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

SV

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.

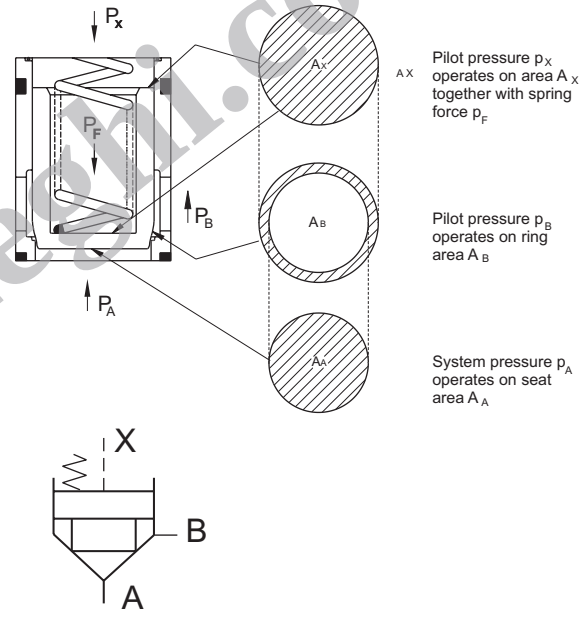
Advantages of VCAR cartridge valves are that when integrated with specially designed manifold blocks they offer space and cost savings in comparison with conventional piped circuit construction. A manifold design using cartridges is more sophisticated than utilising VD4S units and greater attention is 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 Px (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 than15 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

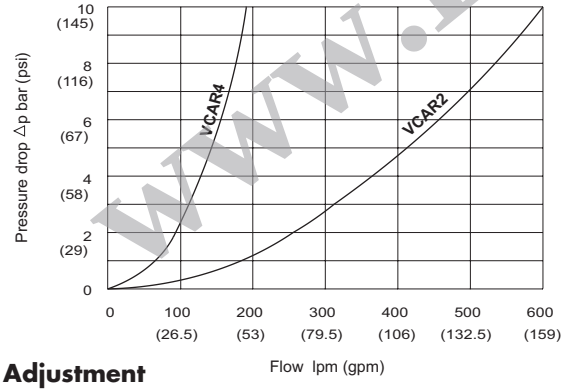
Type of Unit	:	Seat valve
Type of mounting	:	Manifold mounted
Mounting position	:	Optional
Port sizes	:	1/2", 1 1/2"
Directional of flow	:	A→B or B→A
Ambient temperature	:	-20°C...+60°C (-4°F...+140°F)
Special working conditions	:	Consult **VELJAN**

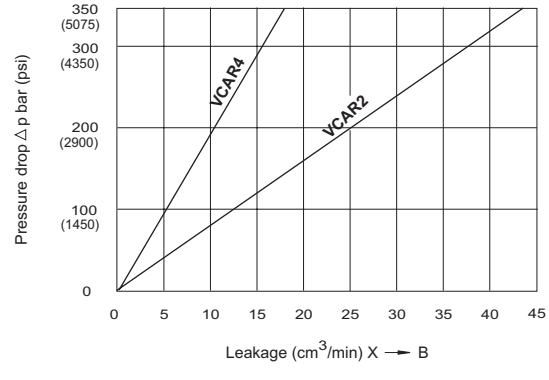
Hydraulics

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^3	4.75 cm^3
- sleeve 95% seat area, spool 45° chamfer	:	1.11 cm^3	5.60 cm^3
- sleeve 60% seat area, spool 45° chamfer	:	0.77 cm^3	3.75 cm^3

Diagrams

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





Adjustment

Type of control adjustment	:	Electrically by solenoid (VVV01)
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[1] - Main valve and plug on top - B.S.P.P. threaded
T[1] - 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[2]

1 - With 95% seat area (AA 95%, AB 5%)
3 - With 60% seat area (AA 60%, AB 40%)

[1] = Series VCAR4 only with spool type 5
[2] = for spool/sleeve combination see below

