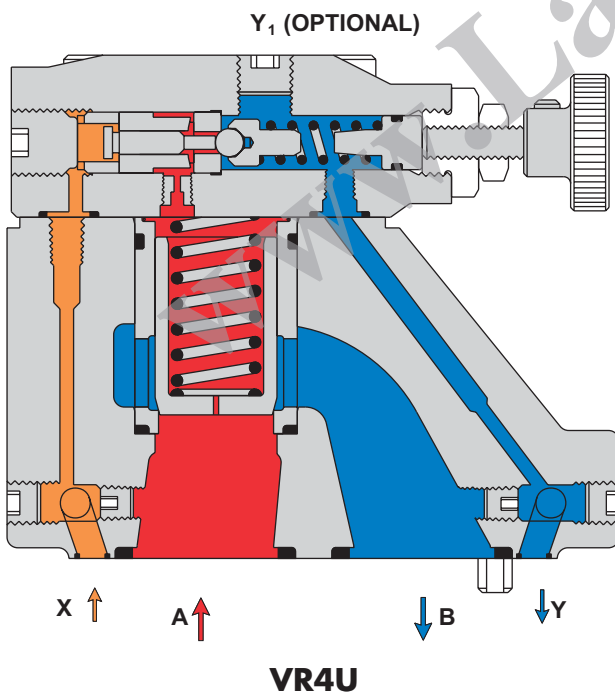
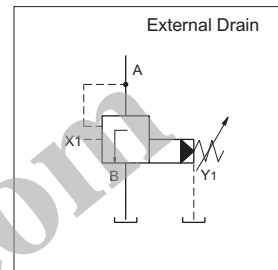
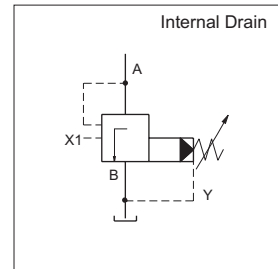


Veljan Unloading Valves series VR4U are pilot operated controls and used to unload a circuit at low pressure when pilot pressure at port X is maintained higher than that of inlet pressure at port A set by the pilot spring. A typical use of an unloader valve is to unload the low pressure side of a double pump. A Pump connected to an Accumulator circuit can also be unloaded by the VR4U valve.

VR4U consists of a high flow poppet type seat valve section controlled by the low flow, adjustable pilot section mounted on top. Pressure setting is achieved by means of knurled knob. For tamper proof setting, acorn nut with lead seal is available as option. Optional vent valve VV01 sandwiched between pilot section and main body can be used for venting the VR4U valves.

Exceptionally fast response is obtained due to the precise ratio between the main piston area and its mass. One of the unique features of VR4U is that it works as a relief valve at the set pressure even in the absence of external pilot signal.



Normally port A is connected to pump and port B to tank. At low pressure, flow entering port A is blocked by the main poppet. Pressure from port A passes to the pilot section through orifices in the main poppet and in the pilot section. No flow takes place in this portion until the pressure overcomes the spring setting of a pilot ball. The pilot ball is lifted from its seat releasing a small pilot flow to tank and resulting in a pressure drop across the main poppet. The main poppet opens and allows only enough flow from port A to port B maintaining inlet pressure at the set value of the pilot spring as in the case of a relief valve.

In this condition, the external pilot pressure from another part of system if applied at port X causes a small override piston to act against the ball pushing it further off its seat resulting in very low pressure drop across the main poppet as long as pilot pressure is maintained, the main poppet opens further and unloads the inlet flow at very low pressure drop. As soon as the pilot pressure drops to approximately 10% below the pilot setting, the main poppet closes with a snap action diverting the main pump flow back to the hydraulic system. Excessive restriction in the tank line or the pilot pressure signal at port X should be avoided to attain a correct function.

SPECIFICATIONS

General

Type	:	Pilot operated Unloading Valve
Design	:	Poppet type
Mounting	:	Threaded/Subplate/Cartridge/Flange
Mounting position	:	Optional
Port sizes (nominal)	:	3/8", 3/4", 1 1/4"
Direction of flow	:	A→B
Ambient temperature	:	-20° C...+60° C (-4° F...+140° F)
Special working conditions	:	Consult VELJAN

