

DENISON HYDRAULICS Pilot Operated Check Valves

Series C4V



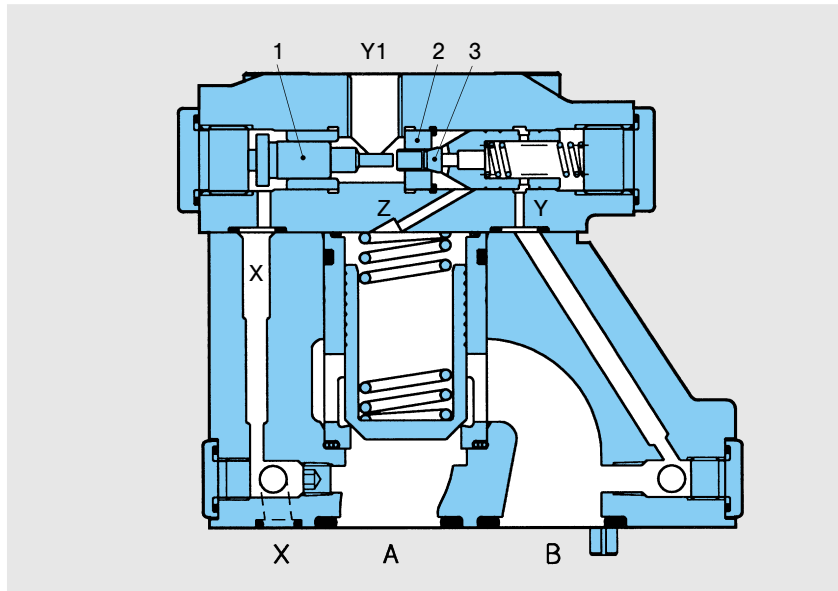
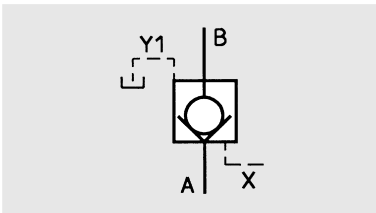
Publ. 6-EN 4600-A, replaces 6-EN 460-B

DENISON Hydraulics

FEATURES

- **Stable Opening:** The pilot cone (3) – also designed as piston – closes the pilot oil connection Y to Z. Therefore pressure variations in port B do not affect the upper side of the main poppet.
- **High Performance:** C4V valves are designed for a maximum pressure of 350 bar and a flow capacity up to 600 l/min.
- **Long Lifetime:** The use of the approved DENISON seat valve components guarantees long lifetime.
- **Standardized Mounting:** Mounting configuration of check valves C4V are in accordance to international standards, such as CETOP-RP 121 H, ISO 6264. Cartridge type, subplate mounting, L-body or T-body are standard.

SYMBOL



OPERATION

Free flow: The main spool is opened by flow from port A without pilot pressure in port X. The necessary cracking pressure A–B is selectable with three variants of springs for each valve size.

Blocked flow: This function is given when the operating pressure in port B exceeds the pressure in port A. This pressure is also available via passage Y at the upper side of the main spool and holds the spool in a closed position. The passage B–A consequently is closed and absolutely leak-free.

Unblocking to opposite flow direction: When an adequate pilot pressure p_x is applied to the pilot head via pilot port X, the pilot cone (3) is moved from its seat (2) by the control piston (1). By that the pilot oil connection from B to Y is closed by item 3 and the pilot chamber of the main spool is vented via Z and Y1 to the tank. The main spool is moved from its seat over the active ring area and flow can pass from B to A. The cracking pressure necessary at port X is determined by the selectable area ratio between the control piston (1) and the diameter of the seat (2) (opening ratio). With the pilot port X unloaded again, the valve closes and flow can pass again from port A to B only.

NOTE

With flow from B–A the cracking pressure in B conforms to the following relation:

$$p_B = 2.5 p_{Y1} + 1.5 (p_F - p_A)$$

p_{Y1} = active tank pressure (bar)

p_F = selected cracking pressure of the main spring (bar)

TECHNICAL DATA

GENERAL

- | | |
|---|--|
| <ul style="list-style-type: none"> • Type of unit • Design • Type of mounting | Pilot Operated Check Valve
Poppet type
Subplate mounting
Threaded body
Cartridge |
| <ul style="list-style-type: none"> • Port sizes • Mounting position • Direction of flow | $\frac{3}{8}''$, $\frac{3}{4}''$, $1\frac{1}{2}''$
Optional
Optional, free flow from A→B
Pilot operated flow from B→A |
| <ul style="list-style-type: none"> • Ambient temperature range • Suitability for special working conditions | – 20 ... + 60 °C
Consult DENISON |