Seal Class

1 - Buna N (Standard), 5 - Viton

Spring (approx. Cracking pressure in bar)

	Sleeve 1- A_A=95%, A_B=5%		Sleeve 3- A_A=60%, A_B=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[2]

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)

SV

RECOMMENDED SPRING, SPOOL, SLEEVE COMBINATIONS

+ - spool 1 & 2 : spring side pressure must not exceed pressure at A-port by more than 20 bar

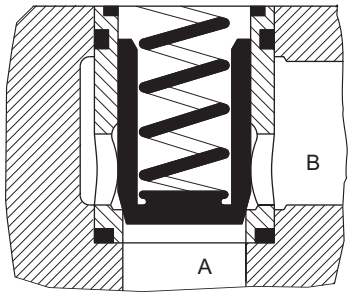
* - spring as per requested cracking pressure

Spring
Spool
Sleeve
VCAR* - * -

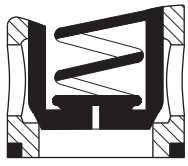
Directional and flow control function Flow A-►B	◄ 1 4 4 1 2+ 4 ►	A B	Pressure unloading function
Directional and flow control function Flow A-►B or B-►A	◄ 3 4 4 1 4 * ►	A B	Check valve function
Pressure control function	◄ 1 1+ 4 3 4 * ►	A B	Pilot operated check valve function
Flow control function with throttle spool B (10°) or C (3°) (for VCAR2 only)	◄ 3 B(C) * 1 5 * ►	A B	Check valve function

VCAR2 - K

Weight : 0.55 lbs (0.25 kg)

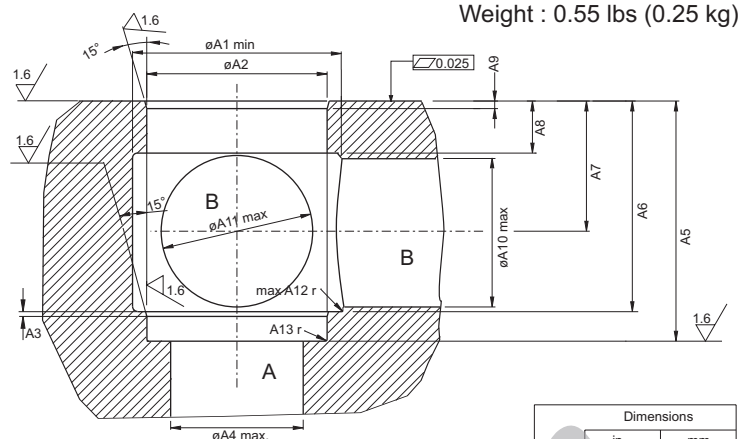


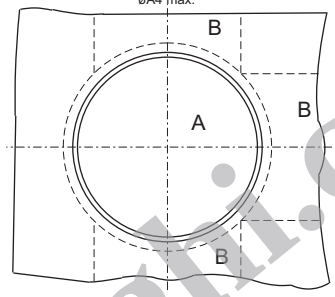
Example of spool code 1:
spool with closed bottom
and 15° chamfer



Example of spool code 2:
spool with 1.2mm dia. Orifice
at the bottom and 15° chamfer

Ports	Function
A	Inlet or Outlet
B	Outlet or Inlet



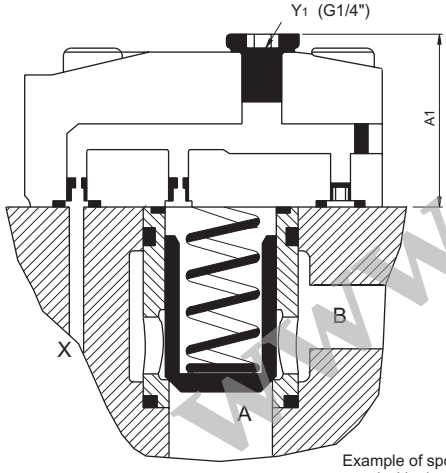


	Dimensions	
	in	mm
A1	ø1.732 +0.04	ø44.0 +1
A2	ø1.5 H8	ø38.1 H8
A3	0.04	1.0
A4	ø1.1	ø28.0
A5	1.997 +0.003	50.73 +0.07
A6	1.752	44.5
A7	1.083 +0.02	27.5 +0.5
A8	0.433	11.0
A9	0.063	1.6
A10	ø1.26	ø32.0
A11	ø1.26	ø32.0
A12	0.08 r	2.0 r
A13	0.016 r	0.4 r

