 145  |
| 88                                  | 119  | 156  | 196  | 216  | 226  |
| 127                                 | 172  | 226  | 283  | 313  | 327  |
| 236                                 | 317  | 415  | 517  | 570  | 596  |
| 410                                 | 550  | 720  | 895  | 990  | 1035 |
| 674                                 | 906  | 1182 | 1475 | 1624 | 1698 |

|           |      | <b>Evaporating temperature 20°F</b> |      |      |      |      |      |      |
|-----------|------|-------------------------------------|------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2                                 | 2.07 | 2.8  | 3.68 | 4.6  | 5.03 | 5.23 |
| ICM20-A   | DN20 | 0.7                                 | 6.3  | 8.5  | 11.2 | 13.9 | 15.2 | 15.9 |
| ICM20-B   | DN20 | 2.8                                 | 36   | 48.7 | 63.6 | 79   | 87   | 90.6 |
| ICM20-C   | DN20 | 5.3                                 | 59.5 | 79.5 | 103  | 128  | 140  | 146  |
| ICM25-A   | DN25 | 7                                   | 92   | 123  | 160  | 198  | 218  | 227  |
| ICM32-A   | DN32 | 10                                  | 133  | 178  | 232  | 289  | 317  | 329  |
| ICM40-A   | DN40 | 17                                  | 245  | 326  | 423  | 525  | 575  | 600  |
| ICM50-A   | DN50 | 27                                  | 427  | 565  | 730  | 905  | 995  | 1038 |
| ICM65-A   | DN65 | 41                                  | 700  | 930  | 1201 | 1489 | 1637 | 1709 |

| <b>Evaporating temperature 0°F</b> |      |      |      |      |      |
|------------------------------------|------|------|------|------|------|
| 2.14                               | 2.89 | 3.76 | 4.65 | 5.06 | 5.24 |
| 6.5                                | 8.7  | 11.4 | 14.1 | 15.3 | 15.9 |
| 37.3                               | 49.8 | 64.5 | 80   | 87   | 90.2 |
| 60.7                               | 80.5 | 104  | 128  | 140  | 146  |
| 94                                 | 125  | 161  | 199  | 217  | 226  |
| 136                                | 181  | 234  | 289  | 316  | 329  |
| 250                                | 330  | 424  | 524  | 575  | 599  |
| 435                                | 570  | 730  | 905  | 993  | 1035 |
| 714                                | 938  | 1203 | 1487 | 1630 | 1698 |

|           |      | <b>Evaporating temperature -20°F</b> |      |      |      |      |      |      |
|-----------|------|--------------------------------------|------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2                                  | 2.21 | 2.95 | 3.8  | 4.65 | 5.05 | 5.19 |
| ICM20-A   | DN20 | 0.7                                  | 6.7  | 8.9  | 11.5 | 14.1 | 15.2 | 15.7 |
| ICM20-B   | DN20 | 2.8                                  | 37.9 | 50.3 | 64.5 | 79.2 | 86.2 | 89.1 |
| ICM20-C   | DN20 | 5.3                                  | 61.3 | 80.1 | 103  | 127  | 138  | 144  |
| ICM25-A   | DN25 | 7                                    | 95   | 125  | 160  | 197  | 215  | 223  |
| ICM32-A   | DN32 | 10                                   | 138  | 182  | 233  | 287  | 314  | 325  |
| ICM40-A   | DN40 | 17                                   | 251  | 329  | 421  | 518  | 567  | 590  |
| ICM50-A   | DN50 | 27                                   | 435  | 565  | 725  | 895  | 980  | 1020 |
| ICM65-A   | DN65 | 41                                   | 714  | 932  | 1192 | 1470 | 1608 | 1672 |

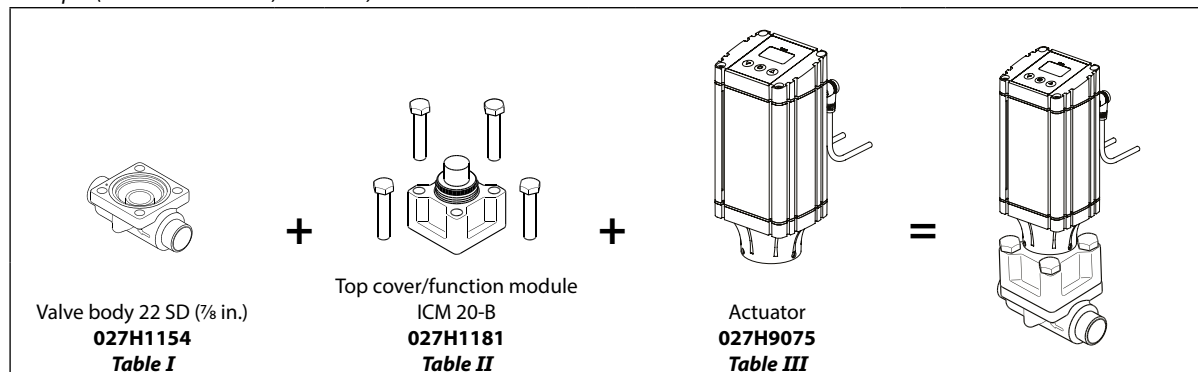
| <b>Evaporating temperature -40°F</b> |      |      |      |      |      |
|--------------------------------------|------|------|------|------|------|
| 2.25                                 | 2.98 | 3.81 | 4.61 | 4.97 | 5.1  |
| 6.8                                  | 9    | 11.5 | 13.9 | 15   | 15.4 |
| 38.1                                 | 50.2 | 64   | 78.5 | 85   | 87.6 |
| 60.5                                 | 79   | 101  | 125  | 136  | 140  |
| 94                                   | 123  | 157  | 193  | 211  | 218  |
| 138                                  | 180  | 231  | 283  | 307  | 318  |
| 248                                  | 323  | 413  | 510  | 555  | 575  |
| 428                                  | 555  | 710  | 875  | 960  | 995  |
| 702                                  | 913  | 1170 | 1443 | 1575 | 1634 |

|           |      | <b>Evaporating temperature -60°F</b> |      |      |      |      |      |      |
|-----------|------|--------------------------------------|------|------|------|------|------|------|
| ICM20-A33 | DN20 | 0.2                                  | 2.27 | 2.98 | 3.78 | 4.53 | 4.86 | 4.96 |
| ICM20-A   | DN20 | 0.7                                  | 6.9  | 9    | 11.4 | 13.7 | 14.7 | 15   |
| ICM20-B   | DN20 | 2.8                                  | 37.7 | 49.5 | 63   | 76.8 | 83   | 85   |
| ICM20-C   | DN20 | 5.3                                  | 59   | 77   | 99   | 122  | 132  | 136  |
| ICM25-A   | DN25 | 7                                    | 92   | 120  | 154  | 189  | 205  | 212  |
| ICM32-A   | DN32 | 10                                   | 135  | 177  | 227  | 276  | 300  | 309  |
| ICM40-A   | DN40 | 17                                   | 240  | 314  | 403  | 498  | 540  | 560  |
| ICM50-A   | DN50 | 27                                   | 412  | 540  | 695  | 855  | 935  | 965  |
| ICM65-A   | DN65 | 41                                   | 679  | 888  | 1143 | 1408 | 1534 | 1586 |

# ICM 20 / ICAD 600A

## Ordering from the parts programme

Example (select from table I, II and III)



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

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

ICM 20 Function module / top cover Table II

| Description | Code Number       |
|-------------|-------------------|
| ICM 20-A33  | <b>027H1186 *</b> |
| ICM 20-A    | <b>027H1180 *</b> |
| ICM 20-B66  | <b>027H1194 *</b> |
| ICM 20-B    | <b>027H1181 *</b> |
| ICM 20-C    | <b>027H1182 *</b> |

\*) Including:  
 Bolts and O-ring (for assembly with ICV valve body)  
 Seat and O-ring (for seat to be mounted in ICV valve body)

Actuator ICAD 600A Table III

| Description                           | Code Number     |
|---------------------------------------|-----------------|
| ICAD 600A with 1.5 m. (60 in.) cables | <b>027H9075</b> |
| ICAD 600A without cables              | <b>027H9120</b> |

## Ordering complete factory assembled valve without actuator

(body, function module/top cover)

Table A

|          | Available connections |                 |                 |                  |                 |                 |                 |                 |                  |
|----------|-----------------------|-----------------|-----------------|------------------|-----------------|-----------------|-----------------|-----------------|------------------|
|          | 20 D (3/4 in.)        | 25 D (1 in.)    | 20 A (3/4 in.)  | 20 SOC (3/4 in.) | 16 SA (5/8 in.) | 22 SA (7/8 in.) | 16 SD (5/8 in.) | 22 SD (7/8 in.) | 20 FPT (3/4 in.) |
| ICM 20-A | <b>027H1030</b>       | <b>027H1020</b> | <b>027H1035</b> | <b>027H1040</b>  |                 | <b>027H1050</b> |                 | <b>027H1045</b> |                  |
| ICM 20-B | <b>027H1031</b>       | <b>027H1021</b> | <b>027H1036</b> | <b>027H1041</b>  |                 | <b>027H1051</b> |                 | <b>027H1046</b> |                  |
| ICM 20-C | <b>027H1032</b>       | <b>027H1022</b> |                 |                  |                 | <b>027H1052</b> |                 | <b>027H1047</b> |                  |
|          | 25 A (1 in.)          |                 |                 |                  |                 |                 |                 |                 |                  |
| ICM 20-A |                       |                 |                 |                  |                 |                 |                 |                 |                  |
| ICM 20-B |                       |                 |                 |                  |                 |                 |                 |                 |                  |
| ICM 20-C | <b>027H1025</b>       |                 |                 |                  |                 |                 |                 |                 |                  |

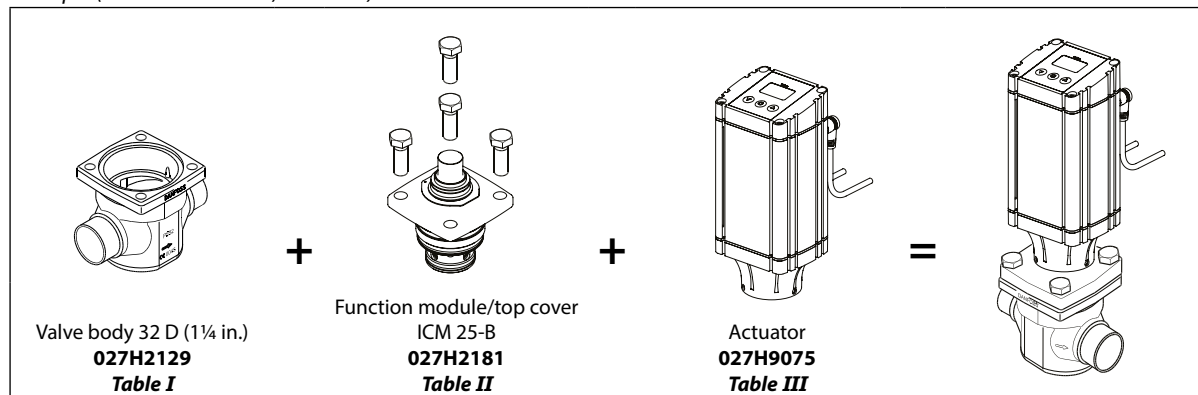
Select from parts programme



# ICM 25 / ICAD 600A

## Ordering from the parts programme

Example (select from table I, II and III)



