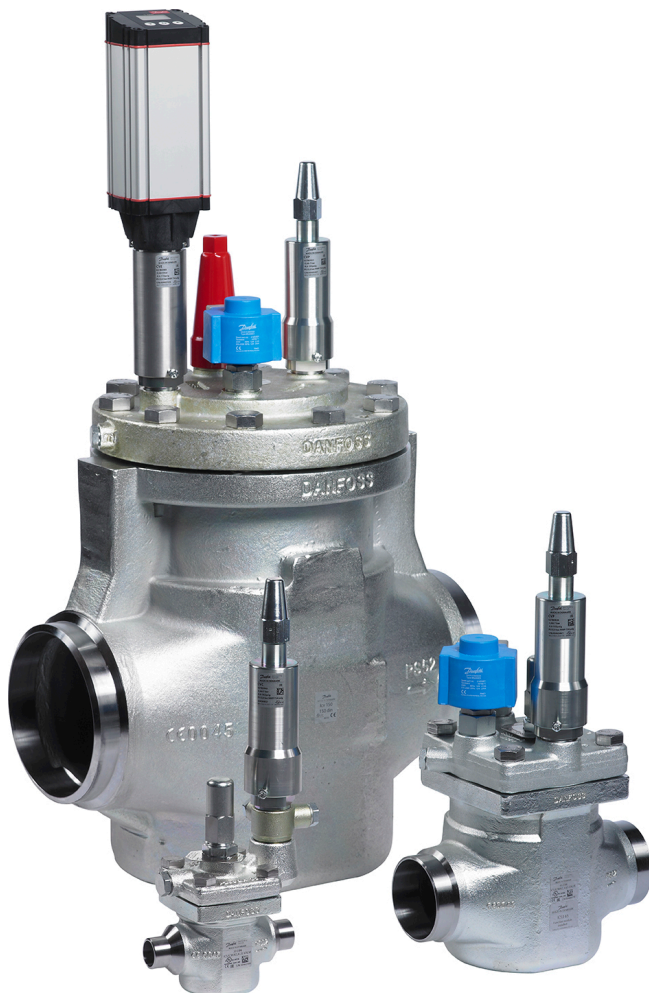


Data Sheet

# Pilot-operated servo valve Type **ICS**

Controlling pressure, temperature and ON/OFF in refrigeration systems



ICS pilot-operated servo valves belong to the ICV (Industrial Control Valve) family.

The valve comprises three main components: valve body, function module and top cover.

ICS pilot-operated servo valves are pilot operated valves for regulating pressure, temperature and ON/OFF function in refrigeration systems. ICS valves are designed for low and high-pressure refrigerants.

ICS valves can be used on the high and lowpressure sides, in wet and dry suction lines and in liquid lines without phase change (i.e. where no expansion takes place in the valve).

The function of ICS valves is dependent on the pilot pressure applied from either a pilot valve or external pilot pressure source.

ICS 1 pilot has one pilot pressure connection and ICS 3 pilot has three pilot pressure connections.

## Features

- Designed for industrial refrigeration applications for a maximum working pressure of 52 bar / 754 psig.
- Applicable to HCFC, HFC, R717 (Ammonia) and R744 (CO<sub>2</sub>).
- Direct coupled connections.
- Connection types include butt weld, socket weld, solder and threaded connections.
- Low temperature steel body.
- Low weight and compact design.
- V-port regulating cone ensures optimum regulating accuracy particularly at part load.
- Function module has a QPQ surface treated insert and a steel piston ring ensuring precise control accuracy.
- ICV 4 in., 5 in. and 6 in. ANSI with NPT threaded pressure outlet in the outlet of the valve.
- Replaceable Teflon valve seat for ICS 25-80.
- Maintenance spare part kit available for ICS 100-150.
- Modular Concept:
  - Each valve body is available with several different connection types and sizes.
  - Valve overhaul on ICS 25-80 is done by replacing the function module.
  - Possible to convert ICS pilot-operated servo valve to ICM motor operated valve.
- Manual opening.
- The ICS valve is a multifunction valve where several pilot valves can be mounted into the pilot ports.
- The standard range of pilot valves can be used on all sizes of ICS valves. Pilot valves can be either screwed directly into the ICS valve, thus eliminating the need for solder/weld connections or external pilot lines.
- Pressure gauge connection port to measure valve inlet pressure.
- The top cover can be rotated into any possible position without affecting the operation of the valve.
- To get an updated list of certification on the products please contact your local Danfoss Sales Company.

## Functions

Figure 1: ICS 1 Pilot

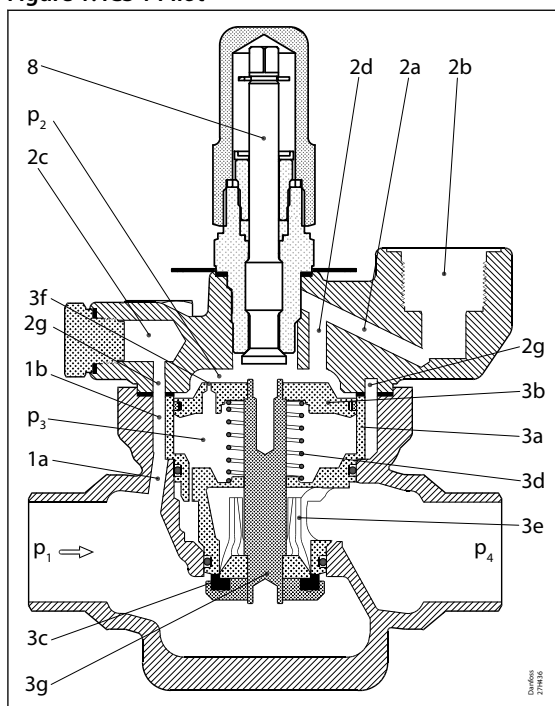
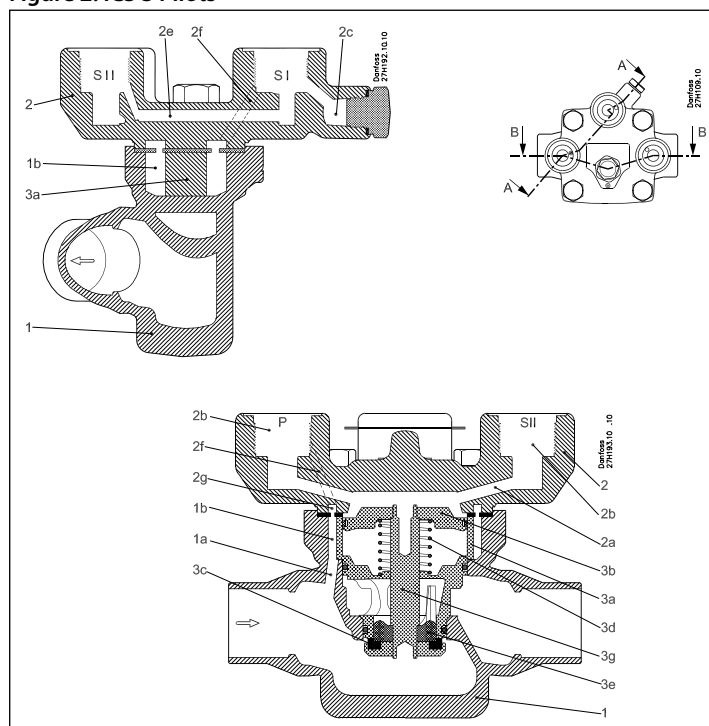


Figure 2: ICS 3 Pilots



### ICS 1 Pilot and ICS 3 Pilot

|    |                                       |                |                            |
|----|---------------------------------------|----------------|----------------------------|
| 1  | Body                                  | 3a             | Cylinder                   |
| 1a | Pilot channel to inlet side           | 3b             | Piston                     |
| 1b | Circular gap between house and module | 3c             | Valve plate                |
| 2  | Top cover                             | 3d             | Spring                     |
| 2a | Pilot channels in top cover           | 3e             | Cone                       |
| 2b | Pilot insertion hole                  | 3f             | Equalisation orifice       |
| 2c | Pressure gauge connection             | 3g             | Piston rod                 |
| 2d | Piston top inlet channel              | p <sub>1</sub> | Inlet pressure             |
| 2e | Cross channel SI to SII               | p <sub>2</sub> | Pressure on piston         |
| 2f | Inlet channel                         | p <sub>3</sub> | Pressure underneath piston |
| 2g | Circular groove                       | p <sub>4</sub> | Outlet pressure            |
| 3  | Function module                       | 8              | Manual operating spindle   |

The ICS main valve is a pilot operated valve. The types of pilot valves used determine the function. The ICS main valve with pilot valve(s) controls refrigerant flow by modulation or on/off in accordance with the pilot valve and main valve status. The manual spindle can be used to open the valve plate.

The opening degree of the main valve is determined by the pressure difference (differential pressure) between pressure  $p_2$ , which acts on top of the servo piston (3b), and pressure  $p_3$ , which acts on the underside of the servo piston.

If this pressure difference is 0, the main valve will be fully closed.

If the pressure difference is 0.2 bar (3 psi) or greater, the main valve will be fully open. At pressure differences ( $p_2 - p_3$ ) between 0.07 bar (1 psi) and 0.2 bar (3 psi), the degree of opening will be correspondingly proportional.

The port of the throttle cone (3e) is V-shaped, which provide good regulation characteristic to pilot operated main valves even at low loads.  $P_3$  pressure is equal to the valve outlet pressure ( $P_4$ ), due to a clearance between the piston rod (3g) and the function module. The opening degree of the ICS valve is therefore controlled by the application of  $P_2$  pressure acting on top of the servo piston, which is equal to or greater than valve outlet pressure ( $P_4$ ).

$p_2 = p_4 \sim$  closed

$p_2 = p_4 + 0.2$  bar (3 psi)  $\sim$  fully open

$p_4 \leq p_2 \leq p_4 + 0.2$  bar (3 psi)  $\sim$  proportional degree of opening.

The maximum pressure ( $p_2$ ) can act on the top of the servo piston (3b).  $p_2$  normally corresponds to the pressure,  $p_1$  - ICS main valve inlet pressure. Inlet pressure  $p_1$  is led, via the drilled channels (1a, 1b, 2f, 2b (pilot), 2a, 2d) in the valve body (1) and cover (2) through the individual pilot valves and onto the top of the servo piston (3b).

The degree of opening of the individual pilot valves determines the magnitude of pressure  $p_2$  and thus the degree of opening of the main valve. The equalisation hole (3f) in the servo piston (3b) ensures that pressure  $p_2$  is balanced in accordance with the degree of opening of the pilot valve.

### **NOTE:**

When ICS valves with 3 pilot ports are used with external pressure connector (Figure 2: ICS 3 Pilots, pos. 61), the valve port inlet pressure will be isolated.

The ICS can be fitted with just a single screwed-in pilot valve or external pilot connection. The degree of opening of the main valve will be in accordance with the control status of the pilot valve or external pilot flow control.

ICS main valve with one pilot connection is fully closed when the pilot valve is fully closed and fully open when the pilot valve is fully open. Otherwise the degree of opening of the main valve is proportional to the degree of opening of the pilot valve.

The ICS 3 pilot version can be fitted with one, two, or three pilot valves so that up to three regulating functions are possible. If the external pilot connection is used, more functions can be added.

In the ICS three pilot version, the pilot ports are related as follows:

- The pilot valves fitted in ports SI and SII are connected in series.
- The ICS 3 pilot operated main valve will be fully closed if just one of the series-connected pilot valves is closed. The main valve can only open if both pilot valves are open at the same time.
- The pilot valve fitted in port P is connected in parallel to the pilot valves in ports SI and SII.

The ICS valve will be fully open if the pilot valve in P is fully open, irrespective of the degree of opening of pilot valves SI and SII.

The ICS valve will be fully closed if the pilot valve in P is fully closed and at least one of the valves in SI or SII is fully closed at the same time. The relation between the pilot valves in ports SI, SII and P is shown in the table on the next page.

If the ICS is not fitted with three pilot valves, the unused port(s) must be sealed with a blanking plug. If the blanking plug is fitted as an assembled unit, A + B, the channels from the specific port will be closed. (See illustration below)

If only the top part, A, of the plug is fitted, the channels from the ports in question will be open. If the degree of opening of the ICS main valve is not to be a function of the main valve inlet pressure, or if more than three regulating functions are required, ports SI, SII or P can be fitted with a nipple for the connection of external pilot pressure. This applies to all ICS versions.

The pressure to which the external pilot line is connected will then determine pressure  $p_2$  on top of the servo piston. The pilot valves fitted in that external pilot line will determine the main valve function. Pilot valves installed in external lines must be mounted in a type CVH housing.

Depending on the function of the pilot valves, the ICS regulating characteristic becomes:

## Pilot-operated servo valve, type ICS

- on/off
- proportional
- integral or
- cascade.

ICS main valves are therefore especially suitable for all forms of temperature and pressure regulating systems.

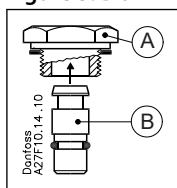
An overview of the types of pilot valves available can be found in the literature "Pilot valves for operated main valves" (AI248786497190).

On the following pages, a number of configuration examples can be found. These are only for explanatory purpose. However, by using the literature regarding pilot valves these examples are easier to comprehend.

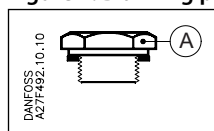
**Table 1: Pilot valve port**

| Pilot valve port |        |        | ICS valve |
|------------------|--------|--------|-----------|
| SI               | SII    | P      |           |
| Open             | Open   | Closed | Open      |
| Open             | Open   | Open   | Open      |
| Open             | Closed | Closed | Closed    |
| Open             | Closed | Open   | Open      |
| Closed           | Open   | Closed | Closed    |
| Closed           | Open   | Open   | Open      |
| Closed           | Closed | Closed | Closed    |
| Closed           | Closed | Open   | Open      |

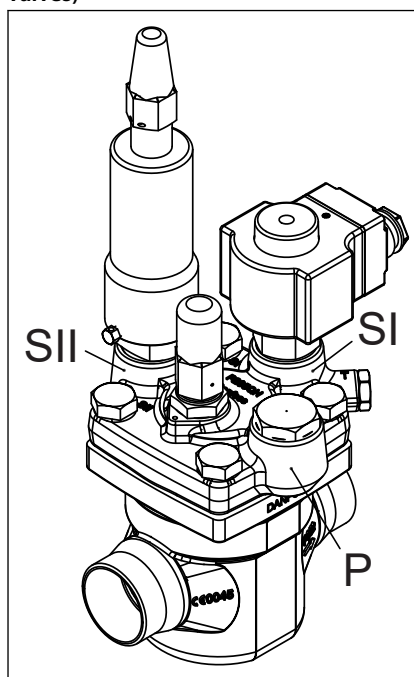
**Figure 3: Blanking plug A + B**



**Figure 4: Blanking plug A**



**Figure 5: Example (ICS with 3 pilot valves)**



## Media

### **Refrigerants**

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

Use with flammable hydrocarbons cannot be recommended; please contact Danfoss.

Surface protection ICS 25-150: The external surface is zinc-chromated to provide good corrosion protection.

### **New refrigerants**

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

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

## Product specification

### **Design**

ICS valves are designed as pilot operated valves requiring minimal pressure differential to open. If the pressure difference is 0 bar /0 psi, the ICS valve will be closed. If the pressure difference is 0.2 bar /3 psi or more, the ICS valve will be fully open. At pressure differences between 0.07 bar /1 psi and 0.2 bar /3 psi, the opening degree will be correspondingly proportional.

The ICS is available for use with either one or three pilot valves.

Two of the three pilot pressure connections (S1 and S2) are connected in series whilst the third (P) is connected in parallel to S1 and S2. This allows different combinations of pilot valves to be used, thus providing numerous variations in control functions.

Valve body and top cover material Low temperature steel

### **Pressure and temperature range**

#### **Temperature range**

-60 °C /+120 °C (-76 °F /+248 °F).

#### **Pressure range**

The valve is designed for: Max. working pressure: 52 bar (754 psig)

#### **Surface protection**

ICS 25-150: The external surface is zinc-chromated to provide good corrosion protection.

#### **Opening differential pressure:**

Fully open: Min. 0.2 bar (min. 3 psig); Max. Opening Pressure Differential (MOPD), solenoid valves only - at nominal conditions.

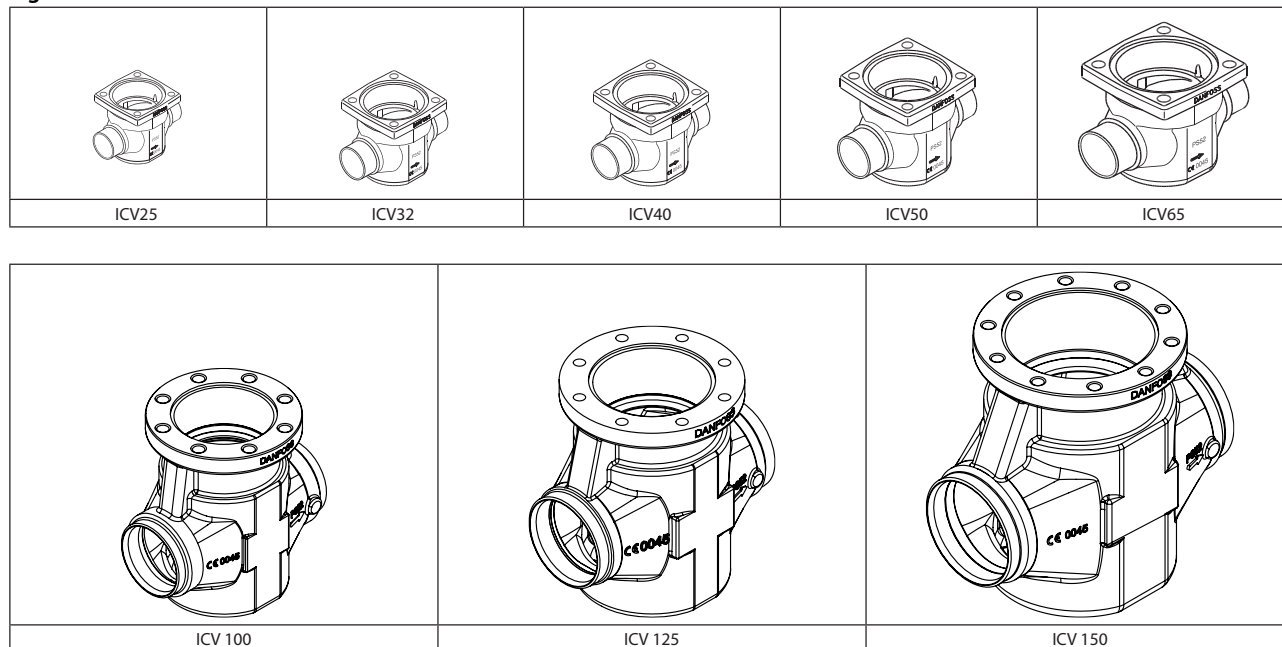
- 10 W a.c. up to 21 bar (305 psi)
- 20 W a.c. up to 40 bar (580 psi)

## The ICS Concept

The ICS 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 eight valve bodies available.



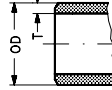
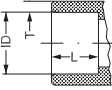

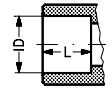

Figure 6: Valve bodies



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

Figure 7: Valve body in 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  |

Each valve body may be fitted with a 1 pilot or 3 pilot top cover.