Hydraulics

Pressure control range	:	Minimum - depends on flow Maximum - 5000 psi (350 bar)
Maximum operating pressure	:	
Port A (inlet)	:	5000 psi (350 bar)
Port B (outlet)	:	Internal pilot drain - 50 psi (3.5 bar) External pilot drain - 430 psi (30 bar)
Port X (pilot)	:	5000 psi (350 bar)
Port Y, Y1 (Pilot drain)	:	Without pressure to tank
Nominal flow gpm (lpm)	:	VR4U 03 (3/8") VR4U 06 (3/4") VR4U 10 (1 1/4") 15.8 (60) 52.9 (200) 119.0 (450)
Maximum flow gpm (lpm)	:	23.8 (90) 79.4 (300) 158.7 (600)
Fluid	:	Mineral oil as per DIN 51524/25 or other fluids on request
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)
Seal compatibility	:	Code 1 (Buna N) or Code 5 (Viton) (contact Veljan with specific oil details)
Cleanliness recommended	:	Better than NAS 1638 Class 8 or ISO 17/14

Adjustment

Manual	:	Handwheel
Rotation	:	3.75 rev.
Operating torque	:	0.72 Nm

Electricals (Vent Valve VVV01)

Nominal voltage	:	Solenoid
Permissible voltage fluctuation	:	Refer to Ordering Code
Max. coil temperature	:	+5%...-10%
Type of current	:	+155° C (311° F)
Input power	:	Alternating Current (AC)/Direct Current (DC)
Holding	:	31 W
Inrush	:	78 VA
Relative operating period	:	264 VA
Type of protection	:	100%
	:	I P 65

ORDERING CODE

Series VR4U 06 - 5 6 5 - 1 0 - 09 - W07 - A 1 ***

Size
 03 - 3/8"
 06 - 3/4"
 10 - 1 1/4"

Max. Pressure of Valve Body
 0 - for cartridges only
 5 - 5000psi (350 bar)

Body Mounting
 Cartridge
 0 - Cartridge Y1 port²⁾ = 1/4" NPTF
 E - Cartridge Y1 port²⁾ = SAE - 4 (7/16" - 20 UNF)
 G¹⁾ - Cartridge Y1 port²⁾ = G 1/4"

Threaded body
 1 - Threaded body - VR4U03 = 1/2" NPTF ;
 VR4U06 = 1" NPTF
 (2 A - Ports, 1B - Port) } X,Y1 ports = 1/4" NPTF
 A - Threaded body VR4U06 = 3/4" NPTF ;
 VR4U10 = 1 1/4" NPTF
 (1 A - Port, 1B - Port) }
 6 - Threaded body VR4U03 = 1/2" B.S.P.P ;
 VR4U06 = 1" B.S.P.P ;
 (2 A - Ports, 1B - Port) } X,Y1 ports = G 1/4"
 D - Threaded body VR4U06 = 3/4" B.S.P.P ;
 VR4U10 = 1 1/4" B.S.P.P ;
 (1 A - Port, 1B - Port) }
 4 - Threaded body VR4U03 - SAE - 8
 VR4U06 - SAE - 16
 (2 A - Port, 1B - Port) } X,Y1 ports = SAE - 4 (7/16" - 20 UNF)
 B - Threaded body VR4U06 - SAE - 12,
 VR4U10 - SAE - 20
 (1 A - Port, 1B - Port) }

Subplate mounting
 3 - Subplate mounting - VR4U03/06 /10 ISO
 (Y1 port - 1/4" NPTF with drain line code 2)
 7 - Subplate mounting Y1 Port²⁾
 SAE - 4 (7/16" - 20 UNF) with drain line code 2)
 9 - Subplate mounting VR4U03/06 /10 ISO
 (Y1 Port²⁾ = 1/4" B.S.P.P ; with drain line code 2)

Flange body
 2 - Flange body (X,Y1 port - 1/4" NPTF)
 (2 A - Ports, 1 B - Port)