HYDRAULIC CHARACTERISTICS

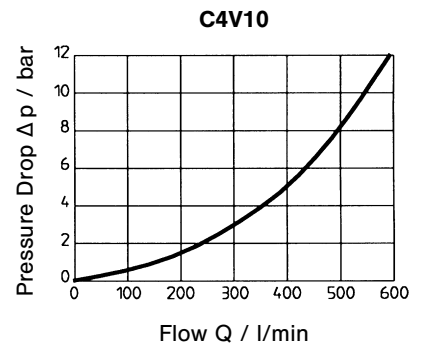
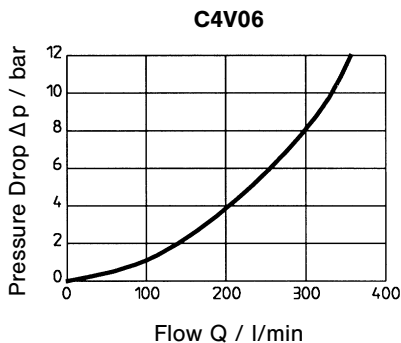
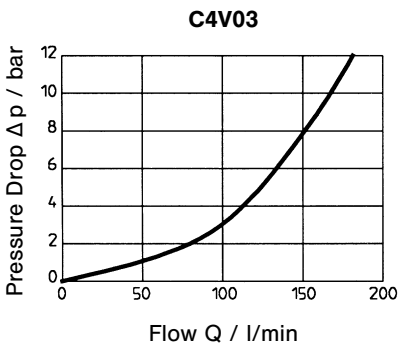
- | | | | | | | | | | | |
|---|---|--|---|--|-----------|-----------|-----------|-----------|-----------|-----------|
| <ul style="list-style-type: none"> • Operating pressure range
– ports A and B • Fluid temperature range • Viscosity range • Recommended operating viscosity | 3.5 ... 350 bar
– 18 °C ... + 80 °C
10 ... 650 cSt
30 cSt | | | | | | | | | |
| <ul style="list-style-type: none"> • Nominal flow • Max. flow | <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">C4V03 ($\frac{3}{8}''$)</td> <td style="text-align: left;">C4V06 ($\frac{3}{4}''$)</td> <td style="text-align: left;">C4V10 ($1\frac{1}{2}''$)</td> </tr> <tr> <td>150 l/min</td> <td>270 l/min</td> <td>450 l/min</td> </tr> <tr> <td>180 l/min</td> <td>360 l/min</td> <td>600 l/min</td> </tr> </table> | C4V03 ($\frac{3}{8}''$) | C4V06 ($\frac{3}{4}''$) | C4V10 ($1\frac{1}{2}''$) | 150 l/min | 270 l/min | 450 l/min | 180 l/min | 360 l/min | 600 l/min |
| C4V03 ($\frac{3}{8}''$) | C4V06 ($\frac{3}{4}''$) | C4V10 ($1\frac{1}{2}''$) | | | | | | | | |
| 150 l/min | 270 l/min | 450 l/min | | | | | | | | |
| 180 l/min | 360 l/min | 600 l/min | | | | | | | | |

TYPE OF ACTUATOR

- | | | | | | | | | | | | |
|---|---|-------|---------------|---------|--------|---------|-------|---------|-------|---------|-------|
| <ul style="list-style-type: none"> • Hydraulically • Pilot pressure range | Pilot operated
5 ... 350 bar | | | | | | | | | | |
| <ul style="list-style-type: none"> • Pilot oil volume | <table border="0" style="width: 100%;"> <tr> <td></td> <td style="text-align: center;">opening ratio</td> </tr> <tr> <td style="text-align: right;">0.64 ml</td> <td style="text-align: center;">10 : 1</td> </tr> <tr> <td style="text-align: right;">0.64 ml</td> <td style="text-align: center;">8 : 1</td> </tr> <tr> <td style="text-align: right;">0.26 ml</td> <td style="text-align: center;">3 : 1</td> </tr> <tr> <td style="text-align: right;">0.08 ml</td> <td style="text-align: center;">1 : 1</td> </tr> </table> | | opening ratio | 0.64 ml | 10 : 1 | 0.64 ml | 8 : 1 | 0.26 ml | 3 : 1 | 0.08 ml | 1 : 1 |
| | opening ratio | | | | | | | | | | |
| 0.64 ml | 10 : 1 | | | | | | | | | | |
| 0.64 ml | 8 : 1 | | | | | | | | | | |
| 0.26 ml | 3 : 1 | | | | | | | | | | |
| 0.08 ml | 1 : 1 | | | | | | | | | | |
| <ul style="list-style-type: none"> • Min. holding pressure for pilot piston (independent of pressure at ports A & B) | <table border="0" style="width: 100%;"> <tr> <td style="text-align: right;">5 bar</td> <td style="text-align: center;">10 : 1</td> </tr> <tr> <td style="text-align: right;">5 bar</td> <td style="text-align: center;">8 : 1</td> </tr> <tr> <td style="text-align: right;">11 bar</td> <td style="text-align: center;">3 : 1</td> </tr> <tr> <td style="text-align: right;">21 bar</td> <td style="text-align: center;">1 : 1</td> </tr> </table> | 5 bar | 10 : 1 | 5 bar | 8 : 1 | 11 bar | 3 : 1 | 21 bar | 1 : 1 | | |
| 5 bar | 10 : 1 | | | | | | | | | | |
| 5 bar | 8 : 1 | | | | | | | | | | |
| 11 bar | 3 : 1 | | | | | | | | | | |
| 21 bar | 1 : 1 | | | | | | | | | | |

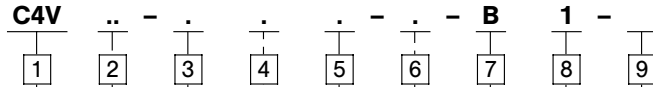
Δp -Q-CHARACTERISTICS

(without spring)



ORDERING CODE

Model Number:



- 1 Series** _____
C4V = Check Valve, pilot operated
- 2 Size** _____
03 = 3/8"
06 = 3/4"
10 = 1 1/2"
- 3 Max. Pressure** _____
0 = for cartridges only } 350 bar
5 = for body valves only }
- 4 Body Mounting** _____
Cartridge with pilot valve:
E = Y1 port = SAE-4 (7/16"-20 UNF) } not for C4V10
G = Y1 port = G 1/4" }