## Pilot-operated servo valve, type ICS

Figure 8: 1 pilot top cover

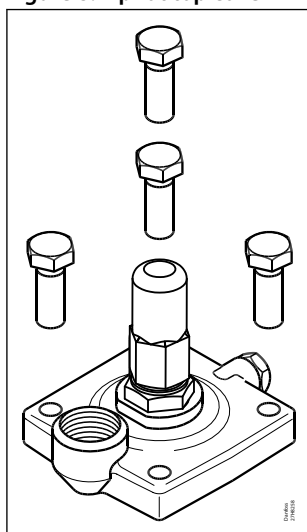
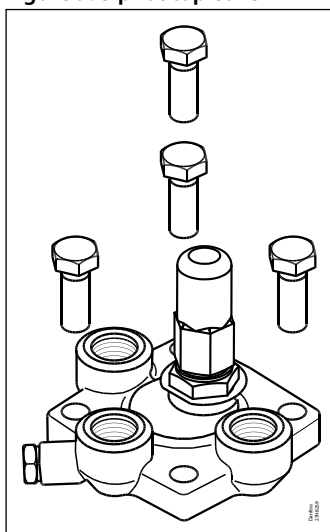
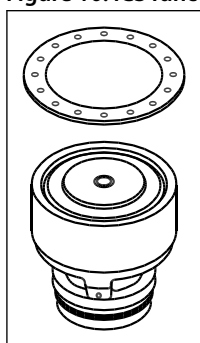


Figure 9: 3 pilot top cover



In ICS, multiple inserts (function modules) are available to give different capacities.

Figure 10: ICS function modules



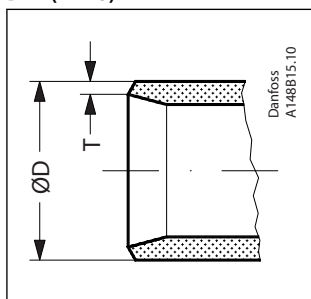
| Type      | Valve body size | $K_v$<br>(m <sup>3</sup> /h) | $C_v$<br>(USgal/min) |
|-----------|-----------------|------------------------------|----------------------|
| ICS 25-5  | 25              | 1.7                          | 2.0                  |
| ICS 25-10 |                 | 3.5                          | 4.1                  |
| ICS 25-15 |                 | 6.0                          | 7.0                  |
| ICS 25-20 |                 | 8                            | 9.3                  |
| ICS 25-25 |                 | 11.5                         | 13.3                 |
| ICS 32    | 32              | 17                           | 20                   |
| ICS 40    | 40              | 27                           | 31                   |
| ICS 50    | 50              | 44                           | 51                   |
| ICS 65    | 65              | 70                           | 81                   |
| ICS 80    | 80              | 85                           | 98                   |
| ICS 100   | 100             | 142                          | 165                  |
| ICS 125   | 125             | 207                          | 240                  |
| ICS 150   | 150             | 354                          | 410                  |

## Connections

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

- D: Butt weld, DIN (2448)
- A: Butt weld, ANSI (B 36.10)
- J: Butt weld, JIS (B 5 602)
- SOC: Socket weld, ANSI (B 16.11)
- SD: Solder connection, DIN (2856)
- SA: Solder connection, ANSI (B 16.22)
- FPT: Female pipe thread (ANSI/ASME B 1.20.1)

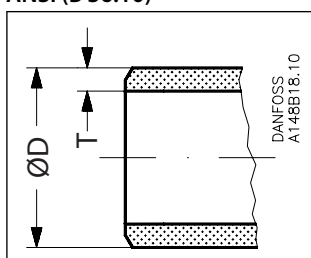
**Figure 11: D: Butt-weld  
DIN (2448)**



**Table 2: Butt-weld DIN**

| Size<br>mm | Size<br>in. | OD<br>mm | T<br>mm | OD<br>in. | T<br>in. |
|------------|-------------|----------|---------|-----------|----------|
| 20         | (¾)         | 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    | 3.6     | 4.5       | 0.14     |
| 125        | (5)         | 140.7    | 4       | 5.5       | 0.16     |
| 150        | (6)         | 168.3    | 6.3     | 6.6       | 0.25     |

**Figure 12: A: Butt-weld  
ANSI (B 36.10)**



**Table 3: Butt-weld ANSI**

| Size<br>mm | Size<br>in. | OD<br>mm | T<br>mm | OD<br>in. | T<br>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       |

# Pilot-operated servo valve, type ICS

| Size<br>mm | Size<br>in. | OD<br>mm | T<br>mm | OD<br>in. | T<br>in. | Schedule |
|------------|-------------|----------|---------|-----------|----------|----------|
| (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     |          |

Figure 13: J: Butt-weld JIS

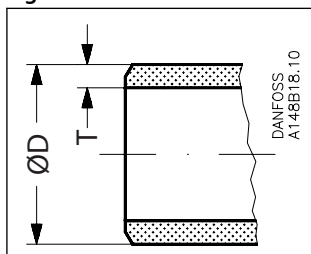


Table 4: Butt-weld JIS

| Size<br>mm | Size<br>in. | OD<br>mm | T<br>mm | OD<br>in. | T<br>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     |

Figure 14: SOC: Socket welding ANSI (B 16.11)

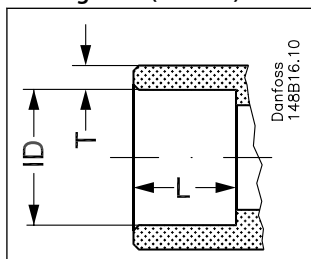


Table 5: Socket welding ANSI

| Size<br>mm | Size<br>in. | OD<br>mm | T<br>mm | OD<br>in. | T<br>in. | L<br>mm | L<br>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     |

Figure 15: SD: Soldering (DIN 2856)

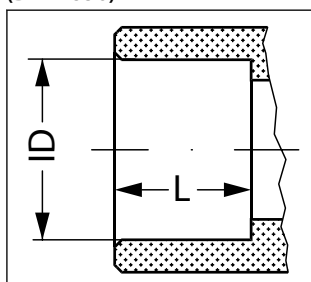


Table 6: SD: Soldering DIN

| Size<br>mm | ID<br>mm | L<br>mm |
|------------|----------|---------|
| 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      |

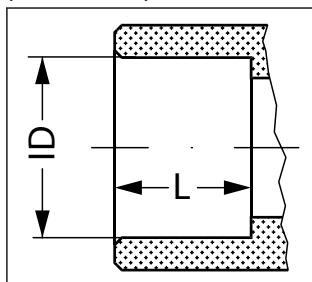
Figure 16: SA: Soldering  
(ANSI B 16.22)


Table 7: Socket welding ANSI

| Size<br>in.    | OD<br>in. | L<br>in. |
|----------------|-----------|----------|
| $\frac{7}{8}$  | 0.875     | 0.650    |
| $1\frac{1}{8}$ | 1.125     | 1.024    |
| $1\frac{3}{8}$ | 1.375     | 1.024    |
| $1\frac{5}{8}$ | 1.625     | 1.102    |
| $2\frac{1}{8}$ | 2.125     | 1.300    |
| $2\frac{5}{8}$ | 2.625     | 1.300    |

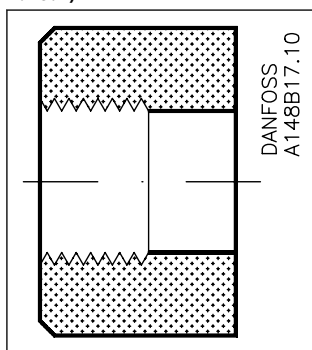
Figure 17: FPT: Female  
pipe thread, (ANSI/ASME B  
1.20.1)


Table 8: Socket welding ANSI

| Size<br>mm | Size<br>in.    | Inside pipe thread                |
|------------|----------------|-----------------------------------|
| (20)       | $\frac{3}{4}$  | ( $\frac{3}{4} \times 14$ NPT)    |
| (25)       | 1              | (1 $\times$ 11.5 NPT)             |
| (32)       | $1\frac{1}{4}$ | ( $1\frac{1}{4} \times 11.5$ NPT) |

## Material specification

Figure 18: ICS 25, 32, 40, 50, 65

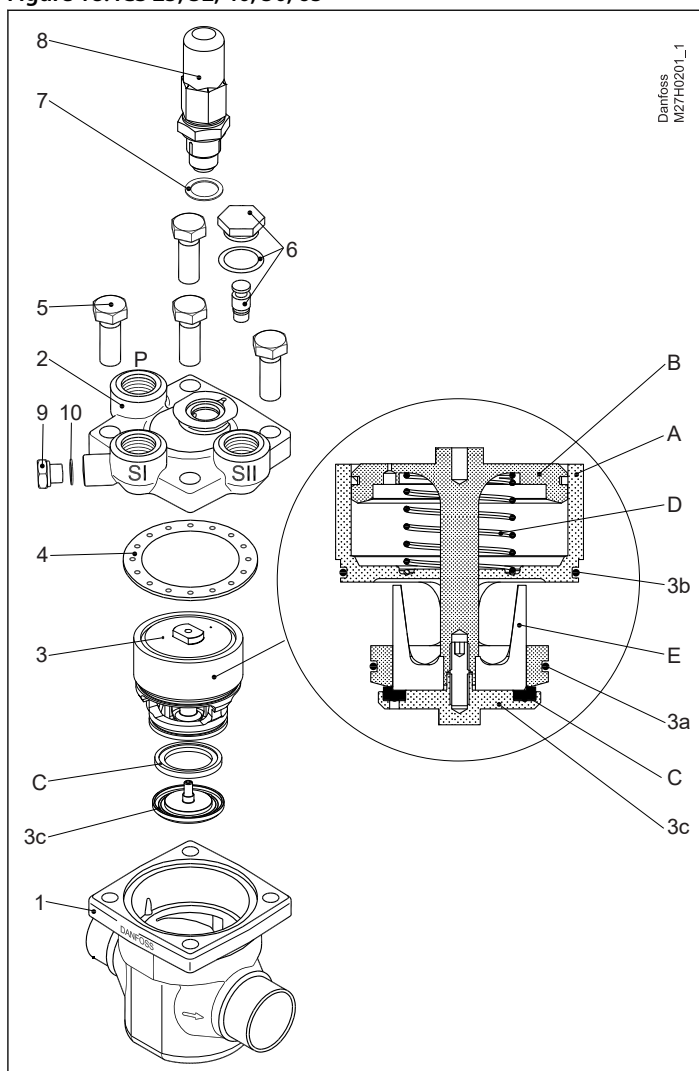


Table 9: Type and size of Bolt (pos. 5)

| Type   | Screw                  |
|--------|------------------------|
| ICS 25 | M12 × 30 A2-70 DIN 933 |
| ICS 32 | M14 × 35 A2-70 DIN 933 |
| ICS 40 | M14 × 40 A2-70 DIN 933 |
| ICS 50 | M16 × 40 A2-70 DIN 933 |
| ICS 65 | M16 × 50 A2-70 DIN 933 |

Table 10: Material and parts list (ICS 25, 32, 40, 50, 65)

| No. | Part                        | Material               | EN  | ASTM                  | JIS         |
|-----|-----------------------------|------------------------|---|-----------------------|-------------|
| 1   | Body                        | Low temperature steel  | G20Mn5QT, EN 10213-3                      | LCC A352              | SCPL1 G5151 |
| 2   | Top cover                   | Low temperature steel  | G20Mn5QT, EN 10213-3<br>P285QH+QT 10222-4 | LCC A352<br>LF2, A350 | SCPL1 G5151 |
| 3   | Function module (assembled) |                        |   |                       |             |
| 3a  | O-ring                      | Chloroprene (Neoprene) |   |                       |             |
| 3b  | O-ring                      | Chloroprene (Neoprene) |   |                       |             |
| 3c  | Washer plate                | Steel                  |   |                       |             |
| A   | Cylinder                    | Steel                  |   |                       |             |
| B   | Piston                      | Steel                  |   |                       |             |
| C   | Valve plate                 | PTFE                   |   |                       |             |
| D   | Spring                      | Steel                  |   |                       |             |

# Pilot-operated servo valve, type ICS

| No. | Part                     | Material            | EN               | ASTM          | JIS           |
|-----|--------------------------|---------------------|------------------|---------------|---------------|
| E   | Cone                     | Steel               |                  |               |               |
| 4   | Gasket                   | Fiber, non-asbestos |                  |               |               |
| 5   | Bolts                    | Stainless steel     | A2-70, EN 1515-1 | Grade B8 A320 | A2-70, B 1054 |
| 6   | Plug                     | Steel               |                  |               |               |
| 7   | Gasket                   | Aluminium           |                  |               |               |
| 8   | Manual operating spindle | Steel               |                  |               |               |
| 9   | Plug                     | Steel               |                  |               |               |
| 10  | Gasket                   | Aluminium           |                  |               |               |

Figure 19: ICS 100, 125, 150

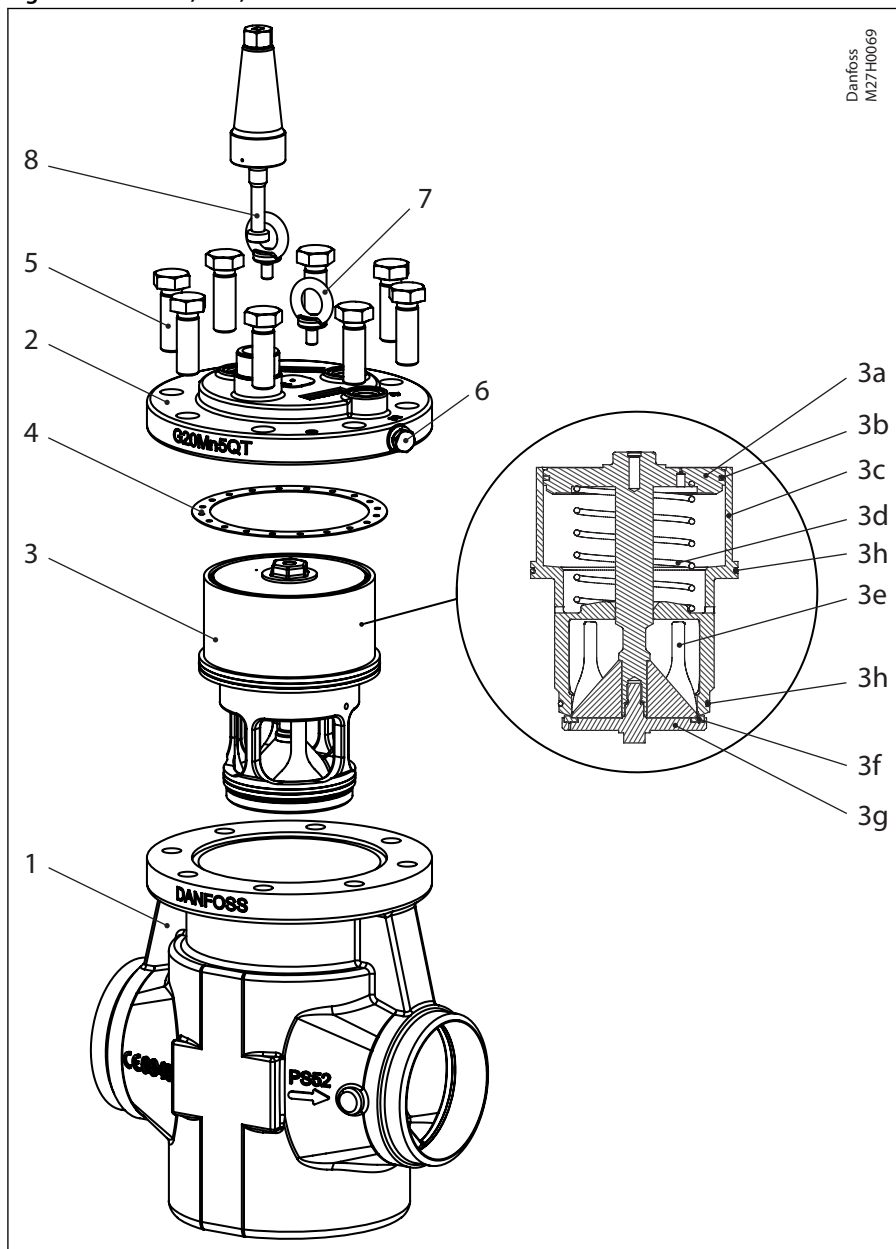


Table 11: Type and size of Bolt (pos. 5)

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

## Pilot-operated servo valve, type ICS

**Table 12: Material and parts list (ICS 100, 125, 150)**

| No. | Part                        | Material                | EN                   | ASTM          | JIS           |
|-----|-----------------------------|-------------------------|----------------------|---------------|---------------|
| 1   | Body                        | 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   |
| 3   | Function module (assembled) |                         |                      |               |               |
| 3a  | Piston/rod                  | Stainless steel / steel |                      |               |               |
| 3b  | Piston ring                 | Steel                   |                      |               |               |
| 3c  | Insert                      | Steel                   |                      |               |               |
| 3d  | Spring                      | Steel                   |                      |               |               |
| 3e  | Cone                        | Stainless steel / steel |                      |               |               |
| 3f  | Teflon plate                | Teflon unfilled         |                      |               |               |
| 3g  | Washer plate                | PTFE                    |                      |               |               |
| 3h  | O-ring                      | Cloroprene (Neoprene)   |                      |               |               |
| 4   | Gasket                      | Fiber, non-asbestos     |                      |               |               |
| 5   | Bolts                       | Stainless steel         | A2-70, EN 1515-1     | Grade B8 A320 | A2-70, B 1054 |
| 6   | Plug                        | Steel                   |                      |               |               |
| 7   | Eye bolt                    | Galvanized steel        |                      |               |               |
| 8   | Manual operating spindle    | Steel                   |                      |               |               |

## Configuration examples

**Table 13: Example no. 1**

|  |  |  |  |  |  |
|--|--|--|--|--|--|
| <b>Example no. 1-1</b><br>Constant pressure regulation<br><ul style="list-style-type: none"> <li>• CVP-L (-0.66 to 7 bar g) (19.5 in. Hg to 102 psig)</li> <li>• CVP-M (4 to 28 bar g) (58 to 406 psig)</li> <li>• CVP-H (25 to 52 bar g) (363 to 754 psig)</li> </ul> |  | <b>Products</b><br>1 × ICS 1 Pilot<br>1 × CVP-L/M/H                            |  | <b>Products</b><br>1 × ICS 3 Pilots<br>1 × CVP-L/M/H<br>2 × Blanking plugs<br>SI: A + B<br>SII: A                            |  |
| <b>Example no. 1-2</b><br>Differential pressure regulation<br><ul style="list-style-type: none"> <li>• CVPP-L (0.66 to 7 bar g) (19.5 in. Hg to 102 psig)</li> <li>• CVPP-M (4 to 28 bar g) (58 to 406 psig)</li> </ul>  |  | <b>Products</b><br>1 × ICS 1 Pilot<br>1 × CVPP-L/M                             |  | <b>Products</b><br>1 × ICS 3 Pilots<br>1 × CVPP-L/M<br>2 × Blanking plugs<br>SI: A + B<br>SII: A                             |  |
| <b>Example no. 1-3</b><br>On/off regulation (solenoid valve)   |  | <b>Products</b><br>1 × ICS 1 Pilot<br>1 × EVM<br>1 × coil                      |  | <b>Products</b><br>1 × ICS 3 Pilots<br>1 × EVM<br>1 × coil<br>2 × Blanking plugs<br>SI: A + B<br>SII: A                      |  |
| <b>Example no. 1-4</b><br>Regulation with external control pressure  |  | <b>Products</b><br>1 × ICS 1 Pilot<br>1 × nipple for external control pressure |  | <b>Products</b><br>1 × ICS 3 Pilots<br>1 × nipple for external control pressure<br>2 × Blanking plugs<br>SI: A + B<br>SII: A |  |

## Pilot-operated servo valve, type ICS

|   |  |  |  |  |  |
|---|--|--|--|--|--|
| <b>Example no. 1-5</b><br>On/off regulation (sole-noid valve)   |  | <b>Products</b><br>1 × ICS 1 Pilot<br>1 × EVM-NO (12 W coil) |  | <b>Products</b><br>1 × ICS 3 Pilots<br>1 × EVM-NO (12 W coil)<br>2 × Blanking plugs<br>SI: A + B<br>SII: A |  |
| <b>Example no. 1-6</b><br>Crankcase pressure regulation. (Max. suction pressure regulation)<br>• -0.45 to 7 bar g (13.3 in. Hg to 102 psig) |  | <b>Products</b><br>1 × ICS 1 Pilot<br>1 × CVC-L              |  | <b>Products</b><br>1 × ICS 3 Pilots<br>1 × CVC-L<br>2 × Blanking plugs<br>SI: A + B<br>SII: A              |  |
| <b>Example no. 1-7</b><br>Electronically controlled media temperature regulation<br>• -0.66 to 8 bar g (19.5 in. Hg to 116 psig)            |  | <b>Products</b><br>1 × ICS 1 Pilot<br>1 × CVE                |  | <b>Products</b><br>1 × ICS 3 Pilots<br>1 × CVE<br>2 × Blanking plugs<br>SI: A + B<br>SII: A                |  |