ICV 25 valve body w/different connections *Table I*

|  |                   |                 |                 |                 |
|--|-------------------|-----------------|-----------------|-----------------|
|  | 20 D (¾ in.)      | 25 D (1 in.)    | 32 D (1¼ in.)   | 40 D (1½ in.)   |
|  | <b>027H2128</b>   | <b>027H2120</b> | <b>027H2129</b> | <b>027H2135</b> |
|  | 35 SD (1⅜ in. SA) | 28 SA (1⅞ in.)  | 22 SA (¾ in.)   | 28 SD (1⅞ in.)  |
|  | <b>027H2134</b>   | <b>027H2126</b> | <b>027H2125</b> | <b>027H2124</b> |
|  | 22 SD (¾ in.)     | 20 A (¾ in.)    | 25 A (1 in.)    | 32 A (1¼ in.)   |
|  | <b>027H2123</b>   | <b>027H2131</b> | <b>027H2121</b> | <b>027H2130</b> |
|  | 20 SOC (¾ in.)    | 25 SOC (1 in.)  | 20 FPT (¾ in.)  | 25 FPT (1 in.)  |
|  | <b>027H2132</b>   | <b>027H2122</b> | <b>027H2133</b> | <b>027H2127</b> |

ICM 25 Function module / top cover *Table II*

|  |             |                   |
|--|-------------|-------------------|
|  | Description | Code Number       |
|  | ICM 25-A    | <b>027H2180 *</b> |
|  | ICM 25-B    | <b>027H2181 *</b> |

\*) Including gasket and O-rings

Actuator ICAD 600A *Table III*

|  |                                       |                 |
|--|---------------------------------------|-----------------|
|  | Description                           | Code Number     |
|  | ICAD 600A with 1.5 m. (60 in.) cables | <b>027H9075</b> |
|  | ICAD 600A without cables              | <b>027H9120</b> |

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

## Ordering complete factory assembled valve without actuator (body, function module/top cover)

*Table A*

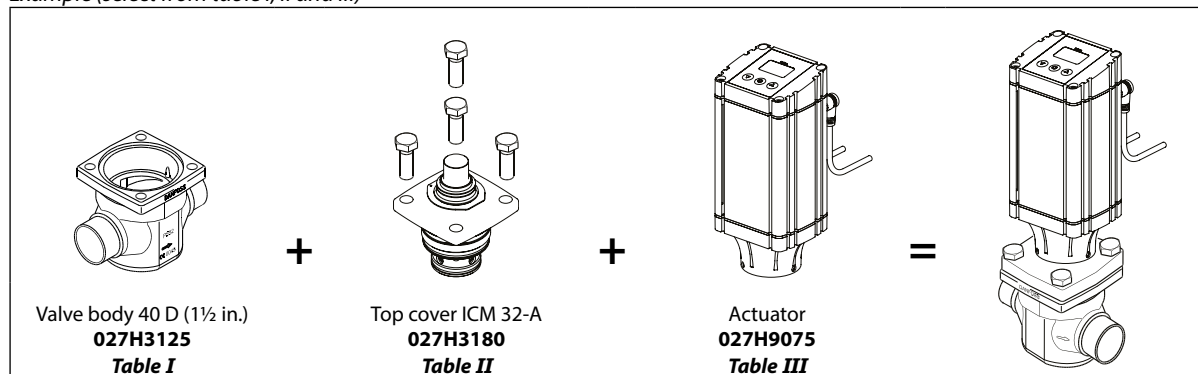
|          |                       |                 |                 |                 |                   |                 |                 |                 |
|----------|-----------------------|-----------------|-----------------|-----------------|-------------------|-----------------|-----------------|-----------------|
|          | Available connections |                 |                 |                 |                   |                 |                 |                 |
|          | 20 D (¾ in.)          | 25 D (1 in.)    | 32 D (1¼ in.)   | 40 D (1½ in.)   | 35 SD (1⅜ in. SA) | 28 SA (1⅞ in.)  | 22 SA (¾ in.)   | 28 SD (1⅞ in.)  |
| ICM 25-A |                       | <b>027H2000</b> |                 | <b>027H2016</b> | <b>027H2014</b>   | <b>027H2012</b> | <b>027H2010</b> | <b>027H2008</b> |
| ICM 25-B |                       | <b>027H2001</b> |                 |                 | <b>027H2015</b>   | <b>027H2013</b> | <b>027H2011</b> | <b>027H2009</b> |
|          | 22 SD (¾ in.)         | 20 A (¾ in.)    | 25 A (1 in.)    | 32 A (1¼ in.)   | 20 SOC (¾ in.)    | 25 SOC (1 in.)  | 20 FPT (¾ in.)  | 25 FPT (1 in.)  |
| ICM 25-A | <b>027H2006</b>       |                 | <b>027H2002</b> |                 |                   | <b>027H2004</b> |                 |                 |
| ICM 25-B | <b>027H2007</b>       |                 | <b>027H2003</b> |                 |                   | <b>027H2005</b> |                 |                 |

Select from parts programme


# ICM 32 / ICAD 600A

## Ordering from the parts programme

Example (select from table I, II and III)



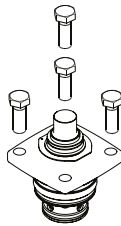
ICV 32 valve body w/different connections **Table I**



|                   |                 |                 |                 |
|-------------------|-----------------|-----------------|-----------------|
| 32 D (1¼ in.)     | 40 D (1½ in.)   | 42 SA (1½ in.)  | 42 SD (1½ in.)  |
| <b>027H3120</b>   | <b>027H3125</b> | <b>027H3127</b> | <b>027H3128</b> |
| 35 SD (1½ in. SA) | 32 A (1¼ in.)   | 32 SOC (1¼ in.) | 40 A (1½ in.)   |
| <b>027H3123</b>   | <b>027H3121</b> | <b>027H3122</b> | <b>027H3126</b> |

**Table I**

ICM 32 Function module / top cover **Table II**

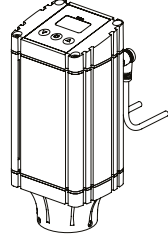


| Description | Code Number       |
|-------------|-------------------|
| ICM 32-A    | <b>027H3180 *</b> |
| ICM 32-B    | <b>027H3181 *</b> |

\*) Including gasket and O-rings

**Table II**

Actuator ICAD 600A **Table III**



| Description                           | Code Number     |
|---------------------------------------|-----------------|
| ICAD 600A with 1.5 m. (60 in.) cables | <b>027H9075</b> |
| ICAD 600A without cables              | <b>027H9120</b> |

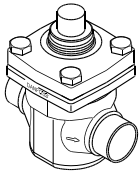
**Table III**

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

## Ordering complete factory assembled valve without actuator

(body, function module/top cover)

**Table A**



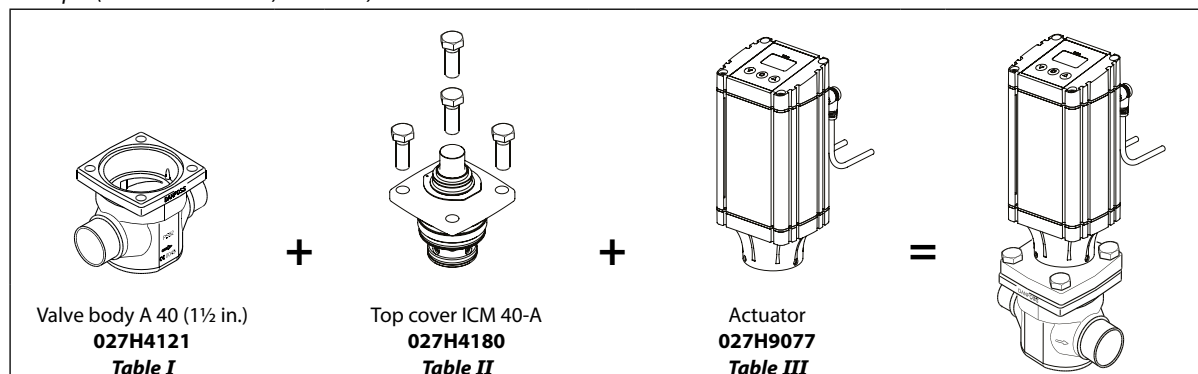
| Available connections |                 |                 |                 |                |                   |                 |                 |               |
|-----------------------|-----------------|-----------------|-----------------|----------------|-------------------|-----------------|-----------------|---------------|
|                       | 32 D (1¼ in.)   | 40 D (1½ in.)   | 42 SA (1½ in.)  | 42 SD (1½ in.) | 35 SD (1½ in. SA) | 32 A (1¼ in.)   | 32 SOC (1¼ in.) | 40 A (1½ in.) |
| ICM 32-A              | <b>027H3000</b> | <b>027H3012</b> | <b>027H3008</b> |                | <b>027H3006</b>   | <b>027H3002</b> | <b>027H3004</b> |               |
| ICM 32-B              | <b>027H3001</b> |                 |                 |                | <b>027H3007</b>   | <b>027H3003</b> | <b>027H3005</b> |               |

Select from parts programme

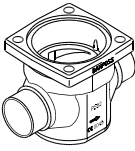
# ICM 40 / ICAD 1200A

## Ordering from the parts programme

Example (select from table I, II and III)



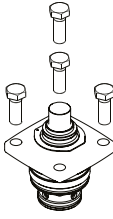
ICV 40 valve body w/different connections Table I



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

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

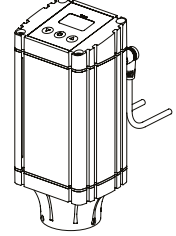
ICM 40 Function module / top cover Table II



| Description | Code Number        |
|-------------|--------------------|
| ICM 40-A    | <b>027H4180</b> *) |
| ICM 40-B    | <b>027H4181</b> *) |

\*) Including gasket and O-rings

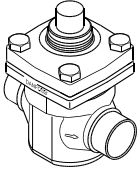
Actuator ICAD 1200A Table III



| Description                            | Code Number     |
|--|-----------------|
| ICAD 1200A with 1.5 m. (60 in.) cables | <b>027H9077</b> |
| ICAD 1200A without cables              | <b>027H9122</b> |

## Ordering complete factory assembled valve without actuator (body, function module/top cover)

Table A



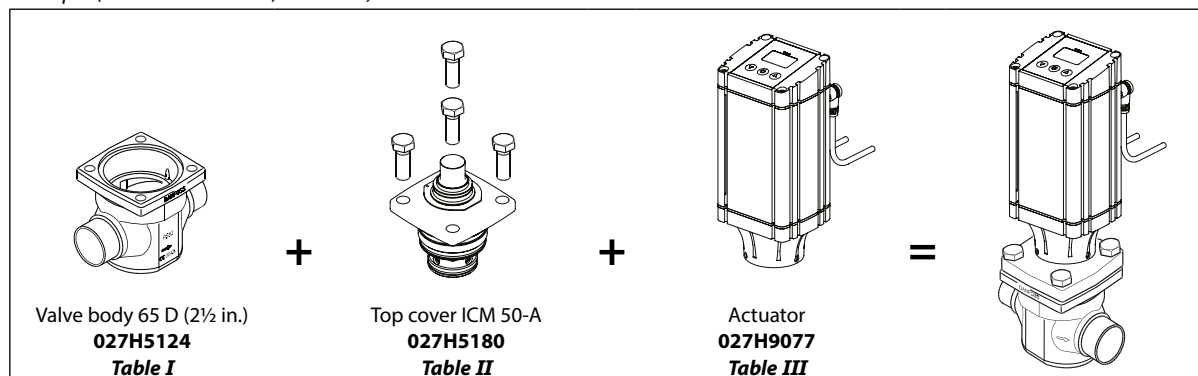
|          |  | Available connections |                 |                   |                   |                  |                    |              |
|----------|--|-----------------------|-----------------|-------------------|-------------------|------------------|--------------------|--------------|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