Subplate mounting:
7 = Y1 port = SAE-4 (7/16"-20 UNF)
9 = Y1 port = G 1/4"

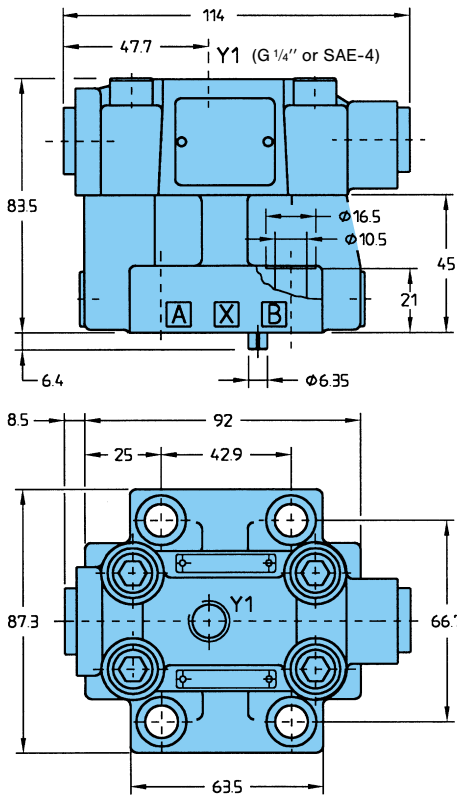
Threaded body:
6 = C4V03 = G 1/2" T-body }
= C4V06 = G 1" T-body } X, Y1 ports = G 1/4"
D = C4V06 = G 3/4" L-body }
= C4V10 = G 1 1/4" L-body }

4 = C4V03 = SAE-8 T-body }
= C4V06 = SAE-16 T-body } X, Y1 ports = SAE-4 (7/16"-20 UNF)
B = C4V06 = SAE-12 L-body }
= C4V10 = SAE-20 L-body }
- 5 Opening Ratio** (pB/pX) _____
1 = 1:1
3 = 3:1
8 = 8:1
9 = 10:1

E = 1:1 }
F = 3:1 } and end position control incl. amplifier (for C4V06/10 only)
G = 8:1 }
H = 10:1 }
- 6 Cracking Pressure** (average value) _____
Flow A → B Flow B → A
- | C4V03 | C4V06/10 | C4V03 | C4V06/10 |
|-------------|----------|---------|----------|
| 2 = 1.0 bar | 1.0 bar | 1.5 bar | 1.7 bar |
| 4 = 4.0 bar | 3.5 bar | 5.5 bar | 6.0 bar |
| 6 = 2.0 bar | 2.2 bar | 3.0 bar | 3.8 bar |
- 7 Design Letter** _____
- 8 Seal Class** _____
1 = NBR-seals (Standard)
4 = EPDM-seals
5 = FPM-seals (Viton®)
- 9 Modifications** _____
0013 = Cover for end position control (see page 10)

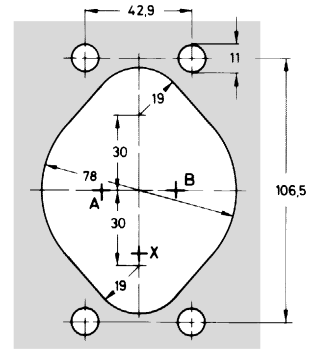
C4V03 (3/8") SUBPLATE MOUNTING

Weight: 2.8 kg



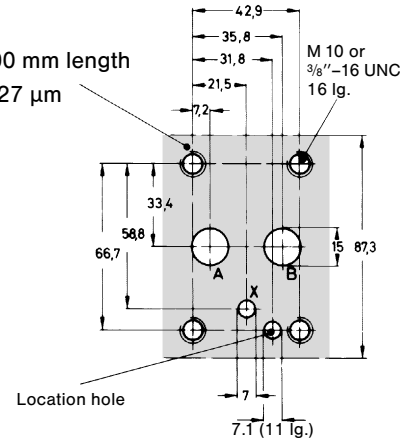
Ports	Function
A	free flow
B	normally closed pilot to open
X	ext. pilot port
Y1	external drain

Panel opening



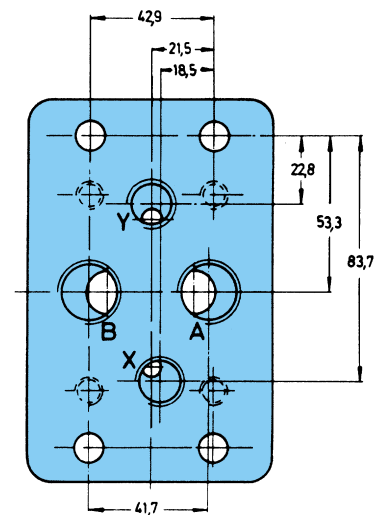
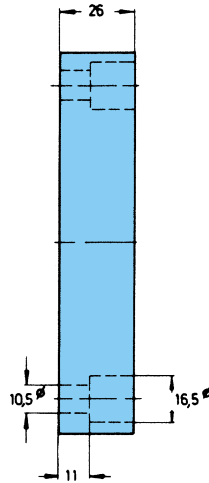
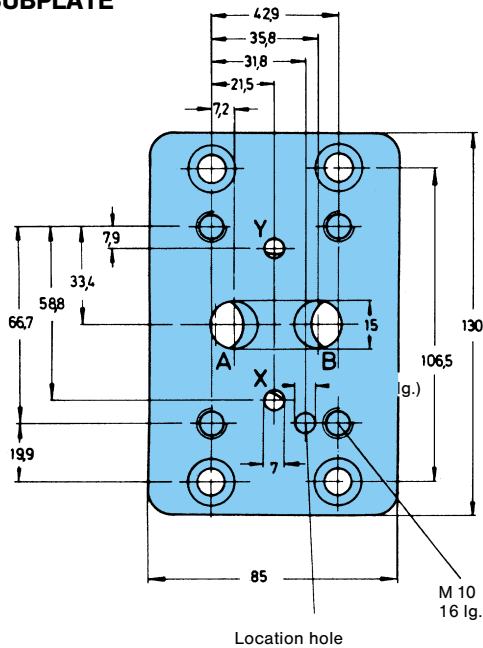
Block mounting face