Table 14: Example no. 2

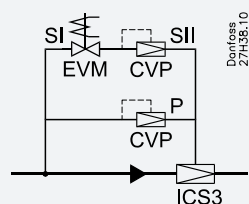
|  |  |  |  |
|--|--|--|--|
| <b>Example no. 2-1</b><br>Constant pressure regulation combined with electrical shut off<br>• -0.66 bar to 7 bar (19.5 in. Hg to 102 psig)               |  | <b>Products</b><br>1 × ICS 3 Pilots<br>1 × blanking plug (A + B)<br>1 × CVP-L<br>1 × EVM<br>1 × coil |  |
| <b>Example no. 2-2</b><br>Constant pressure regulation combined with electrical wide open  |  | <b>Products</b><br>1 × ICS 3 Pilots<br>1 × blanking plug (A)<br>1 × CVP-L<br>1 × EVM                 |  |
| <b>Example no. 2-3</b><br>Constant pressure regulation combined with electrical shut off and wide open<br>• -0.66 bar to 7 bar (19.5 in. Hg to 102 psig) |  | <b>Products</b><br>1 × ICS 3 Pilots<br>1 × CVP-L<br>2 × EVM<br>2 × coils                             |  |

### Pilot-operated servo valve, type ICS

### Example no. 2-4

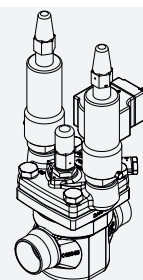
Constant pressure regulation with change-over between two preset evaporating pressures

- 0.66 bar to 7 bar (19.5 in. Hg to 102 psig)



## Products

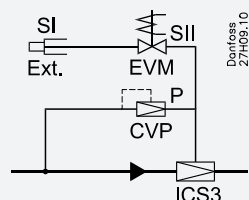
1 × ICS 3 Pilots  
2 × CVP-L  
1 × EVM  
1 × coil



### Example no. 2-5

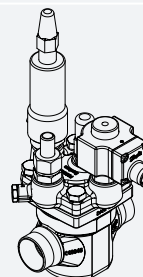
External control pressure with electrical shut off combined with constant pressure regulation

- 0.66 bar to 7 bar (19.5 in. Hg to 102 psig)



## Products

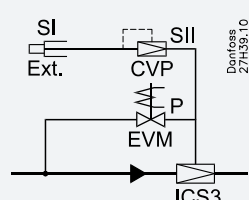
- 1 × ICS 3 Pilots
- 1 × Nipple for external control pressure
- 1 × CVP-L
- 1 × EVM
- 1 × Coil



### Example no. 2-6

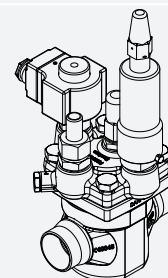
Constant pressure regulation with external control pressure combined with electrical wide open

- -0.66 bar to 7 bar (19.5 in. Hg to 102 psig)



## Products

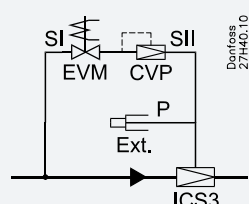
- 1 × ICS 3 Pilots
- 1 × Nipple for external control pressure
- 1 × CVP-L
- 1 × EVM
- 1 × Coil



### Example no. 2-7

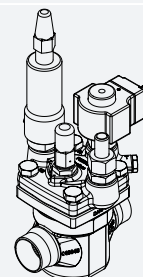
Constant pressure regulation with electrical shut off combined with external control pressure

- -0.66 bar to 7 bar (19.5 in. Hg to 102 psig)



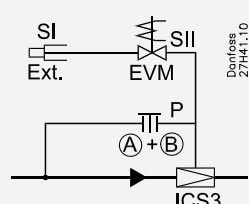
## Products

- 1 × ICS 3 Pilots
- 1 × Nipple for external control pressure
- 1 × CVP-L
- 1 × EVM
- 1 × Coil



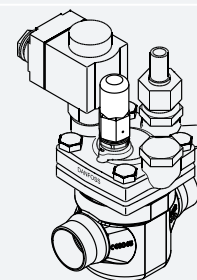
### Example no. 2-8

Solenoid valve with external control pressure for small pressure drops



## Products

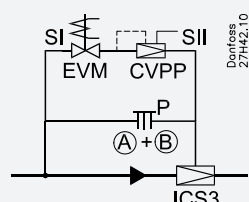
- 1 x ICS 3
- 1 x Blanking plug (A + B)
- 1 x Nipple for external control pressure
- 1 x EVM
- 1 x Coil



### Example no. 2-9

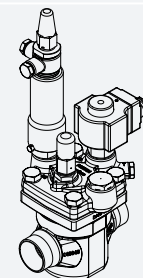
Differential pressure regulation combined with electrical shut off

- CVPP-L (0.66 bar to 7 bar ) (19.5 in. Hg to 102 psig)



## Products

- 1 × ICS 3
- 1 × Blanking plug (A + B)
- 1 × CVPP-L
- 1 × EVM
- 1 × Coil

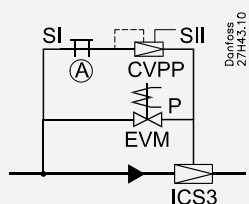


## Pilot-operated servo valve, type ICS

### Example no. 2-10

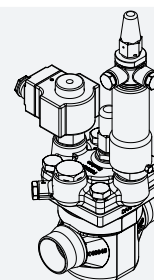
Differential pressure regulation combined with electrical wide open

- CVPP-L (0.66 bar to 7 bar) (19.5 in. Hg to 102 psig)



### Products

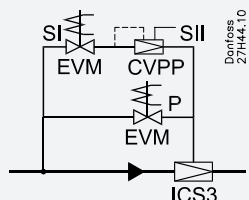
- 1 × ICS 3 Pilots
- 1 × Blanking plug (A)
- 1 × CVPP-L
- 1 × EVM
- 1 × Coil



### Example no. 2-11

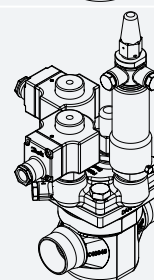
Differential pressure regulation combined with electrical wide open and shut off

- CVPP-L (0.66 bar to 7 bar) (19.5 in. Hg to 102 psig)



### Products

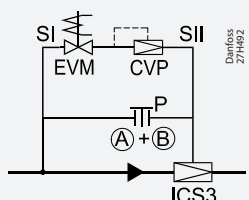
- 1 × ICS 3 Pilots
- 1 × CVPP-L
- 2 × EVM
- 2 × Coils



### Example no. 2-12

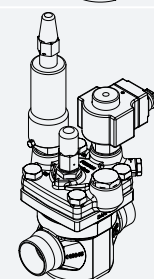
Constant pressure regulation combined with electrical shut off

- CVP-L (-0.66 bar to 7 bar) (19.5 in. Hg to 102 psig)
- CVP-M (4 bar to 28 bar) (58 to 406 psig)
- CVP-H (25 bar to 52 bar) (363 to 754 psig)



### Products

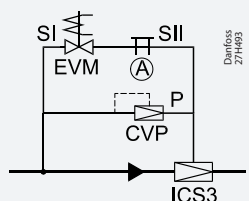
- 1 × ICS 3 Pilots
- 1 × Blanking plug (A + B)
- 1 × CVP-L/M/H
- 1 × EVM
- 1 × Coil



### Example no. 2-13

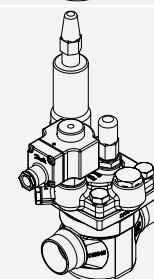
Constant pressure regulation combined with electrical wide open

- CVP-L (-0.66 bar to 7 bar) (19.5 in. Hg to 102 psig)
- CVP-M (4 bar to 28 bar) (58 to 406 psig)
- CVP-H (25 bar to 52 bar) (363 to 754 psig)



### Products

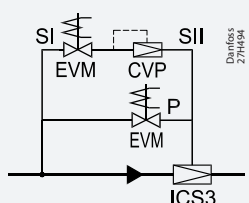
- 1 × ICS 3 Pilots
- 1 × Blanking plug (A)
- 1 × CVP-L/M/H
- 1 × EVM
- 1 × Coil



### Example no. 2-14

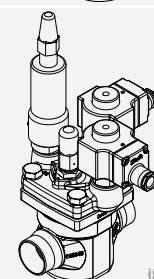
Constant pressure regulation combined with electrical shut off and wide open

- CVP-L (-0.66 bar to 7 bar) (19.5 in. Hg to 102 psig)
- CVP-M (4 bar to 28 bar) (58 to 406 psig)
- CVP-H (25 bar to 52 bar) (363 to 754 psig)



### Products

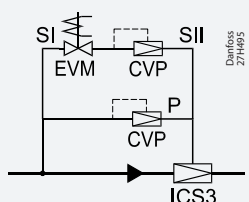
- 1 × ICS 3 Pilots
- 1 × CVP-L/M/H
- 2 × EVM
- 2 × Coils



### Example no. 2-15

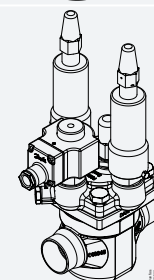
Constant pressure regulation with change-over between two preset evaporating pressures

- CVP-L (-0.66 bar to 7 bar) (19.5 in. Hg to 102 psig)
- CVP-M (4 bar to 28 bar) (58 to 406 psig)
- CVP-H (25 bar to 52 bar) (363 to 754 psig)



### Products

- 1 × ICS 3 Pilots
- 2 × CVP-L/M/H
- 1 × EVM
- 1 × Coil

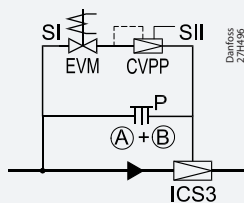


## Pilot-operated servo valve, type ICS

### Example no. 2-16

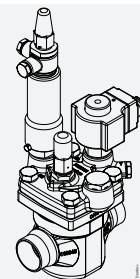
Differential pressure regulation combined with electrical shut off

- CVPP-L (-0.66 bar to 7 bar) (19.5 in. Hg to 102 psig)
- CVPP-M (4 bar to 28 bar) (58 to 406 psig)



### Products

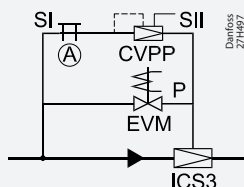
- 1 × ICS 3 Pilots
- 1 × Blanking plug (A + B)
- 1 × CVPP-L/M
- 1 × EVM
- 1 × Coil



### Example no. 2-17

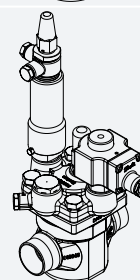
Differential pressure regulation combined with electrical wide open

- CVPP-L (-0.66 bar to 7 bar) (19.5 in. Hg to 102 psig)
- CVPP-M (4 bar to 28 bar) (58 to 406 psig)



### Products

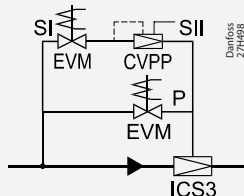
- 1 × ICS 3 Pilots
- 1 × Blanking plug (A)
- 1 × CVPP-L/M
- 1 × EVM
- 1 × Coil



### Example no. 2-18

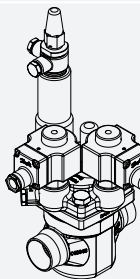
Differential pressure regulation combined with electrical wide open and shut off

- CVPP-L (-0.66 bar to 7 bar) (19.5 in. Hg to 102 psig)
- CVPP-M (4 bar to 28 bar) (58 to 406 psig)



### Products

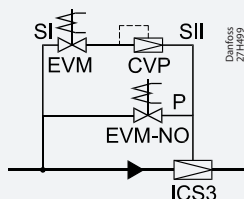
- 1 × ICS 3 Pilots
- 1 × CVPP-L/M
- 2 × EVM
- 2 × Coils



### Example no. 2-19

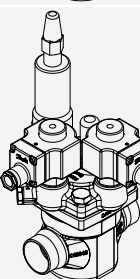
Constant pressure regulation combined with electrical wide open and shut off

- CVP-L (-0.66 bar to 7 bar) (19.5 in. Hg to 102 psig)
- CVP-M (4 bar to 28 bar) (58 to 406 psig)
- CVP-H (25 bar to 52 bar) (363 to 754 psig)



### Products

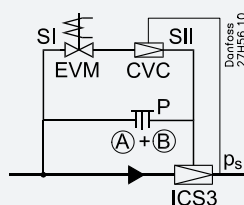
- 1 × ICS 3 Pilots
- 1 × CVP-L/M/H
- 1 × EVM
- 1 × EVM-NO (12 W coil)
- 2 × Coils



### Example no. 2-20

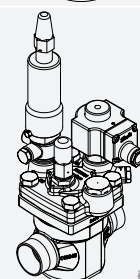
Crankcase pressure regulation (max. suction pressure regulation) combined with shut off

- -0.45 bar to 7 bar (13.3 in. Hg to 102 psig)



### Products

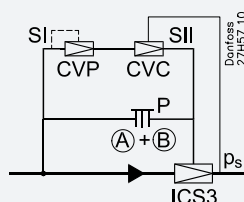
- 1 × ICS 3 Pilots
- 1 × Blanking plug (A + B)
- 1 × CVC-L
- 1 × EVM
- 1 × Coil



### Example no. 2-21

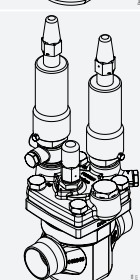
Crankcase pressure regulation (max. suction pressure regulation) combined with evaporating pressure regulation

- -0.66 bar to 28 bar (19.5 in. Hg to 406 psig).



### Products

- 1 × ICS 3 Pilots
- 1 × Blanking plug (A + B)
- 1 × CVC-L/M
- 1 × CVP-L/M

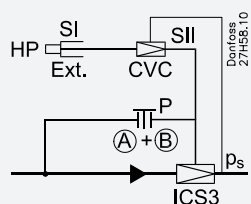


## Pilot-operated servo valve, type ICS

### Example no. 2-22

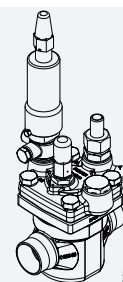
Crankcase pressure regulation (max. suction pressure regulation) at low pressure drops across the valve

- 0.45 bar to 7 bar (13.3 in. Hg to 102 psig)



### Products

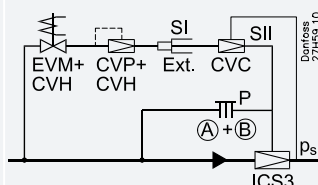
1 × ICS 3 Pilots  
1 × Blanking plug (A + B)  
1 × Nipple for external control pressure  
1 × CVC-L



### Example no. 2-23

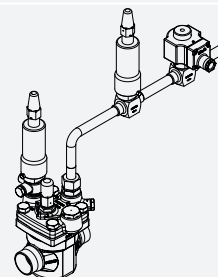
Crankcase pressure regulation (max. suction pressure regulation) combined with constant pressure regulation and electrical shut off.

- 0.66 bar to 7 bar (19.5 in. Hg to 102 psig).



### Products

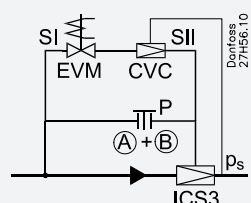
1 × ICS 3 Pilots  
1 × Blanking plug (A + B)  
1 × Nipple for external control pressure  
1 × CVP-L  
1 × EVM  
1 × Coil  
2 × CVH  
1 × CVC-L



### Example no. 2-24

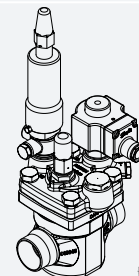
Hot gas bypass regulation combined with electrical shut off

- 0.45 bar to 7 bar (13.3 in. Hg to 102 psig)



### Products

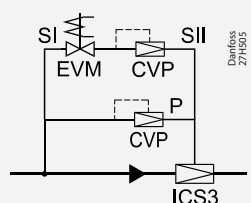
1 × ICS 3 Pilots  
1 × Blanking plug (A + B)  
1 × CVC-L  
1 × EVM  
1 × Coil



### Example no. 2-25

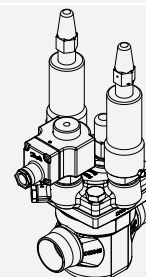
Constant pressure regulation with electrical shut off and protection against high pressure when suction line is closed

- 0.66 bar to 28 bar (19.5 in. Hg to 406 psig).



### Products

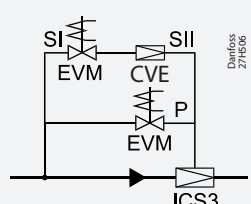
1 × ICS 3 Pilots  
1 × CVP-L  
1 × EVM  
1 × Coil  
1 × CVP-M



### Example no. 2-26

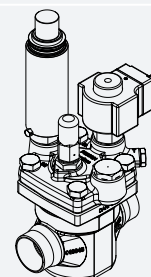
Electronically controlled media temperature regulation combined with electrical shut off

- 1 bar to 8 bar (0 in. Hg to 116 psig).



### Products

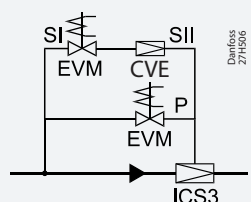
1 × ICS 3 Pilots  
1 × Blanking plug (A + B)  
1 × CVE  
1 × EVM  
1 × Coil



### Example no. 2-27

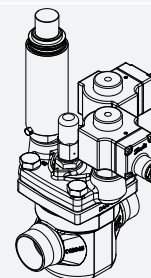
Electronically controlled media temperature regulation combined with electrical shut off and wide open

- 1 bar to 8 bar (0 in. Hg to 116 psig).



### Products

1 × ICS 3 Pilots  
1 × CVE  
2 × EVM  
2 × Coils

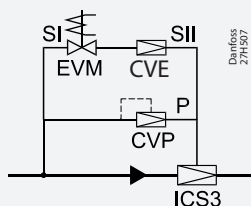


## Pilot-operated servo valve, type ICS

### Example no. 2-28

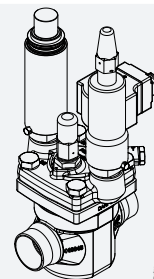
Electronically controlled media temperature regulation combined with electrical shut off and changeover to constant pressure regulation

- 1 bar to 8 bar (0 in. Hg to 116 psig).



### Products

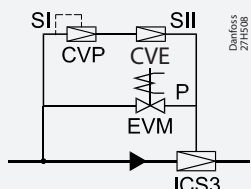
- 1 × ICS 3 Pilots
- 1 × CVQ
- 1 × CVP-L
- 1 × EVM
- 1 × Coil



### Example no. 2-29

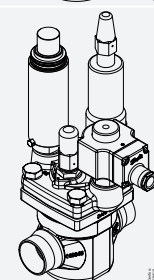
Electronically controlled media temperature regulation with low evaporating pressure protection combined with wide open

- 1 bar to 8 bar (0 in. Hg to 116 psig).



### Products

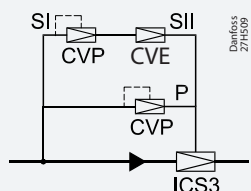
- 1 × ICS 3 Pilots
- 1 × CVE
- 1 × CVP-L
- 1 × EVM
- 1 × Coil



### Example no. 2-30

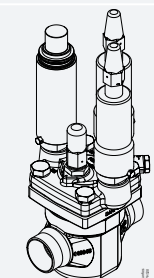
Electronically controlled media temperature regulation with low evaporating pressure protection combined with changeover to constant pressure regulation

- 1 bar to 8 bar (0 in. Hg to 116 psig).



### Products

- 1 × ICS 3 Pilots
- 1 × CVE
- 2 × CVP-L



## Valve selection based on capacity calculation

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

Download Coolselector®2 for free at [coolselector.danfoss.com](https://coolselector.danfoss.com).