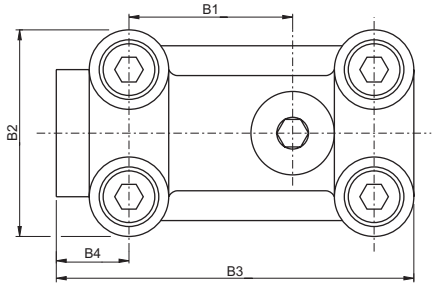
SV

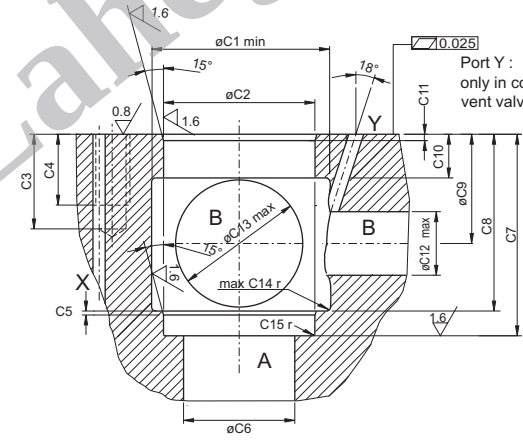
VCAR2 - H

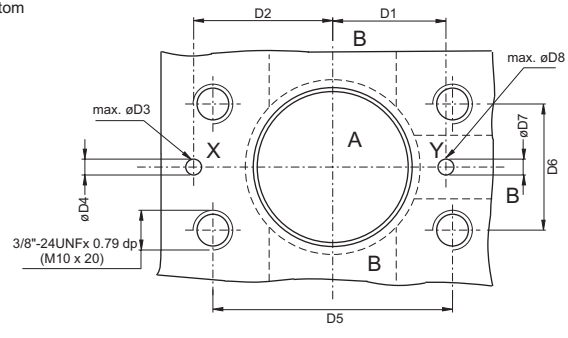
Weight : 2.41 lbs (1.1 kg)



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







	Dimensions	
	in	mm
A1	1.713	43.5
B1	1.622	41.2
B2	2.047	52.0
B3	3.543	90.0
B4	0.720	18.3
C1	ø1.733 +0.04	ø44.0 +1
C2	ø1.5 H8	ø38.1 H8
C3	0.945	24.0
C4	0.709	18.0
C5	0.04	1.0
C6	ø1.1	ø28.0
C7	1.997 +0.003	50.73 +0.07
C8	1.752	44.5
C9	ø1.083 +0.02	ø27.5 +0.5
C10	ø0.433	ø11.0
C11	0.063	1.6
C12	ø0.63	ø16.0
C13	ø1.26	ø32.0
C14	0.08 r	2.0 r
C15	0.02 r	0.4 r
D1	1.22	28.5
D2	1.378	35.0
D3	ø0.315	ø8.0
D4	ø0.126	ø3.2
D5	2.375 ±0.008	60.32 ±0.2
D6	1.25 ±0.008	31.75 ±0.2
D7	ø0.126	ø3.2
D8	ø0.237	ø6.0

Mounting screws *(Qty4)	Order no
4 screws 3/8"- 24UNF x 1¾lg or M10 x 45 : DIN 912-10.9	V359 - 15220 - 0 V700 - 71602 - 8
4 Lock washer	V700 - 72166 - 8

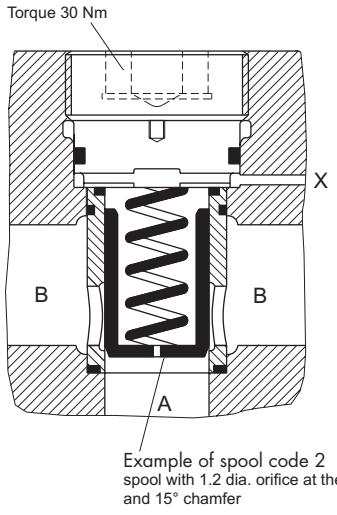
* Mounting screws must be ordered separately.