Flatness 0.01 mm / 100 mm length
Surface finish CLA 1.27 µm



SUBPLATE

Weight: 2 kg



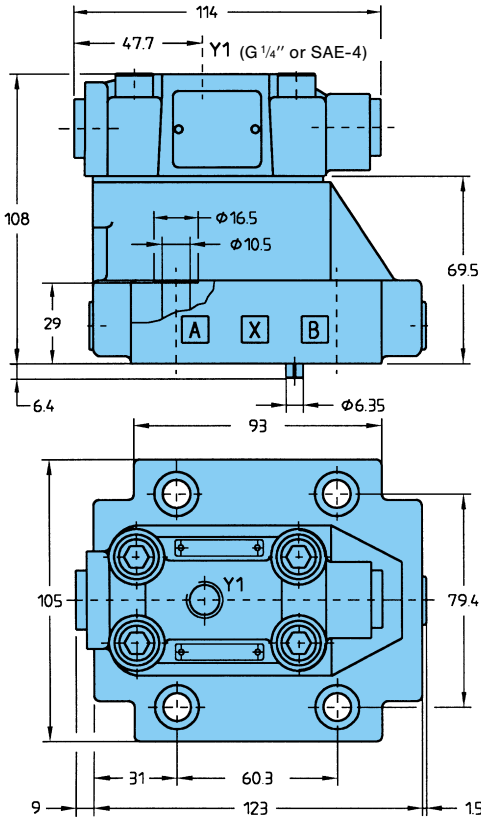
**** Note:** Port Y must be plugged.

Model No.	Order No.	Port sizes		4 Mounting screws* (Torque 68 Nm)		
		A + B	X + Y**	Dimension	Order No.	min. tensile strength
SS-B-08-G 113	S16-63124-0	G 1/2"	G 1/4"	M 10 x 35 DIN 912-12.9	700-70039-8	at p ≤ 210 bar = 100 daN/mm ² at p > 210 bar = 120 daN/mm ²

* Mounting screws are included in subplate order.
For valves ordered without subplate, mounting screws must be ordered separately.

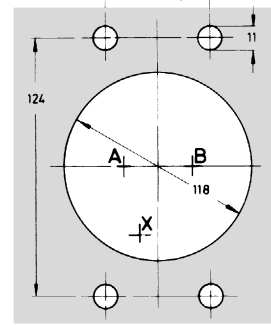
C4V06 (3/4") SUBPLATE MOUNTING

Weight: 4.6 kg

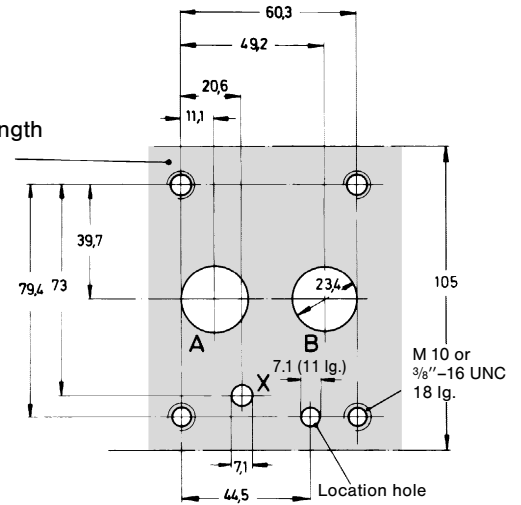


Ports	Function
A	free flow
B	normally closed pilot to open
X	ext. pilot port
Y1	external drain

Panel opening

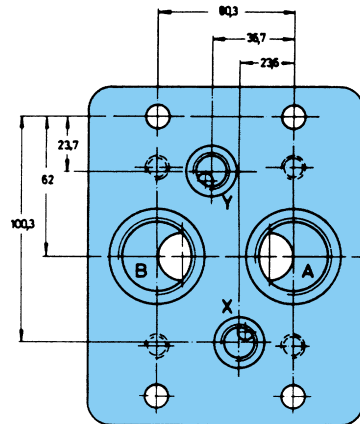
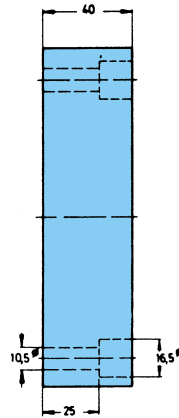
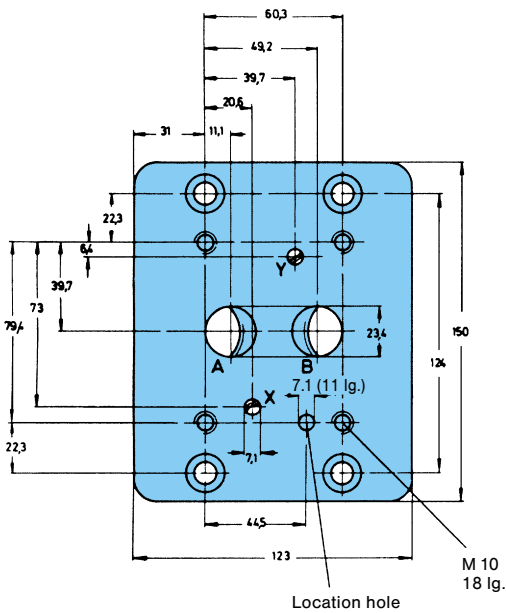