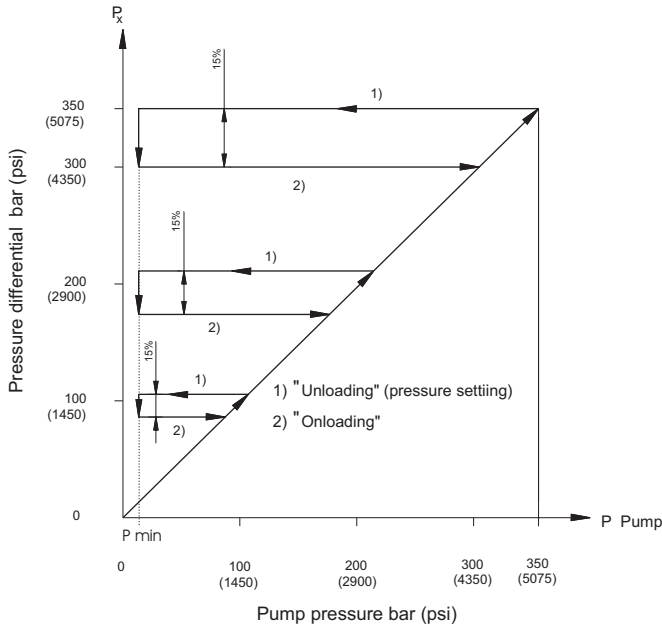
Modification
Seal Class
 1 - Buna N (Standard)
 5 - Viton
Design letter
Solenoid Voltage
 (Omit for non vent version)
 W01 - 115V/60 Hz AC GOR - 12V DC
 W02 - 230V/60 Hz AC GOQ - 24V DC
 W06 - 115V/50 Hz AC GOH - 48V DC
 W07 - 230V/50 Hz AC
Electrical Vent
 (3way VENT VALVE VV01)
 Omit for non vent version
 09 - With manual override (Solenoid de-energized : open to tank. Solenoid energized : vent line blocked)
 10 - Without manual override (Solenoid de-energized : open to tank. Solenoid energized : vent line blocked)
 11 - With manual override (Solenoid de-energized : vent line blocked Solenoid energized : open to tank)
 12 - Without manual override (Solenoid de-energized : vent line blocked Solenoid energized : open to tank)
Drain line
 0 - Internal
 1 - External from subplate } At subplate mounting only with body code 3,7,9
 or manifold (Y)
 2 - External from pilot head (Y1)
Type of Control
 1 - Hand knob (32mm dia)
 2 - Hand knob (50mm dia) (not for version with vent valve VV01)
 3 - Acorn nut with lead seal
Pressure setting range
 1 - 100 - 1500 psi (7 - 105 bar) } Nominal pressure differential 20%
 3 - 100 - 3000 psi (7 - 210 bar) }
 5 - 100 - 5000 psi (7 - 350 bar) } Nominal pressure differential 15%

1) Only with Drain line code 2
 2) Port Y1 is only available at Drain line (code2) external from pilot head.



PERFORMANCE CURVES

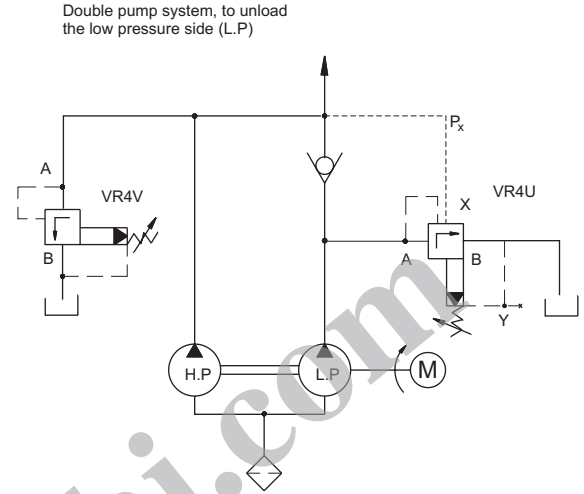
Pressure Differential Characteristics



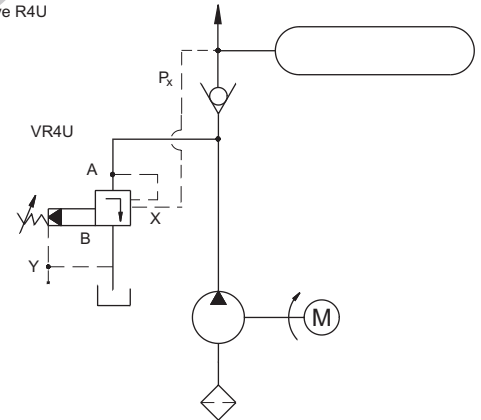
The differential between Unloading and Onloading is typical 15%. When system pressure (for instance accumulator) drops 15% below the pilot setting, the valve closes and pump feeds the system again.

$\Delta p - q_v$ - Characteristics
(Fluid 60 cSt at 40°C
Test temp. 50°C ± 10%)

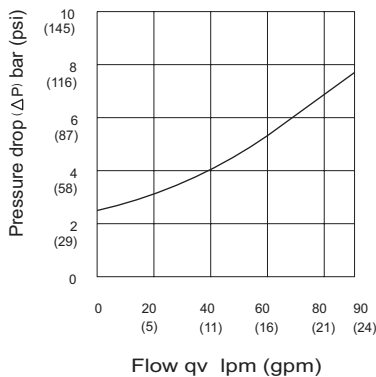
Typical application systems



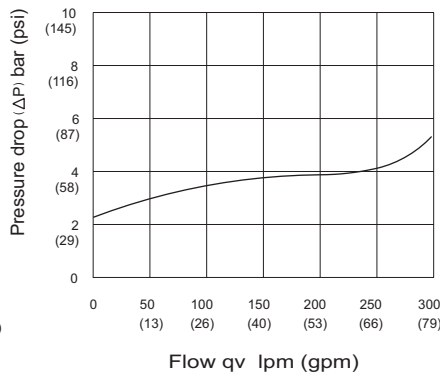
Accumulator system with unloading valve R4U