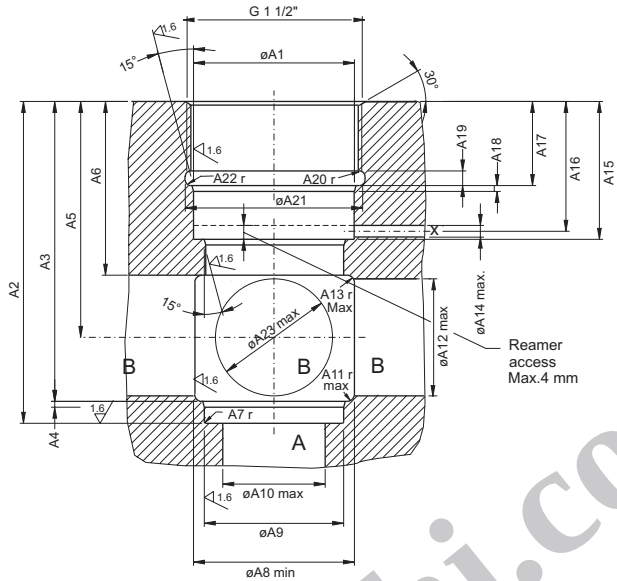
Ports	Function
A & B	Inlet or Outlet (optional)
X & Y	pilot holes [1)]

[1)] drilled according to function

VCAR2 - 0

Weight : 1.53 lbs (0.7 kg)





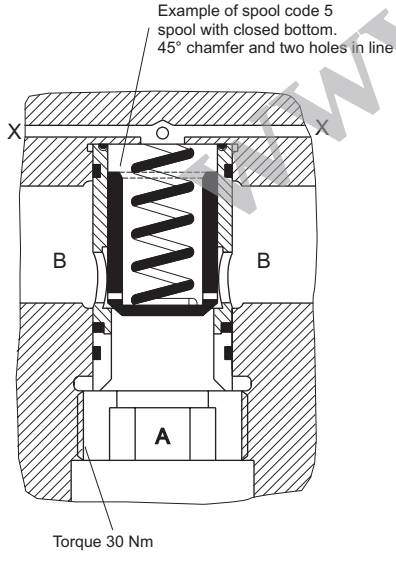
	Dimensions	
	in	mm
A1	ø1.733 H8	ø44.0 H8
A2	3.465	88.0
A3	3.229	82.0
A4	0.063	1.6
A5	2.54 +0.02	64.5 +0.5
A6	1.87	47.5
A7	0.016 r	0.4 r
A8	ø1.732 +0.04	ø44.0 +1
A9	ø1.5 H8	ø38.1 H8
A10	ø1.1	ø28.0
A11	0.08 r	2.0 r
A12	ø1.26	ø32.0
A13	0.08 r	2.0 r
A14	ø0.126	ø3.2
A15	1.488 ±0.008	37.8 ±0.2
A16	1.398 +0.012	35.5 +0.3
A17	0.906	23.0
A18	0.063	1.6
A19	0.16	4.0
A20	0.059 r	1.5 r
A21	ø1.91 +0.008	ø48.5 +0.2
A22	0.059 r	1.5 r
A23	ø1.26	ø32.0