Select from parts programme

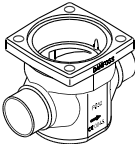
# ICM 50 / ICAD 1200A

## Ordering from the parts programme

Example (select from table I, II and III)



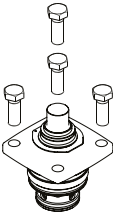
ICV 50 valve body w/different connections *Table I*



|                 |                 |                   |                 |
|-----------------|-----------------|-------------------|-----------------|
| 50 D (2 in.)    | 65 D (2½ in.)   | 54 SD (2¼ in. SA) | 50 A (2 in.)    |
| <b>027H5120</b> | <b>027H5124</b> | <b>027H5123</b>   | <b>027H5121</b> |
| 50 SOC (2 in.)  | 65 A (2½ in.)   |                   |                 |
| <b>027H5122</b> | <b>027H5125</b> |                   |                 |

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

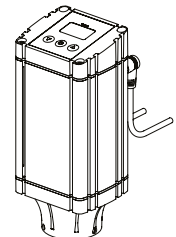
ICM 50 Function module / top cover *Table II*



| Description | Code Number        |
|-------------|--------------------|
| ICM 50-A    | <b>027H5180</b> *) |
| ICM 50-B    | <b>027H5181</b> *) |

\*) Including gasket and O-rings

Actuator ICAD 1200A *Table III*

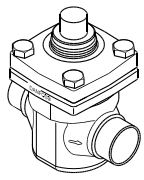


| Description                            | Code Number     |
|--|-----------------|
| ICAD 1200A with 1.5 m. (60 in.) cables | <b>027H9077</b> |
| ICAD 1200A without cables              | <b>027H9122</b> |

## Ordering complete factory assembled valve without actuator

(body, function module/top cover)

*Table A*



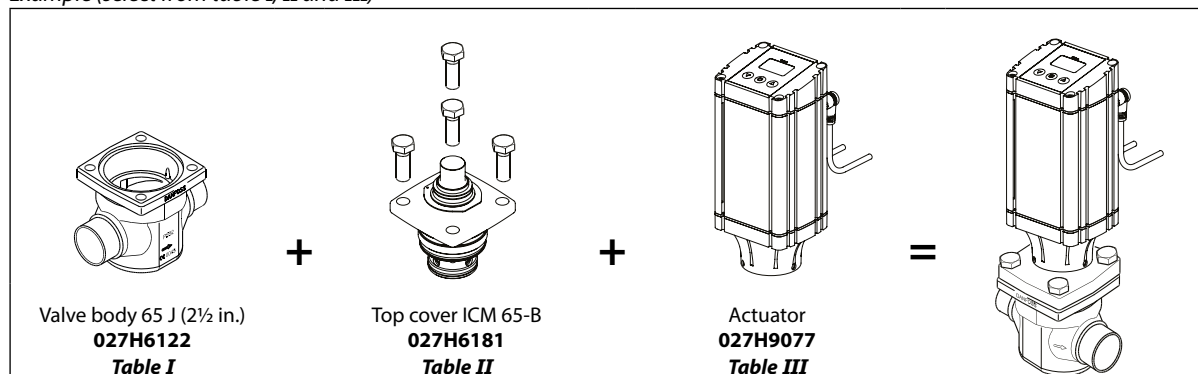
| Available connections |                 |                 |                   |                 |                 |               |
|-----------------------|-----------------|-----------------|-------------------|-----------------|-----------------|---------------|
|                       | 50 D (2 in.)    | 65 D (2½ in.)   | 54 SD (2¼ in. SA) | 50 A (2 in.)    | 50 SOC (2 in.)  | 65 A (2½ in.) |
| ICM 50-A              | <b>027H5000</b> | <b>027H5008</b> | <b>027H5006</b>   | <b>027H5002</b> | <b>027H5004</b> |               |
| ICM 50-B              | <b>027H5001</b> |                 | <b>027H5007</b>   | <b>027H5003</b> | <b>027H5005</b> |               |

Select from parts programme

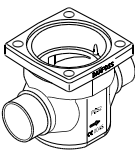
# ICM 65 / ICAD 1200A

## Ordering from the parts programme

Example (select from table I, II and III)

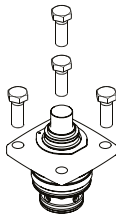


ICV 65 valve body w/different connections **Table I**



|                                  |                                   |                                  |                                    |
|----------------------------------|-----------------------------------|----------------------------------|------------------------------------|
| 65 D (2½ in.)<br><b>027H6120</b> | 65 A (2½ in.)<br><b>027H6121</b>  | 65 J (2½ in.)<br><b>027H6122</b> | 80 D (3 in.)<br><b>027H6126</b>    |
| 80 A (3 in.)<br><b>027H6127</b>  | 67 SA (2¾ in.)<br><b>027H6125</b> | 76 SD (3 in.)<br><b>027H6124</b> | 65 SOC (2½ in.)<br><b>027H6123</b> |

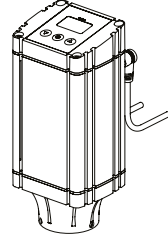
ICM 65 Function module / top cover **Table II**



| Description | Code Number       |
|-------------|-------------------|
| ICM 65-A    | <b>027H6180 *</b> |
| ICM 65-B    | <b>027H6181 *</b> |

\*) Including gasket and O-rings

Actuator ICAD 1200A **Table III**

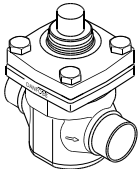


| Description                            | Code Number     |
|--|-----------------|
| ICAD 1200A with 1.5 m. (60 in.) cables | <b>027H9077</b> |
| ICAD 1200A without cables              | <b>027H9122</b> |

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

## Ordering complete factory assembled valve without actuator (body, function module/top cover)

**Table A**

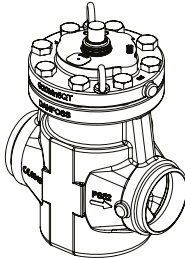
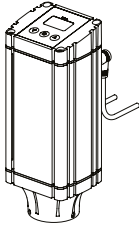
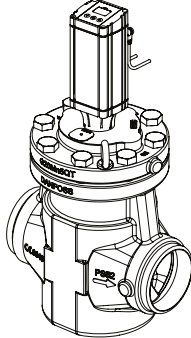


|          | Available connections |                 |               |              |              |                 |                 |                 |
|----------|-----------------------|-----------------|---------------|--------------|--------------|-----------------|-----------------|-----------------|
|          | 65 D (2½ in.)         | 65 A (2½ in.)   | 65 J (2½ in.) | 80 D (3 in.) | 80 A (3 in.) | 67 SA (2¾ in.)  | 76 SD (3 in.)   | 65 SOC (2½ in.) |
| ICM 65-A | <b>027H6010</b>       | <b>027H6012</b> |               |              |              |                 |                 |                 |
| ICM 65-B | <b>027H6001</b>       | <b>027H6003</b> |               |              |              | <b>027H6007</b> | <b>027H6009</b> | <b>027H6005</b> |

Select from parts programme

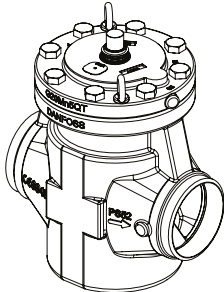
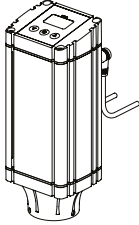
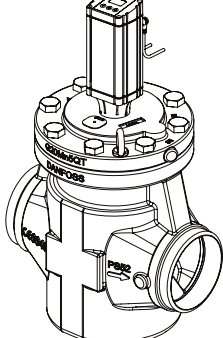
## ICM 100

**Complete factory assembled valve without actuator**  
(body, function module/top cover)

|         |   |               |  |   |  |                          |
|---------|---|---------------|--|---|--|--------------------------|
| ICM 100 |  |               |  |  |  |                          |
|         | Available connections   |               |  |   | ICAD 1200A with 1.5 m. (60 in.) cables | ICAD 1200A without cable |
|         | 100 D (4 in.)   | 100 A (4 in.) |  |   | <b>027H9077</b>                        | <b>027H9122</b>          |

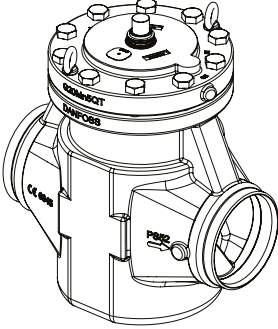
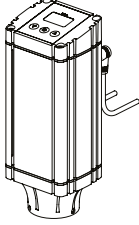
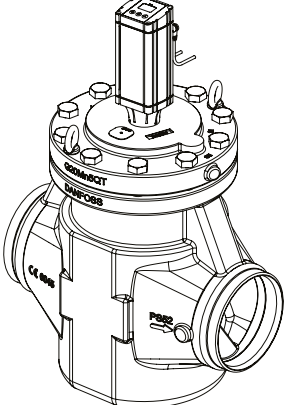
## ICM 125

**Complete factory assembled valve without actuator**  
(body, function module/top cover)

|         |  |               |   |  |  |                          |
|---------|--|---------------|---|--|--|--------------------------|
| ICM 125 |  |               |  |  |  |                          |
|         | Available connections  |               |   |  | ICAD 1200A with 1.5 m. (60 in.) cables | ICAD 1200A without cable |
|         | 125 D (5 in.)  | 125 A (5 in.) |   |  | <b>027H9077</b>                        | <b>027H9122</b>          |

## ICM 150

**Complete factory assembled valve without actuator**  
(body, function module/top cover)

|         |   |               |  |   |  |                          |
|---------|---|---------------|--|---|--|--------------------------|
| ICM 150 |  |               |  |  |  |                          |
|         | Available connections   |               |  |   | ICAD 1200A with 1.5 m. (60 in.) cables | ICAD 1200A without cable |
|         | 150 D (6 in.)   | 150 A (6 in.) |  |   | <b>027H9077</b>                        | <b>027H9122</b>          |

**Accessories**

*ICV PM flanged valve housings*

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

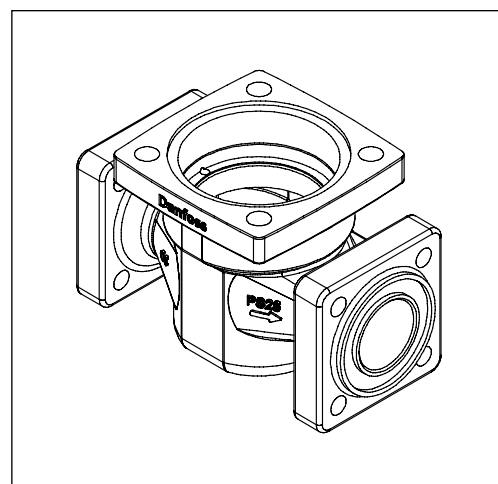
*Pressure range*

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.