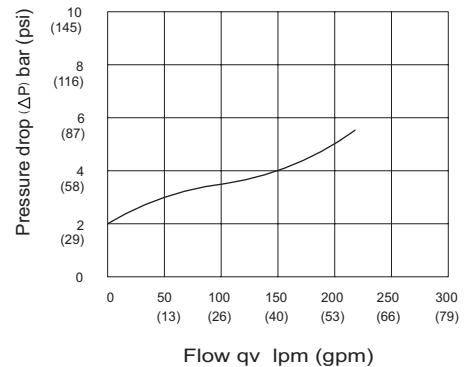
VR4U03



VR4U06

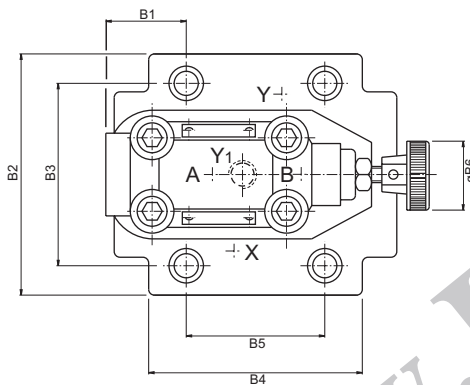
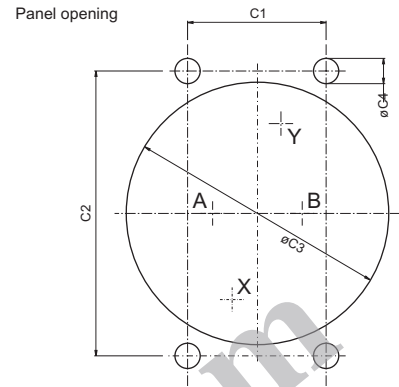
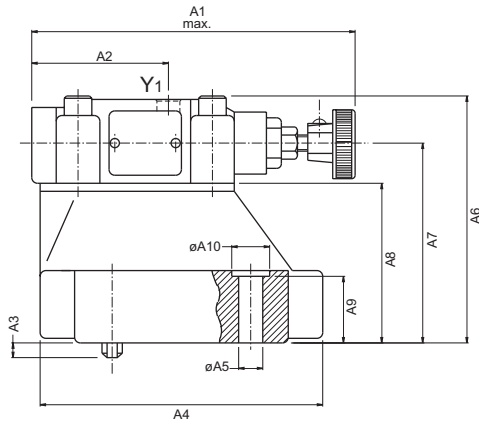


VR4U10

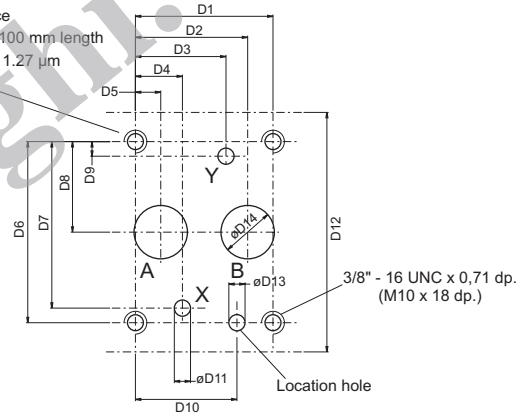


VR4U06 (3/4") SUBPLATE MOUNTING BODY (#3, #7 & #9)

Weight : 9.89 lbs (4.5 kg)



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



Dimensions		
	in	mm
A1	5.55	141.0
A2	2.34	59.5
A3	0.25	6.4
A4	4.842	123.0
A5	ø0.41	ø10.5
A6	4.232	107.5
A7	3.425	87.0
A8	2.736	69.5
A9	1.142	29.0
A10	ø0.65	ø16.5

Dimensions		
	in	mm
B1	1.38	35.0
B2	4.134	105.0
B3	3.126	79.4
B4	3.66	93.0
B5	2.374	60.3
B6	ø1.26	ø32.0