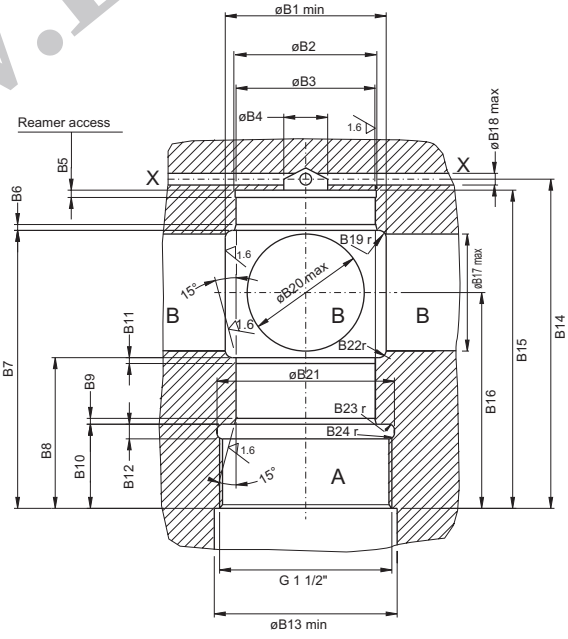
Ports	Function
A & B	Inlet or Outlet (optional)
X	Pilot port

SV

VCAR2 - U

Weight : 1.53 lbs (0.7 kg)

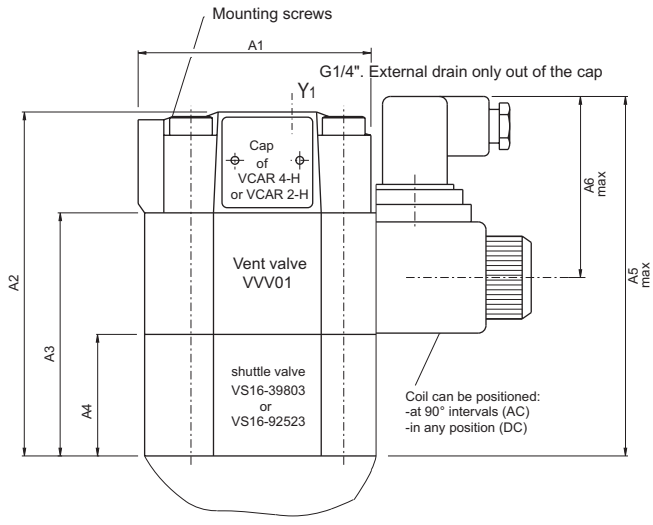


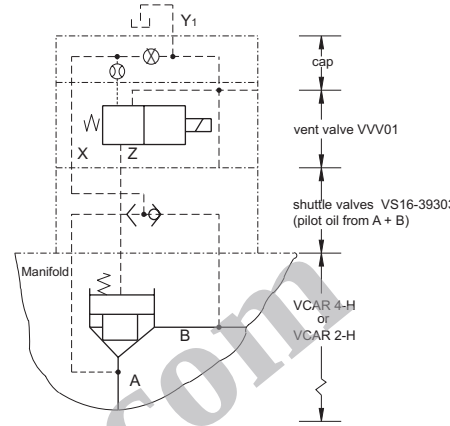


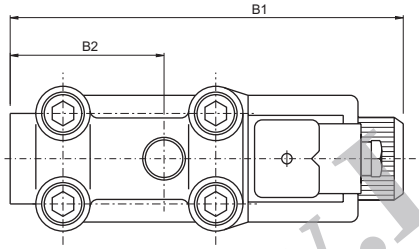
	Dimensions	
	in	mm
B1	1.733 +0.04	44.0 +1
B2	ø1.52	ø38.6
B3	ø1.5 H8	ø38.1 H8
B4	ø0.473	ø12.0
B5	0.08	2.0
B6	0.063	1.6
B7	2.993	76.0
B8	1.622 +0.02	41.2 +0.5
B9	0.063	1.6
B10	0.906	23.0
B11	0.063	1.6
B12	0.16	4.0
B13	ø1.969	50.0
B14	3.544	90.0
B15	3.426	87.0
B16	2.323	59.0
B17	ø1.26	ø32.0
B18	ø0.126	ø3.2
B19	0.08 r	2.0 r
B20	ø1.26	ø32.0
B21	ø1.91 +0.008	ø48.5 +0.2
B22	0.08 r	2.0 r
B23	0.059 r	1.5 r
B24	0.059 r	1.5 r