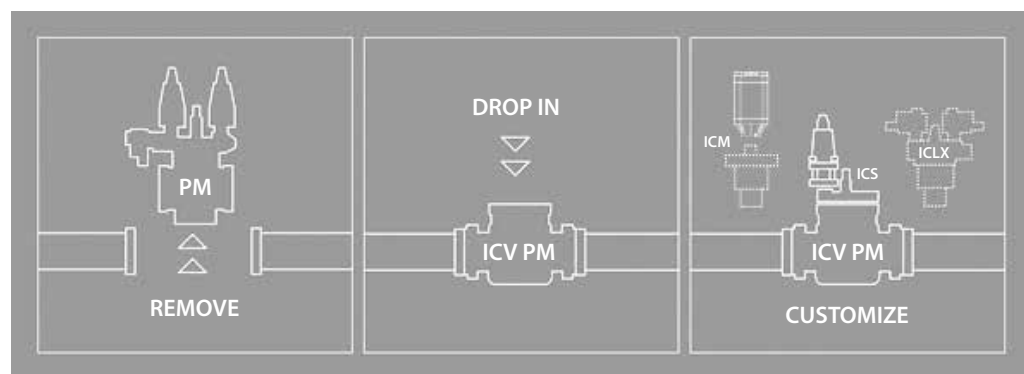
| Description             | Code no.            |
|-------------------------|---------------------|
| ICV 25 PM Valve housing | <b>027H2119</b> *)  |
| ICV 32 PM Valve housing | <b>027H3129</b> *)  |
| ICV 40 PM Valve housing | <b>027H4128</b> *)  |
| ICV 50 PM Valve housing | <b>027H5127</b> **) |
|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

\*) Includes ICV PM valve housing, flange gaskets and flange bolts.

\*\*\*) Includes ICV PM valve housing, flange gaskets, flange bolts and flange nuts.



Function modules and top covers must be ordered separately (see the section "Ordering").



## ICM 20 / ICAD 600A

### Spare parts and accessories

#### Spare parts

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

#### 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 | <b>027H0430</b> |

#### Accessories

| Description | Code Number     |
|-------------|-----------------|
| ICAD-UPS    | <b>027H0182</b> |

#### Accessories

| Description         | Code Number     |
|---------------------|-----------------|
| Multi-function tool | <b>027H0180</b> |

#### Accessories

| Cable for ICAD 600A/1200A |                 |
|---------------------------|-----------------|
| Cable length              | Code number     |
| Cable set 1.5 m, female   | <b>027H0426</b> |
| Cable set 3 m, female     | <b>027H0438</b> |
| Cable set 10 m, female    | <b>027H0427</b> |
| Cable set 15 m, female    | <b>027H0435</b> |

#### Accessories

| Protection cap ICAD 600A/1200A |                 |
|--------------------------------|-----------------|
| Description                    | Code number     |
| Protection cap                 | <b>027H0431</b> |

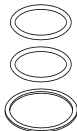
Please observe, when used in CO<sub>2</sub>, that the o-rings on the ICM module can swell (grow). At service it is recommend that new o-rings are installed before the ICM functions module again is installed in the ICV valve body.



## ICM 25-32 / ICAD 600A

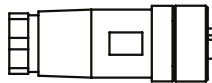
### Spare parts and accessories

#### Spare parts




| Description           | Code Number     |
|-----------------------|-----------------|
| ICM 25 Inspection kit | <b>027H2218</b> |
| ICM 32 Inspection kit | <b>027H3016</b> |

#### Accessories



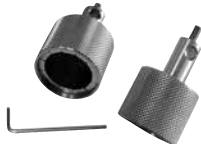
| Connectors for ICAD 600A/1200A  |                 |
|---|-----------------|
| Connector type  | Code number     |
| Two Female Connectors with screw terminals:<br>- connector for power<br>- connector for control signals | <b>027H0430</b> |

#### Accessories



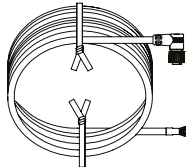
| Description | Code Number     |
|-------------|-----------------|
| ICAD-UPS    | <b>027H0182</b> |

#### Accessories



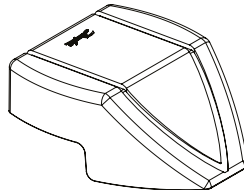
| Description         | Code Number     |
|---------------------|-----------------|
| Multi-function tool | <b>027H0180</b> |

#### Accessories



| Cable for ICAD 600A/1200A |                 |
|---------------------------|-----------------|
| Cable length              | Code number     |
| Cable set 1.5 m, female   | <b>027H0426</b> |
| Cable set 3 m, female     | <b>027H0438</b> |
| Cable set 10 m, female    | <b>027H0427</b> |
| Cable set 15 m, female    | <b>027H0435</b> |

#### Accessories



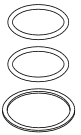
| Protection cap ICAD 600A/1200A |                 |
|--------------------------------|-----------------|
| Description                    | Code number     |
| Protection cap                 | <b>027H0431</b> |

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

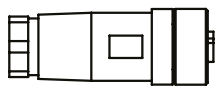
### Spare parts and accessories

#### Spare parts




| Description           | Code Number     |
|-----------------------|-----------------|
| ICM 40 Inspection kit | <b>027H4014</b> |
| ICM 50 Inspection kit | <b>027H5014</b> |
| ICM 65 Inspection kit | <b>027H6016</b> |

#### Accessories



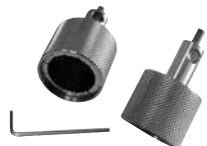
| Connectors for ICAD 600A/1200A  |                 |
|---|-----------------|
| Connector type  | Code number     |
| Two Female Connectors with screw terminals:<br>- connector for power<br>- connector for control signals | <b>027H0430</b> |

#### Accessories



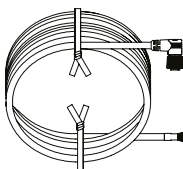
| Description | Code Number     |
|-------------|-----------------|
| ICAD-UPS    | <b>027H0182</b> |

#### Accessories



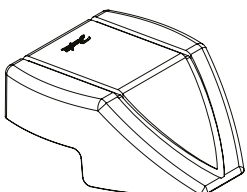
| Description         | Code Number     |
|---------------------|-----------------|
| Multi-function tool | <b>027H0181</b> |

#### Accessories



| Cable for ICAD 600A/1200A |                 |
|---------------------------|-----------------|
| Cable length              | Code number     |
| Cable set 1.5 m, female   | <b>027H0426</b> |
| Cable set 3 m, female     | <b>027H0438</b> |
| Cable set 10 m, female    | <b>027H0427</b> |
| Cable set 15 m, female    | <b>027H0435</b> |

#### Accessories



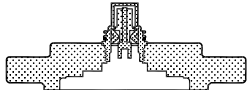
| Protection cap ICAD 600A/1200A |                 |
|--------------------------------|-----------------|
| Description                    | Code number     |
| Protection cap                 | <b>027H0431</b> |


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.

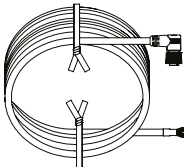
# ICM 100-125-150 / ICAD 1200A

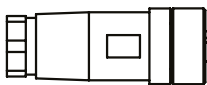
## Spare parts and accessories

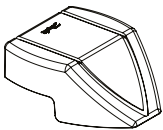
### Accessories


|   |         |                    |
|---|---------|--------------------|
|  |         |                    |
| <b>Top covers</b>   |         |                    |
| <i>Consist of:</i><br>Top cover complete with magnet coupling and gasket          | Size    | <b>Code number</b> |
|   | ICM 100 | <b>027H7133</b>    |
|   | ICM 125 | <b>027H7153</b>    |
|   | ICM 150 | <b>027H7173</b>    |

|   |
|---|
|  |
| ICAD-UPS  |
| <b>Code Number</b>  |
| <b>027H0182</b>   |

|   |                    |
|---|--------------------|
|  |                    |
| <b>Cable for ICAD 600A/1200A</b>  |                    |
| <i>Cable length</i>   | <b>Code number</b> |
| Cable set 1.5 m, female   | <b>027H0426</b>    |
| Cable set 3 m, female   | <b>027H0438</b>    |
| Cable set 10 m, female  | <b>027H0427</b>    |
| Cable set 15 m, female  | <b>027H0435</b>    |

|   |                    |
|---|--------------------|
|                      |                    |
| <b>Connectors for ICAD 600A/1200A</b>   |                    |
| <i>Connector type</i>   | <b>Code number</b> |
| Two Female Connectors with screw terminals:<br>- connector for power<br>- connector for control signals | <b>027H0430</b>    |

|   |                    |
|---|--------------------|
|  |                    |
| <i>Description</i>  | <b>Code number</b> |
| Protection cap ICAD 600A/1200A  | <b>027H0431</b>    |

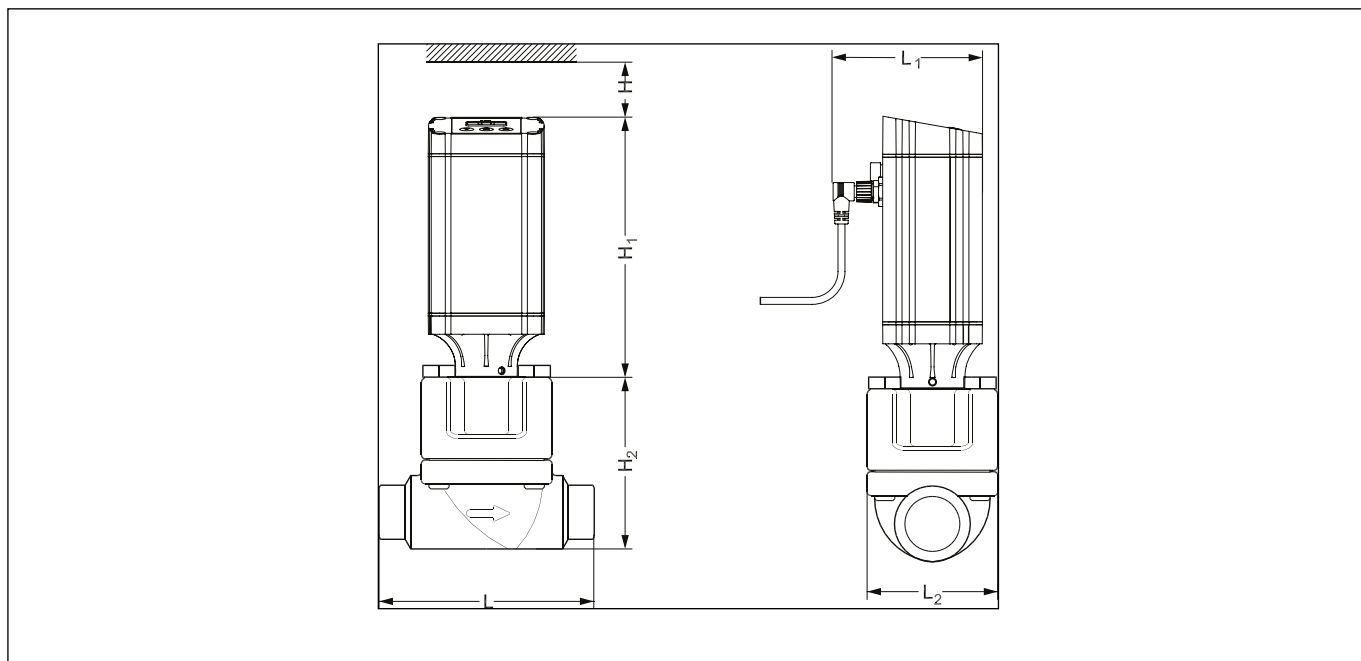
|   |                    |
|---|--------------------|
|  |                    |
| <i>Description</i>  | <b>Code Number</b> |
| Multi-function tool   | <b>027H0181</b>    |