## Dimensions and weights

### ICS 25-5 to ICS 25-25

Figure 20: Dimensions and weights - ICS 25-5 to ICS 25-25

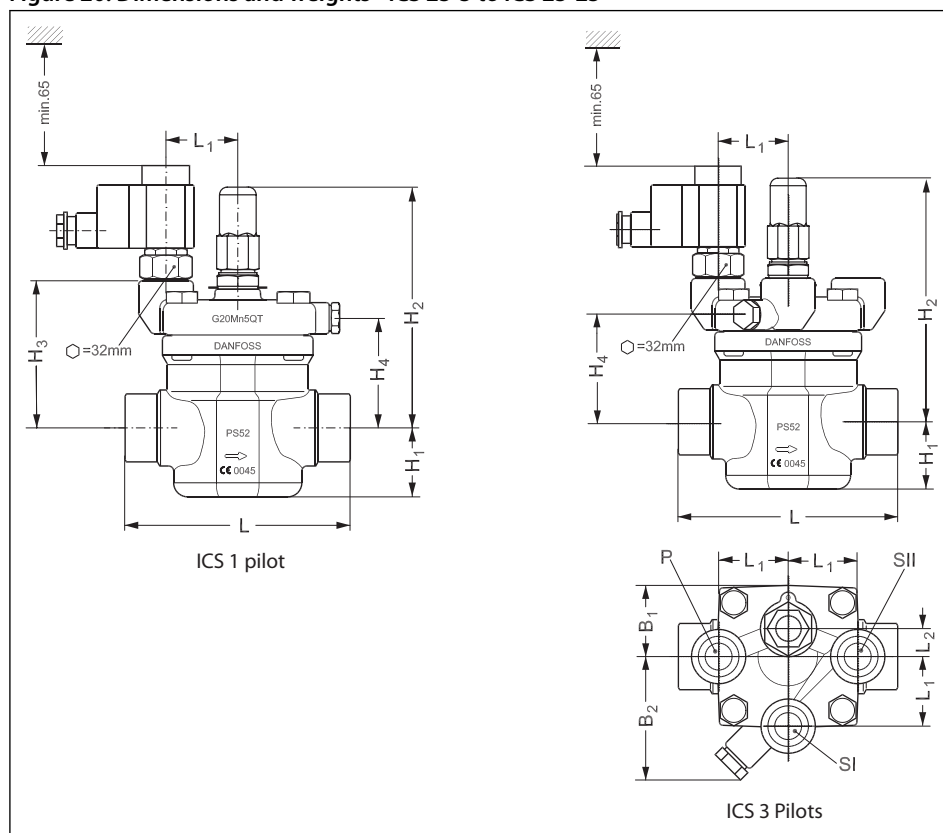


Table 15: Connection type and Weight

| Connection     |           | H <sub>1</sub> | H <sub>2</sub> | H <sub>3</sub> | H <sub>4</sub> | L           | L <sub>1</sub> | L <sub>2</sub> | B <sub>1</sub> | B <sub>2</sub> | Weight<br>ICS 1 Pilot | Weight<br>ICS 3<br>Pilots |
|----------------|-----------|----------------|----------------|----------------|----------------|-------------|----------------|----------------|----------------|----------------|-----------------------|---------------------------|
| 20 D (¾ in.)   | mm<br>in. | 37<br>1.46     | 145<br>5.71    | 86<br>3.39     | 60<br>2.36     | 135<br>5.31 | 42<br>1.65     | 15<br>0.59     | 42<br>1.65     | 87<br>3.43     | 3 kg<br>6.6 lb.       | 3.6 kg<br>7.92 lb.        |
| 25 D (1 in.)   | mm<br>in. | 37<br>1.46     | 145<br>5.71    | 86<br>3.39     | 60<br>2.36     | 135<br>5.31 | 42<br>1.65     | 15<br>0.59     | 42<br>1.65     | 87<br>3.43     | 3 kg<br>6.6 lb.       | 3.6 kg<br>7.92 lb.        |
| 32 D (1¼ in.)  | mm<br>in. | 37<br>1.46     | 145<br>5.71    | 86<br>3.39     | 60<br>2.36     | 135<br>5.31 | 42<br>1.65     | 15<br>0.59     | 42<br>1.65     | 87<br>3.43     | 3 kg<br>6.6 lb.       | 3.6 kg<br>7.92 lb.        |
| 40 D (1½ in.)  | mm<br>in. | 37<br>1.46     | 145<br>5.71    | 86<br>3.39     | 60<br>2.36     | 135<br>5.31 | 42<br>1.65     | 15<br>0.59     | 42<br>1.65     | 87<br>3.43     | 3 kg<br>6.6 lb.       | 3.6 kg<br>7.92 lb.        |
| 20 A (¾ in.)   | mm<br>in. | 37<br>1.46     | 145<br>5.71    | 86<br>3.39     | 60<br>2.36     | 135<br>5.31 | 42<br>1.65     | 15<br>0.59     | 42<br>1.65     | 87<br>3.43     | 3 kg<br>6.6 lb.       | 3.6 kg<br>7.92 lb.        |
| 25 A (1 in.)   | mm<br>in. | 37<br>1.46     | 145<br>5.71    | 86<br>3.39     | 60<br>2.36     | 135<br>5.31 | 42<br>1.65     | 15<br>0.59     | 42<br>1.65     | 87<br>3.43     | 3 kg<br>6.6 lb.       | 3.6 kg<br>7.92 lb.        |
| 32 A (1¼ in.)  | mm<br>in. | 37<br>1.46     | 145<br>5.71    | 86<br>3.39     | 60<br>2.36     | 135<br>5.31 | 42<br>1.65     | 15<br>0.59     | 42<br>1.65     | 87<br>3.43     | 3 kg<br>6.6 lb.       | 3.6 kg<br>7.92 lb.        |
| 20 SOC (¾ in.) | mm<br>in. | 37<br>1.46     | 145<br>5.71    | 86<br>3.39     | 60<br>2.36     | 135<br>5.31 | 42<br>1.65     | 15<br>0.59     | 42<br>1.65     | 87<br>3.43     | 3 kg<br>6.6 lb.       | 3.6 kg<br>7.92 lb.        |
| 25 SOC (1 in.) | mm<br>in. | 37<br>1.46     | 145<br>5.71    | 86<br>3.39     | 60<br>2.36     | 147<br>5.79 | 42<br>1.65     | 15<br>0.59     | 42<br>1.65     | 87<br>3.43     | 3 kg<br>6.6 lb.       | 3.6 kg<br>7.92 lb.        |
| 22 SD (¾ in.)  | mm<br>in. | 37<br>1.46     | 145<br>5.71    | 86<br>3.39     | 60<br>2.36     | 135<br>5.31 | 42<br>1.65     | 15<br>0.59     | 42<br>1.65     | 87<br>3.43     | 3 kg<br>6.6 lb.       | 3.6 kg<br>7.92 lb.        |
| 28 SD (1⅝ in.) | mm<br>in. | 37<br>1.46     | 145<br>5.71    | 86<br>3.39     | 60<br>2.36     | 147<br>5.78 | 42<br>1.65     | 15<br>0.59     | 42<br>1.65     | 87<br>3.43     | 3 kg<br>6.6 lb.       | 3.6 kg<br>7.92 lb.        |
| 22 SA (¾ in.)  | mm<br>in. | 37<br>1.46     | 145<br>5.71    | 86<br>3.39     | 60<br>2.36     | 135<br>5.31 | 42<br>1.65     | 15<br>0.59     | 42<br>1.65     | 87<br>3.43     | 3 kg<br>6.6 lb.       | 3.6 kg<br>7.92 lb.        |
| 28 SA (1⅝ in.) | mm<br>in. | 37<br>1.46     | 145<br>5.71    | 86<br>3.39     | 60<br>2.36     | 147<br>5.78 | 42<br>1.65     | 15<br>0.59     | 42<br>1.65     | 87<br>3.43     | 3 kg<br>6.6 lb.       | 3.6 kg<br>7.92 lb.        |

# Pilot-operated servo valve, type ICS

| Connection        |           | H <sub>1</sub> | H <sub>2</sub> | H <sub>3</sub> | H <sub>4</sub> | L           | L <sub>1</sub> | L <sub>2</sub> | B <sub>1</sub> | B <sub>2</sub> | Weight ICS 1 Pilot | Weight ICS 3 Pilots |
|-------------------|-----------|----------------|----------------|----------------|----------------|-------------|----------------|----------------|----------------|----------------|--------------------|---------------------|
| 35 SA (1 3/8 in.) | mm<br>in. | 37<br>1.46     | 145<br>5.71    | 86<br>3.39     | 60<br>2.36     | 147<br>5.78 | 42<br>1.65     | 15<br>0.59     | 42<br>1.65     | 87<br>3.43     | 3 kg<br>6.6 lb.    | 3.6 kg<br>7.92 lb.  |
| 20 FPT (3/4 in.)  | mm<br>in. | 37<br>1.46     | 145<br>5.71    | 86<br>3.39     | 60<br>2.36     | 135<br>5.31 | 42<br>1.65     | 15<br>0.59     | 42<br>1.65     | 87<br>3.43     | 3 kg<br>6.6 lb.    | 3.6 kg<br>7.92 lb.  |
| 25 FPT (1 in.)    | mm<br>in. | 37<br>1.46     | 145<br>5.71    | 86<br>3.39     | 60<br>2.36     | 135<br>5.31 | 42<br>1.65     | 15<br>0.59     | 42<br>1.65     | 87<br>3.43     | 3 kg<br>6.6 lb.    | 3.6 kg<br>7.92 lb.  |

## NOTE:

Specified weights are approximate values only.

**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

## ICS 32

Figure 21: ICS 32, Dimensions and weights

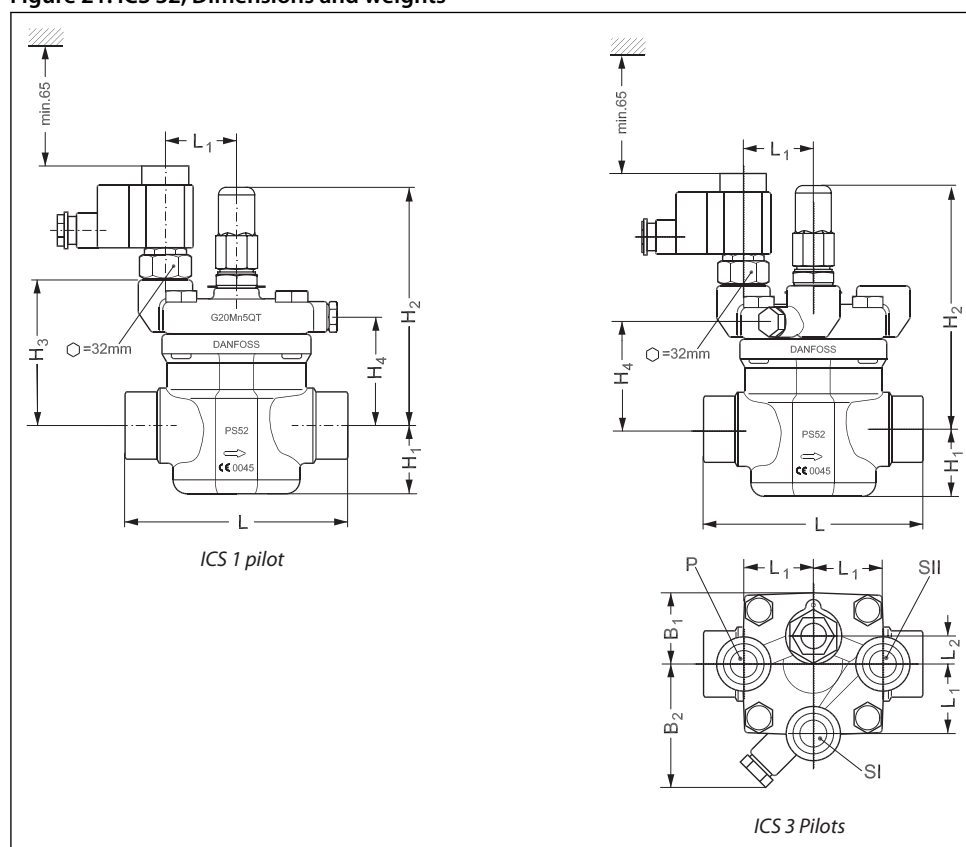


Table 16: Connection type and Weight

| Connection       |           | H <sub>1</sub> | H <sub>2</sub> | H <sub>3</sub> | H <sub>4</sub> | L           | L <sub>1</sub> | L <sub>2</sub> | B <sub>1</sub> | B <sub>2</sub> | Weight ICS 1 Pilot | Weight ICS 3 Pilots |
|------------------|-----------|----------------|----------------|----------------|----------------|-------------|----------------|----------------|----------------|----------------|--------------------|---------------------|
| 32 D (1 1/4 in.) | mm<br>in. | 40<br>1.57     | 160<br>6.30    | 100<br>3.93    | 74<br>2.91     | 145<br>5.71 | 51<br>2.00     | 15<br>0.59     | 51<br>2.00     | 87<br>3.43     | 4.5 kg<br>9.9 lb.  | 5 kg<br>11 lb.      |
| 40 D (1 1/2 in.) | mm<br>in. | 40<br>1.57     | 160<br>6.30    | 100<br>3.93    | 74<br>2.91     | 145<br>5.71 | 51<br>2.00     | 15<br>0.59     | 51<br>2.00     | 87<br>3.43     | 4.5 kg<br>9.9 lb.  | 5 kg<br>11 lb.      |
| 32 A (1 1/4 in.) | mm<br>in. | 40<br>1.57     | 160<br>6.30    | 100<br>3.93    | 74<br>2.91     | 145<br>5.71 | 51<br>2.00     | 15<br>0.59     | 51<br>2.00     | 87<br>3.43     | 4.5 kg<br>9.9 lb.  | 5 kg<br>11 lb.      |

## Pilot-operated servo valve, type ICS

| Connection        |           | H <sub>1</sub> | H <sub>2</sub> | H <sub>3</sub> | H <sub>4</sub> | L           | L <sub>1</sub> | L <sub>2</sub> | B <sub>1</sub> | B <sub>2</sub> | Weight ICS 1 Pilot | Weight ICS 3 Pilots |
|-------------------|-----------|----------------|----------------|----------------|----------------|-------------|----------------|----------------|----------------|----------------|--------------------|---------------------|
| 40 A (1½ in.)     | mm<br>in. | 40<br>1.57     | 160<br>6.30    | 100<br>3.93    | 74<br>2.91     | 145<br>5.71 | 51<br>2.00     | 15<br>0.59     | 51<br>2.00     | 87<br>3.43     | 4.5 kg<br>9.9 lb.  | 5 kg<br>11 lb.      |
| 32 SOC (1¼ in.)   | mm<br>in. | 40<br>1.57     | 160<br>6.30    | 100<br>3.93    | 74<br>2.91     | 145<br>5.71 | 51<br>2.00     | 15<br>0.59     | 51<br>2.00     | 87<br>3.43     | 4.5 kg<br>9.9 lb.  | 5 kg<br>11 lb.      |
| 35 SD (1⅜ in. SA) | mm<br>in. | 40<br>1.57     | 160<br>6.30    | 100<br>3.93    | 74<br>2.91     | 145<br>5.71 | 51<br>2.00     | 15<br>0.59     | 51<br>2.00     | 87<br>3.43     | 4.5 kg<br>9.9 lb.  | 5 kg<br>11 lb.      |
| 42 SD (1⅝ in.)    | mm<br>in. | 40<br>1.57     | 160<br>6.30    | 100<br>3.93    | 74<br>2.91     | 145<br>5.71 | 51<br>2.00     | 15<br>0.59     | 51<br>2.00     | 87<br>3.43     | 4.5 kg<br>9.9 lb.  | 5 kg<br>11 lb.      |
| 42 SA (1⅝ in.)    | mm<br>in. | 40<br>1.57     | 160<br>6.30    | 100<br>3.93    | 74<br>2.91     | 145<br>5.71 | 51<br>2.00     | 15<br>0.59     | 51<br>2.00     | 87<br>3.43     | 4.5 kg<br>9.9 lb.  | 5 kg<br>11 lb.      |

### NOTE:

Specified weights are approximate values only.

**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

## ICS 40

Figure 22: ICS 40, Dimensions and weights

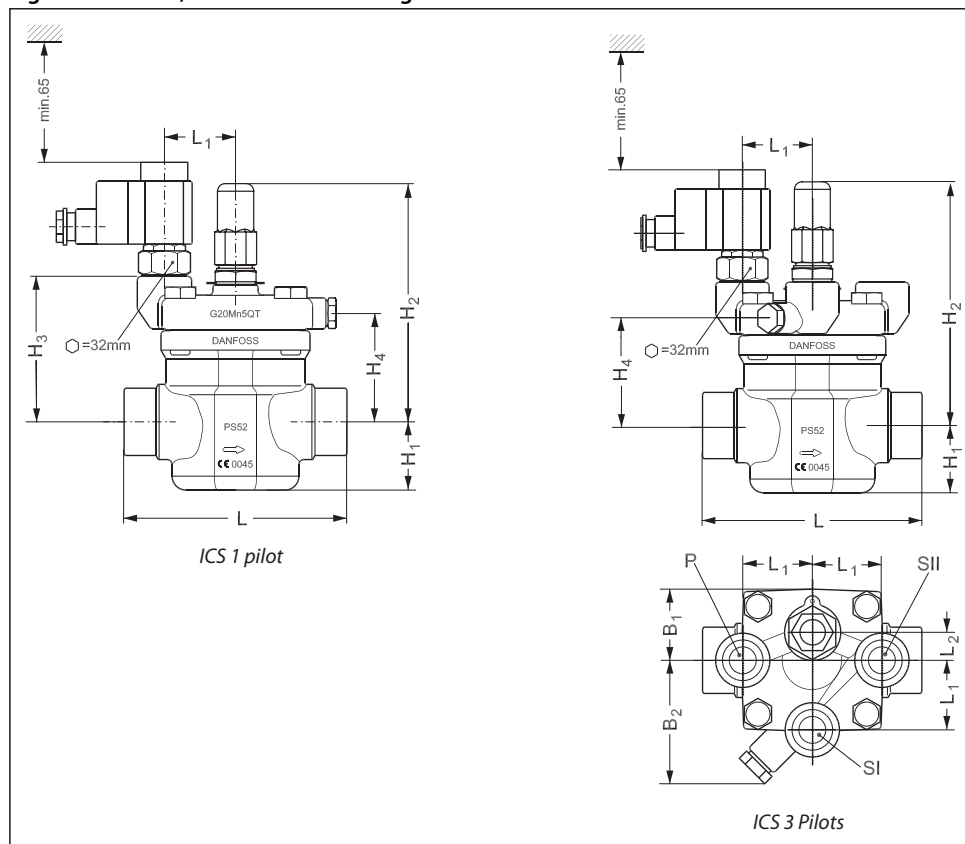


Table 17: Connection type and Weight

| Connection      |           | H <sub>1</sub> | H <sub>2</sub> | H <sub>3</sub> | H <sub>4</sub> | L           | L <sub>1</sub> | L <sub>2</sub> | B <sub>1</sub> | B <sub>2</sub> | Weight ICS 1 Pilot | Weight ICS 3 Pilots |
|-----------------|-----------|----------------|----------------|----------------|----------------|-------------|----------------|----------------|----------------|----------------|--------------------|---------------------|
| 40 D (1½ in.)   | mm<br>in. | 49<br>1.93     | 166<br>6.54    | 105<br>4.13    | 78<br>3.07     | 160<br>6.30 | 51<br>2.00     | 15<br>0.59     | 54<br>2.13     | 87<br>3.43     | 5.9 kg<br>13.0 lb. | 6.3 kg<br>13.9 lb.  |
| 50 D (2 in.)    | mm<br>in. | 49<br>1.93     | 166<br>6.54    | 105<br>4.13    | 78<br>3.07     | 180<br>7.09 | 51<br>2.00     | 15<br>0.59     | 54<br>2.13     | 87<br>3.43     | 5.9 kg<br>13.0 lb. | 6.3 kg<br>13.9 lb.  |
| 40 A (1½ in.)   | mm<br>in. | 49<br>1.93     | 166<br>6.54    | 105<br>4.13    | 78<br>3.07     | 160<br>6.30 | 51<br>2.00     | 15<br>0.59     | 54<br>2.13     | 87<br>3.43     | 5.9 kg<br>13.0 lb. | 6.3 kg<br>13.9 lb.  |
| 50 A (2 in.)    | mm<br>in. | 49<br>1.93     | 166<br>6.54    | 105<br>4.13    | 78<br>3.07     | 180<br>7.09 | 51<br>2.00     | 15<br>0.59     | 54<br>2.13     | 87<br>3.43     | 5.9 kg<br>13.0 lb. | 6.3 kg<br>13.9 lb.  |
| 40 SOC (1½ in.) | mm<br>in. | 49<br>1.93     | 166<br>6.54    | 105<br>4.13    | 78<br>3.07     | 180<br>7.09 | 51<br>2.00     | 15<br>0.59     | 54<br>2.13     | 87<br>3.43     | 5.9 kg<br>13.0 lb. | 6.3 kg<br>13.9 lb.  |
| 42 SD (1⅝ in.)  | mm<br>in. | 49<br>1.93     | 166<br>6.54    | 105<br>4.13    | 78<br>3.07     | 180<br>7.09 | 51<br>2.00     | 15<br>0.59     | 54<br>2.13     | 87<br>3.43     | 5.9 kg<br>13.0 lb. | 6.3 kg<br>13.9 lb.  |
| 42 SA (1⅝ in.)  | mm<br>in. | 49<br>1.93     | 166<br>6.54    | 105<br>4.13    | 78<br>3.07     | 180<br>7.09 | 51<br>2.00     | 15<br>0.59     | 54<br>2.13     | 87<br>3.43     | 5.9 kg<br>13.0 lb. | 6.3 kg<br>13.9 lb.  |

**NOTE:**

Specified weights are approximate values only.