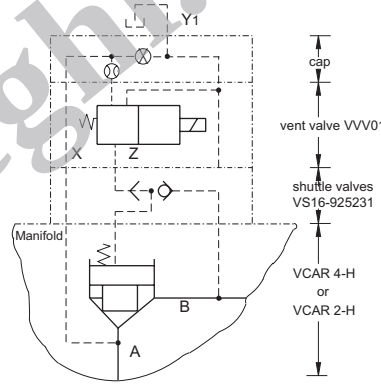
Ports	Function
A & B	Inlet or Outlet (optional)
X	Pilot port

SHUTTLE VALVES FOR VCAR4 - H & VCAR2 - H









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 DC - 6.418	AC - 152 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:

ORDERING CODE FOR VENT VALVE :

VVV01 - 3 1 1 - W07 - D - 1

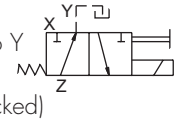
Series

Type

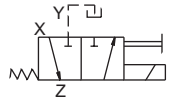
3 - 3- way model

Spool position

1 - Solenoid de-energised : free flow from Z to Y (VCAR = open)
Solenoid energised : X to Z (VCAR = blocked)



2 - Solenoid de-energised: X to Z (VCAR = blocked)
Solenoid energised : free flow from Z to Y (VCAR = open)



Control

1 - plug - in - type solenoid with manual over-ride
2 - plug - in - type solenoid without manual over - ride