### Spare parts

Please see DKRCI.PY.HS0.C

## ICM 20 / ICAD 600A

### Dimensions

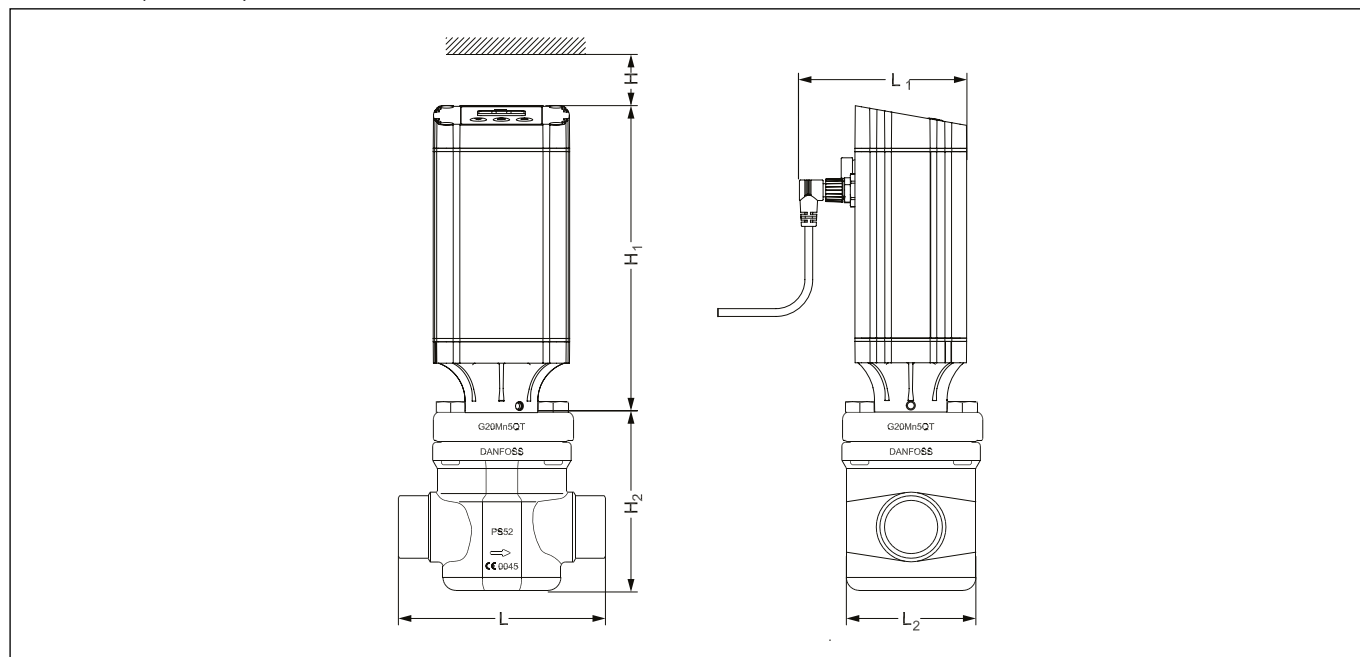


| Connection     |     | H    | H <sub>1</sub> | H <sub>2</sub> | L    | L <sub>1</sub> | L <sub>2</sub> | Weight ICM incl. ICAD |
|----------------|-----|------|----------------|----------------|------|----------------|----------------|-----------------------|
| 20 D (¾ in.)   | mm  | 40   | 195            | 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.               |

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

### Dimensions (continued)

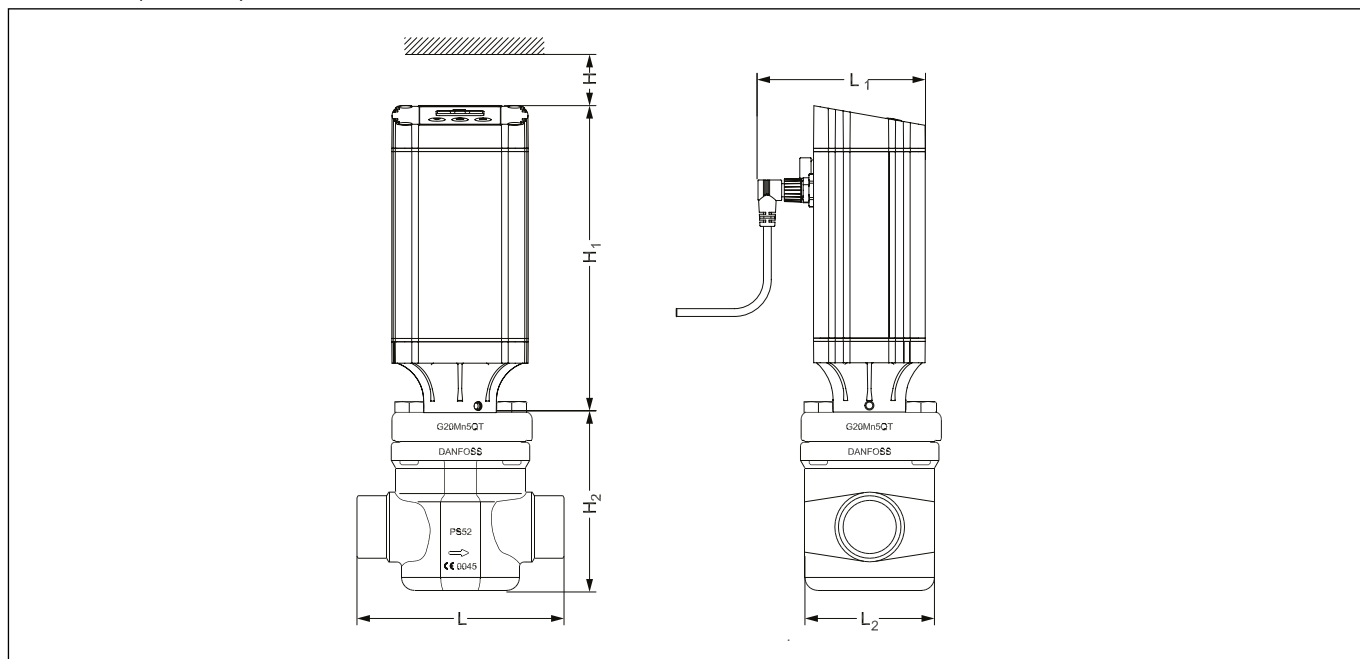


| Connection        |     | H    | H <sub>1</sub> | H <sub>2</sub> | L    | L <sub>1</sub> | L <sub>2</sub> | Weight ICM incl. ICAD |
|-------------------|-----|------|----------------|----------------|------|----------------|----------------|-----------------------|
| 20 D (¾ in.)      | mm  | 40   | 195            | 99             | 135  | 102            | 84             | 4.1 kg                |
|                   | in. | 1.58 | 7.68           | 3.90           | 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           | 3.90           | 5.31 | 4.02           | 3.31           | 8.8 lb.               |
| 32 D (1¼ in.)     | mm  | 40   | 195            | 99             | 135  | 102            | 84             | 4.1 kg                |
|                   | in. | 1.58 | 7.68           | 3.90           | 5.31 | 4.02           | 3.31           | 8.8 lb.               |
| 40 D (1½ in.)     | mm  | 40   | 195            | 99             | 135  | 102            | 84             | 4.1 kg                |
|                   | in. | 1.58 | 7.68           | 3.90           | 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           | 3.90           | 5.31 | 4.02           | 3.31           | 8.8 lb.               |
| 25 A (1 in.)      | mm  | 40   | 195            | 99             | 135  | 102            | 84             | 4.1 kg                |
|                   | in. | 1.58 | 7.68           | 3.90           | 5.31 | 4.02           | 3.31           | 8.8 lb.               |
| 32 A (1¼ in.)     | mm  | 40   | 195            | 99             | 135  | 102            | 84             | 4.1 kg                |
|                   | in. | 1.58 | 7.68           | 3.90           | 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           | 3.90           | 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           | 3.90           | 5.83 | 4.02           | 3.31           | 8.8 lb.               |
| 22 SD (⅞ in.)     | mm  | 40   | 195            | 99             | 135  | 102            | 84             | 4.1 kg                |
|                   | in. | 1.58 | 7.68           | 3.90           | 5.31 | 4.02           | 3.31           | 8.8 lb.               |
| 28 SD (1⅛ in.)    | mm  | 40   | 195            | 99             | 147  | 102            | 84             | 4.1 kg                |
|                   | in. | 1.58 | 7.68           | 3.90           | 5.79 | 4.02           | 3.31           | 8.8 lb.               |
| 22 SA (⅞ in.)     | mm  | 40   | 195            | 99             | 135  | 102            | 84             | 4.1 kg                |
|                   | in. | 1.58 | 7.68           | 3.90           | 5.31 | 4.02           | 3.31           | 8.8 lb.               |
| 28 SA (1⅛ in.)    | mm  | 40   | 195            | 99             | 147  | 102            | 84             | 4.1 kg                |
|                   | in. | 1.58 | 7.68           | 3.90           | 5.79 | 4.02           | 3.31           | 8.8 lb.               |
| 35 SD (1⅜ in. SA) | mm  | 40   | 195            | 99             | 147  | 102            | 84             | 4.1 kg                |
|                   | in. | 1.58 | 7.68           | 3.90           | 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           | 3.90           | 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           | 3.90           | 5.31 | 4.02           | 3.31           | 8.8 lb.               |

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

### Dimensions (continued)

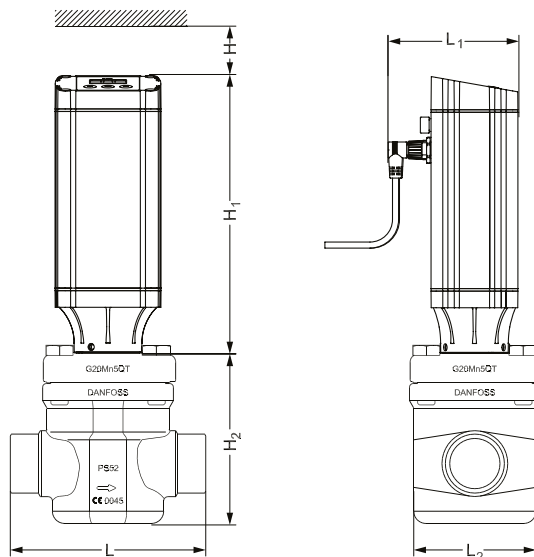


| Connection        |     | H    | H <sub>1</sub> | H <sub>2</sub> | L    | L <sub>1</sub> | L <sub>2</sub> | Weight ICM incl. ICAD |
|-------------------|-----|------|----------------|----------------|------|----------------|----------------|-----------------------|
| 32 D (1¼ in.)     | mm  | 40   | 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 (1½ 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 (1¼ 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 (1½ 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 SOC (1¼ 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 (1⅜ 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 (1⅝ 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 (1⅝ 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.              |

