

FEATURES

Veljan Seat Valves are body type mounting series VD4S and cartridge units series VCAR. The complete range of cartridges - body mounted VD4S and manifold mounted VCAR are sized from 3/8" to 1 1/2" permit flows from 180 lpm to 600 lpm and pressures up to 350 bar.

The interface porting on the subplate body versions follow CETOP, ISO and DIN standards and is dimensionally identical with the **VELJAN** VR4 series of pressure controls. Hence VD4S and VR4 valves can be conveniently used in combined circuitry.

The modular design is used in all valve sizes and the valves are used for a variety of functions :

- As a leak - proof directional control
- As a pressure control for the adjustment or limitation of the pressure
- As a check valve to obtain unidirectional flow
- As a throttle valve to control and limit the rate of flow

A variety of standard combinations of internal components are available along with additional options to suit special circuitry. These options are :

- Poppet stroke limiter :  
to control maximum flow rate,
- Vent valve sandwiched :  
to electrically control poppet operation,
- Seat area changes :  
to vary operational characteristics,
- Shuttle valves :  
To take pilot oil from Port A and Port B.

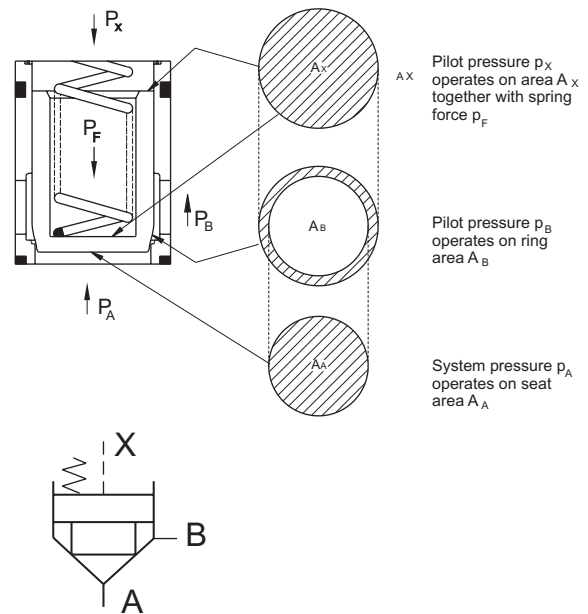
Advantages of VCAR cartridge valves are that when integrated with specially designed manifold blocks they offer space and cost savings in comparison with conventional piped circuit construction. A manifold design using cartridges is more sophisticated than utilising VD4S units and greater attention is required in the assembly of the cartridges into the manifolds.

Fast response and rapid frequency of operation even at the highest flow is achieved due to poppet design and precise ratio between its mass and stroke. The cast passages within the VD4S valve body when used with correctly designed manifolds ensure circuits in which pressure drop and oil turbulence is minimal.

Veljan seat valves and cartridges function to direct flow from port A to port B or vice - versa and their operation is dependent upon the effective pressure area and spring force on the poppet. The cracking pressure is proportional to the ratio of control area to seat or ring area. Pilot pressure at port X acting on the control area closes the seat valve, thus forces generated by cylinders or hydraulic motors can be decelerated to zero by controlling the differential pressure.

Acceleration or deceleration of fluid which the seat valve is controlling will take place whilst the valve is opening or closing and the time normally necessary to overcome overlap in conventional spool valves is eliminated. In addition to this improved response time, the action also ensures that the seat valve functions without introducing system pressure peaks or shocks and therefore machine cycle times may be reduced without detriment. Various seat valve combinations are manufactured to suit a wide variety of specialized industrial applications.

Cracking pressure depends on the area ratio of individual combination of spool and sleeve.



Example : With a ratio of 95% seat area to 5% ring area and a spring pressure = 2.2 bar then the following cracking pressures apply.

Direction of flow		Supposed pilot pressure P <sub>x</sub> (bar)						
		0	9	15	30	100	250	330
PA	A → B	2.2	11.7	18.0	34	108	265	350
PB	B → A	42	222	342	>350 646	>350 2052	>350 5035	>350 6650

It is obvious that with flow direction B to A and a control (pilot pressure) at X of more than 15 bar, pressure in excess of maximum valve rating would be exceeded before the valve would open. Under static conditions the valve would still remain leakproof even at substantially higher pressure.