Seal Class

1 - Buna N (Standard)
5 - Viton

Design letter

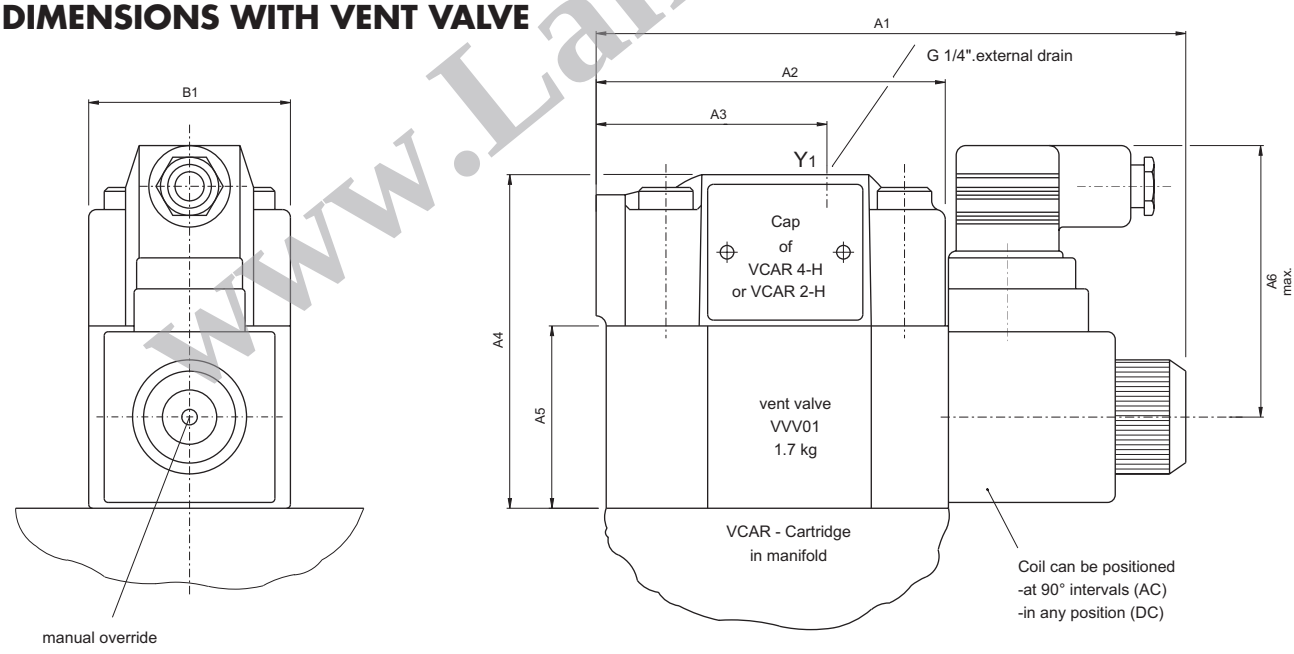
D - AC Solenoid
E - DC Solenoid

Solenoid Voltage

W01 - 115V/60 Hz AC
W02 - 230V/60 Hz AC
W06 - 115V/50 Hz AC
W07 - 230V/50 Hz AC
GOR - 12V DC
GOQ - 24V DC
GOH - 48V DC

SV

DIMENSIONS WITH VENT VALVE

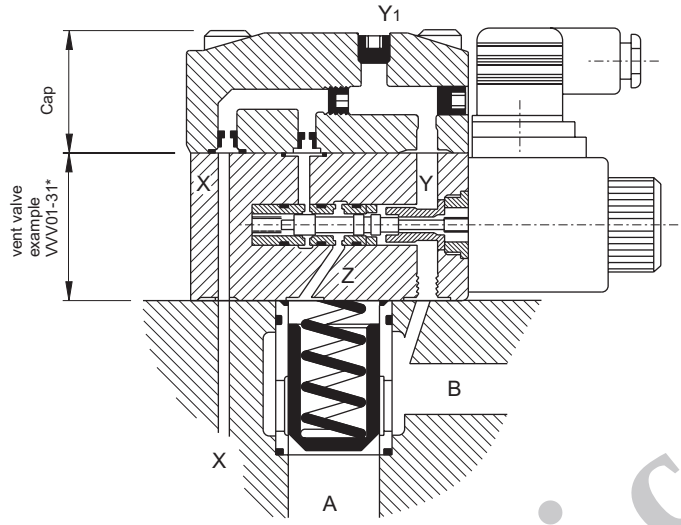


Screws for installation with vent valve:

	Order number
4 Screws 3/8"-24 UNF x 3 1/2" lg. or M10 x 90 (din 912 - 10.9)	V359 - 15340 - 0 or V700 - 70808 - 8

	Dimensions	
	in	mm
A1	AC - 5.984 DC - 6.417	AC - 152.0 DC - 163.0
A2	3.543	90.0
A3	2.34	59.5
A4	3.386	86.0
A5	1.85	47.0
A6	2.756	70.0

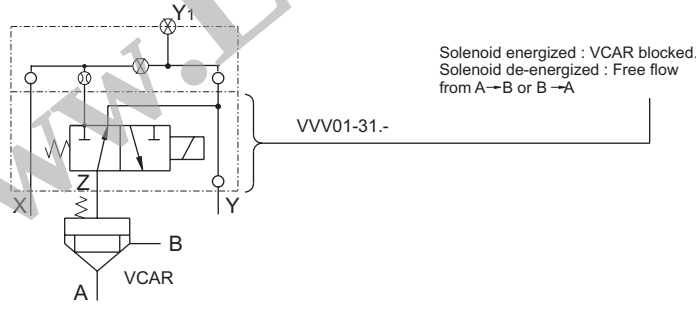
	Dimensions	
	in	mm
B1	2.047	52.0

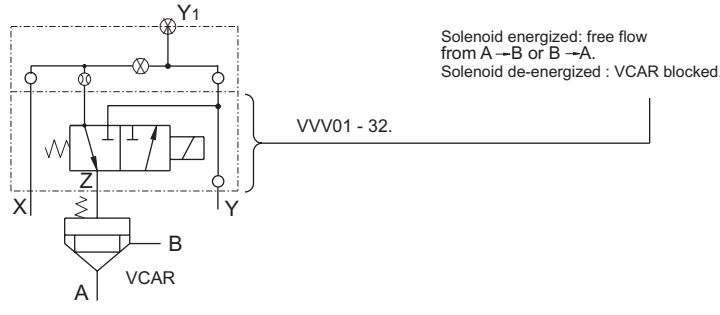


SV

Function

Pilot pressure from X ⟶ Z blocks the 2/2 - way valve VCAR.
Drain from Z ⟶ Y effects free flow from A ⟶ B or B ⟶ A.
Port X and Y can be connected internally or externally.
When port B is pressurised drain must be connected externally (port Y1).
Port Y1 in the in VVV01 then must be plugged.