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

## ICM 40 / ICAD 1200A

### Dimensions (continued)

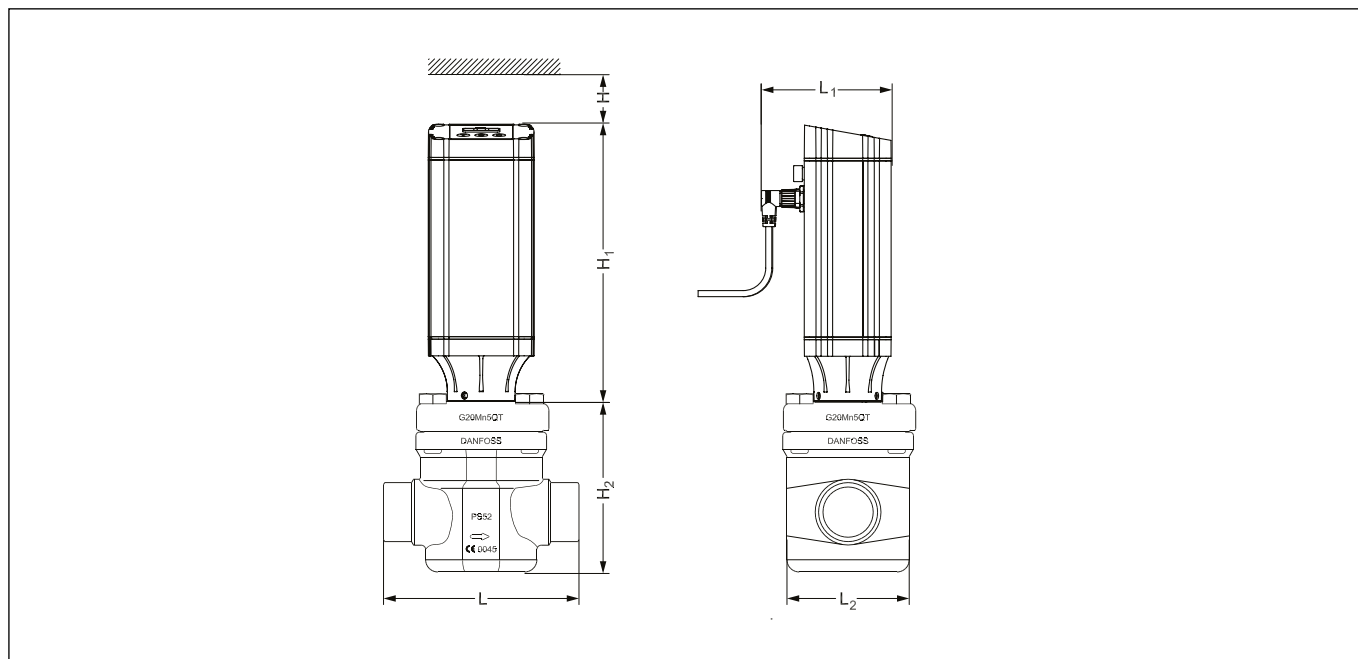


| Connection      |     | H    | H <sub>1</sub> | H <sub>2</sub> | L    | L <sub>1</sub> | L <sub>2</sub> | Weight ICM incl. ICAD |
|-----------------|-----|------|----------------|----------------|------|----------------|----------------|-----------------------|
| 40 D (1½ in.)   | mm  | 45   | 219            | 131            | 160  | 102            | 107            | 7.8 kg                |
|                 | in. | 1.77 | 8.62           | 5.16           | 6.30 | 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 (1½ in.)   | mm  | 45   | 219            | 131            | 160  | 102            | 107            | 7.8 kg                |
|                 | in. | 1.77 | 8.62           | 5.16           | 6.30 | 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 (1½ 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 (1½ 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 (1½ 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.              |

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

## ICM 50 / ICAD 1200A

### Dimensions (continued)



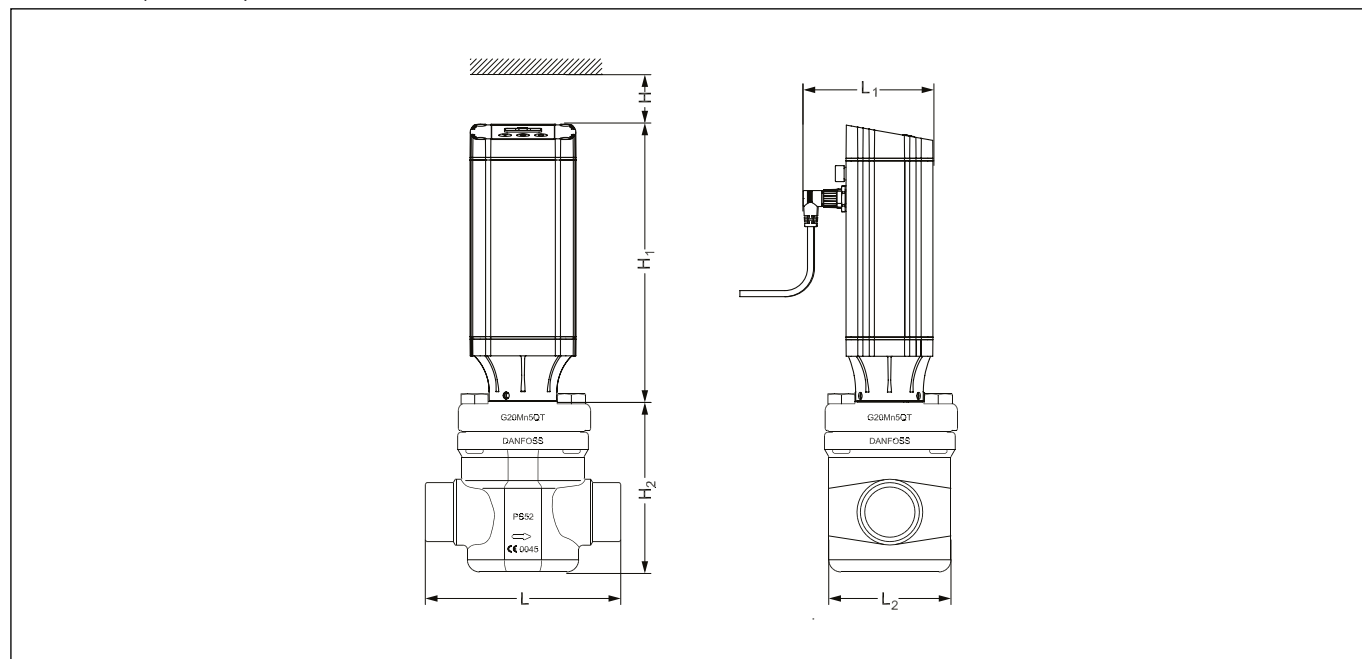
| Connection        |     | H    | H <sub>1</sub> | H <sub>2</sub> | L    | L <sub>1</sub> | L <sub>2</sub> | Weight ICM incl. ICAD |
|-------------------|-----|------|----------------|----------------|------|----------------|----------------|-----------------------|
| 50 D (2 in.)      | mm  | 45   | 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 (2½ 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 (2½ 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           | 8.50 | 4.02           | 4.92           | 24.4 lb.              |
| 54 SD (2½ in. SA) | mm  | 45   | 219            | 159            | 216  | 102            | 125            | 11.1kg                |
|                   | in. | 1.77 | 8.62           | 6.26           | 8.50 | 4.02           | 4.92           | 24.4 lb.              |

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



## ICM 65 / ICAD 1200A

### Dimensions (continued)

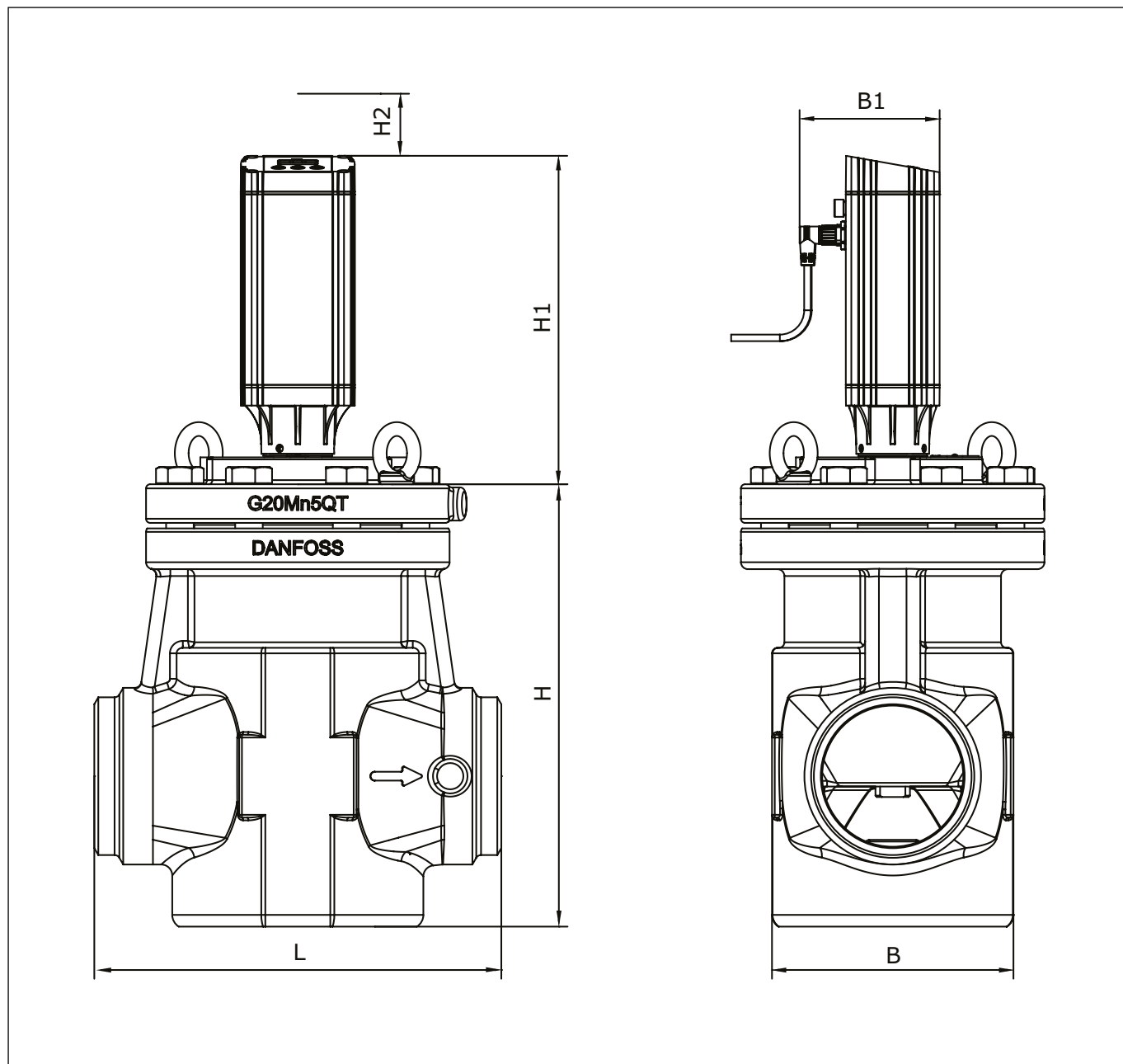


| Connection      |     | H    | H <sub>1</sub> | H <sub>2</sub> | L    | L <sub>1</sub> | L <sub>2</sub> | Weight ICM incl. ICAD |
|-----------------|-----|------|----------------|----------------|------|----------------|----------------|-----------------------|
| 65 D (2½ in.)   | mm  | 45   | 219            | 188            | 230  | 102            | 139            | 16.6 kg               |
|                 | in. | 1.77 | 8.62           | 7.40           | 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           | 7.40           | 9.65 | 4.02           | 5.47           | 36.5 lb               |
| 65 A (2½ in.)   | mm  | 45   | 219            | 188            | 230  | 102            | 139            | 16.6 kg               |
|                 | in. | 1.77 | 8.62           | 7.40           | 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           | 7.40           | 9.65 | 4.02           | 5.47           | 36.5 lb               |
| 65 J (2½ in.)   | mm  | 45   | 219            | 188            | 230  | 102            | 139            | 16.6 kg               |
|                 | in. | 1.77 | 8.62           | 7.40           | 9.06 | 4.02           | 5.47           | 36.5 lb               |
| 65 SOC (2½ in.) | mm  | 45   | 219            | 188            | 230  | 102            | 139            | 16.6 kg               |
|                 | in. | 1.77 | 8.62           | 7.40           | 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           | 7.40           | 9.65 | 4.02           | 5.47           | 36.5 lb               |
| 67 SA (2¾ in.)  | mm  | 45   | 219            | 188            | 245  | 102            | 139            | 16.6 kg               |
|                 | in. | 1.77 | 8.62           | 7.40           | 9.65 | 4.02           | 5.47           | 36.5 lb               |