**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

## ICS 50

Figure 23: ICS 50, Dimensions and weights

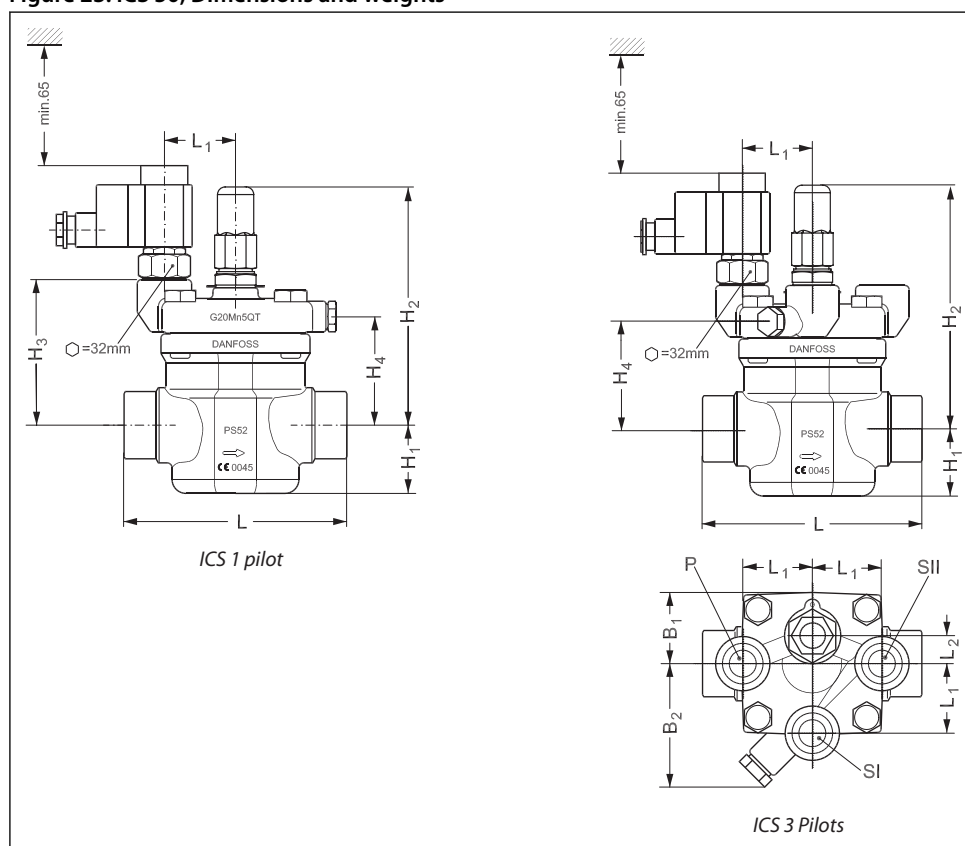


Table 18: Connection type and Weight

| Connection        |           | H <sub>1</sub> | H <sub>2</sub> | H <sub>3</sub> | H <sub>4</sub> | L           | L <sub>1</sub> | L <sub>2</sub> | B <sub>1</sub> | B <sub>2</sub> | Weight<br>ICS 1 Pilot | Weight<br>ICS 3<br>Pilots |
|-------------------|-----------|----------------|----------------|----------------|----------------|-------------|----------------|----------------|----------------|----------------|-----------------------|---------------------------|
| 50 D (2 in.)      | mm<br>in. | 59<br>2.32     | 181<br>7.13    | 120<br>4.72    | 93<br>3.66     | 200<br>7.87 | 51<br>2.00     | 15<br>0.59     | 63<br>2.48     | 91<br>3.58     | 8.9 kg<br>19.6 lb.    | 9.2 kg<br>20.2 lb.        |
| 65 D (2½ in.)     | mm<br>in. | 59<br>2.32     | 181<br>7.13    | 120<br>4.72    | 93<br>3.66     | 210<br>8.27 | 51<br>2.00     | 15<br>0.59     | 63<br>2.48     | 91<br>3.58     | 8.9 kg<br>19.6 lb.    | 9.2 kg<br>20.2 lb.        |
| 50 A (2 in.)      | mm<br>in. | 59<br>2.32     | 181<br>7.13    | 120<br>4.72    | 93<br>3.66     | 200<br>7.87 | 51<br>2.00     | 15<br>0.59     | 63<br>2.48     | 91<br>3.58     | 8.9 kg<br>19.6 lb.    | 9.2 kg<br>20.2 lb.        |
| 65 A (2½ in.)     | mm<br>in. | 59<br>2.32     | 181<br>7.13    | 120<br>4.72    | 93<br>3.66     | 210<br>8.27 | 51<br>2.00     | 15<br>0.59     | 63<br>2.48     | 91<br>3.58     | 8.9 kg<br>19.6 lb.    | 9.2 kg<br>20.2 lb.        |
| 50 SOC (2 in.)    | mm<br>in. | 59<br>2.32     | 181<br>7.13    | 120<br>4.72    | 93<br>3.66     | 216<br>8.50 | 51<br>2.00     | 15<br>0.59     | 63<br>2.48     | 91<br>3.58     | 8.9 kg<br>19.6 lb.    | 9.2 kg<br>20.2 lb.        |
| 54 SD (2⅞ in. SA) | mm<br>in. | 59<br>2.32     | 181<br>7.13    | 120<br>4.72    | 93<br>3.66     | 216<br>8.50 | 51<br>2.00     | 15<br>0.59     | 63<br>2.48     | 91<br>3.58     | 8.9 kg<br>19.6 lb.    | 9.2 kg<br>20.2 lb.        |

**NOTE:**

Specified weights are approximate values only.

**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

## ICS 65/ ICS 80

Figure 24: ICS 65 / ICS 80, Dimensions and weights

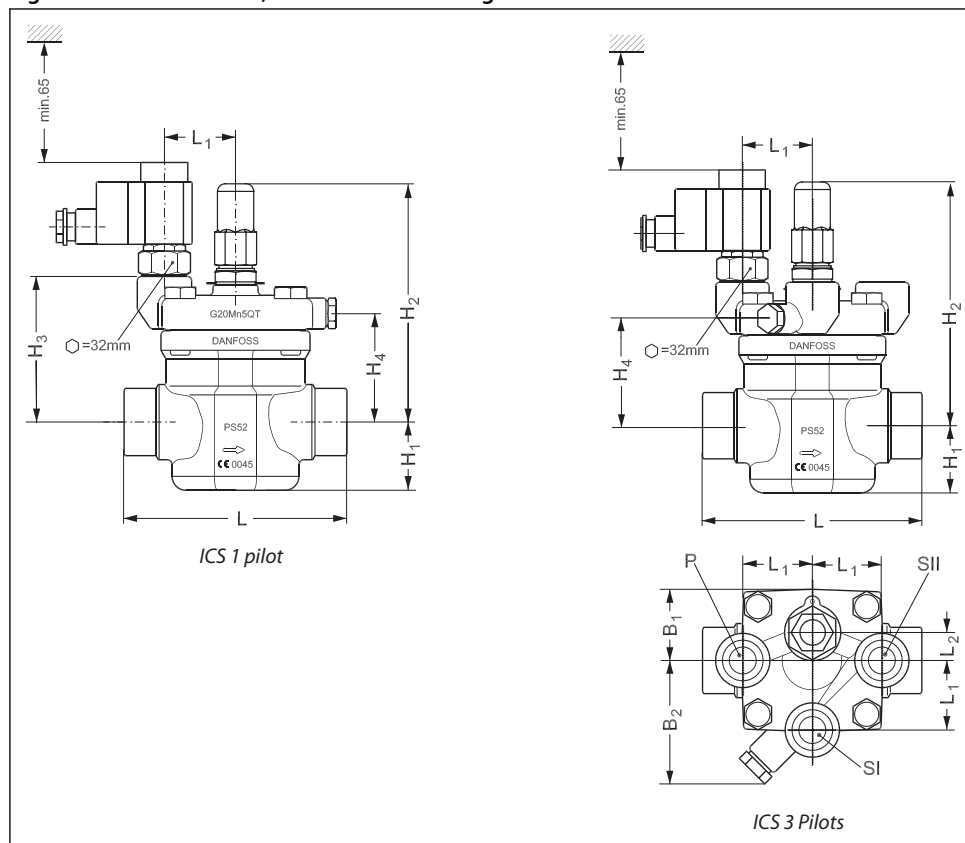


Table 19: Connection type and Weight

| Connection      |           | H <sub>1</sub> | H <sub>2</sub> | H <sub>3</sub> | H <sub>4</sub> | L           | L <sub>1</sub> | L <sub>2</sub> | B <sub>1</sub> | B <sub>2</sub> | Weight<br>ICS 1 Pilot | Weight<br>ICS 3<br>Pilots |
|-----------------|-----------|----------------|----------------|----------------|----------------|-------------|----------------|----------------|----------------|----------------|-----------------------|---------------------------|
| 65 D (2½ in.)   | mm<br>in. | 65<br>2.56     | 202<br>7.95    | 140<br>5.51    | 115<br>4.53    | 230<br>9.06 | 51<br>2.00     | 15<br>0.59     | 70<br>2.76     | 91<br>3.58     | 13.4 kg<br>29.48 lb.  | 13.5 kg<br>29.7 lb.       |
| 80 D (3 in.)    | mm<br>in. | 65<br>2.56     | 202<br>7.95    | 140<br>5.51    | 115<br>4.53    | 245<br>9.65 | 51<br>2.00     | 15<br>0.59     | 70<br>2.76     | 91<br>3.58     | 13.4 kg<br>29.48 lb.  | 13.5 kg<br>29.7 lb.       |
| 65 A (2½ in.)   | mm<br>in. | 65<br>2.56     | 202<br>7.95    | 140<br>5.51    | 115<br>4.53    | 230<br>9.06 | 51<br>2.00     | 15<br>0.59     | 70<br>2.76     | 91<br>3.58     | 13.4 kg<br>29.48 lb.  | 13.5 kg<br>29.7 lb.       |
| 80 A (3 in.)    | mm<br>in. | 65<br>2.56     | 202<br>7.95    | 140<br>5.51    | 115<br>4.53    | 245<br>9.65 | 51<br>2.00     | 15<br>0.59     | 70<br>2.76     | 91<br>3.58     | 13.4 kg<br>29.48 lb.  | 13.5 kg<br>29.7 lb.       |
| 65 J (2½ in.)   | mm<br>in. | 65<br>2.56     | 202<br>7.95    | 140<br>5.51    | 115<br>4.53    | 230<br>9.06 | 51<br>2.00     | 15<br>0.59     | 70<br>2.76     | 91<br>3.58     | 13.4 kg<br>29.48 lb.  | 13.5 kg<br>29.7 lb.       |
| 65 SOC (2½ in.) | mm<br>in. | 65<br>2.56     | 202<br>7.95    | 140<br>5.51    | 115<br>4.53    | 230<br>9.06 | 51<br>2.00     | 15<br>0.59     | 70<br>2.76     | 91<br>3.58     | 13.4 kg<br>29.48 lb.  | 13.5 kg<br>29.7 lb.       |
| 76 SD (3 in.)   | mm<br>in. | 65<br>2.56     | 202<br>7.95    | 140<br>5.51    | 115<br>4.53    | 245<br>9.65 | 51<br>2.00     | 15<br>0.59     | 70<br>2.76     | 91<br>3.58     | 13.4 kg<br>29.48 lb.  | 13.5 kg<br>29.7 lb.       |
| 67 SA (2¾ in.)  | mm<br>in. | 65<br>2.56     | 202<br>7.95    | 140<br>5.51    | 115<br>4.53    | 245<br>9.65 | 51<br>2.00     | 15<br>0.59     | 70<br>2.76     | 91<br>3.58     | 13.4 kg<br>29.48 lb.  | 13.5 kg<br>29.7 lb.       |

**NOTE:**

Specified weights are approximate values only.

**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

## ICS 100

Figure 25: ICS 100, Dimensions and weights

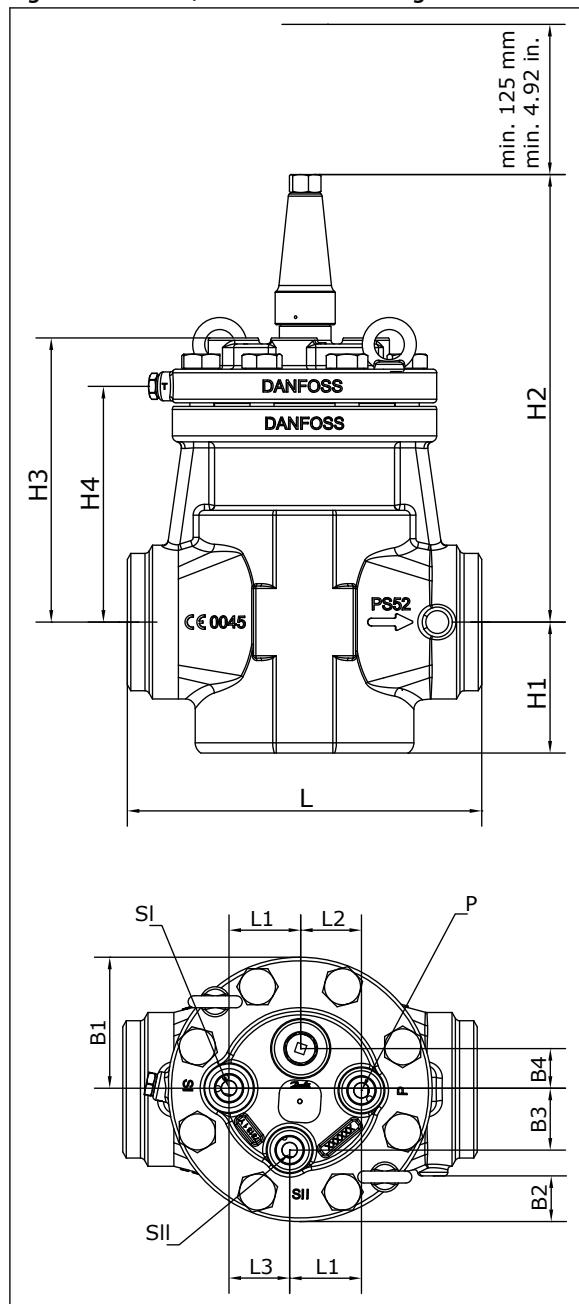


Table 20: Connection type and Weight

| Connection         |     | H <sub>1</sub> | H <sub>2</sub> | H <sub>3</sub> | H <sub>4</sub> | L    | L <sub>1</sub> | L <sub>2</sub> | L <sub>3</sub> | B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | B <sub>4</sub> | Weight   |
|--------------------|-----|----------------|----------------|----------------|----------------|------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------|
| 100 D or A (4 in.) | mm  | 109            | 372            | 237            | 196            | 295  | 60             | 51             | 50             | 109            | 38             | 52             | 33             | 45 kg    |
|                    | in. | 4.3            | 14.7           | 9.3            | 7.7            | 11.6 | 2.4            | 2.0            | 2.0            | 4.3            | 1.5            | 2.1            | 1.3            | 99.2 lb. |

**NOTE:**

Specified weights are approximate values only.

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

## ICS 125

Figure 26: ICS 125, Dimensions and weights

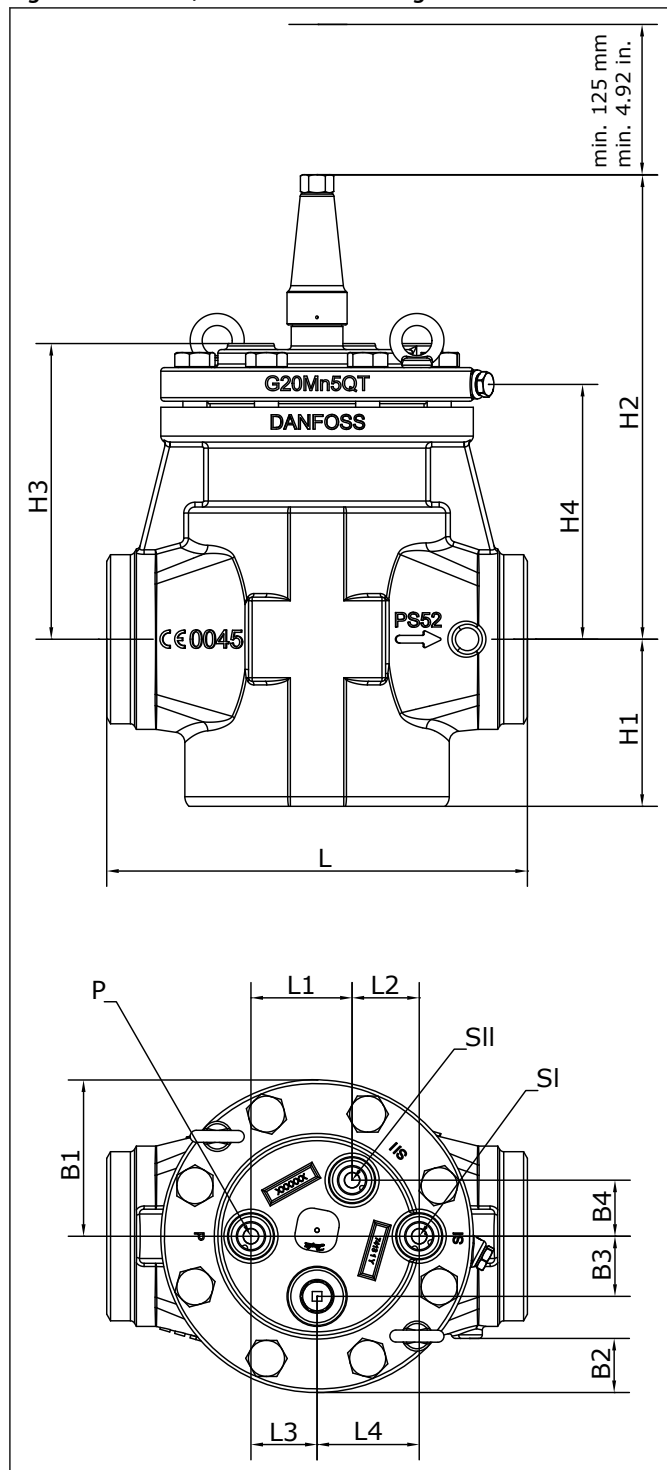


Table 21: Connection type and Weight

| Connection         |           | H <sub>1</sub> | H <sub>2</sub> | H <sub>3</sub> | H <sub>4</sub> | L           | L <sub>1</sub> | L <sub>2</sub> | L <sub>3</sub> | L <sub>4</sub> | B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | B <sub>4</sub> | Weight             |
|--------------------|-----------|----------------|----------------|----------------|----------------|-------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|--------------------|
| 125 D or A (5 in.) | mm<br>in. | 139<br>5.5     | 386<br>15.2    | 246<br>9.7     | 212<br>8.4     | 350<br>13.8 | 84<br>3.3      | 56<br>2.2      | 55<br>2.2      | 85<br>3.4      | 130<br>5.1     | 45<br>1.8      | 50<br>2.0      | 47<br>1.9      | 68 kg<br>149.9 lb. |

**NOTE:**

Specified weights are approximate values only.