**SPECIFICATIONS**

**General**

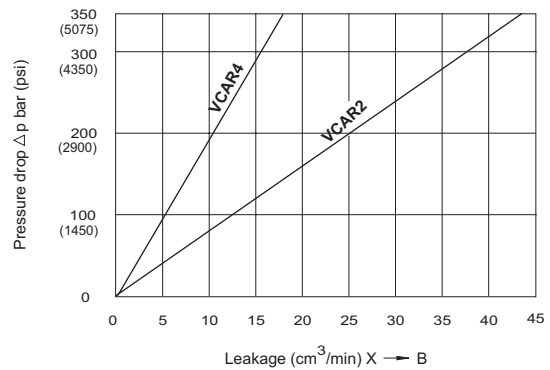
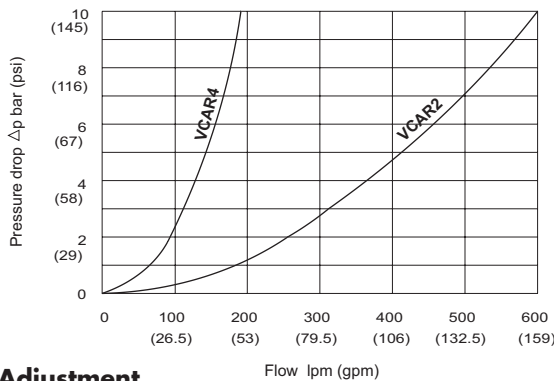
Type of Unit	:	Seat valve
Type of mounting	:	Manifold mounted
Mounting position	:	Optional
Port sizes	:	1/2", 1 1/2"
Directional of flow	:	A→B or B→A
Ambient temperature	:	-20°C...+60°C (-4°F...+140°F)
Special working conditions	:	Consult <b>VELJAN</b>

**Hydraulics**

Operating Pressure range	:	
Port A, B, X	:	0 - 5000 psi (0 - 350 bar)
Port Y	:	0 (Without pressure to tank)
		VCAR4 (1/2")      VCAR2 (1 1/2")
Normal flow gpm (lpm)	:	40 (150)      119 (450)
Maximum flow gpm (lpm)	:	48 (180)      159 (600)
Fluid Temperature Range	:	-18°C...+80°C (0°F...+176°F)
Viscosity Range	:	10 to 650 cSt (60 to 3900 SSU)
Optimum operating viscosity	:	30 cSt (180 SSU)
Pilot volume	:	VCAR4 (1/2")      VCAR2 (1 1/2")
- sleeve 95% seat area, spool 15° chamfer	:	1.00 cm <sup>3</sup> 4.75 cm <sup>3</sup>
- sleeve 95% seat area, spool 45° chamfer	:	1.11 cm <sup>3</sup> 5.60 cm <sup>3</sup>
- sleeve 60% seat area, spool 45° chamfer	:	0.77 cm <sup>3</sup> 3.75 cm <sup>3</sup>

Diagrams

Oil viscosity 38 cSt (228 SUS); Oil temperature 50°C (122°F)



**Adjustment**

Type of control adjustment	:	Electrically by solenoid (VV01)
Nominal voltage	:	12, 24, 48 V DC
		115/230 V AC, 50 cycles
		115/230 V AC, 60 cycles
Permissible Voltage difference	:	+5... -10%
Maximum coil temperature	:	+155°C (239°F)
Input power	:	31W
Holding	:	78 VA
Inrush	:	264 VA
Relative operating period	:	100%
Type of protection	:	IP 65

**ORDERING CODE**

**VCAR2 - K - 1 2 7 - 1**

**Cartridge**

VCAR4 = 1/2"

VCAR2 = 1 1/2"

**Type of mounting**

K - Main valve (spool, sleeve, spring)

H - Main valve with cap

Port Y1 - 1/4" B.S.P.P.