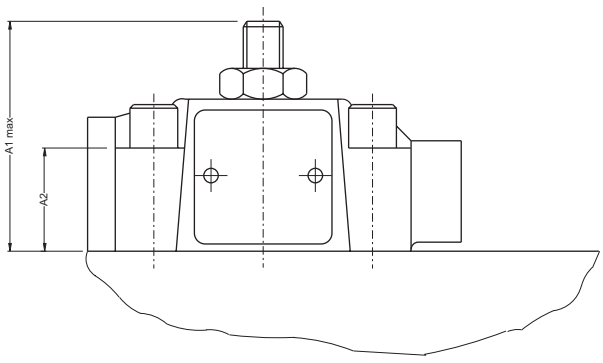


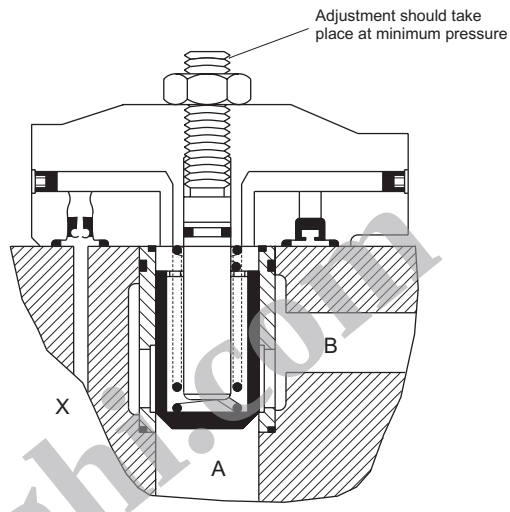


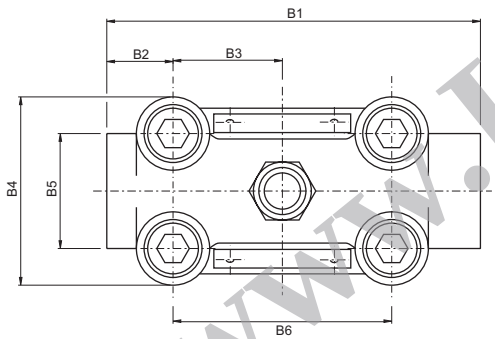
STROKE LIMITER FOR VCAR2 - K

Order number VS16 - 39490

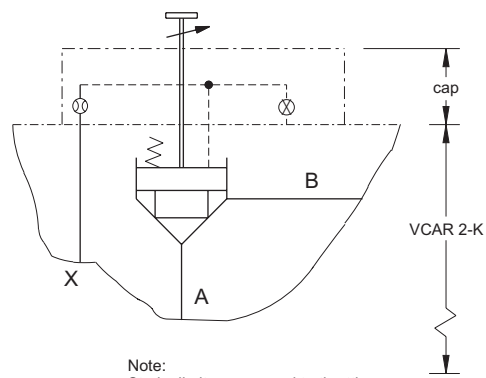
Weight : 2.2 lbs (1.0 kg)







Note :
stroke limiter not in connection
with vent valve VVV01, shuttle valve.



Note:
Stroke limiters are used to throttle
the oil flow in both directions
(from A → B and B → A).

	Dimensions	
	in	mm
A1	2.5	63.5
A2	1.12	28.5

	Dimensions	
	in	mm
B1	4.063	103.2
B2	0.72	18.3
B3	1.19	30.2
B4	2.05	52.0
B5	1.25	31.75
B6	2.375	60.32