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

## ICS 150

Figure 27: ICS 150, Dimensions and weights

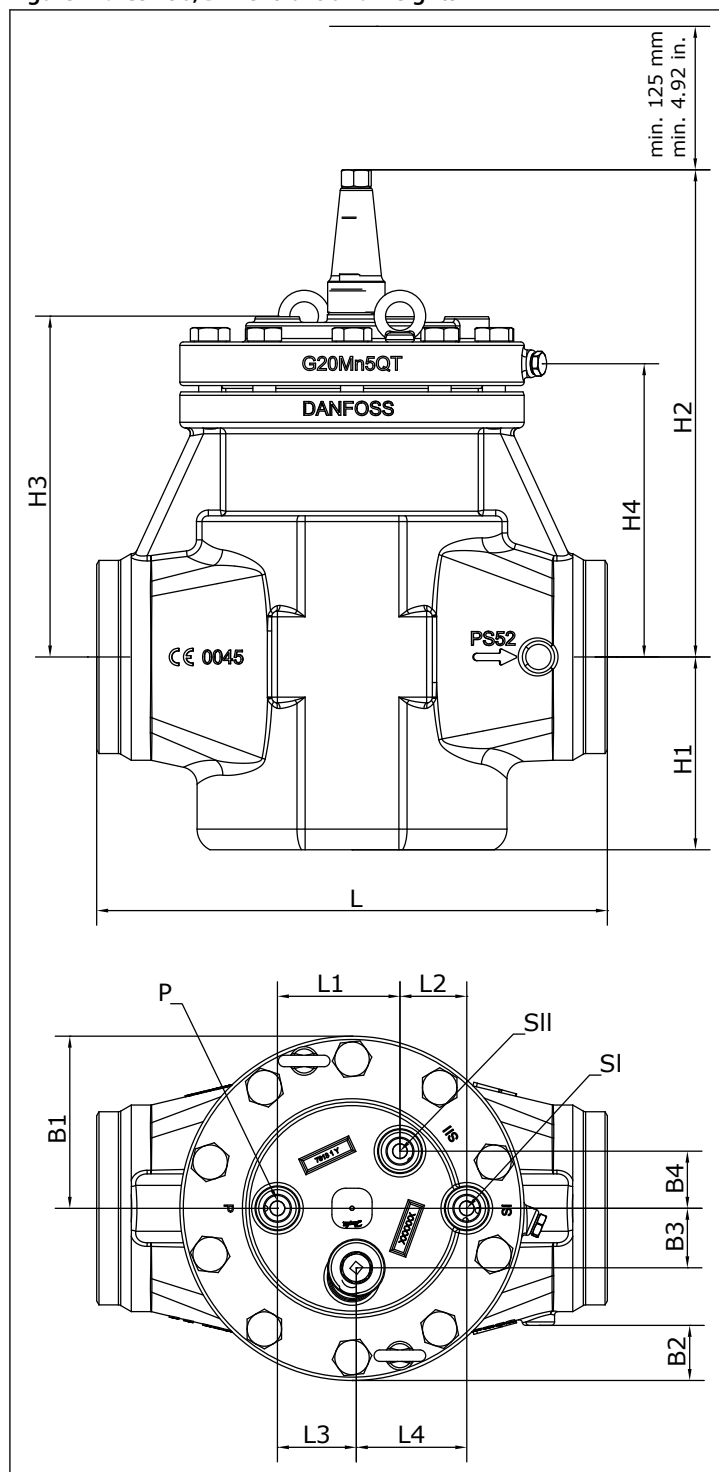


Table 22: Connection type and Weight

| Connection         |           | H <sub>1</sub> | H <sub>2</sub> | H <sub>3</sub> | H <sub>4</sub> | L           | L <sub>1</sub> | L <sub>2</sub> | L <sub>3</sub> | L <sub>4</sub> | B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | B <sub>4</sub> | Weight              |
|--------------------|-----------|----------------|----------------|----------------|----------------|-------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
| 150 D or A (6 in.) | mm<br>in. | 168<br>6.6     | 425<br>16.7    | 297<br>11.7    | 256<br>10.1    | 445<br>17.5 | 107<br>4.2     | 58<br>2.3      | 69<br>2.7      | 96<br>3.8      | 150<br>5.9     | 48<br>1.9      | 52<br>2.1      | 50<br>2.0      | 115 kg<br>253.5 lb. |

**NOTE:**

Specified weights are approximate values only.

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

## Ordering

### ICS 25

#### Ordering from the parts programme

Figure 28: Example (select from table ICS 25 valve body w/different connections, table ICS 25 function module and table ICS 25 top cover)

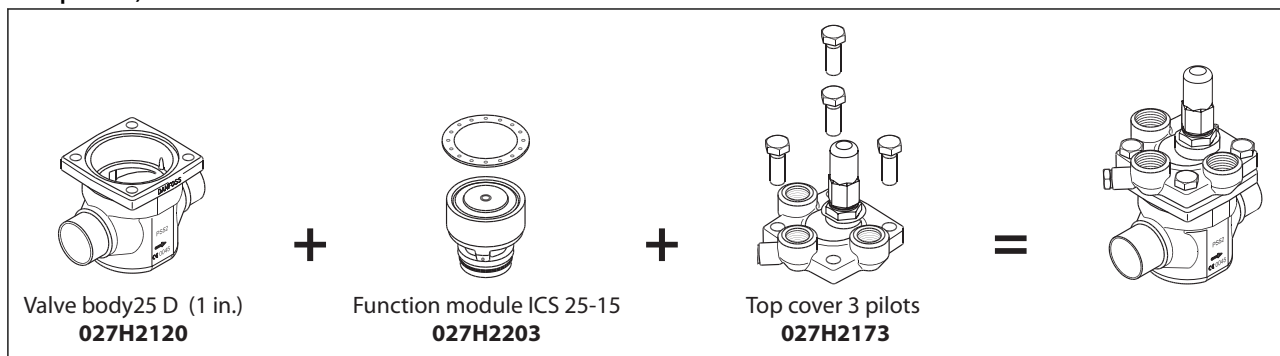


Figure 29: ICS 25 valve body

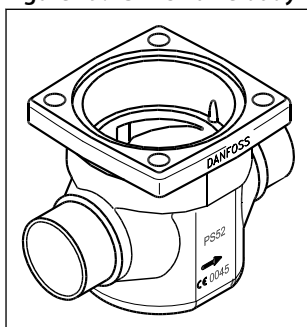


Table 23: ICS 25 valve body w/different connections

| Connection          | Code Number |
|---------------------|-------------|
| 20 D (3/4 in.)      | 027H2128    |
| 25 D (1 in.)        | 027H2120    |
| 32 D (1 1/4 in.)    | 027H2129    |
| 40 D (1 1/2 in.)    | 027H2135    |
| 35 SD (13/8 in. SA) | 027H2134    |
| 28 SA (1 1/8 in.)   | 027H2126    |
| 22 SA (7/8 in.)     | 027H2125    |
| 28 SD (1 1/8 in.)   | 027H2124    |
| 22 SD (7/8 in.)     | 027H2123    |
| 20 A (3/4 in.)      | 027H2131    |
| 25 A (1 in.)        | 027H2121    |
| 32 A (1 1/4 in.)    | 027H2130    |
| 20 SOC (3/4 in.)    | 027H2132    |
| 25 SOC (1 in.)      | 027H2122    |
| 20 FPT (1/2 in.)    | 027H2133    |
| 25 FPT (1 in.)      | 027H2127    |

**D** = Butt-weld DIN

**A** = Butt-weld ANSI

**J** = Butt-weld JIS

**SOC** = Socket weld ANSI

**SD** = Solder DIN

**SA** = Solder ANSI

**FPT** = Female Pipe Thread

Figure 30: ICS 25 function module

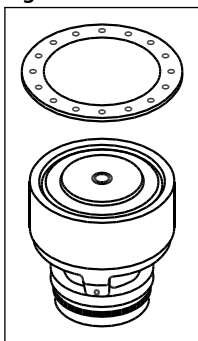


Table 24: ICS 25 function module

| Description | Code Number             |
|-------------|-------------------------|
| ICS 25-5    | 027H2201 <sup>(1)</sup> |
| ICS 25-10   | 027H2202 <sup>(1)</sup> |
| ICS 25-15   | 027H2203 <sup>(1)</sup> |
| ICS 25-20   | 027H2204 <sup>(1)</sup> |
| ICS 25-25   | 027H2200 <sup>(1)</sup> |

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

Figure 31: ICS 1

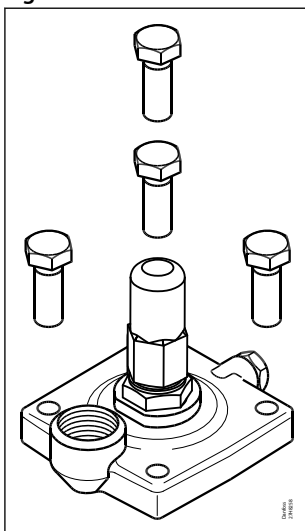


Figure 32: ICS 3

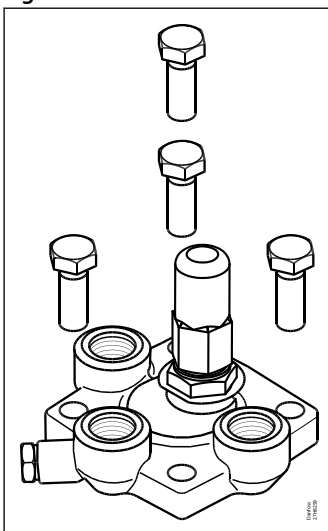


Table 25: ICS 25 top cover

| Description        | Code Number             |
|--------------------|-------------------------|
| Top cover 1 Pilot  | 027H2172 <sup>(2)</sup> |
| Top cover 3 Pilots | 027H2173 <sup>(3)</sup> |

<sup>(2)</sup> Including bolts

<sup>(3)</sup> including bolts and one blanking plug

**Ordering complete factory assembled valve**  
(body, function module and top cover)

# Pilot-operated servo valve, type ICS

Figure 33: 1 pilot

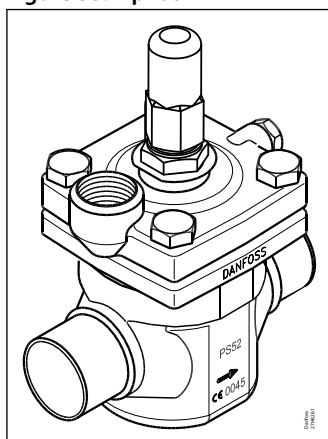


Figure 34: 3 pilots

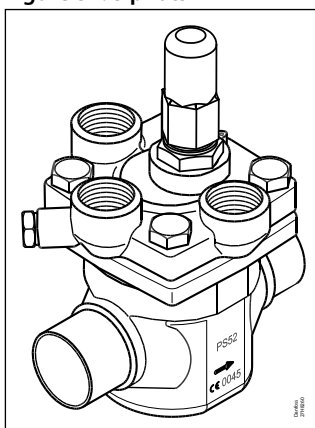


Table 26: Connections

|           |                         | Available connections |              |                  |                  |                      |                   |                 |                   |
|-----------|-------------------------|-----------------------|--------------|------------------|------------------|----------------------|-------------------|-----------------|-------------------|
|           |                         | 20 D (3/4 in.)        | 25 D (1 in.) | 32 D (1 1/4 in.) | 40 D (1 1/2 in.) | 35 SD (1 3/8 in. SA) | 28 SA (1 1/8 in.) | 22 SA (7/8 in.) | 28 SD (1 1/8 in.) |
| ICS 25-5  | 1 Pilot                 | 027H2028              | 027H2020     | *                | *                | *                    | 027H2026          | 027H2025        | 027H2024          |
|           | 3 Pilots <sup>(4)</sup> | 027H2078              | 027H2070     | *                | *                | *                    | 027H2076          | 027H2075        | 027H2074          |
| ICS 25-10 | 1 Pilot                 | 027H2038              | 027H2030     | *                | *                | *                    | 027H2036          | 027H2035        | 027H2034          |
|           | 3 Pilots <sup>(4)</sup> | 027H2088              | 027H2080     | *                | *                | *                    | 027H2086          | 027H2085        | 027H2084          |
| ICS 25-15 | 1 Pilot                 | 027H2048              | 027H2040     | *                | *                | *                    | 027H2046          | 027H2045        | 027H2044          |
|           | 3 Pilots <sup>(4)</sup> | 027H2098              | 027H2090     | *                | *                | *                    | 027H2096          | 027H2095        | 027H2094          |
| ICS 25-20 | 1 Pilot                 | 027H2058              | 027H2050     | *                | *                | *                    | 027H2056          | 027H2055        | 027H2054          |
|           | 3 Pilots <sup>(4)</sup> | 027H2108              | 027H2100     | *                | *                | *                    | 027H2106          | 027H2105        | 027H2104          |
| ICS 25-25 | 1 Pilot                 | 027H2068              | 027H2060     | *                | *                | *                    | 027H2066          | 027H2065        | 027H2064          |
|           | 3 Pilots <sup>(4)</sup> | 027H2118              | 027H2110     | *                | *                | *                    | 027H2116          | 027H2115        | 027H2114          |

<sup>(4)</sup> Including one blanking plug (A+B)

\* Select from parts programme

Table 27: Connections

|           |                         | Available connections |                |              |                  |                  |                |                  |                |
|-----------|-------------------------|-----------------------|----------------|--------------|------------------|------------------|----------------|------------------|----------------|
|           |                         | 22 SD (7/8 in.)       | 20 A (3/4 in.) | 25 A (1 in.) | 32 A (1 1/4 in.) | 20 SOC (3/4 in.) | 25 SOC (1 in.) | 20 FPT (1/2 in.) | 25 FPT (1 in.) |
| ICS 25-5  | 1 Pilot                 | 027H2023              | 027H2029       | 027H2021     | *                | 027H2140         | *              | *                | *              |
|           | 3 Pilots <sup>(4)</sup> | 027H2073              | 027H2079       | 027H2071     | *                | 027H2145         | *              | *                | *              |
| ICS 25-10 | 1 Pilot                 | 027H2033              | 027H2039       | 027H2031     | *                | *                | *              | *                | *              |
|           | 3 Pilots <sup>(4)</sup> | 027H2083              | 027H2089       | 027H2081     | *                | 027H2146         | *              | *                | *              |
| ICS 25-15 | 1 Pilot                 | 027H2043              | 027H2049       | 027H2041     | *                | 027H2142         | *              | *                | *              |
|           | 3 Pilots <sup>(4)</sup> | 027H2093              | 027H2099       | 027H2091     | *                | *                | *              | *                | *              |
| ICS 25-20 | 1 Pilot                 | 027H2053              | 027H2059       | 027H2051     | *                | 027H2143         | *              | *                | *              |
|           | 3 Pilots <sup>(4)</sup> | 027H2103              | 027H2109       | 027H2101     | *                | 027H2148         | *              | *                | *              |
| ICS 25-25 | 1 Pilot                 | 027H2063              | *              | 027H2061     | *                | *                | 027H2062       | *                | *              |
|           | 3 Pilots <sup>(4)</sup> | 027H2113              | *              | 027H2111     | *                | *                | 027H2112       | *                | *              |

\* Select from parts programme

## ICS 32

### Ordering from the parts programme

Figure 35: Example (select from table ICV 32 valve body w/different connections, table ICS 32 function module and table ICS 32 top cover)

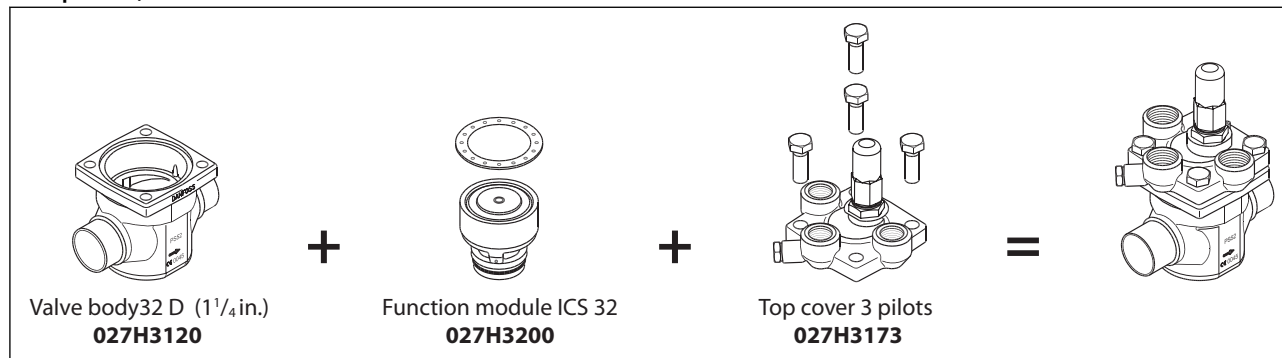


Figure 36: ICV 32 valve body w/different connections

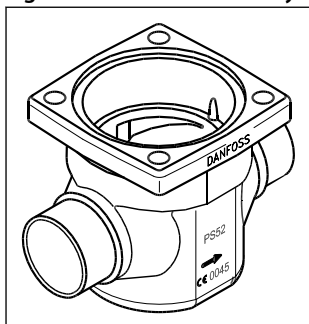


Table 28: ICV 32 valve body w/different connections

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

**D** = Butt-weld DIN

**A** = Butt-weld ANSI

**J** = Butt-weld JIS

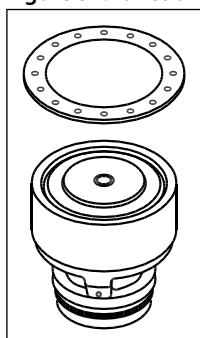
**SOC** = Socket weld ANSI

**SD** = Solder DIN

**SA** = Solder ANSI

**FPT** = Female Pipe Thread

Figure 37: function module



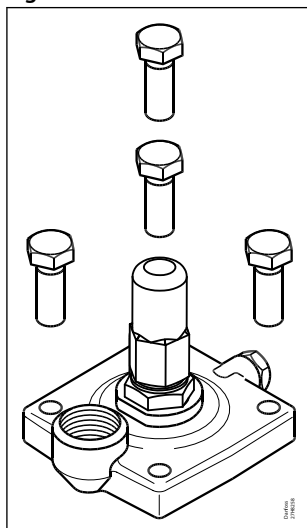
## Pilot-operated servo valve, type ICS

**Table 29: ICS 32 function module**

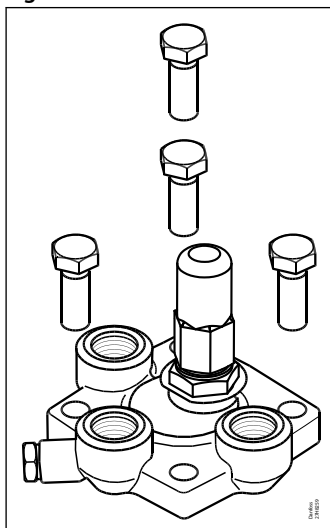
| Description | Code Number             |
|-------------|-------------------------|
| ICS 32      | 027H3200 <sup>(1)</sup> |