O<sup>1)</sup> - Main valve and plug on top - B.S.P.P. threaded

T<sup>1)</sup> - Main valve and plug on top - 1 1/8" - 12 UNF threaded (only for VCAR4)

U - Main valve and plug at bottom - B.S.P.P. Threaded

B - Main valve and plug at bottom - 1 1/8" - 12 UNF Threaded (only for VCAR4)

(For O, T, U, B with spacer)

**Sleeve type<sup>2)</sup>**

1 - With 95% seat area (AA 95%, AB 5%)

3 - With 60% seat area (AA 60%, AB 40%)

**Seal Class**

1 - Buna N ( Standard), 5 - Viton

**Spring** (approx. Cracking pressure in bar)

	Sleeve 1- AA=95%, AB=5%		Sleeve 3- AA=60%, AB=40%			
	A → B		A → B		B → A	
	VCAR4	VCAR2	VCAR4	VCAR2	VCAR4	VCAR2
1=	2.8	3.5	6.5	6.5	9.5	11.0
2=	0.5	0.5	1.0	1.0	1.5	1.7
3=	0.3	0.3	0.6	0.6	0.9	1.0
4=	2.2	2.2	4.0	3.5	5.5	6.0
5=	-	9.0	-	16.0	-	28.0
6=	1.2	1.2	2.0	2.2	3.0	3.8
7=	3.0	-	8.0	-	12.0	-

**Spool type<sup>2)</sup>**

1 - With closed bottom and 15° chamfer

2 - With 0.8mm dia orifice at the bottom and 15° chamfer (only for VCAR4). With 1.2mm dia orifice at the bottom and 15° chamfer (only for VCAR2).

4 - With Closed bottom & 45° chamfer

5 - With Closed bottom & 45° chamfer and two holes In line

B - Throttle spool with 10° chamfer

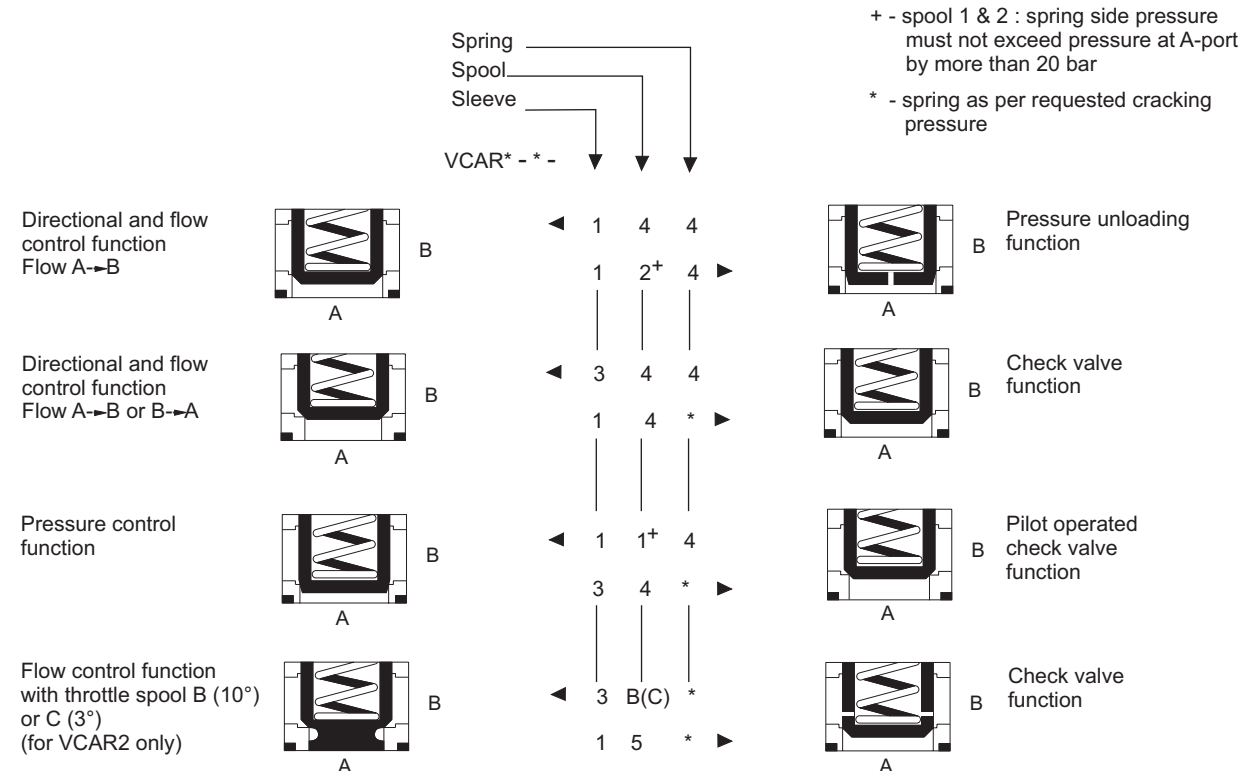
C - Throttle spool with 3° chamfer (only for VCAR2)