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

### Dimensions (continued)

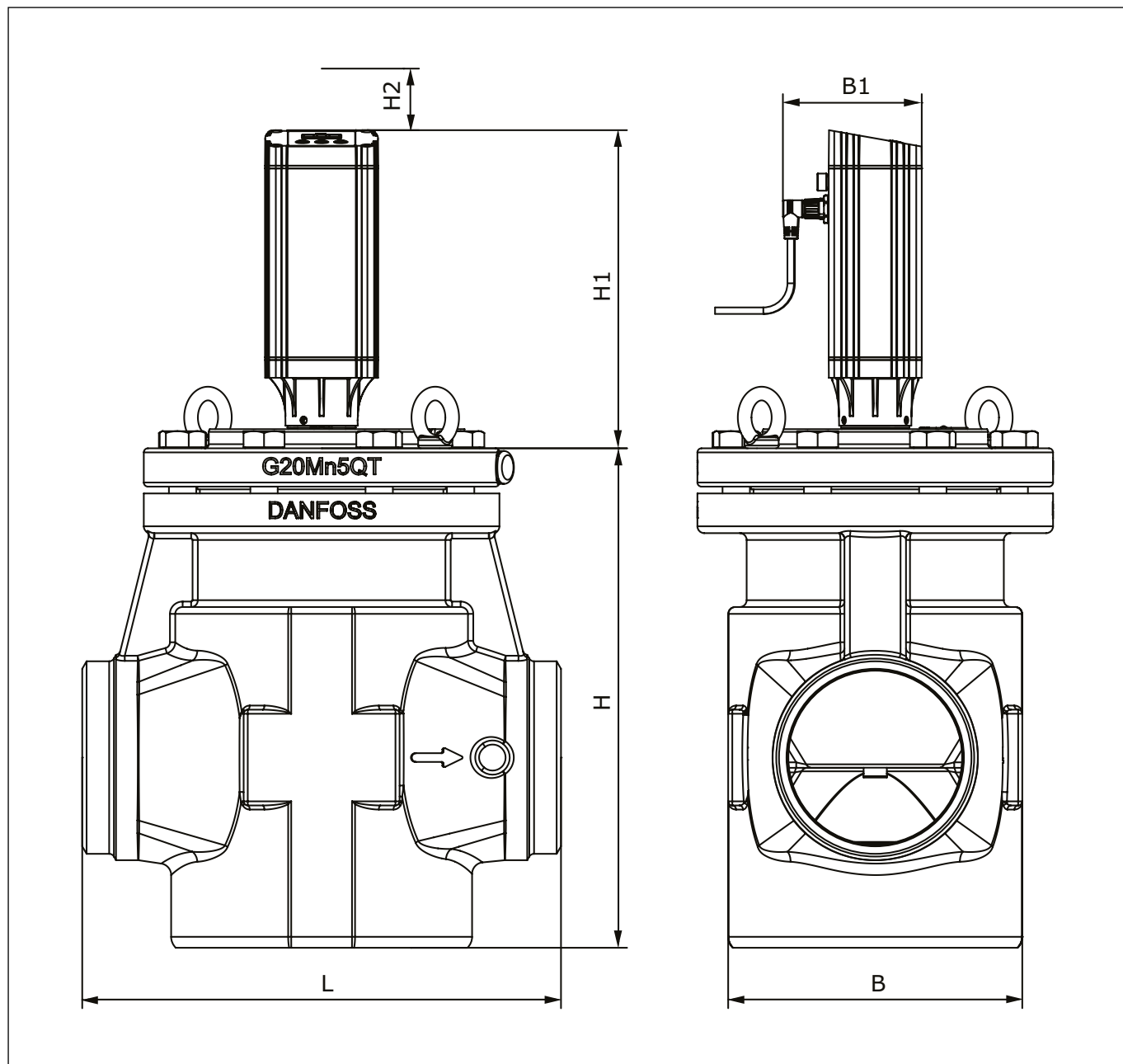


| Connection      |     | H     | H <sub>1</sub> | H <sub>2</sub> | L     | B    | B <sub>1</sub> | Weight ICM incl. ICAD |
|-----------------|-----|-------|----------------|----------------|-------|------|----------------|-----------------------|
| 100 D/A (4 in.) | mm  | 321   | 238            | 45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

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

## ICM 125 / ICAD 1200A

### Dimensions (continued)

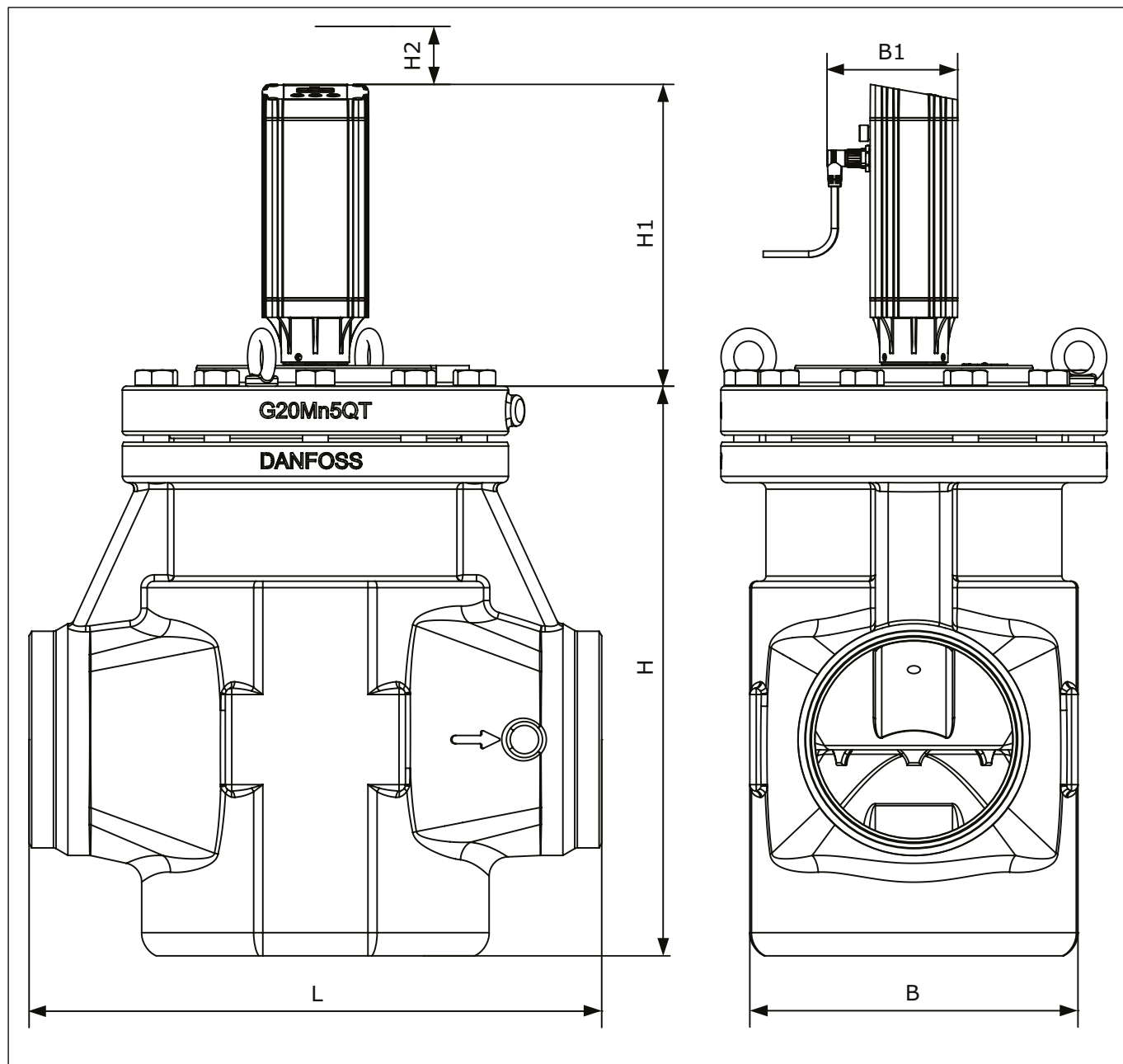


| Connection      |     | H     | H <sub>1</sub> | H <sub>2</sub> | L     | B    | B <sub>1</sub> | Weight ICM incl. ICAD |
|-----------------|-----|-------|----------------|----------------|-------|------|----------------|-----------------------|
| 125 D/A (5 in.) | mm  | 365   | 238            | 45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

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

## ICM 150 / ICAD 1200A

### Dimensions (continued)

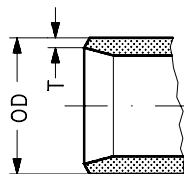


| Connection      |     | H     | H <sub>1</sub> | H <sub>2</sub> | L     | B     | B <sub>1</sub> | Weight ICM incl. ICAD |
|-----------------|-----|-------|----------------|----------------|-------|-------|----------------|-----------------------|
| 150 D/A (6 in.) | mm  | 443   | 238            |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

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

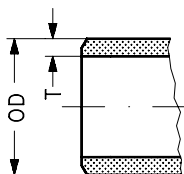
**Connections**

D: Butt-weld DIN (2448)



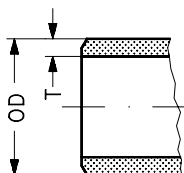
| Size mm | Size in. | OD mm | T mm | OD in. | T in. |  |  |
|---------|----------|-------|------|--------|-------|--|--|
| 20      | (3/4)    | 26.9  | 2.3  | 1.059  | 0.091 |  |  |
| 25      | (1)      | 33.7  | 2.6  | 1.327  | 0.103 |  |  |
| 32      | (1¼)     | 42.4  | 2.6  | 1.669  | 0.102 |  |  |
| 40      | (1½)     | 48.3  | 2.6  | 1.902  | 0.103 |  |  |
| 50      | (2)      | 60.3  | 2.9  | 2.37   | 0.11  |  |  |
| 65      | (2½)     | 76.1  | 2.9  | 3      | 0.11  |  |  |
| 80      | (3)      | 88.9  | 3.2  | 3.50   | 0.13  |  |  |
| 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  |  |  |

A: Butt-weld ANSI (B 36.10)



| Size mm | Size in. | OD mm | T mm | OD in. | T in. | Schedule |  |
|---------|----------|-------|------|--------|-------|----------|--|
| (20)    | ¾        | 26.9  | 4.0  | 1.059  | 0.158 | 80       |  |
| (25)    | 1        | 33.7  | 4.6  | 1.327  | 0.181 | 80       |  |
| (32)    | 1¼       | 42.4  | 4.9  | 1.669  | 0.193 | 80       |  |
| (40)    | 1½       | 48.3  | 5.1  | 1.902  | 0.201 | 80       |  |
| (50)    | 2        | 60.3  | 3.9  | 2.37   | 0.15  | 40       |  |
| (65)    | 2½       | 73.0  | 5.2  | 2.87   | 0.20  | 40       |  |
| (80)    | 3        | 88.9  | 5.5  | 3.50   | 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  |          |  |