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

**Figure 38: ICS 1**



**Figure 39: ICS 3**



**Table 30: ICS 32 top cover**

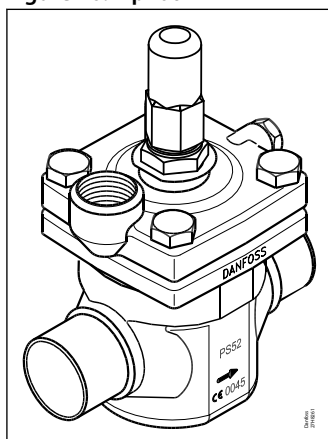
| Description        | Code Number             |
|--------------------|-------------------------|
| Top cover 1 Pilot  | 027H3172 <sup>(2)</sup> |
| Top cover 3 Pilots | 027H3173 <sup>(3)</sup> |

<sup>(2)</sup> Including bolts

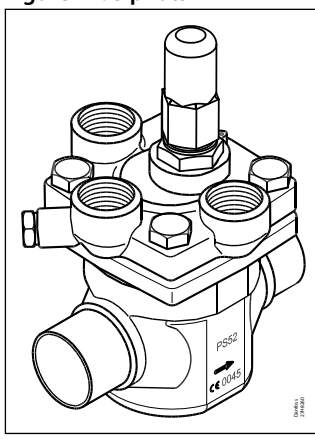
<sup>(3)</sup> Including bolts and one blanking plug

### Ordering complete factory assembled valve (body, function module and top cover)

**Figure 40: 1 pilot**



**Figure 41: 3 pilots**



**Table 31: Connections**

|        |                         | Available connections |               |                |                |                   |               |                 |               |
|--------|-------------------------|-----------------------|---------------|----------------|----------------|-------------------|---------------|-----------------|---------------|
|        |                         | 32 D (1¼ in.)         | 40 D (1½ in.) | 42 SA (1⅝ in.) | 42 SD (1⅝ in.) | 35 SD (1⅝ in. SA) | 32 A (1¼ in.) | 32 SOC (1¼ in.) | 40 A (1½ in.) |
| ICS 32 | 1 Pilot                 | 027H3020              | *             | *              | *              | 027H3023          | 027H3021      | 027H3022        | *             |
|        | 3 Pilots <sup>(4)</sup> | 027H3030              | *             | *              | *              | 027H3033          | 027H3031      | 027H3032        | *             |

<sup>(4)</sup> Including one blanking plug (A+B)

\* Select from parts programme

## ICS 40

### Ordering from the parts programme

Figure 42: Example (select from table ICV 40 valve body w/different connections, table ICS 40 function module and table ICS 40 top cover)

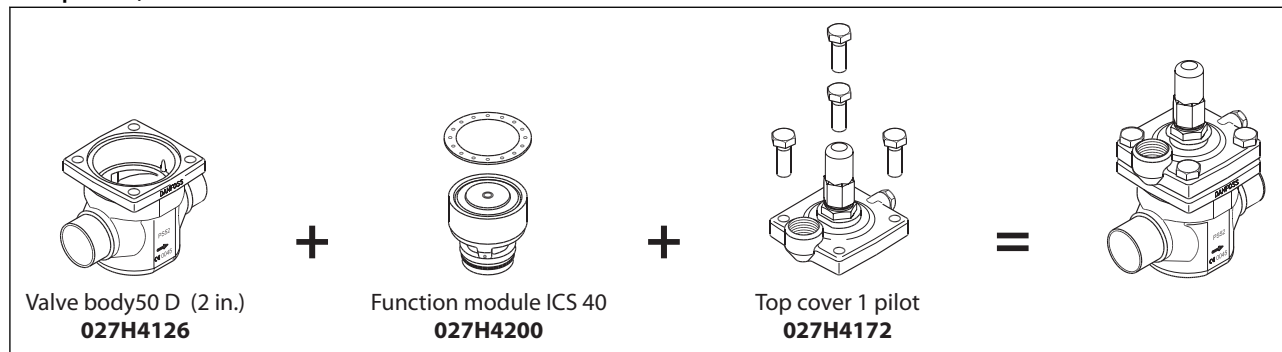


Figure 43: ICV 40 valve body w/different connections

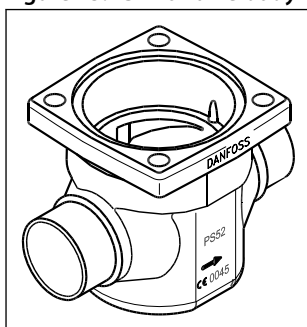


Table 32: ICV 40 valve body w/different connections

| Connections     | Code Number |
|-----------------|-------------|
| 40 D (1½ in.)   | 027H4120    |
| 50 D (2 in.)    | 027H4126    |
| 42 SA (1⅜ in.)  | 027H4124    |
| 42 SD (1⅜ in.)  | 027H4123    |
| 40 A (1½ in.)   | 027H4121    |
| 40 SOC (1½ in.) | 027H4122    |
| 50 A (2 in.)    | 027H4127    |

**D** = Butt-weld DIN

**A** = Butt-weld ANSI

**J** = Butt-weld JIS

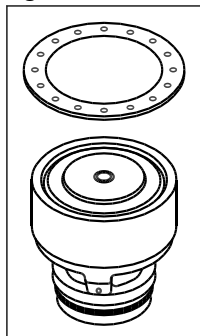
**SOC** = Socket weld ANSI

**SD** = Solder DIN

**SA** = Solder ANSI

**FPT** = Female Pipe Thread

Figure 44: function module



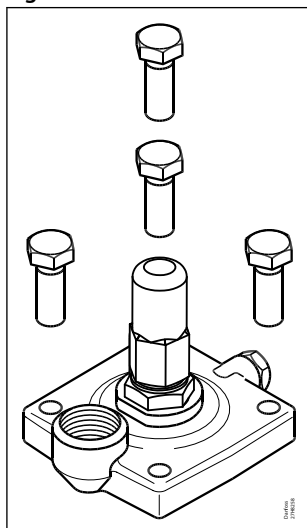
## Pilot-operated servo valve, type ICS

**Table 33: ICS 40 function module**

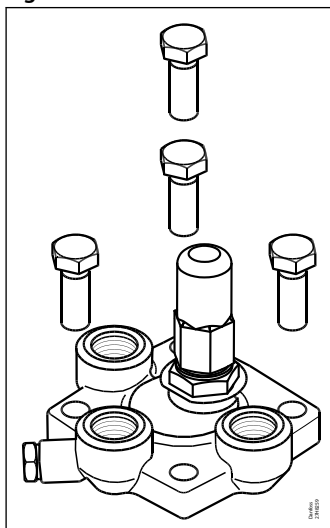
| Description | Code Number             |
|-------------|-------------------------|
| ICS 40      | 027H4200 <sup>(1)</sup> |

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

**Figure 45: ICS 1**



**Figure 46: ICS 3**



**Table 34: ICS 40 top cover**

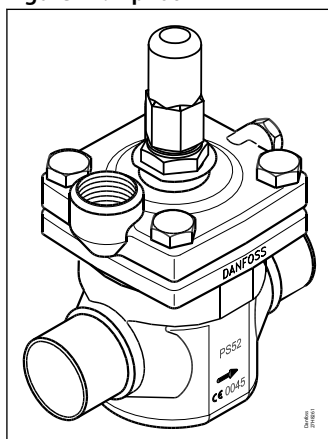
| Description        | Code Number             |
|--------------------|-------------------------|
| Top cover 1 Pilot  | 027H4172 <sup>(2)</sup> |
| Top cover 3 Pilots | 027H4173 <sup>(3)</sup> |

<sup>(2)</sup> Including bolts

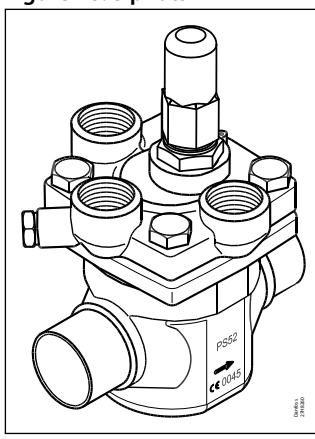
<sup>(3)</sup> Including bolts and one blanking plug

### Ordering complete factory assembled valve (body, function module and top cover)

**Figure 47: 1 pilot**



**Figure 48: 3 pilots**



**Table 35: Connections**

|        |                         | Available connections |              |                |                |               |                 |              |
|--------|-------------------------|-----------------------|--------------|----------------|----------------|---------------|-----------------|--------------|
|        |                         | 40 D (1½ in.)         | 50 D (2 in.) | 42 SA (1½ in.) | 42 SD (1½ in.) | 40 A (1½ in.) | 40 SOC (1½ in.) | 50 A (2 in.) |
| ICS 32 | 1 Pilot                 | 027H4020              | *            | 027H4024       | 027H4023       | 027H4021      | 027H4022        | *            |
|        | 3 Pilots <sup>(4)</sup> | 027H4030              | *            | 027H4034       | 027H4033       | 027H4031      | 027H4032        | *            |

<sup>(4)</sup> Including one blanking plug (A+B)

\* Select from parts programme

## ICS 50

### Ordering from the parts programme

Figure 49: Example (select from table ICV 50 valve body w/different connections, table ICS 50 function module and table ICS 50 top cover)

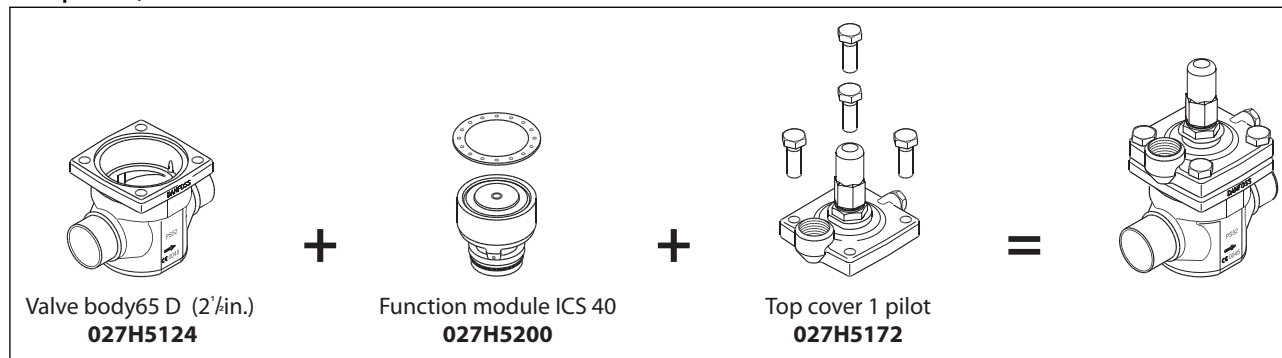


Figure 50: ICV 50 valve body w/different connections

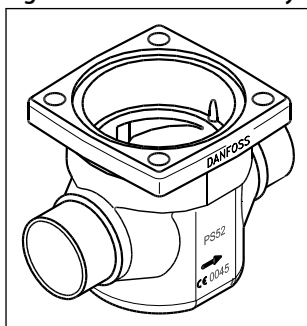


Table 36: ICV 50 valve body w/different connections

| Connections          | Code Number |
|----------------------|-------------|
| 50 D (2 in.)         | 027H5120    |
| 65 D (2 1/2 in.)     | 027H5124    |
| 54 SD (2 1/8 in. SA) | 027H5123    |
| 50 A (2 in.)         | 027H5121    |
| 50 SOC (2 in.)       | 027H5122    |
| 65 A (2 1/2 in.)     | 027H5125    |

**D** = Butt-weld DIN

**A** = Butt-weld ANSI

**J** = Butt-weld JIS

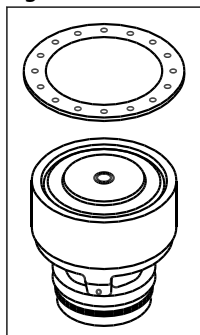
**SOC** = Socket weld ANSI

**SD** = Solder DIN

**SA** = Solder ANSI

**FPT** = Female Pipe Thread

Figure 51: function module



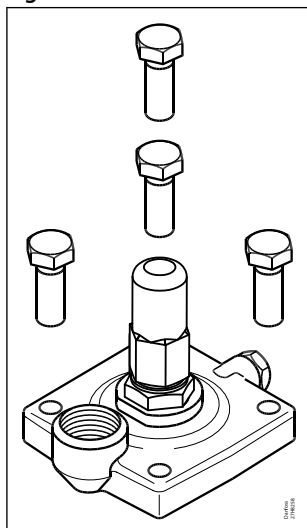
## Pilot-operated servo valve, type ICS

**Table 37: ICS 50 function module**

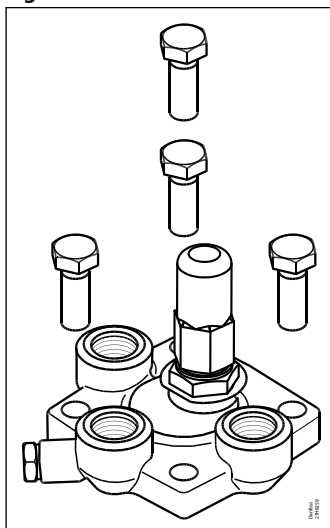
| Description | Code Number             |
|-------------|-------------------------|
| ICS 50      | 027H5200 <sup>(1)</sup> |

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

**Figure 52: ICS 1**



**Figure 53: ICS 3**



**Table 38: ICS 50 top cover**

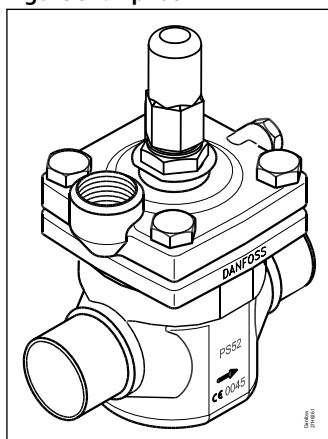
| Description        | Code Number             |
|--------------------|-------------------------|
| Top cover 1 Pilot  | 027H5172 <sup>(2)</sup> |
| Top cover 3 Pilots | 027H5173 <sup>(3)</sup> |

<sup>(2)</sup> Including bolts

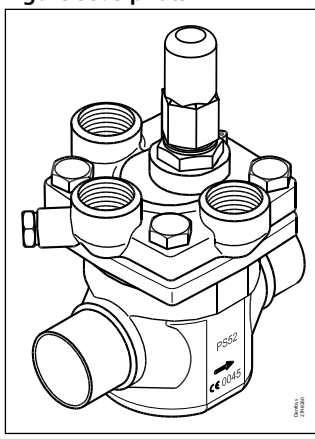
<sup>(3)</sup> Including bolts and one blanking plug

### Ordering complete factory assembled valve (body, function module and top cover)

**Figure 54: 1 pilot**



**Figure 55: 3 pilots**



**Table 39: Connections**

|        |                         | Available connections |               |                   |               |              |                |
|--------|-------------------------|-----------------------|---------------|-------------------|---------------|--------------|----------------|
|        |                         | 50 D (2 in.)          | 65 D (2½ in.) | 54 SD (2⅝ in. SA) | 65 A (2½ in.) | 50 A (2 in.) | 50 SOC (2 in.) |
| ICS 50 | 1 Pilot                 | 027H5020              | *             | 027H5023          | *             | 027H5021     | 027H5022       |
|        | 3 Pilots <sup>(4)</sup> | 027H5030              | *             | 027H5033          | *             | 027H5031     | 027H5032       |

<sup>(4)</sup> Including one blanking plug (A+B)

\* Select from parts programme

## ICS 65 and ICS 80

### Ordering from the parts programme

Figure 56: Example (select from table ICV 65 valve body w/different connections, table ICS 65 and ICS 80 function module and table ICS 65/80 top cover)

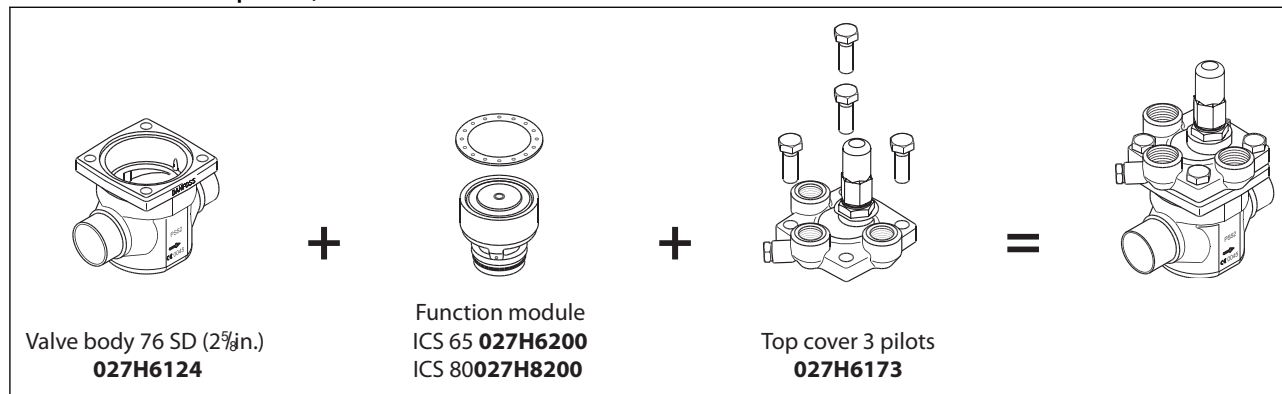


Figure 57: ICV 65 valve body w/different connections

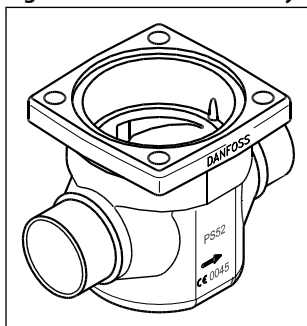


Table 40: ICV 65 valve body w/different connections

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

**D** = Butt-weld DIN

**A** = Butt-weld ANSI

**J** = Butt-weld JIS

**SOC** = Socket weld ANSI

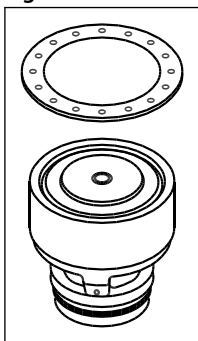
**SD** = Solder DIN

**SA** = Solder ANSI

**FPT** = Female Pipe Thread

## Pilot-operated servo valve, type ICS

**Figure 58: function module**

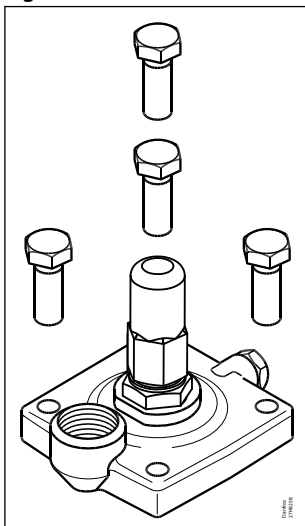


**Table 41: ICS 65 and ICS 80 function module**

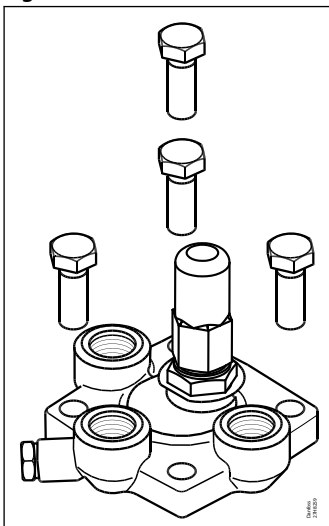
| Description | Code Number             |
|-------------|-------------------------|
| ICS 65      | 027H6200 <sup>(1)</sup> |
| ICS 80      | 027H8200 <sup>(1)</sup> |

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

**Figure 59: ICS 1**



**Figure 60: ICS 3**



**Table 42: ICS 65/80 top cover**

| Description             | Code Number             |
|-------------------------|-------------------------|
| Top cover 1 Pilot (65)  | 027H6172 <sup>(2)</sup> |
| Top cover 3 Pilots (65) | 027H6173 <sup>(3)</sup> |
| Top cover 1 Pilot (80)  | 027H8192 <sup>(2)</sup> |
| Top cover 3 Pilots (80) | 027H8193 <sup>(3)</sup> |

<sup>(2)</sup> Including bolts

<sup>(3)</sup> Including bolts and one blanking plug

**Ordering complete factory assembled valve**  
(body, function module and top cover)

## Pilot-operated servo valve, type ICS

Figure 61: 1 pilot

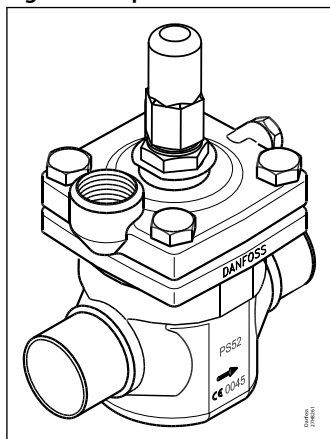


Figure 62: 3 pilots

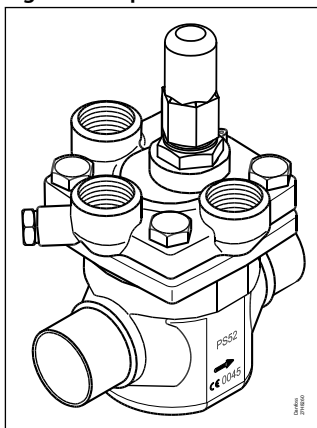


Table 43: Connections

|        |                         | Available connections |               |                 |              |              |                |               |               |
|--------|-------------------------|-----------------------|---------------|-----------------|--------------|--------------|----------------|---------------|---------------|
|        |                         | 65 D (2½ in.)         | 65 A (2½ in.) | 65 SOC (2½ in.) | 80 D (3 in.) | 80 A (3 in.) | 67 SA (2⅝ in.) | 76 SD (3 in.) | 65 J (2½ in.) |
| ICS 50 | 1 Pilot                 | 027H6020              | 027H6021      | 027H6023        | *            | *            | 027H6025       | 027H6024      | *             |
|        | 3 Pilots <sup>(4)</sup> | 027H6030              | 027H6021      | 027H6033        | *            | *            | 027H6035       | 027H6034      | *             |
| ICS 80 | 1 Pilot                 | *                     | *             | *               | 027H8020     | 027H8021     | *              | *             | *             |
|        | 3 Pilots <sup>(4)</sup> | *                     | *             | *               | 027H8030     | 027H8031     | *              | *             | *             |

<sup>(4)</sup> Including one blanking plug (A+B)

\* Select from parts programme

### NOTE:

The capacity of the ICS 80 module can only be achieved when using the valve body with 80 D or A (3 in) connections.