<sup>1)</sup> = Series VCAR4 only with spool type 5

<sup>2)</sup> = for spool/sleeve combination see below

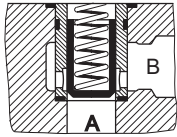


**RECOMMENDED SPRING, SPOOL, SLEEVE COMBINATIONS**



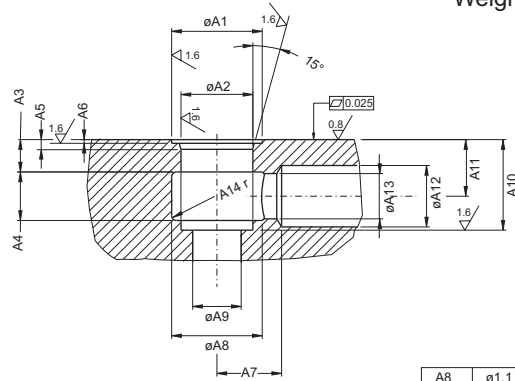
**VCAR4 - K**

Weight : 0.15 lbs (0.07 kg)



Example of spool code 4  
spool with closed bottom and 45° chamfer

Ports	Function
A	Inlet or Outlet
B	Outlet or Inlet

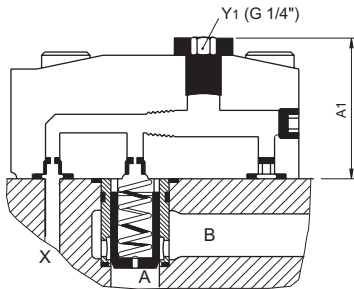


	Dimensions	
	in	mm
A1	1.1 <sup>+0.004</sup>	28.0 <sup>+0.1</sup>
A2	0.875 <sup>+0.0008</sup>	22.225 <sup>+0.02</sup>
A3	0.4	10.0
A4	0.59	15.0
A5	0.12	3.0

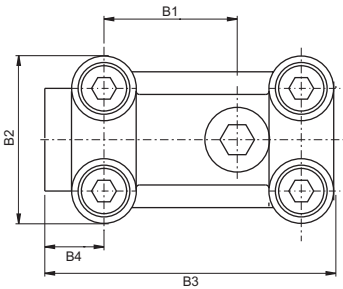
A8	1.1	28.0
A9	0.59	15.0
A10	1.1 <sup>+0.002</sup>	28.0 <sup>+0.05</sup>
A11	0.689	17.5
A12	0.75	19.0
A13	0.55	14.0
A14	0.059 r	1.5 r
A6	0.045 <sup>+0.005</sup>	1.14 <sup>+0.13</sup>
A7	0.787	20.0

**VCAR4 - H**

Weight : 2.2 lbs(1.0 kg)

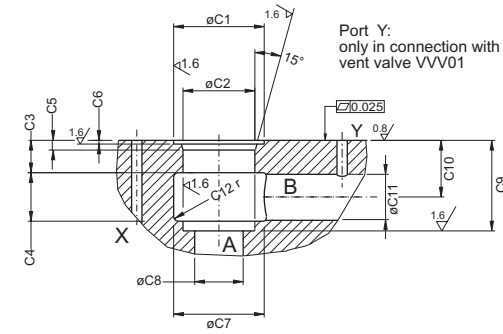


Example of spool code 2  
spool with 0.8 mm dia. orifice at the bottom and 15° chamfer