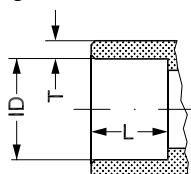
J: Butt-weld JIS



| Size mm | Size in. | OD mm | T mm | OD in. | T in. |  |  |
|---------|----------|-------|------|--------|-------|--|--|
| (20)    | ¾        | 26.9  | 4.0  | 1.059  | 0.158 |  |  |
| (25)    | 1        | 33.7  | 4.6  | 1.327  | 0.181 |  |  |
| (32)    | 1¼       | 42.4  | 4.9  | 1.669  | 0.193 |  |  |
| (40)    | 1½       | 48.3  | 5.1  | 1.902  | 0.201 |  |  |
| (50)    | 2        | 60.3  | 3.9  | 2.37   | 0.15  |  |  |
| (65)    | 2½       | 76.3  | 5.2  | 3.0    | 0.20  |  |  |
| (80)    | 3        | 88.9  | 5.5  | 3.50   | 0.22  |  |  |

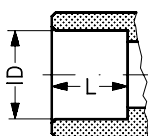
**Connections**

SOC:  
Socket welding ANSI (B 16.11)



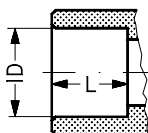
| Size mm | Size in. | ID mm | T mm | ID in. | T in. | L mm | L in. |
|---------|----------|-------|------|--------|-------|------|-------|
| (20)    | ¾        | 27.2  | 4.6  | 1.071  | 0.181 | 13   | 0.51  |
| (25)    | 1        | 33.9  | 7.2  | 1.335  | 0.284 | 13   | 0.51  |
| (32)    | 1¼       | 42.7  | 6.1  | 1.743  | 0.240 | 13   | 0.51  |
| (40)    | 1½       | 48.8  | 6.6  | 1.921  | 0.260 | 13   | 0.51  |
| (50)    | 2        | 61.2  | 6.2  | 2.41   | 0.24  | 16   | 0.63  |
| (65)    | 2½       | 74    | 8.8  | 2.91   | 0.344 | 16   | 0.63  |

SD: Soldering (DIN 2856)



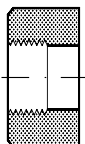
| Size mm | Size in. | ID mm | ID in. | L mm | L in. |
|---------|----------|-------|--------|------|-------|
| 16      |          | 16.07 |        | 15   |       |
| 22      |          | 22.08 |        | 16.5 |       |
| 28      |          | 28.08 |        | 26   |       |
| 35      |          | 35.07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

SA: Soldering (ANSI B 16.22)



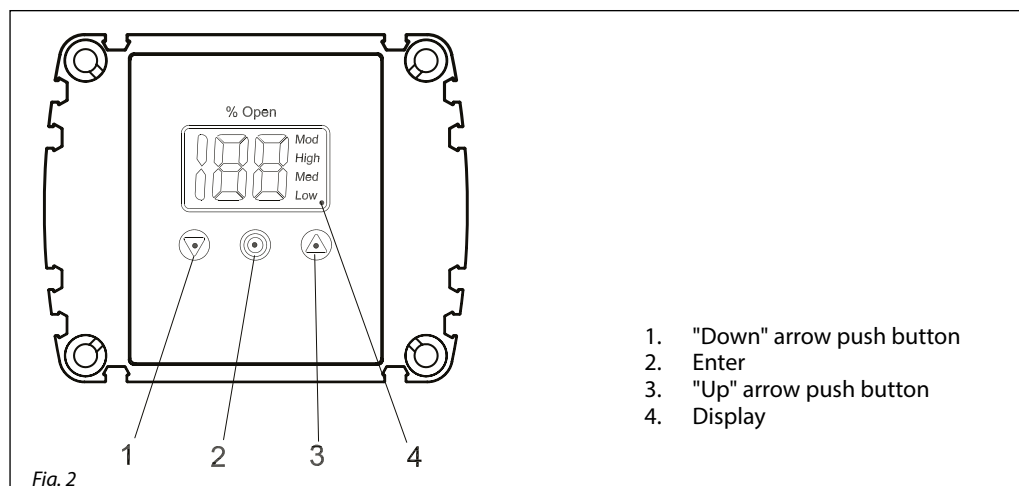
|  |       |  |       |  |       |
|--|-------|--|-------|--|-------|
|  | 5/8   |  | 0.625 |  | 0.591 |
|  | 7/8   |  | 0.875 |  | 0.650 |
|  | 1 1/8 |  | 1.125 |  | 1.024 |
|  | 1 3/8 |  | 1.375 |  | 0.984 |
|  | 1 1/2 |  | 1.625 |  | 1.102 |
|  | 2 1/8 |  | 2.125 |  | 1.300 |
|  | 2 3/8 |  | 2.625 |  | 1.300 |

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



| Size mm | Size in. | Inside pipe thread |
|---------|----------|--------------------|
| (20)    | ¾        | (¾ x 14 NPT)       |
| (25)    | 1        | (1 x 11.5 NPT)     |
| (32)    | 1¼       | (1¼ x 11.5 NPT)    |

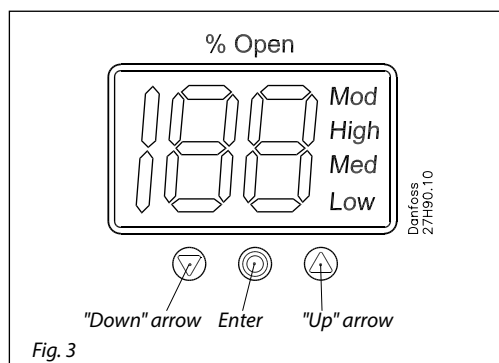
General operation



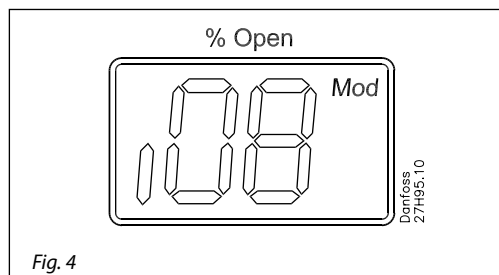
ICAD is equipped with an MMI (Man Machine Interface) from which it is possible to monitor and change the setting of parameters to adapt the ICAD and the corresponding ICM to the actual refrigeration application.

The setting of parameters is managed by means of the integrated ICAD MMI (see fig. 2 and fig. 3) and consists of:

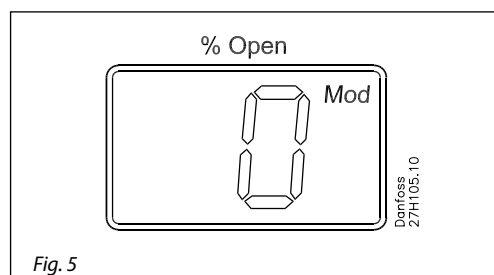
- To exit from the **Parameter list** and return to the display of Opening Degree (OD) keep the push button activated for 2 seconds.
- Display (fig. 2, pos. 4)
  - Normally the Opening Degree (OD) 0 - 100 % of the ICM valve is displayed. No activation of push buttons for 20 seconds means that the display will always show OD (see fig. 5).



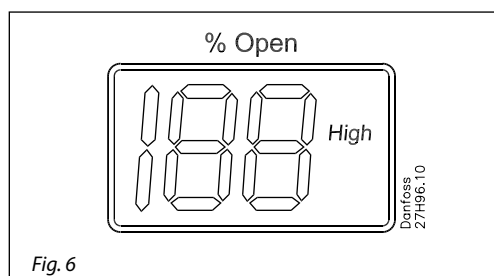
- "Down" arrow push button (fig. 2, pos. 1)
  - Decreases parameter number by 1 at each activation
- "Up" arrow pushbutton (fig. 2, pos. 3)
  - Increases parameter number by 1 at each activation
- Enter push button (fig. 2, pos. 2)
  - Gives access to the **Parameter list** by keeping the push button activated for 2 seconds. A **Parameter list** example is shown below (parameter **j08**, fig. 4).



- Gives access to change a value once the **Parameter list** has been accessed
- Acknowledge and save change of value of a parameter.



- Displays the parameter.
- Displays the actual value of a parameter.
- Displays the function status by means of text (fig. 2, 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 fig. 6).



### Alarms

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.<br>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>j01</b> = 2, or <b>j02</b> = 2<br>When <b>j03</b> = 1 and AI A > 22 mA<br>When <b>j03</b> = 2 and AI A > 22 mA<br>or AI A < 2 mA<br>When <b>j03</b> = 3 and AI A > 12 V<br>When <b>j03</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>j08</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   |
| 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 <b>i16</b> = 1<br>If the valve is locked in more than 15 seconds.<br>ICM stopped and hold position<br><b>A9</b> flashing in display<br><b>A9</b> alarm can only be reset by Power OFF/ON of ICAD                                  |

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 **j11**.



## Data sheet | Motor operated valves, type and actuators type ICAD

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



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/ICMTS 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)<br>=> Low is displayed.<br>If ICM is opening and (33 < <b>i04</b> <= 66) or ICM is closing and (33 < <b>i14</b> <= 66)<br>=> Med is displayed.<br>If ICM is opening and ( <b>i04</b> >= 67) or ICM is closing and ( <b>i14</b> >= 67)<br>=> 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   |
| DI function   | <b>i09</b>     | 1   | 2   | 1               | ✓      |      | No        | Define function when DI is ON (short circuited DI terminals) when <b>i02</b> = 2<br>1: Open ICM valve (DI = OFF => Close ICM valve)<br>2: Close ICM valve (DI = OFF => Open ICM valve)  |
| Password  | <b>i10</b>     | 0   | 199 | 0               |        | -    | -         | Enter number to access password protected parameters: <b>i26</b><br>Password = 11   |
| Old Alarms  | <b>i11</b>     | 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.  | <b>i12</b>     | 0   | 100 | 50              | ✓      |      | No        | Only active if <b>i07</b> = 4<br>If fail safe supply is connected and power cut occurs, the ICM will go to the specified OD.  |
| Inverse operation   | <b>i13</b>     | 0   | 1   | 0               | ✓      |      | No        | When <b>i02</b> = 1<br>0: Increasing Analog Input signal => Increasing ICM Opening Degree<br>1: Increasing Analog Input signal => Decreasing ICM Opening Degree<br>When <b>i02</b> = 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 <b>ON/OFF Mode</b><br>Closing speed  | <b>i14</b>     | 0   | 100 | 50/ 100         | ✓      | -    | No        | See <b>i04</b> .<br>If <b>i26</b> = 1 - 3 then factory setting = 100<br>If <b>i26</b> = 4 - 9 then factory setting = 50   |
| Manual set point  | <b>i15</b>     | 0   | 100 | 0               |        |      | No        | When <b>i01</b> = 2, <b>i15</b> determine the start up value.   |

to be continued....

## Data sheet | Motor operated valves, type and actuators type ICAD

### Parameter list

(continued)

| Description                                       | ICAD parameter | Min | Max | Factory Setting | Stored | Unit | Pass word | Comments   |
|---|----------------|-----|-----|-----------------|--------|------|-----------|--|
| Encoder operation                                 | i16            | 0   | 1   | 1               | ✓      |      | Yes       | <b>NB:</b> 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       | <b>NB:</b> 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

| Description        | ICV Name | Min | Max | Factory Setting | Stored | Unit | Pass word | 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><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 (fig. 2) is alternating between showing: **CA** and **A1** the factory resetting is complete.