If any other ICV 65 valve body is used the capacity of the complete valve will be reduced by approximately 6%.

## ICS 100 - 150

### Ordering complete factory assembled valve

(body, function module and top cover)

Figure 63: ICS 100

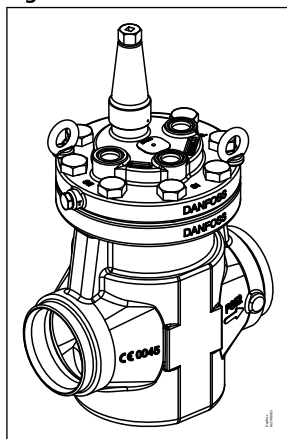


Table 44: Connections

|                        |  | Connections   |  |
|------------------------|--|---------------|--|
|                        |  | 100 D (4 in.) | 100 A (4 in.)                                |
| ICS 100 <sup>(1)</sup> |  | 027H7120      | 027H7121                                     |
|                        |  |               | 100 A (4 in.) with ⅜ in. NPT pressure outlet |
|                        |  |               | 027H7122                                     |

<sup>(1)</sup> Including two blanking plugs (A) and one sealing plug (B)

## Pilot-operated servo valve, type ICS

Figure 64: ICS 125

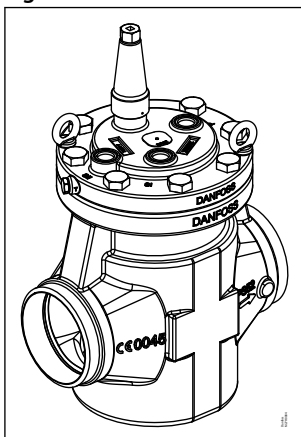


Table 45: Connections

|                        | Connections   |               |  |
|------------------------|---------------|---------------|--|
|                        | 125 D (5 in.) | 125 A (5 in.) | 125 A (5 in.) with 3/8 in. NPT pressure outlet |
| ICS 125 <sup>(1)</sup> | 027H7140      | 027H7141      | 027H7142                                       |

Figure 65: ICS 150

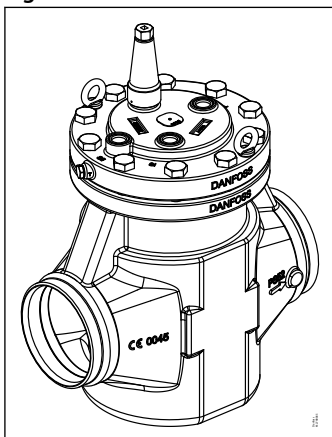


Table 46: Connections

|                        | Connections   |               |  |
|------------------------|---------------|---------------|--|
|                        | 150 D (6 in.) | 150 A (6 in.) | 150 A (6 in.) with 3/8 in. NPT pressure outlet |
| ICS 150 <sup>(1)</sup> | 027H7160      | 027H7161      | 027H7162                                       |

**Spare parts:** Please see AI245486497115

## Accessories

Figure 66: Top cover

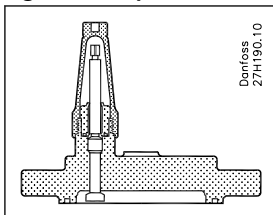


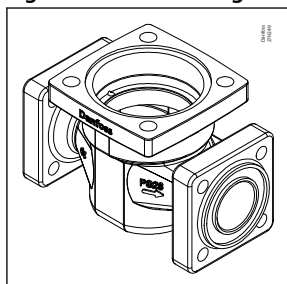
Table 47: Top covers

|  | Top covers |             |
|--|------------|-------------|
|  | Size       | Code number |
| Consist of: Top cover complete with manual spindle, and gasket | ICS 100    | 027H7123    |
|  | ICS 125    | 027H7143    |
|  | ICS 150    | 027H7163    |

### ICV PM flanged valve housings

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

Figure 67: ICV PM flanged valve housing



### Pressure range

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

Table 48: Top covers

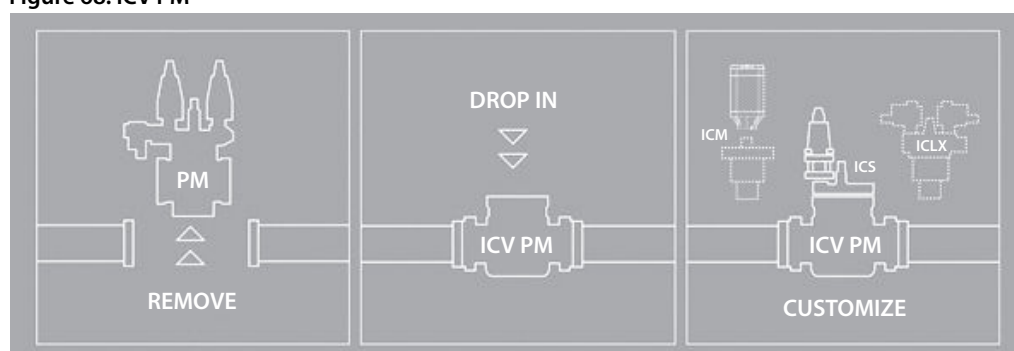
| Description             | Code no.                |
|-------------------------|-------------------------|
| ICV 25 PM Valve housing | 027H2119 <sup>(1)</sup> |
| ICV 32 PM Valve housing | 027H3129 <sup>(1)</sup> |
| ICV 40 PM Valve housing | 027H4128 <sup>(1)</sup> |
| ICV 50 PM Valve housing | 027H5127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

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

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

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

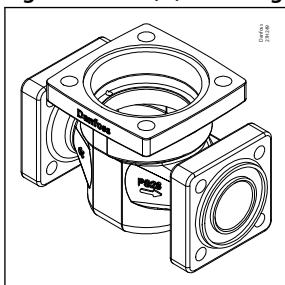
Figure 68: ICV PM



### ICV (H)A4A flanged valve housings

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

Figure 69: ICV (H)A4A flanged valve housing



### Pressure range

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

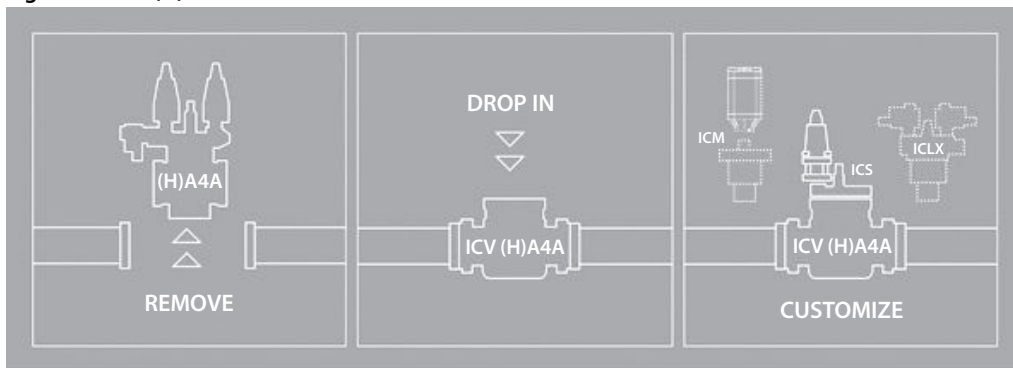
Table 49: ICV Valve housing

| Description                 | Code no.                |
|-----------------------------|-------------------------|
| ICV 25 (H)A4A Valve housing | 027H2304 <sup>(3)</sup> |
| ICV 32 A4A Valve housing    | 027H3130                |
| ICV 32 HA4A Valve housing   | 027H3131                |
| ICV 40 (H)A4A Valve housing | 027H4129                |
| ICV 50 (H)A4A Valve housing | 027H5128                |
| ICV 65 (H)A4A Valve housing | 027H6129                |

<sup>(3)</sup> Includes ICV (H)A4A valve housing, flange gaskets, flange bolts and flange nuts.

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

Figure 70: ICV (H)A4A



### Pressure gauge connection (weld / solder)

Figure 71: Pressure gauge connection (weld / solder).

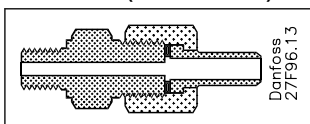


Table 50: Pressure gauge connection (weld / solder).

| Description  | Code no. |
|--|----------|
| $\varnothing$ 6.5 mm / $\varnothing$ 10 mm<br>( $\varnothing$ 0.26 in. / $\varnothing$ 0.39 in.) weld / solder | 027B2035 |

Figure 72: Pressure gauge connection (weld / solder)

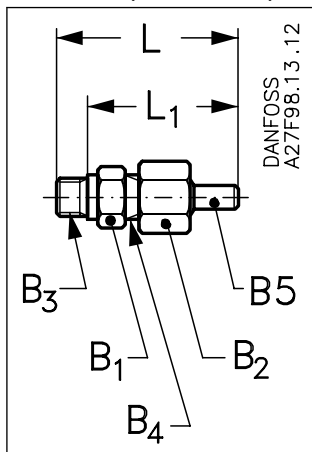


Table 51: Pressure gauge connection (weld / solder)

| Accessories | size      | L          | L <sub>1</sub> | B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | B <sub>4</sub> | B <sub>5</sub> |
|-------------|-----------|------------|----------------|----------------|----------------|----------------|----------------|----------------|
|             | mm<br>in. | 66<br>2.60 | 54<br>2.13     | AF 19          | AF 22          | G ¼ A          | G ⅜ A          | Ø6.5 / Ø10     |

### Pressure gauge connection, ¼ in. flare (self-closing)

Pressure gauge connection, ¼ in. flare (self-closing) Must not be used in R 717 plant.

Figure 73: ¼ in. flare (self-closing)

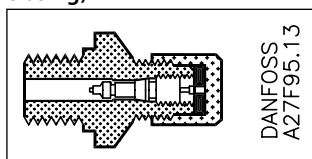


Table 52: Connection

| Description | Code no. |
|-------------|----------|
| ¼ in. flare | 027B2041 |

Figure 74: ¼ in. flare (self-closing)

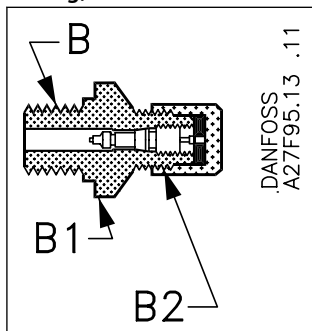


Table 53: Pressure gauge connection, ¼ in. flare (self-closing)

| Accessories | B     | B <sub>1</sub> | B <sub>2</sub> |
|-------------|-------|----------------|----------------|
| ¼ in. flare | G ¼ A | AF 19          | ¼ in. flare    |

## Pressure gauge connection (cutting ring)

Figure 75: Pressure gauge connection (cutting ring).

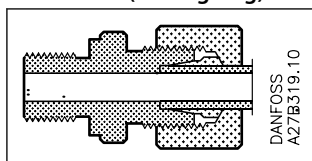


Table 54: Cutting ring connection

| Description                    | Code no. |
|--------------------------------|----------|
| Cutting ring connection, 6 mm  | 027B2063 |
| Cutting ring connection, 10 mm | 027B2064 |

Figure 76: Cutting ring connection

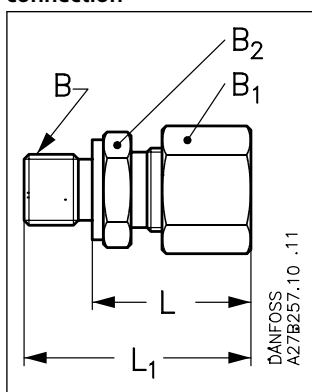


Table 55: Pressure gauge connection (cutting ring)

| Accessories |           | L          | L1         | B     | B1    | B2    |
|-------------|-----------|------------|------------|-------|-------|-------|
| 6 mm        | mm<br>in. | 27<br>1.06 | 39<br>1.54 | G ¼ A | AF 19 | AF 14 |
| 10 mm       | mm<br>in. | 29<br>1.14 | 40<br>1.57 | G ¼ A | AF 19 | AF 14 |

## Multi-function tool

Table 56: Multi-function tool

| Description                       | Code no.            |
|-----------------------------------|---------------------|
| Multi-function tool for ICS 25-65 | 027H0180 / 027H0181 |

Figure 77: Multi-function tool



The multi-function tool can be used for:

- Removing the ICS function module
- Operating the manual spindle

For further information please see the instruction PIHU0A.

## Pressure gauge connection

Figure 78: Connection

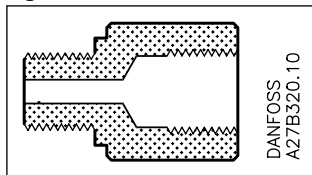


Table 57: Pressure gauge connection

| Description | Code no. |
|-------------|----------|
| ¼ FPT       | 027B2062 |

Figure 79: Pressure gauge connection

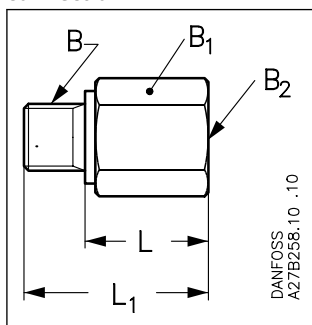


Table 58: Pressure gauge connection

| Accessories |     | L    | L <sub>1</sub> | B     | B <sub>1</sub> | B <sub>2</sub> |
|-------------|-----|------|----------------|-------|----------------|----------------|
|             | mm  | 23   | 35.5           |       |                |                |
|             | in. | 0.91 | 1.40           | G ¼ A | AF 22          | ¼ FPT          |

## External pilot connection

Figure 80: Connection

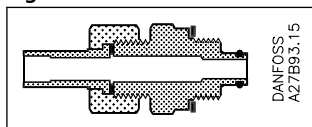
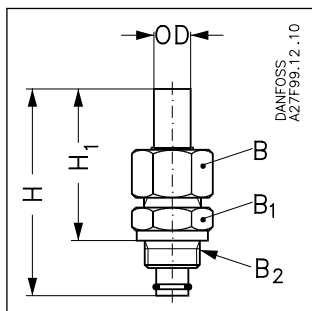


Table 59: ICS connections

| ICS       | Description  | Code no. |
|-----------|--|----------|
| 5 - 80    | External pilot connection (incl. damping orifice, D: 1.0 mm) | 027F1048 |
| 5 - 150   | Accessory bag with seal and O-ring for pilot valve           | 027F0666 |
| 100 - 150 | External pilot connection (incl. damping orifice, D: 1.8 mm) | 027F1049 |

Figure 81: External pilot connection



Pilot-operated servo valve, type ICS

Table 60: External pilot connection

| Accessories |           | H          | H <sub>1</sub> | OD         | B     | B <sub>1</sub> | B <sub>2</sub> |
|-------------|-----------|------------|----------------|------------|-------|----------------|----------------|
|             | mm<br>in. | 90<br>3.54 | 66<br>2.60     | 18<br>0.71 | AF 32 | AF 32          | M 24 × 1.5     |

Blanking plug for pilot valves

Figure 82:  
Blanking plug

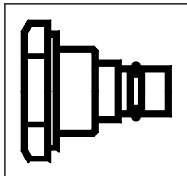


Figure 83: Blanking plug

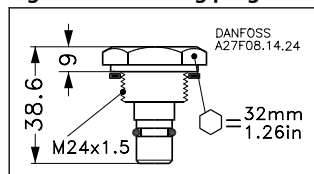


Table 61: Blanking plug

| Description   | Code no. |
|---------------|----------|
| Blanking plug | 027F1046 |

Figure 84: FIA Straightway

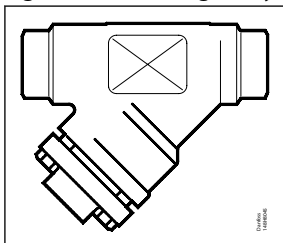


Table 62: Recommended filters


| Recommended filters |             |          |          |          |          | Filter element for liquid line |          | Filter element for suction line |          |
|---------------------|-------------|----------|----------|----------|----------|--------------------------------|----------|---------------------------------|----------|
|                     |             |          |          |          |          | 150 mesh                       | 100 mesh | 72 mesh                         | 38 mesh  |
| Filter Type         | Size        | D        | A        | FPT      | SOC      | 100 my                         | 150 my   | 250 my                          | 500 my   |
| FIA 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 |

## Certificates, declarations, and approvals

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

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

**Table 63: The ICV valve approvals**

|   |   |
|---|---|
|  | <p>The ICV valve concept is designed to fulfill global refrigeration requirements.<br/>For specific approval information, please contact Danfoss.<br/>The ICS valves are approved in accordance with the European standard specified in the Pressure Equipment Directive and are CE marked.</p> |
|---|---|

**Table 64: ICS valves**

| ICS 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                   |

**Table 65: Certificates and declarations**

| File name                          | Document type                 | Document topic        | Approval authority |
|------------------------------------|-------------------------------|-----------------------|--------------------|
| RU Д-ДК.БЛ08.В.00191_18            | EAC Declaration               | Machinery & Equipment | EAC                |
| 0045 202 1204 Z 00354 19 D 001(00) | Pressure - Safety Certificate | -                     | TÜV                |
| RU Д-ДК.БЛ08.В.00189_18            | EAC Declaration               | EMC                   | EAC                |
| RU Д-ДК.РА01.В.72054_20            | EAC Declaration               | PED                   | EAC                |
| RU С-ДК.БЛ08.В.01093_20            | Pressure - Safety Certificate | PED                   | EAC                |
| 033F0685.AK                        | EU Declaration                | EMCD/PED              | Danfoss            |
| 033F0691.AE                        | Manufacturers Declaration     | RoHS                  | Danfoss            |
| 0045 202 1204 Z 00355 19 D 001(00) | Pressure - Safety Certificate | -                     | TÜV                |
| 19.10325.266                       | Marine - Safety Certificate   | -                     | RMRS               |

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