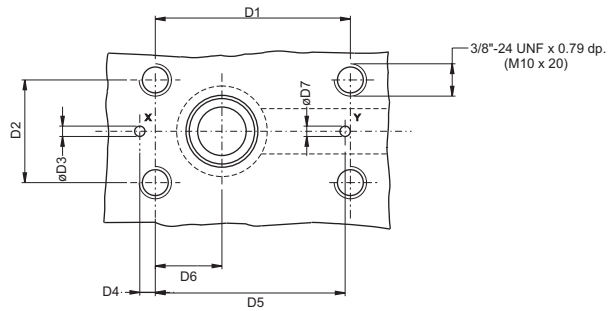


	Dimensions	
	in	mm
A1	1.713	43.5

	Dimensions	
	in	mm
B1	1.622	41.2
B2	2.047	52.0
B3	3.543	90.0
B4	0.720	18.3



Port Y:  
only in connection with  
vent valve VVV01



	Dimensions	
	in	mm
C1	1.1 <sup>+0.004</sup>	28.0 <sup>+0.1</sup>
C2	0.875 <sup>+0.0008</sup>	22.225 <sup>+0.02</sup>
C3	0.39	10.0
C4	0.59	15.0
C5	0.12	3.0
C6	0.045 <sup>+0.005</sup>	1.14 <sup>+0.13</sup>
C7	1.1	28.0
C8	0.59	15.0
C9	1.1 <sup>+0.002</sup>	28.0 <sup>+0.05</sup>
C10	0.689	17.5
C11	0.55	14.0
C12	0.059 r	1.5 r

	Dimensions	
	in	mm
D1	2.374 <sup>+0.008</sup>	60.32 <sup>+0.2</sup>
D2	1.25 <sup>+0.008</sup>	31.75 <sup>+0.2</sup>
D3	0.126	3.2
D4	0.189	4.8
D5	2.311	58.7
D6	0.81	20.6
D7	0.126	3.2

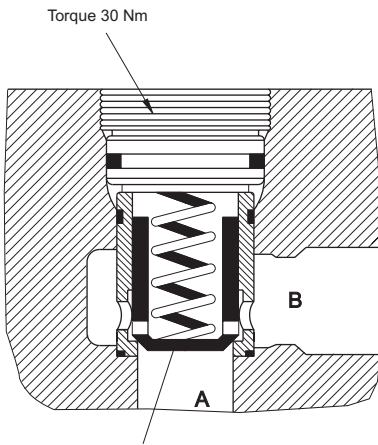
Mounting screws* (Qty4)	Order no
4 screws 3/8"- 24UNF x 1 1/4" lg or M10 x 45 : DIN 912-10.9	V359 - 15220 - 0 V700 - 71602 - 8
4 Lock washer	V700 - 72166 - 8

Ports	Function
A & B	Inlet or Outlet(optional)
X & Y	Pilot holes <sup>1)</sup>

\* Mounting screws must be ordered separately

<sup>1)</sup> drilled according to function

## VCAR4 - O/T



Series VCAR4 - O/T Only with spool type 5, with closed bottom, 45° chamfer and two holes in line.

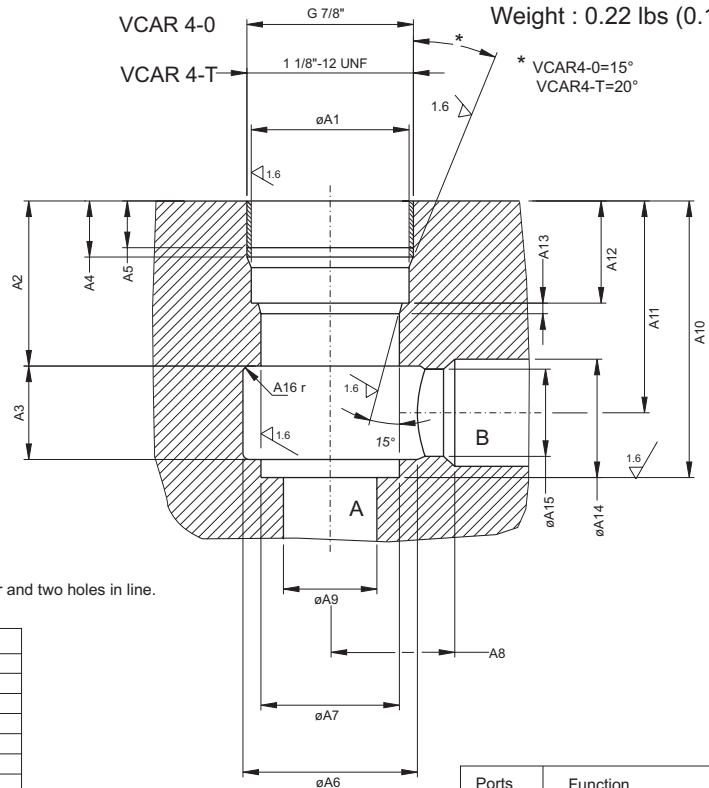
Dimensions		
	in	mm
A1	$\phi 0.997^{+0.0008}$	$\phi 25.33^{+0.02}$
A2	1.044	26.5
A3	0.59	15.0
A4	0.35	9.0
A5	0.3	7.5
A6	$\phi 1.1$	$\phi 28.0$
A7	$\phi 0.875^{+0.0008}$	$\phi 22.225^{+0.02}$
A8	0.789	20.0