Block mounting face
 Flatness 0.01 mm / 100 mm length
 Surface finish CLA 1.27 μ m



SUBPLATE

Weight: 4.8 kg



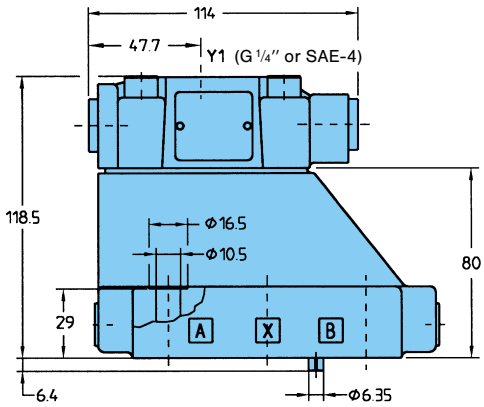
**** Note:** Port Y must be plugged.

Model No.	Order No.	Port sizes		4 Mounting screws* (Torque 68 Nm)		
		A + B	X + Y**	Dimension	Order No.	min. tensile strength
SS-B-16-G 115	S16-39168-0	G 1"	G 1/4"	M 10 x 45 DIN 912-12.9	700-71602-8	at $p \leq 210$ bar = 100 daN/mm ² at $p > 210$ bar = 120 daN/mm ²

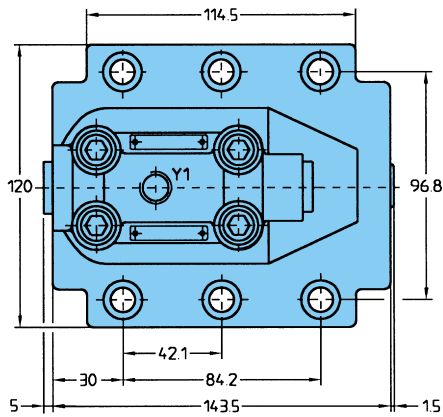
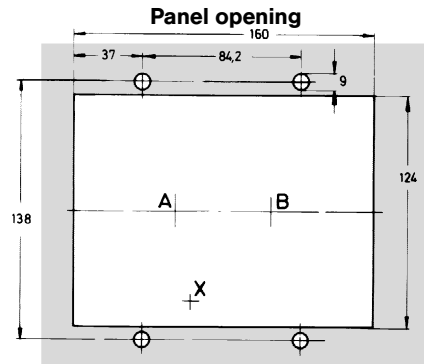
* Mounting screws are included in subplate order.
 For valves ordered without subplate, mounting screws must be ordered separately.

C4V10 (1 1/2") SUBPLATE MOUNTING

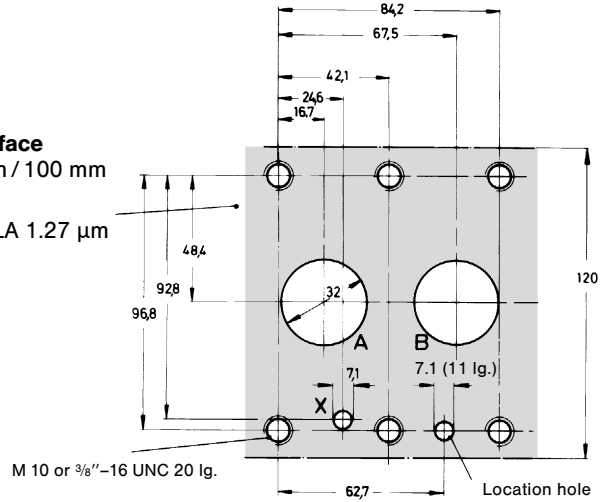
Weight: 6.1 kg



Ports	Function
A	free flow
B	normally closed pilot to open
X	ext. pilot port
Y1	external drain

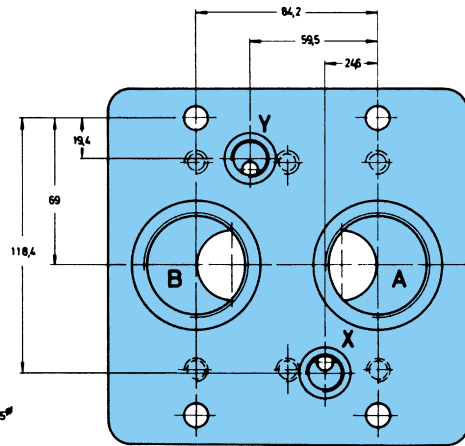
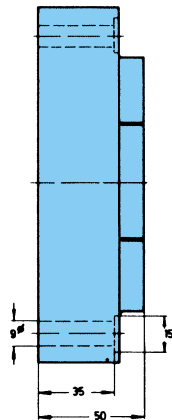
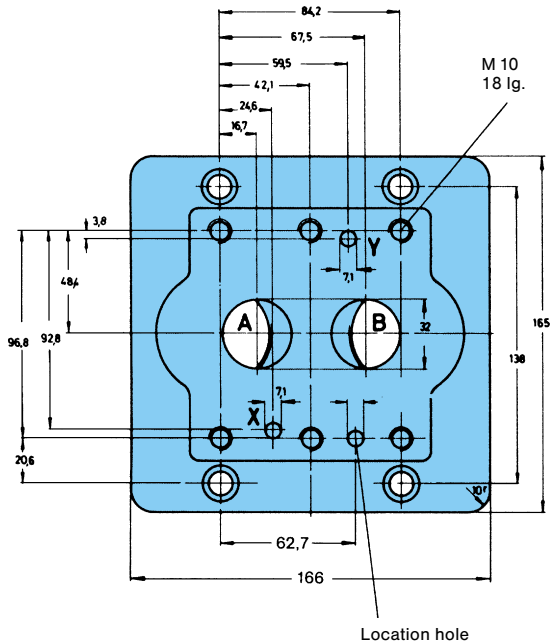


Block mounting face
 Flatness 0.01 mm / 100 mm length
 Surface finish CLA 1.27 µm



SUBPLATE

Weight: 8.5 kg



**** Note:** Port Y must be plugged.

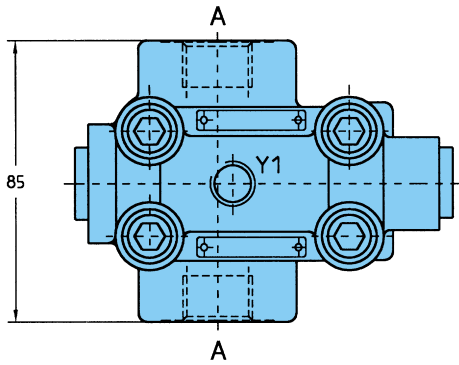
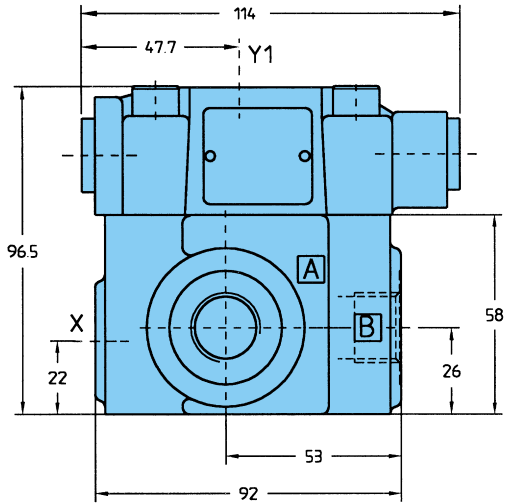
Model No.	Order No.	Port sizes		6 Mounting screws* (Torque 68 Nm)		
		A + B	X + Y**	Dimension	Order No.	min. tensile strength
SS-B-24-G 117	S16-39197-0	G 1 1/2"	G 1/4"	M 10 x 45 DIN 912-12.9	700-71602-8	at p ≤ 210 bar = 100 daN/mm ² at p > 210 bar = 120 daN/mm ²

* Mounting screws are included in subplate order.
 For valves ordered without subplate, mounting screws must be ordered separately.

C4V03 (3/8") – C4V06 (3/4") THREADED BODY

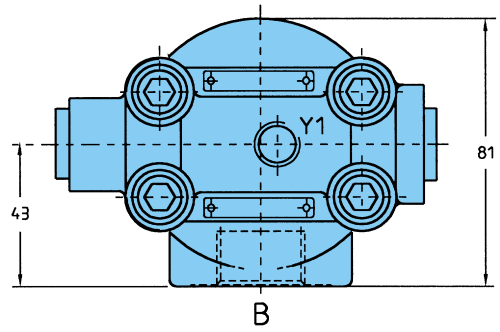
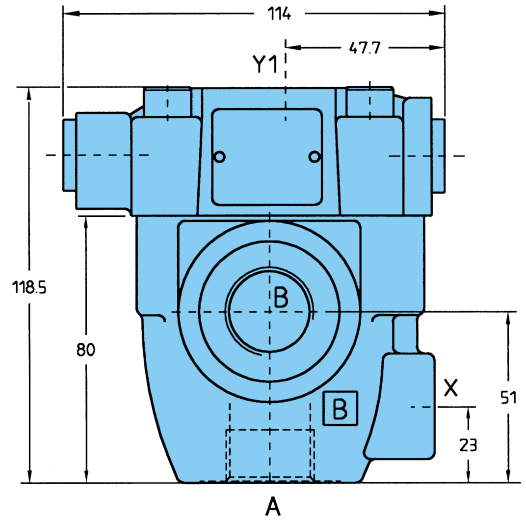
C4V03

Weight: 3.3 kg



C4V06

Weight: 3.4 kg



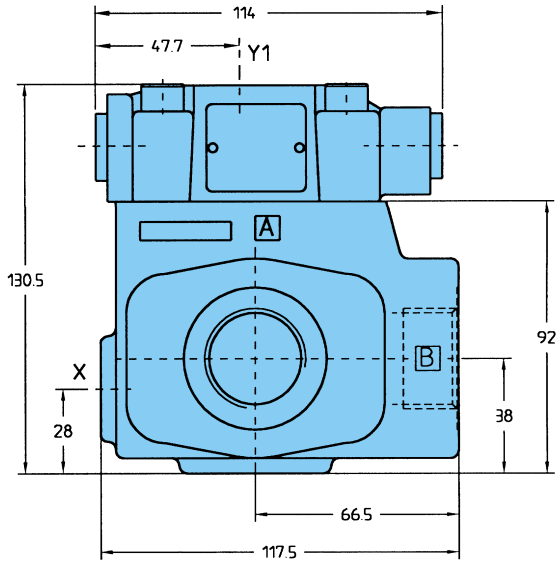
Ports	Function	Port Sizes
A (2x)	free flow	G 1/2" or SAE-8 (3/4"-16 UNF)
B	normally closed pilot to open	G 1/2" or SAE-8 (3/4"-16 UNF)
X	ext. pilot port	G 1/4" or SAE-4 (7/16"-20 UNF)
Y1	external drain	G 1/4" or SAE-4 (7/16"-20 UNF)

Ports	Function	Port Sizes
A	free flow	G 3/4" or SAE-12 (1 1/16"-12 UN)
B	normally closed pilot to open	G 3/4" or SAE-12 (1 1/16"-12 UN)
X	ext. pilot port	G 1/4" or SAE-4 (7/16"-20 UNF)
Y1	external drain	G 1/4" or SAE-4 (7/16"-20 UNF)

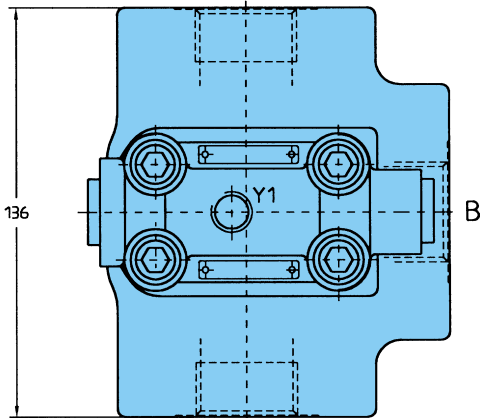
C4V06 (3/4") – C4V10 (1 1/2") THREADED BODY

C4V06

Weight: 6.7 kg



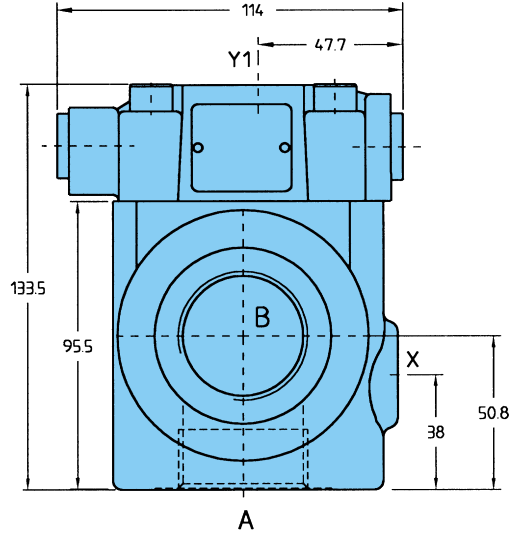
A



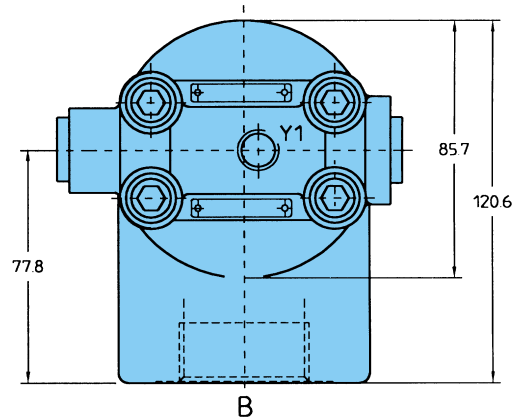
A

C4V10

Weight: 5.7 kg



A



B

Ports	Function	Port Sizes
A (2x)	free flow	G 1" or SAE-16 (1 ⁵ / ₁₆ "–12 UN)
B	normally closed pilot to open	G 1" or SAE-16 (1 ⁵ / ₁₆ "–12 UN)
X	ext. pilot port	G 1/4" or SAE-4 (7/16"–20 UNF)
Y1	external drain	G 1/4" or SAE-4 (7/16"–20 UNF)

Ports	Function	Port Sizes
A	free flow	G 1 1/4" or SAE-20 (1 ⁵ / ₈ "–12 UN)
B	normally closed pilot to open	G 1 1/4" or SAE-20 (1 ⁵ / ₈ "–12 UN)
X	ext. pilot port	G 1/4" or SAE-4 (7/16"–20 UNF)
Y1	external drain	G 1/4" or SAE-4 (7/16"–20 UNF)

END POSITION CONTROL

Weight: 1.4 kg

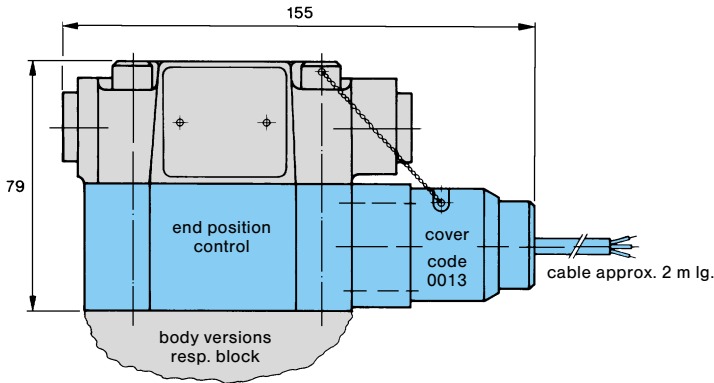
End position control by proximity switch (incl. amplifier).

Valve open: proximity switch activated.

This proximity switch is pressure proof and has no wearing parts.