Dimensions		
	in	mm
C1	2.374	60.3
C2	4.88	124.0
C3	ø4.645	ø118.0
C4	ø0.433	ø11.0

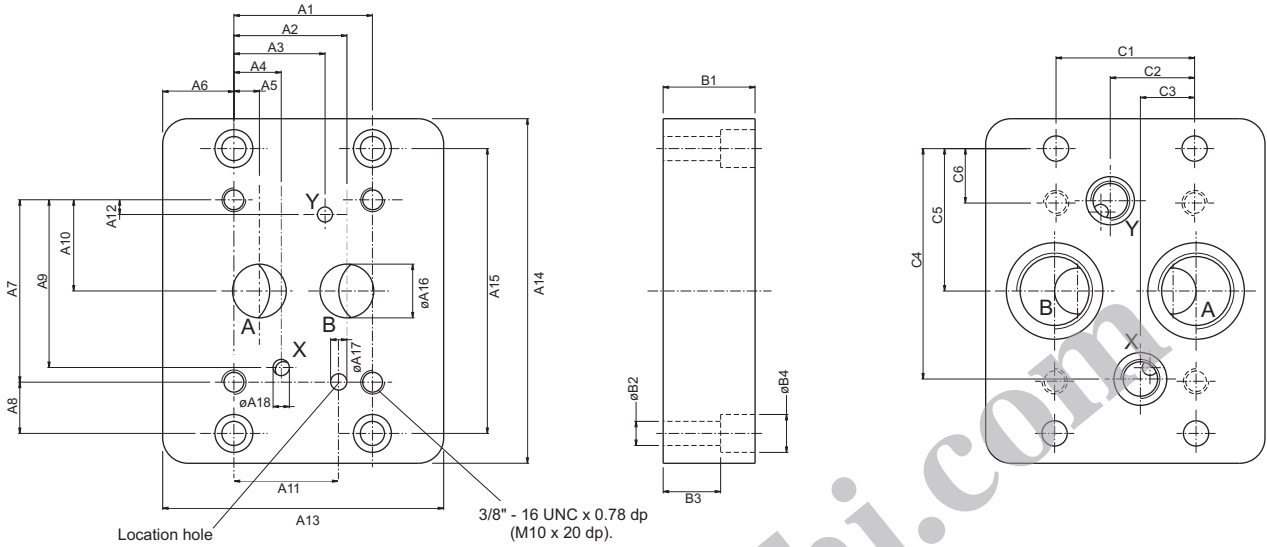
Dimensions		
	in	mm
D1	2.374	60.3
D2	1.937	49.2
D3	1.563	39.7
D4	0.811	20.6
D5	0.437	11.1
D6	3.126	79.4
D7	2.874	73.0
D8	1.563	39.7
D9	0.25	6.4
D10	1.75	44.5
D11	ø0.28	ø7.1
D12	4.134	105.0
D13	ø0.92	ø23.4
D14	ø0.28 x 0.433 dp.	ø7.1 x 11.0 dp.

Ports	Function
A	Pressure (inlet)
B	Tank (outlet)
X	Remote control or vent connection
Y(Y1)	External drain ¹⁾

1) Optional from pilot head or subplate.
Port Y₁ is only available at drain line (code 2) external from the pilot head.

SUBPLATE FOR VR4U06 (3/4")

Weight : 10.54 lbs (4.8 kg)



	Dimensions	
	in	mm
A1	2.374	60.3
A2	1.937	49.2
A3	1.563	39.7
A4	0.811	20.6
A5	0.437	11.1
A6	1.22	31.0
A7	3.126	79.4
A8	0.88	22.3
A9	2.874	73.0
A10	1.563	39.7
A11	1.75	44.5
A12	0.25	6.4
A13	4.843	123
A14	5.905	150.0
A15	4.882	124.0
A16	ø0.92	ø23.4
A17	ø0.28 x 0.315 dp.	ø7.1 x 8.0 dp.
A18	ø0.28	ø7.1