Dimensions		
	in	mm
A9	$\phi 0.59$	$\phi 15.0$
A10	1.748	44.4
A11	1.34	34.0
A12	0.646	16.4
A13	0.067	1.7
A14	$\phi 0.75$	$\phi 19.0$
A15	$\phi 0.55$	$\phi 14.0$
A16	0.059 r	1.5 r

VCAR 4-0 Weight : 0.22 lbs (0.1 kg)

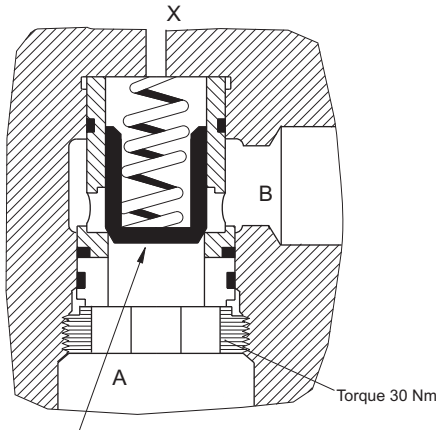
VCAR 4-T

\* VCAR4-0=15°  
VCAR4-T=20°



Ports	Function
A & B	Inlet or Outlet (optional)

## VCAR4 - U/B

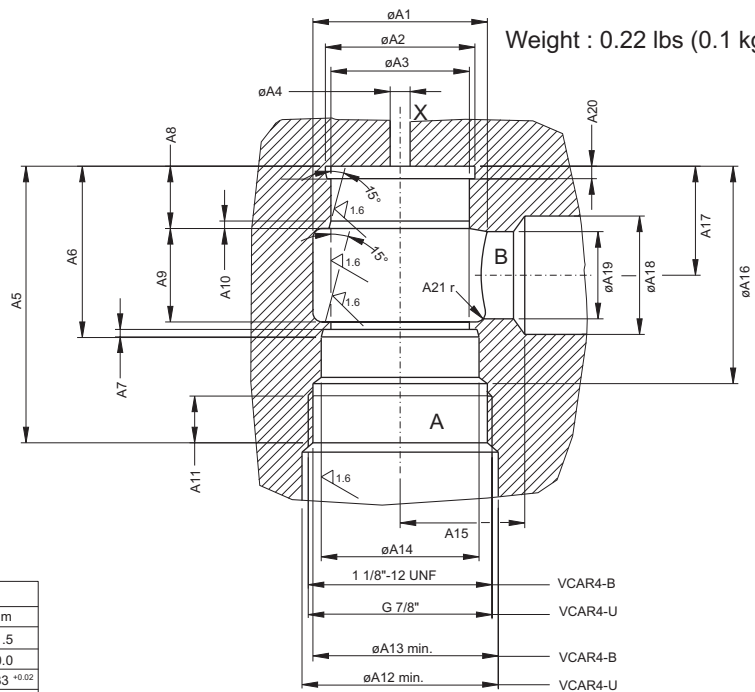


Example of spool code 1: spool with closed bottom and 15° chamfer

Dimensions		
	in	mm
A1	$\phi 1.1^{+0.004}$	$\phi 28.0^{+0.1}$
A2	$\phi 0.945$	$\phi 24.0$
A3	$\phi 0.875^{+0.0008}$	$\phi 22.225^{+0.02}$
A4	$\phi 0.126$	$\phi 3.2$
A5	1.748	44.4
A6	$1.083^{+0.004}$	$27.5^{+0.1}$
A7	0.048	1.2
A8	0.4	10.0
A9	0.59	15.0
A10	0.048	1.2
A11	0.3	7.5

Dimensions		
	in	mm
A12	$\phi 1.24$	$\phi 31.5$
A13	$\phi 1.182$	$\phi 30.0$
A14	$\phi 0.997^{+0.0008}$	$\phi 25.33^{+0.02}$
A15	0.787	20.0
A16	$\phi 1.374^{+0.0004}$	$\phi 34.9^{+0.01}$
A17	0.689	17.5
A18	$\phi 0.748$	$\phi 19.0$
A19	$\phi 0.55$	$\phi 14.0$
A20	$0.08^{+0.004}$	$2.0^{-0.1}$
A21	0.059 r	1.5 r