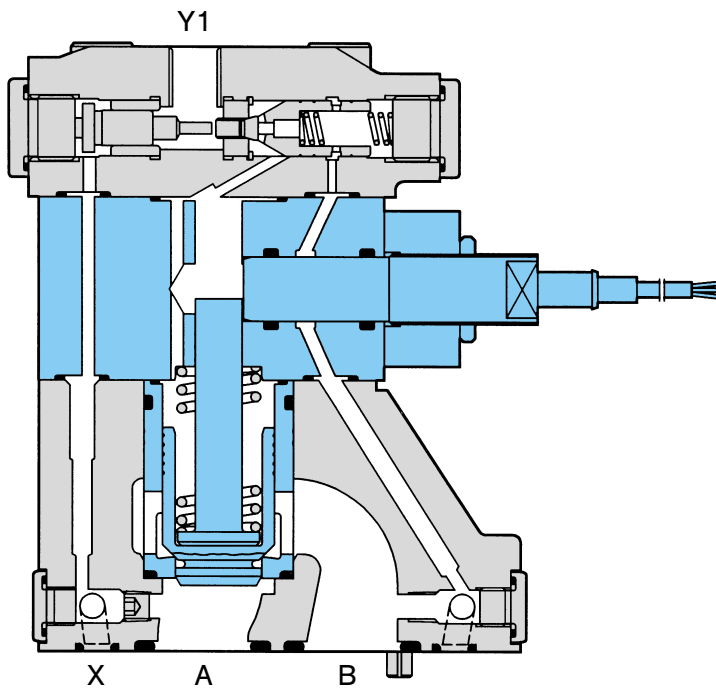
Note:

End position control for C4V06 & C4V10 only.

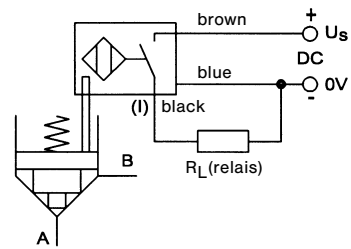
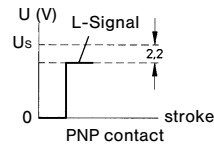


Technical Data (Proximity switch):

Function:	PNP, Contact
Supply voltage (U_s):	10...30 VDC
Supply voltage ripple:	$\leq 10\%$
Current consumption:	max. 8 mA
Residual voltage L-Signal:	$U_s - 2.2\text{ V}$ at I_{max}
Output current (I):	$\leq 200\text{ mA}$
Type of protection:	IP 67
Ambient temperature:	$-25 \dots +70\text{ }^\circ\text{C}$
Wire cross-sectional area:	$3 \times 0.5\text{ mm}^2$



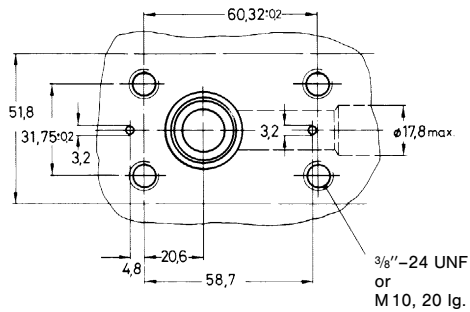
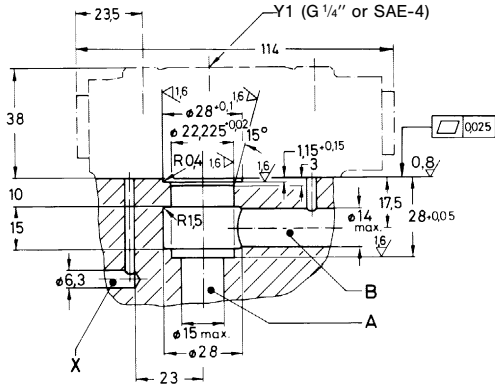
Example: C4V06 subplate mounting



CARTRIDGES WITH CAP

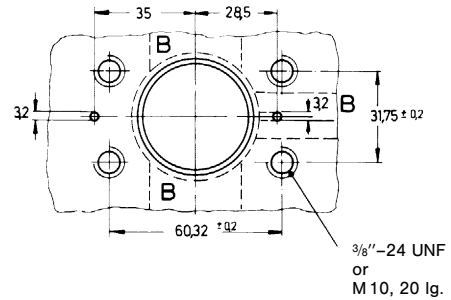
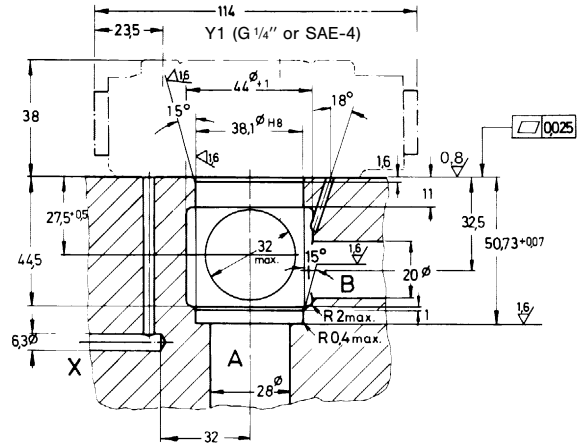
C4V03

Weight: 1.1 kg



C4V06

Weight: 1.2 kg



Ports	Function
A	free flow
B*	normally closed, pilot to open
X	external pilot port
Y1	external drain

* arrangement optional for C4V06

4 Mounting screws	
Dimension	Order-No.
3/8"-24 UNF x 1 3/4" lg.	359-15220-0
or M10 x 45 mm, DIN 912-12.9	700-71602-8

(mounting screws must be ordered separately)
Torque 68 Nm

The product described is subject to continual development and the manufacturer reserves the right to change the specifications without notice.