	Dimensions	
	in	mm
B1	1.575	40.0
B2	ø0.41	ø10.5
B3	0.984	25.0
B4	ø0.65	ø16.5

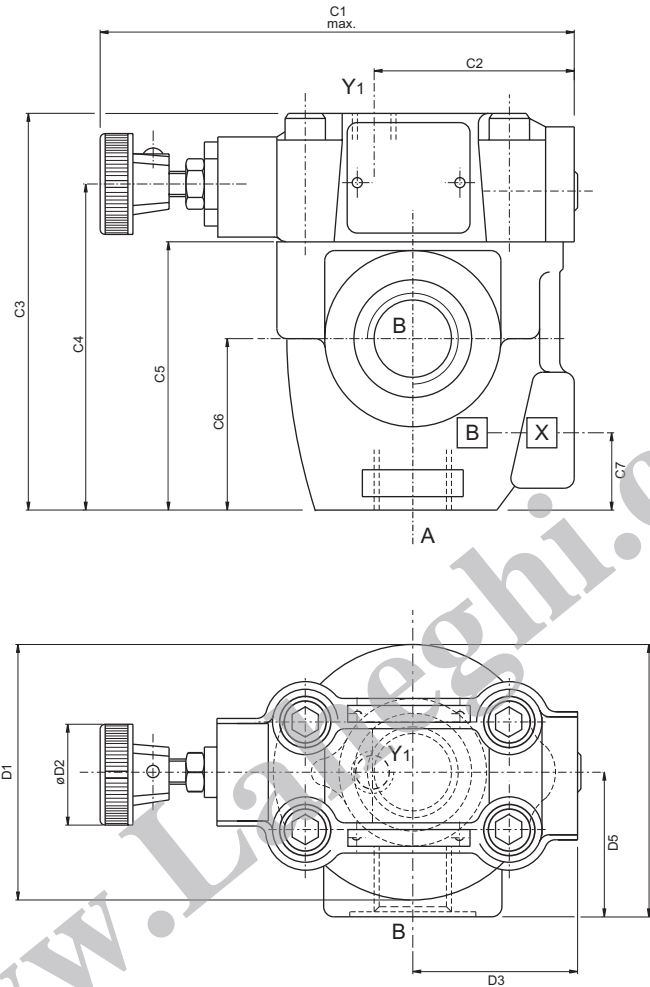
	Dimensions	
	in	mm
C1	2.374	60.3
C2	1.445	36.7
C3	0.93	23.6
C4	3.949	100.3
C5	2.44	62.0
C6	0.933	23.7

Order No.	Port sizes		4 Mounting screws*		
	A+B	X+Y	Dimension	Order No.	min.tensile strength
VSS - P - 16 - G 114	1" NPTF	1/4" NPTF	3/8"-16UNC 1 3/4 lg	V359-16220	at p< 210 bar = 100 daN/mm ² (Torque 68 Nm) at p>210 bar = 120 daN/mm ² (Torque 82 Nm)
VSS - B - 12 - G 115	3/4" B.S.P.P.	1/4" B.S.P.P.	M10 x 45mm DIN 912 - 12.9	V700 - 71602	
VSS - B - 16 - G 115	1" B.S.P.P.				

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

VR4U06 (3/4") - THREADED BODY (#A, #B & #D)

Weight : 7.25 lbs (3.3 kg)



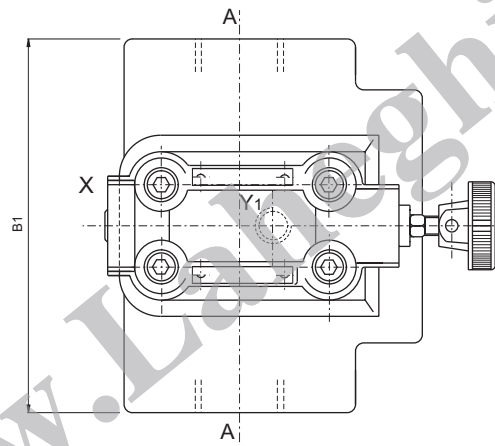
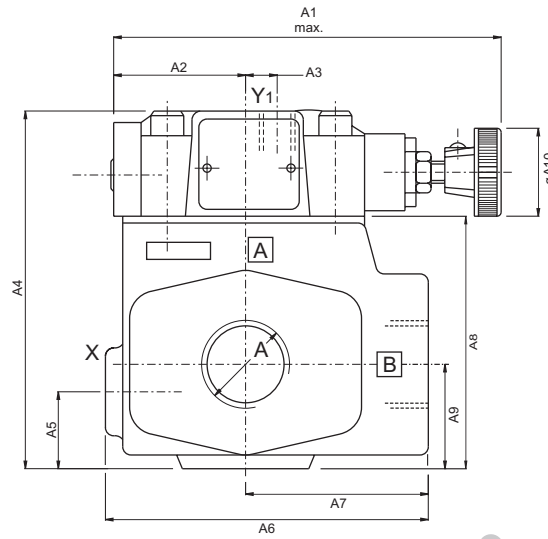
	Dimensions	
	in	mm
C1	5.55	141.0
C2	2.34	59.5
C3	4.646	118.0
C4	3.82	97.0
C5	3.15	80.0
C6	2.01	51.0
C7	0.905	23.0

	Dimensions	
	in	mm
D1	2.99	76.0
D2	ø1.26	ø32.0
D3	1.93	49.0
D4	3.19	81.0
D5	1.693	43.0

Ports	Function	Port Sizes
A	Pressure (inlet)	3/4" NPTF or G 3/4" or SAE - 12 (1 ¹ / ₁₆ " - 12 UNF)
B	Tank (outlet)	3/4" NPTF or G 3/4" or SAE - 12 (1 ¹ / ₁₆ " - 12 UNF)
X	Remote control or vent connection	1/4" NPTF or G 1/4" or SAE - 4 (7/16" - 20 UNF)
Y ₁	External drain	1/4" NPTF or G 1/4" or SAE - 4 (7/16" - 20 UNF)

VR4U06 (3/4") - THREADED BODY (#1, #4 & #6)

Weight : 14.5 lbs (6.6 kg)



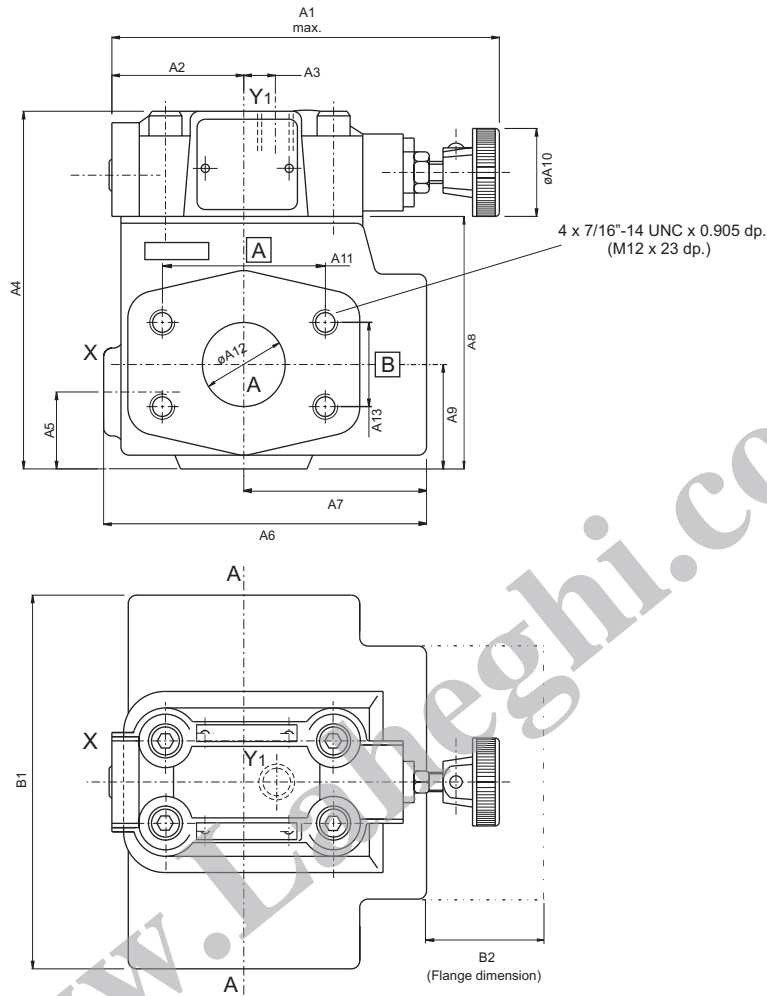
	Dimensions	
	in	mm
A1	5.55	141.0
A2	1.89	48.0
A3	0.453	11.5
A4	5.12	130.0
A5	1.102	28.0
A6	4.626	117.5
A7	2.62	66.5
A8	3.622	92.0
A9	1.496	38.0
A10	ø1.26	ø32.0

	Dimensions	
	in	mm
B1	5.35	136.0

Ports	Function	Port Sizes
A(2)	Pressure (inlet)	1" NPTF or G 1" or SAE - 16 (1 5/16 - 12 UNF)
B	Tank (outlet)	1" NPTF or G 1" or SAE - 16 (1 5/16 - 12 UNF)
X	Remote control or vent connection	1/4" NPTF or G 1/4" or SAE - 4 (7/16" - 20 UNF)
Y1	External drain	1/4" NPTF or G 1/4" or SAE - 4 (7/16" - 20 UNF)

VR4U06 (3/4") - FLANGE BODY (#2)

Weight : 14.5 lbs (6.6 kg)



	Dimensions	
	in	mm
A1	5.55	141.0
A2	1.89	48.0
A3	0.453	11.5
A4	5.12	130.0
A5	1.102	28.0
A6	4.626	114.3
A7	2.5	63.5
A8	3.622	92.0
A9	1.5	38.1
A10	ø1.26	ø32.0
A11	2.307	58.6
A12	ø1.18	ø30.0
A13	1.188	30.2

	Dimensions	
	in	mm
B1	5.35	136.0
B2	1.56	39.8

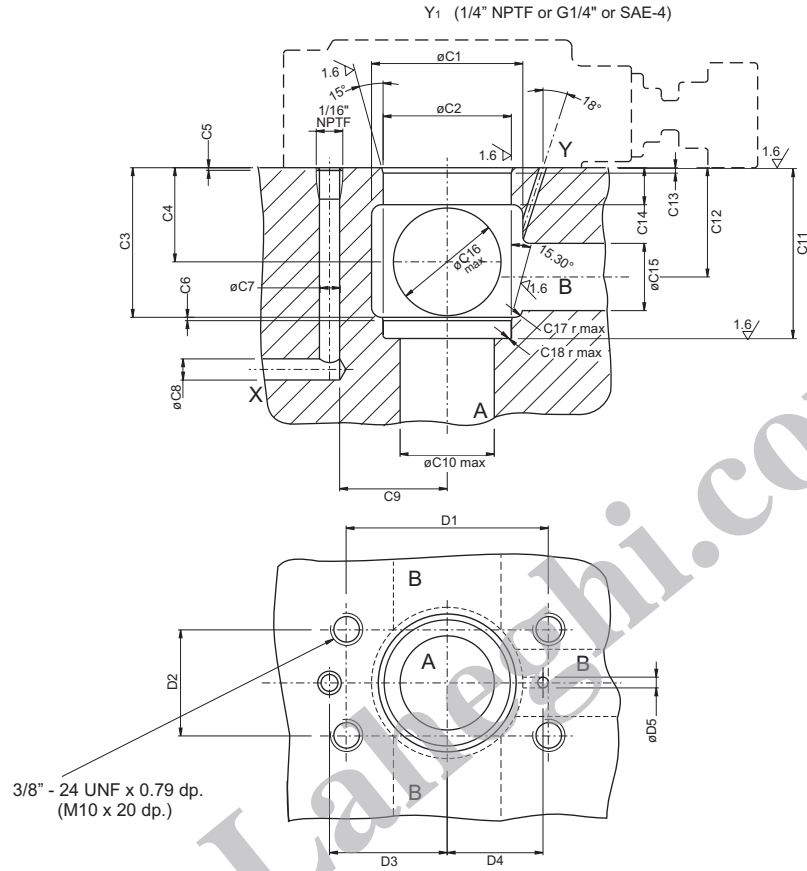
Ports	Function	Flange model no	Flange order no	Port Sizes
A (2x)	Pressure (inlet)	VFS4 - B - 20 - 26 or VFS4 - P - 20 - 26	VS14 - 66935 or VS14 - 66927	1 1/4" B.S.P.P or 1 1/4" NPTF
B	Tank (outlet)	-	-	1/4" B.S.P.P or 1/4" NPTF
X	External remote control pilot	-	-	1/4" B.S.P.P or 1/4" NPTF
Y1	External drain	-	-	1/4" B.S.P.P or 1/4" NPTF

Flanges must be ordered separately.
Mounting screws are included in flange order.

CARTRIDGES WITH PILOT VALVES VR4U06/VR4U10 (#0, #E & #G)

Weight : 2.63 lbs (1.2 kg)

PC



3/8" - 24 UNF x 0.79 dp.
(M10 x 20 dp.)

	Dimensions	
	in	mm
C1	ø1.772 ø1.732	ø45.0 ø44.0
C2	ø1.501 ø1.500	ø38.139 ø38.100
C3	1.752	44.5
C4	1.102/1.083	28.0/27.5
C5	0.031	0.8
C6	0.04	1.0
C7	ø0.236	ø6.0
C8	ø0.248	ø6.3
C9	1.26	32.0
C10	ø1.1	ø28.0
C11	2.000/1.997	50.80/50.73
C12	1.28	32.5
C13	0.063	1.6
C14	0.433	11.0
C15	ø0.79	ø20.0
C16	ø1.26	ø32.0
C17	0.08 r	2.0 r
C18	0.018 r	0.4 r

	Dimensions	
	in	mm
D1	2.383/2.367	60.52/60.12
D2	1.24/1.26	31.55/31.95
D3	1.38	35.0
D4	1.122	28.5
D5	ø0.126	ø3.2

Ports	Function
A	Pressure (Inlet)
B	Tank (Outlet)
X	External control connection
Y, Y ₁ ¹⁾	Drain

1) Port Y₁ is only available at drain line (code 2) external from the pilot head.

4 Mounting screws*	
Dimensions	Order number
3/8" - 24 UNF x 1 ³ / ₄ "lg. or M10 x 45mm, DIN 912 - 12.9	V359 -15220 or V700 - 71602

* Mounting screws must be ordered separately