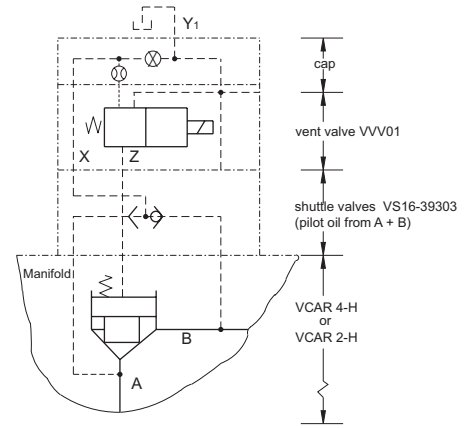
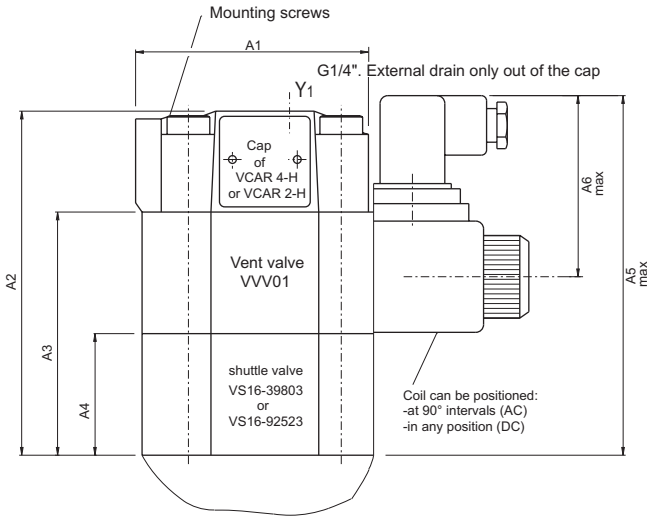
Weight : 0.22 lbs (0.1 kg)



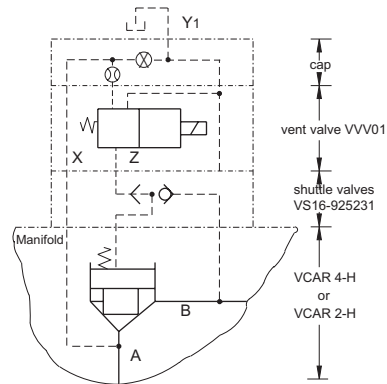
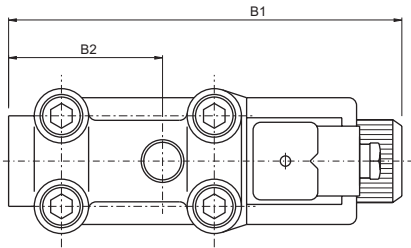
Ports	Function
A&B	Inlet or Outlet (optional)
X	Pilot hole <sup>1)</sup>

<sup>1)</sup> Drilled according to function

## SHUTTLE VALVES FOR VCAR4 - H & VCAR2 - H



SV



1 Pilot oil from A + B.  
From B → A Check valve function.

Note : Shuttle valves only use in connection with vent valve VVV01

	Dimensions	
	in	mm
A1	3.543	90.0
A2	5.236 (4.41)	133.0 (112.0)
A3	3.70 (2.874)	94.0 (73.0)
A4	1.85 (1.024)	47.0 (26)
A5	5.472 (4.646)	139.0 (118.0)
A6	2.755	70.0

	Dimensions	
	in	mm
B1	AC - 5.984	AC - 152
	DC - 6.418	DC - 163
B2	2.34	59.4

( ) Dimensions in brackets are for version with shuttle valve VS16-92523

Mounting screws* (Qty 4)		Shuttle valve
Size	Order number	Order number and weight
3/8" - 24 UNF x 5 1/2" lg. or M 10 x 140. DIN 912 -12.9	V359 - 15420 - 8 V361 - 11424 - 8	for version with shuttle valve VS16 - 39303 Weight: 2.64 lbs (1.2 kg)
3/8" - 24 UNF x 4 1/2" lg. or M 10 x 120. DIN 912 -10.9	V359 - 15380 - 8 V700 - 71456 - 8	for version with shuttle valve VS16 - 92523 Weight: 1.76 lbs (0.8 kg)

\* Mounting screws must be ordered separately: