

Bankable Control Valves

Catalog 3123/USA



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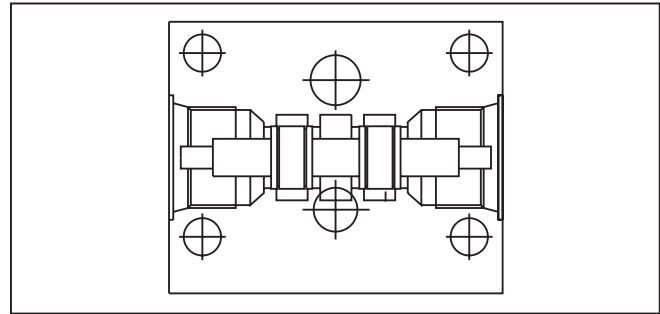
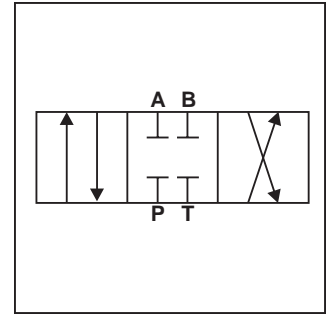
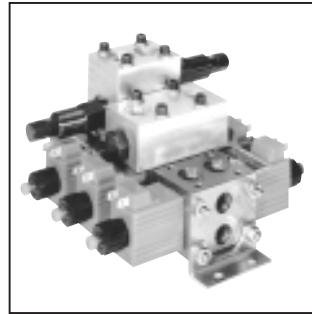
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General Description

Series BV06 Bankables are 2 or 3 position, 4-way, solenoid operated directional control valves. They provide a spool valve that can be used either individually or in multiple spool banks. BV06 bankable valves have auxiliary banking sections that can be mounted to provide auxiliary functions such as an inlet relief or unloading function. In addition, stack-on sections can be mounted on the cylinder port face of the BV06 bankable valve spool sections to provide additional functions such as crossover reliefs, cylinder port reliefs, P.O. checks, flow controls, and counterbalances. BV06 valves can be used to create custom, multi-functional circuits.

Features

- High flow capacity with reduced space requirements.
- High back pressure; all ports withstand maximum working pressure.
- Precision machined valve body is made from high tensile cast iron.
- Six different spool styles are available.
- Available operators include single or double solenoids.
- All solenoids are a one-piece coil featuring numerous voltages and terminations.



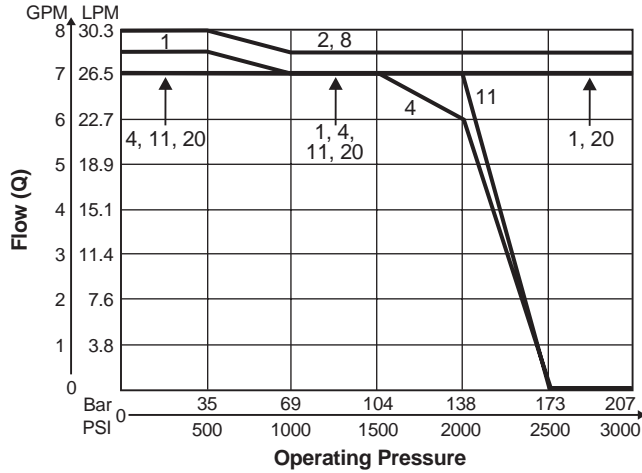
Operation

The spool is shifted from its center position by energizing one of the solenoids. Three-position spring centered and two-position spring offset valves are available.

Specifications

Nominal Flow (at 70 PSI ΔP)	23-38 LPM (6-10 GPM) depending on spool
Maximum Inlet & Tank Pressure	Parallel: 210 Bar (3000 PSI) Inlet 210 Bar (3000 PSI) Tank Series: 210 Bar (3000 PSI) Inlet & Tank
Porting	SAE -6
Maximum Internal Leakage @ 210 Bar (3000 PSI) (110 SSU oil)	#1 Spool: 82 cc per land/min. (5.00 cu. in. per land/min.) #2 Spool: 164 cc per land/min. (10.01 cu. in. per land/min.) #4 Spool: 82 cc per land/min. (5.00 cu. in. per land/min.) #8 Spool: 82 cc per land/min. (5.00 cu. in. per land/min.) #11 Spool: 164 cc per land/min. (10.01 cu. in. per land/min.)
Operating Temperature Range (Ambient)	Nitrile: -40°C to +93°C (-40°F to +200°F) Fluorocarbon: -32°C to +121°C (-25°F to +250°F)
Material	Body: Precision machined and honed from cast iron. Spool: Hardened and ground steel.
Filtration	ISO Code 16/13, SAE Class 4 or better
Mounting Position	No restrictions
Mounting Type	Individually or line mounted

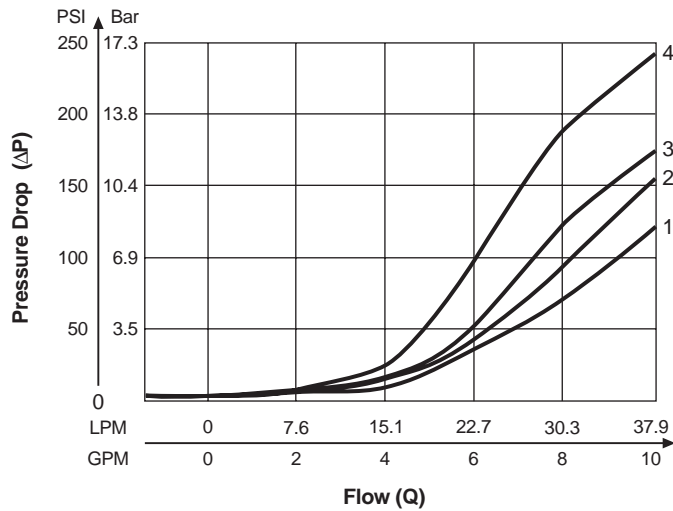
Switching Limits



Notes:

1. Unless otherwise specified, all curves were generated using solenoid actuators at 90% of rated with voltage.
2. All valves tested using 110 SSU oil.

Differential Pressure



	Spool No./ Flow Direction	P21	P1, P23	P4	P11	S2, S8, S24
Spool	P to A or B	1	2	2	2	4
Shifted	A or B to T	1	2	1	2	4
Spool	P to T					2
Centered	A or B to T			3		

Note: Flow in center position for spool P11 as compared to P4 is 7% of the nominal flow.

Solenoid Coil Specifications

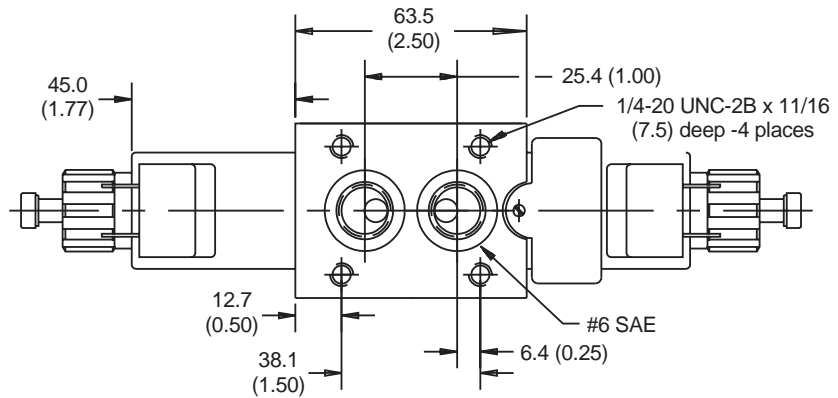
Solenoid Code	Nominal Voltage/Hz	In Rush Amps	Holding Amps	Wattage
D012	12 VDC	Not Applicable	2.3	30
D024	24 VDC	Not Applicable	1.2	30
A120	120 VAC	(Rectified Coil)	Not Applicable	30

Solenoid Response Times

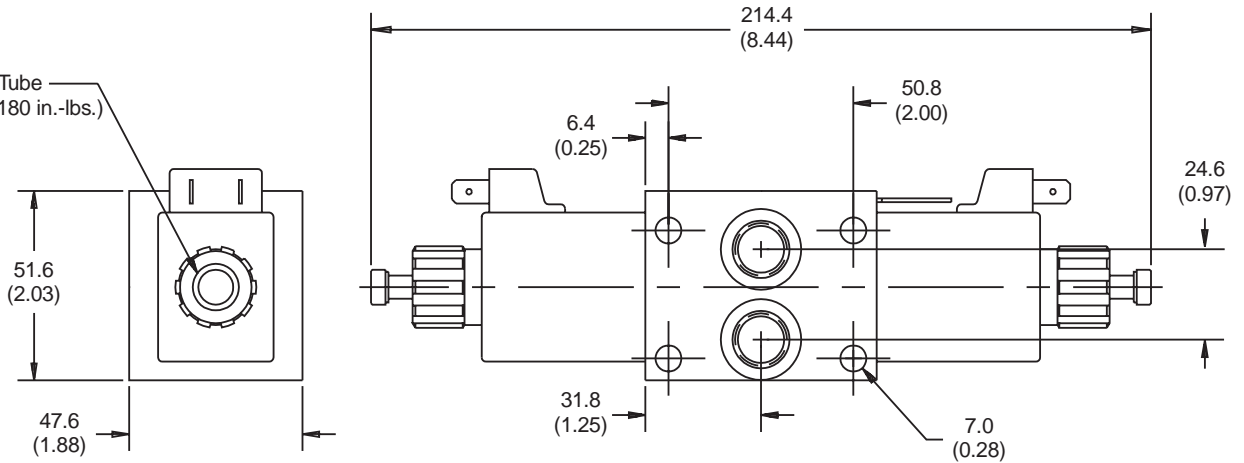
DC COILS				
Spool	Coil Type	Pull In	Pressure Response Drop Out	Full Shift Drop Out
1	12 VDC, 30 Watt	30 ms	73 ms	244 ms
2	12 VDC, 30 Watt	20 ms	10 ms	134 ms
4	12 VDC, 30 Watt	23 ms	41 ms	287 ms
8	12 VDC, 30 Watt	26 ms	13 ms	136 ms
11	12 VDC, 30 Watt	19 ms	22 ms	200 ms
20	12 VDC, 30 Watt	17 ms	6.9 ms	244 ms
21	12 VDC, 30 Watt	30 ms	73 ms	244 ms
23	12 VDC, 30 Watt	30 ms	73 ms	244 ms
24	12 VDC, 30 Watt	26 ms	13 ms	136 ms

*Inch equivalents for millimeter dimensions are shown in (**)

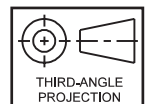
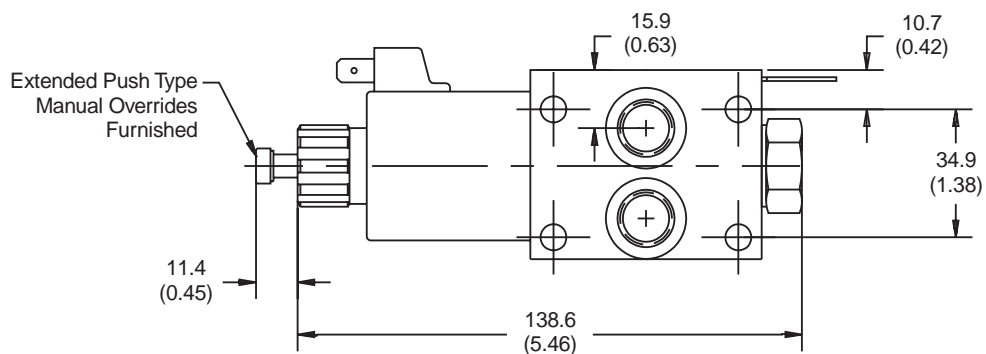
Double Solenoid



Solenoid Tube
 20 N.m. (180 in.-lbs.)
 Torque



Single Solenoid



Spool Sections

BV

Bankable
Valves

06

Size

Code	Description
06	22.7 LPM (6 GPM) Nominal Flow

Spools

Seals

Code	Description
Omit	Nitrile
V	Fluorocarbon

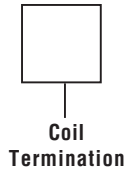
Code	Description	Symbol
P1	30.0 LPM (8 GPM) Max. Flow* without Malfunction; Parallel Circuit Only	
P4	22.7 LPM (6 GPM) Max. Flow* without Malfunction; Parallel Circuit Only	
P11	26.5 LPM (7 GPM) Max. Flow* without Malfunction; Parallel Circuit Only	
P20	22.7 LPM (6 GPM) Max. Flow* without Malfunction; Parallel Circuit Only	
P21	22.7 LPM (6 GPM) Max. Flow* without Malfunction; Parallel Circuit Only	
P23	30.0 LPM (8 GPM) Max. Flow* without Malfunction; Parallel Circuit Only	
S2	26.5 LPM (7 GPM) Max. Flow* without Malfunction; Series Circuit Only	
S8	26.5 LPM (7 GPM) Max. Flow* without Malfunction; Series Circuit Only	
S24	26.5 LPM (7 GPM) Max. Flow* without Malfunction; Series Circuit Only	

*At 70 PSI ΔP

Note: Maximum of six spools per assembly. For each additional spool repeat spool option after stack-on option.

Note: Standard setting 2500 PSI @ 6 GPM, with screw adjustments on all relief cartridges.
 Standard setting 1000 PSI @ crack, with screw adjustments on all counterbalance cartridges.

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Coil Termination



Coil Voltage

Code	Description
D012	12 VDC; 30 Watt
D024	24 VDC; 30 Watt
A120	120 VAC; 30 Watt



Body

Code	Description
D	DIN 43650 Plug Face (AC or DC)
PV	SAE 1B-0.25 Double Spade, Vertically-Oriented (DC Only)
SV	Double 8-32 Screw & Nut Vertically-Oriented (DC Only)
S1V	Single 8-32 Screw & Nut Internally Ground, Vertically-Oriented (DC Only)
W	Double Wire 24" Class H (DC Only)
WP	Weather Pack Connector, 5" Leads, Male Connector (DC Only)

Code	Description
6T	Individual Body with 9/16-18 SAE Straight Thread Ports
6TF	Individual Body with 9/16-18 SAE Straight Thread Ports & Mounting Feet
E6T	Inlet/Outlet Parallel Body with 9/16-18 SAE Straight Thread Ports
M6T	Middle Parallel Body with 9/16-18 SAE Straight Thread Ports
SM6T	Series Middle Body with 9/16-18 SAE Straight Thread Ports
SI6T	Series Inlet Body with 9/16-18 SAE Straight Thread Ports
SO6T	Series Outlet Body (No Spool)

Service Parts

Bodies

- BV06-6T Parallel or Series Individual Body
- BV06-E6T Parallel Inlet/Outlet Body
- BV06-M6T Parallel Middle Body
- BV06-SI6T Series Inlet Body
- BV06-SM6T Series Middle Body
- BV06-SO6T Series Outlet Body (No Spool)

Coils

- P/N 851050***** Double Spade Coil
- P/N 851052***** Double Wire Coil
- P/N 851054***** Double Screw Coil
- P/N 851056***** Single Screw Coil
- P/N 851020***** DIN Plug Face Coil (AC or DC)
- P/N 1500189 Weather Pack Coil

Note: Coils are available in 12 VDC, 24 VDC, & 120 VAC versions only. P/N 851052-012 VDC is a 12 VDC Double Wire Coil.

Tube Assemblies

- P/N 709780-01 Tube Assembly with heavy spring - use with P1, P11, & P23 spools
- P/N 1500051 Tube Assembly with light spring - use with P4, S2, S8, & S24 spools
- P/N 1500056 Tube Assembly with heavy spring - use with P20 & P21 spools

Plug Assemblies (Single Solenoid Valve only)

- P/N 710020-01 Plug Assembly with Heavy Spring - use with P1, P11, & P23 spools
- P/N 710020-03 Plug Assembly with Light Spring - use with P4, P20, P21, S2, S8, & S20 spools

Tube End Nut P/N 118113-00

Tube O-ring

- P/N 3908N-9 (Nitrile)
- P/N 3908V-9 (Fluorocarbon)

Spools

- P/N 118736-00 Code P1 Spool
- P/N 118737-00 Code P4 Spool
- P/N 118767-00 Code P11 Spool
- P/N 118731-00 Code P20 Spool
- P/N 118731-00 Code P21 Spool
- P/N 118736-00 Code P23 Spool
- P/N 710025-00 Code S2 Spool
- P/N 710015-00 Code S8 Spool
- P/N 710015-00 Code S24 Spool

Weights:

- Single Solenoid
- Spool Section 1.26 kg (2.8 lbs.)
- Double Solenoid
- Spool Section 1.50 kg (3.3 lbs.)

General Description

Series BVB06 Bankable Inlets include Inlet Reliefs, Bankable Unloader, Bankable Inlet Relief with Unloader, and Proportional Bankable Unloader. They are used in conjunction with BV06 bankable valve sections. They are used to regulate system pressure, unload the pump in a closed center circuit, or regulate pressure and unload the pump in a closed center circuit.

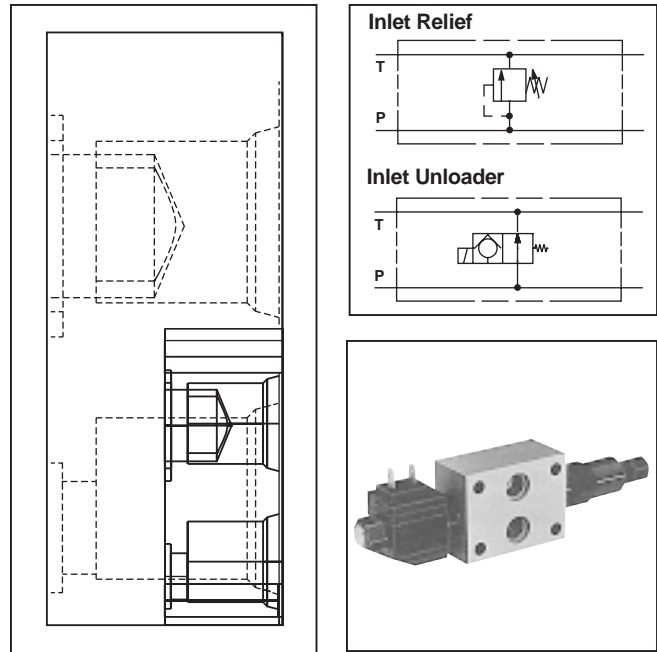
Operation

Inlet Relief — The inlet relief on the bankable valves is used to regulate the maximum system pressure. The inlet relief on the BV06 is a RD083 series cartridge valve.

Unloading Valve — The inlet unloader is normally used with closed center directional valves to unload the pump when the directional control valves are in a neutral position. This is a normally open solenoid valve that is energized whenever one of the directional control valves are shifted out of neutral. The inlet unloader on a BV06 is a DS081N series cartridge valve.

Inlet Relief with Unloader — This valve is normally used with closed center directional control valves to provide a system relief and to unload the pump when the directional control valves are in the neutral position.

Proportional Unloader — This valve is used in systems with single or multiple non-proportional directional control valves. The unloader is a normally open proportional flow control valve. By actuating one of the directional control valves and varying the input current to the proportional valve; the actuated directional control valve receives the benefit of proportional flow from the proportional unloader. As less flow is directed to tank by the proportional unloader, more flow is available to the actuated directional control valve. Once the optimum speed is achieved to the actuator from the directional control valve, the current to the proportional unloader can then be held constant.



Features

- High flow capacity with reduced space requirements.
- Full cartridge design — no loose parts — standard cartridge valves.
- Relief valve is differential area, direct-acting, poppet design.
- Manual override optional for unloading valve.
- Manual override standard for proportional unloader.

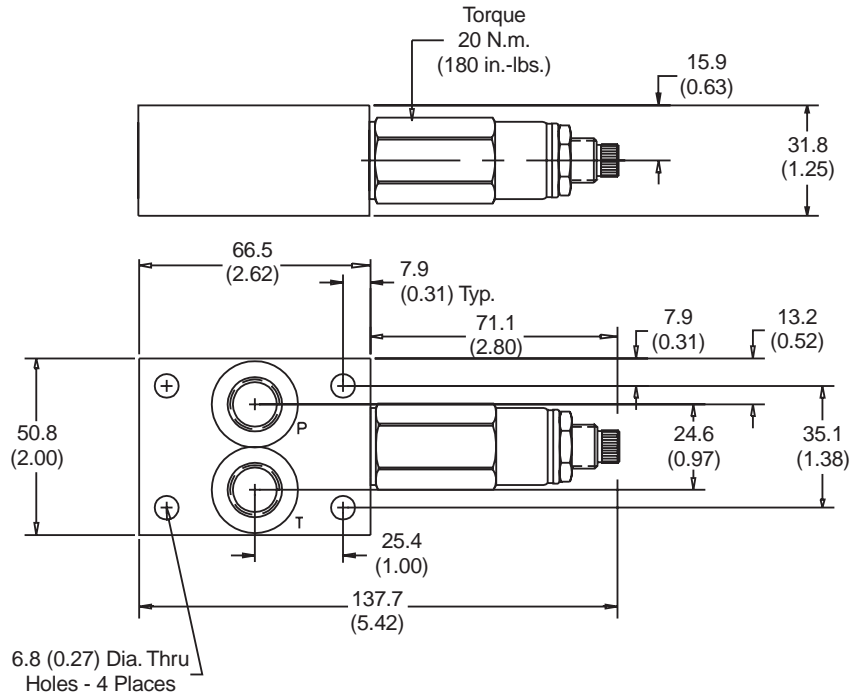
Specifications

	Inlet Relief	Unloader	Proportional Unloader
Rated Flow	37.9 LPM (10 GPM)	34.1 LPM (9 GPM)	30.3 LPM (8 GPM)
Max. Inlet Pressure	210 Bar (3000 PSI)	210 Bar (3000 PSI)	210 Bar (3000 PSI)
Max. Setting Pressure	210 Bar (3000 PSI)	Not Applicable	Not Applicable
Reseat Pressure	80% of Crack Pressure	Not Applicable	Not Applicable
Max. Internal Leakage	2/3 cc/min. (10 drops/min.) at 350 Bar (5000 PSI)	2/3 cc/min. (10 drops/min.) at 350 Bar (5000 PSI)	82 cc/min. (5 cu. in./min.)
Cavity	C08-2	C08-2	C09-2
Operating Temperature Range (Ambient)	Nitrile: -40°C to +93°C (-40°F to +200°F) Fluorocarbon: -23°C to +121°C (-10°F to +250°F)		
Cartridge Material	All parts steel. All working parts hardened, ground, and lapped.		
Body Material	High Tensile Aluminum or Continuous Cast Steel		
Filtration	ISO Code 16/13, SAE Class 4 or better		
Mounting	No restrictions		

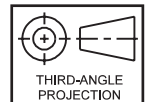
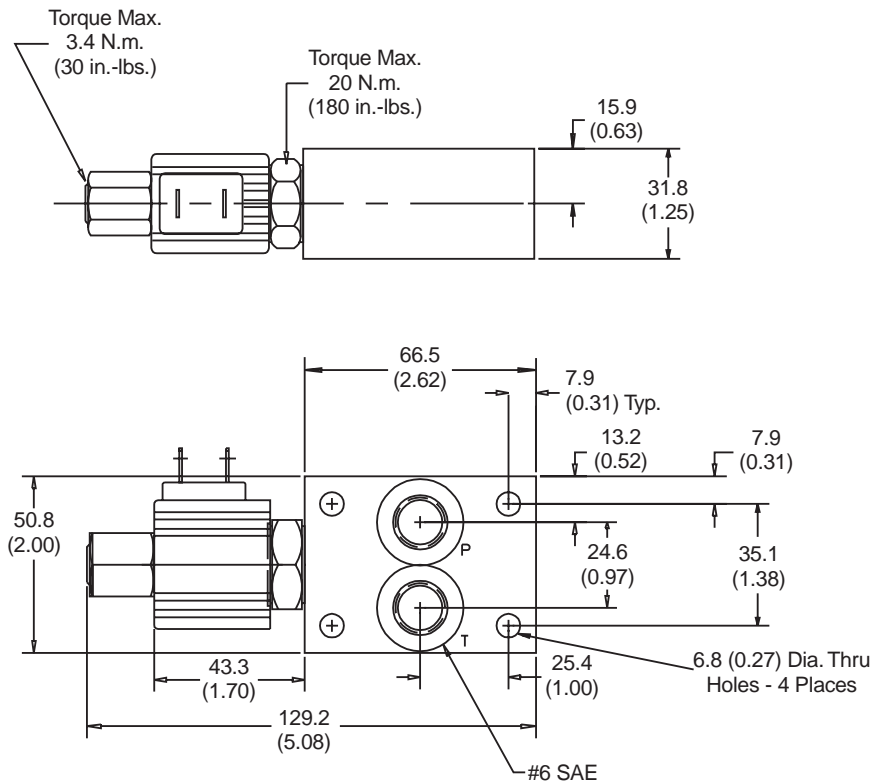
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*Inch equivalents for millimeter dimensions are shown in (**)

Inlet Relief

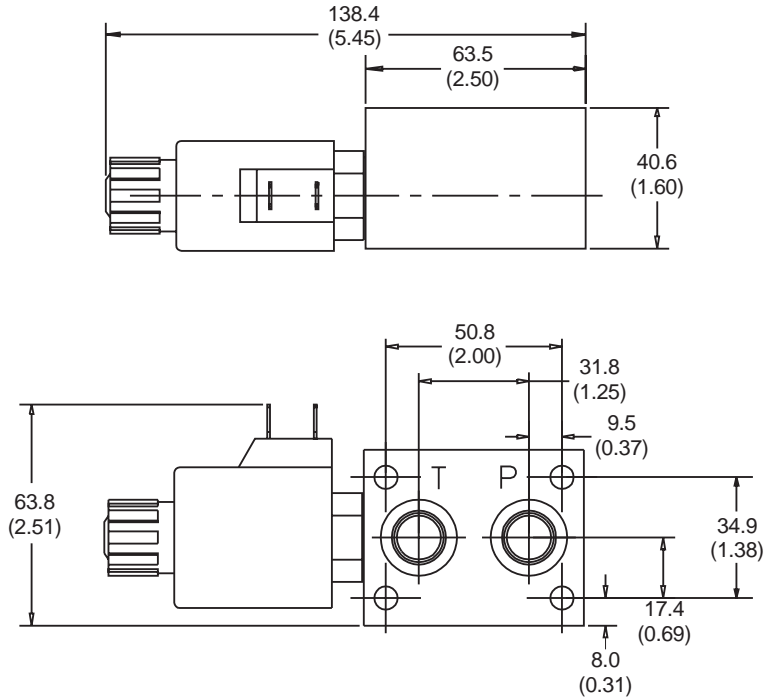


Inlet Unloader

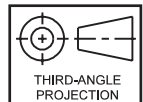
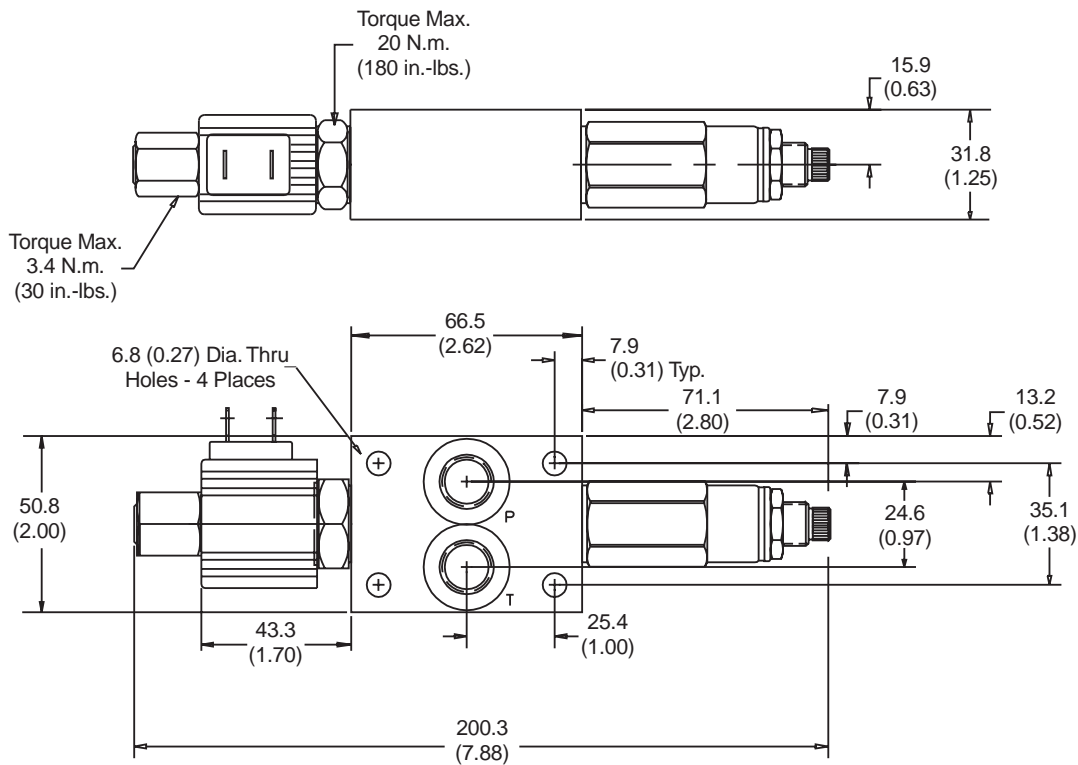


*Inch equivalents for millimeter dimensions are shown in (**)

Proportional Inlet



Inlet Unloader with Relief



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BVB06										6T
Bankable Valve	Function	Relief Adjustment	Adjustment Range	Optional Pressure Setting	Coil Voltage	Coil Wattage	Override Option (Unloader)	Coil Termination	Seals	SAE-6 Body

Code	Description
Omit	Unloader Only
C	Capped with Concealed adjustment

Pressure x 10 (i.e., 235 = 2350 PSI (1.6 Bar)). All settings at 11.3 LPM (3 GPM).	
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Code	Description
Omit	Nitrile
V	Fluorocarbon

Code	Description
Omit	Unloader Only
20	21-138 Bar (300-2000 PSI) Setting: 121 Bar (1750 PSI) @ 1.6 LPM (6 GPM)
30	103-207 Bar (1500-3000 PSI) Setting: 172 Bar (2500 PSI) @ 1.6 LPM (6 GPM)

Code	Description
Omit	Main Relief Only
D012	12 VDC
D024	24 VDC
A120	120 VAC

Code	Description
Omit	Main Relief Only
D	DIN 43650 Plug Face (AC or DC)
P	Dual Spade (DC Only)
S	Double Screw (DC Only)
S1	Single Screw Internally Ground (DC Only)
W	Dual Wire (DC Only)
WP	Weather Pack (DC Only)

Code	Description
Omit	No Override/Proportional
M	Flush Type
E	Extended Pin

Code	Description	Symbol
MR	Main Relief	
U	Unloader	
UR	Unloader & Relief	
PU3	Proportional Unloader 11.3 LPM (3 GPM) with 17 Watt Coil	
PU6	Proportional Unloader 22.5 LPM (6 GPM) with 17 Watt Coil	
PU8	Proportional Unloader 30 LPM (8 GPM) with 30 Watt Coil	

Code	Description
Omit	Main Relief Only
L	12 Watt (non-Prop)
L	17 Watt (Prop)
H	25 Watt (non-Prop)
H	30 Watt (Prop)

Weights:

Model BVB06U	.48 kg (1.1 lbs.)
Model BVB06UR	.64 kg (1.4 lbs.)
Model BVB06MR	.43 kg (0.9 lbs.)
Model BVB06PU	.48 kg (1.1 lbs.)

Service Parts	
Solenoid Coils	
BVB06MR-6T	(Body for main relief or unloader)
BVB06UR-6T	(Body for main relief with unloader)
BVB06PU-6T	(Body for proportional unloader)

General Description

Bankable Stack-On valves include single and double P. O. check valves, single and double crossover relief valves, single and double meter-in and meter-out, pressure compensated and non-compensated flow controls, single and double reliefs to tank, and single and double counterbalance valves.

All stack-on valves fit on top of their BV06 bankable spool sections to provide secondary functions. Up to two different stack-on valves can be installed on top of their respective bankable spool sections.

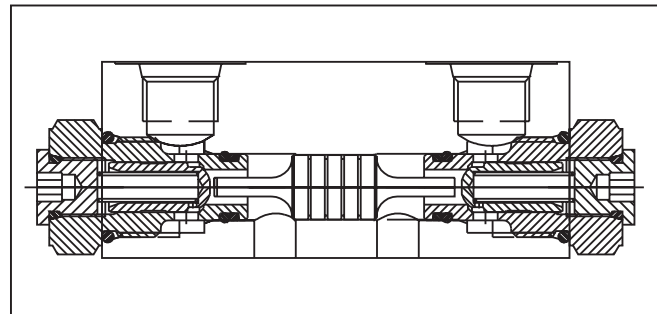
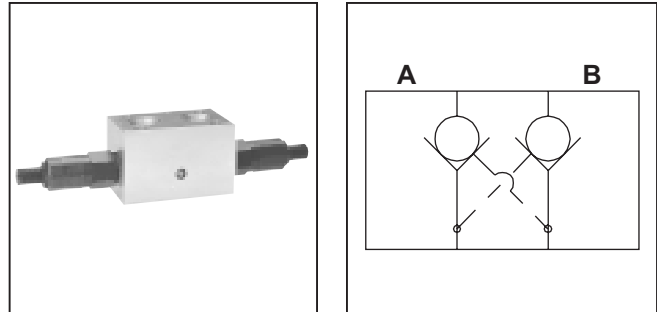
Operation

Stack-on single and double P.O. Check valves are used in load holding operations. These should only be used in conjunction with a motor spool, a bleeder spool, or a series spool.

Single and dual crossover reliefs are used to vent shocks that occur at a motor. Any spool can be used in conjunction with these reliefs.

Meter-in and meter-out flow controls are used to control speed either to or from the actuator. The pressure compensated version will provide constant flow regardless of changes in load or pressure. Any spool can be used in conjunction with these flow controls.

Single and double counterbalances are used in load holding and over center applications. These should only be used in conjunction with a motor spool, a bleeder spool, or a series spool.



Features

- Cartridge design eliminates leak points.
- High flow capacity with reduced space requirements.
- Reduced cumulative pressure drop.
- Easy to service.

Specifications

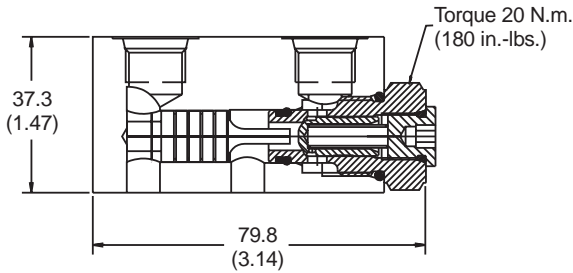
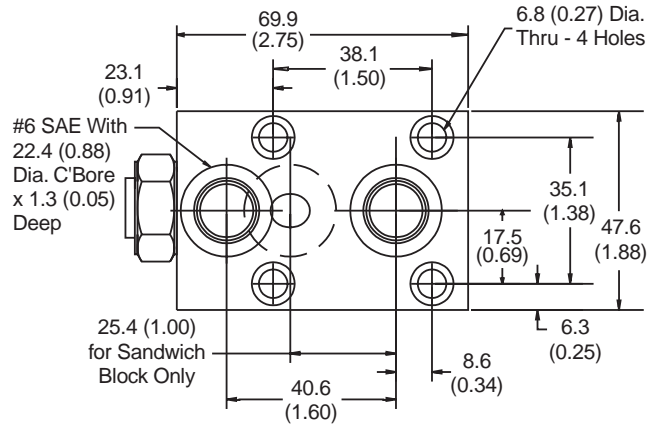
	P.O. Checks	Crossover Reliefs	Flow Controls	P.C. Flow Controls	Counterbalances
Rated Flow	37.9 LPM (10 GPM)	37.9 LPM (10 GPM)	45.4 LPM (12 GPM)	30.3 LPM (8 GPM)	56.8 LPM (15 GPM)
Max. Operating Pressure	350 Bar (5000 PSI)	350 Bar (5000 PSI)	210 Bar (3000 PSI)	210 Bar (3000 PSI)	275 Bar (4000 PSI)
Max. Leakage @ Rated Pressure	1/3 cc/min. (5 drops/min.)	2/3 cc/min. (10 drops/min.)	1/3 cc/min. (5 drops/min.)	Not Applicable	1/3 cc/min. (5 drops/min.)
Oper. Temp. Range (Ambient)	-25°C to +93°C (-40°F to +200°F)				
Cartridge Material	All parts steel. All working parts hardened, ground, and lapped.				
Body Material	Aluminum Alloy				
Porting	SAE -6	SAE -6	SAE -6	SAE -6	SAE -6
Filtration	ISO Code 16/13, SAE Class 4 or better				
Mounting	No restrictions				
Cavity	C08-2	C09-2	C10-2	C10-2	Special

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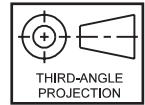
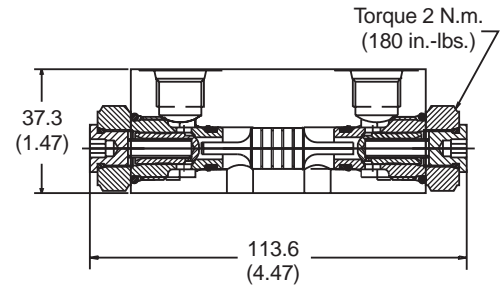
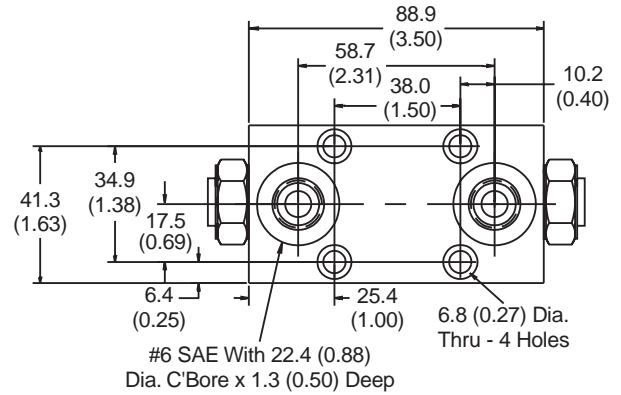
Dimensions

*Inch equivalents for millimeter dimensions are shown in (**)

Single P.O. Check



Double P.O. Check



Single P.O. Check

Description	Part Number
Block	118778-01
Cartridge	CVH081P
Piston	118763-00

Double P.O. Check

Description	Part Number
Block	118779-01
Cartridge	CVH081P
Piston	118764-00

Ordering Information

BV

Bankable Valve

06

Size

Location

Cracking Pressure

Code	Description
06	22.7 LPM (6 GPM) Nominal Flow

Code	Description
A	A Port P.O. Check
B	B Port P.O. Check
C	A & B Port P.O. Check

Code	Description
Omit	0.3 Bar (5 PSI)
10	0.7 Bar (10 PSI)
20	1.4 Bar (20 PSI)
65	4.4 Bar (65 PSI)

Weights:

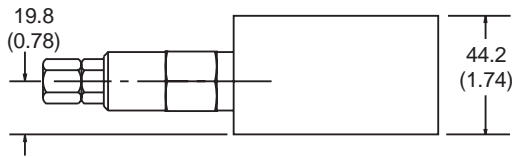
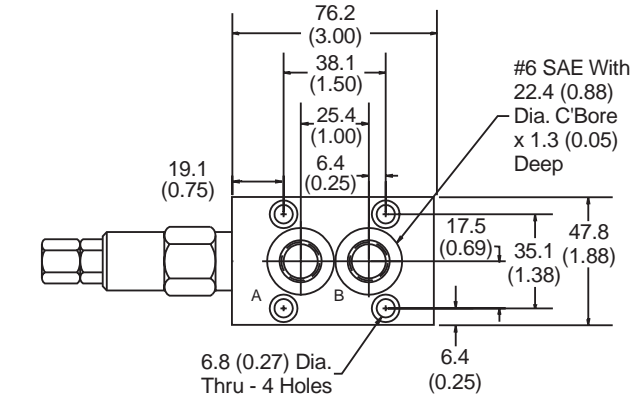
BV06-A or BV06-B .51 kg (18 oz.)
 BV06-C .76 kg (27 oz.)

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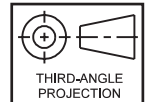
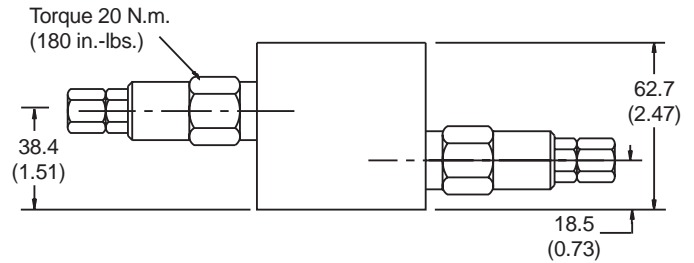
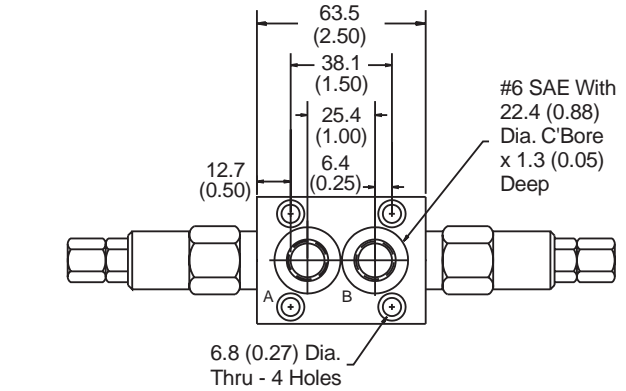
Dimensions

*Inch equivalents for millimeter dimensions are shown in (**)

Single Crossover Relief



Double Crossover Relief



Single Crossover Relief

Description	Part Number
Block	118780-01
Cartridge 21-138 Bar (300-2000 PSI)	RD083C20
Cartridge 104-207 Bar (1500-3000 PSI)	RD083C30

Double Crossover Relief

Description	Part Number
Block	118781-01
Cartridge 21-138 Bar (300-2000 PSI)	RD083C20
Cartridge 104-207 Bar (1500-3000 PSI)	RD083C30

Ordering Information

BV

Bankable
Valve

06

Size

[]

Location

C

Adjustment
Style

[]

Adjustment
Range

Code	Description
06	22.7 LPM (6 GPM) Nominal Flow

Code	Description
D	A Port to B Port Crossover Relief
E	B Port to A Port Crossover Relief
F	A & B Port Crossover Relief

Code	Description
C	Concealed Adjust

Code	Description
15	7-104 Bar (100-1500 PSI) Setting: 52 Bar (750 PSI) @ 11.4 LPM (3 GPM)
30	69-207 Bar (1000-3000 PSI) Setting: 135 Bar (2000 PSI) @ 11.4 LPM (3 GPM)

Weights:

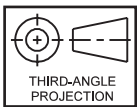
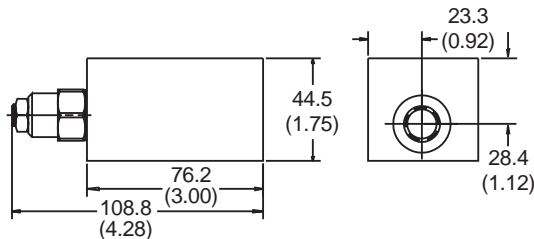
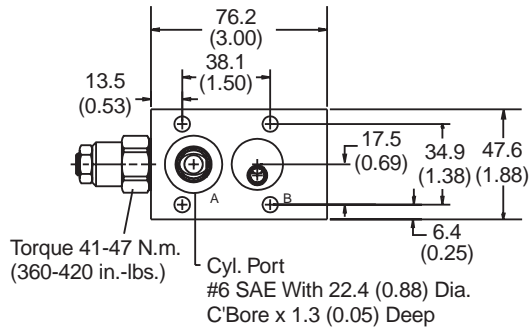
BV06-D or BV06-E .51 kg (18 oz.)
 BV06-F .76 kg (27 oz.)

bv06so.p65, dd, jk

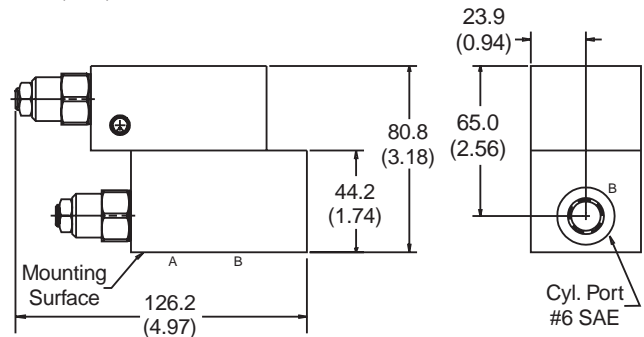
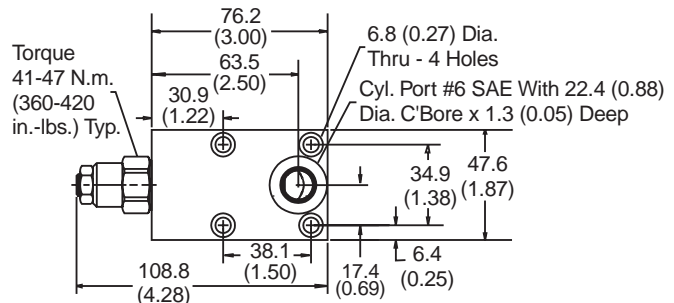
Dimensions

*Inch equivalents for millimeter dimensions are shown in (**)

Counterbalance



Double Counterbalance



Counterbalance

Description	Part Number	Qty
Block	118776-01	1
Cartridge 28-104 Bar (400-1500 PSI)	Consult Factory	1
Cartridge 69-207 Bar (1000-3000 PSI)	Consult Factory	1
102X1	Pipe Plug	1

Double Counterbalance

Description	Part Number	Qty
Block	118776-01	1
Block	118777-01	1
Cartridge 28-104 Bar (400-1500 PSI)	Consult Factory	2
Cartridge 69-207 Bar (1000-3000 PSI)	Consult Factory	2
102X1	Pipe Plug	2
O-ring	2018N-7	2

Ordering Information

BV

Bankable
Valve

06

Size

Code	Description
06	22.7 LPM (6 GPM) Nominal Flow

Location

3

3:1 Pilot Ratio

Code	Description
3	3:1 Ratio

S

Adjustment Style

Code	Description
S	Screw

Adjustment
Range

Code	Description
NN	A Port Counterbalance
PP	B Port Counterbalance
RR	A & B Port Counterbalance

Code	Description
15	28-104 Bar (400-1500 PSI) Setting: 86 Bar (1250 PSI) @ 22.5 LPM (6 GPM)
40	69-276 Bar (1000-4000 PSI) Setting: 172 Bar (2500 PSI) @ 22.5 LPM (6 GPM)

Weights:

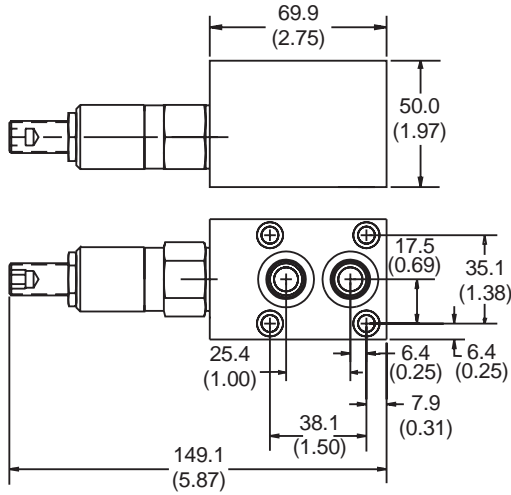
BV06-NN & BV06-PP .51 kg (18 oz.)
 BV06-RR .96 kg (34 oz.)

bv06so.p65, dd, jk

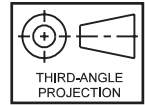
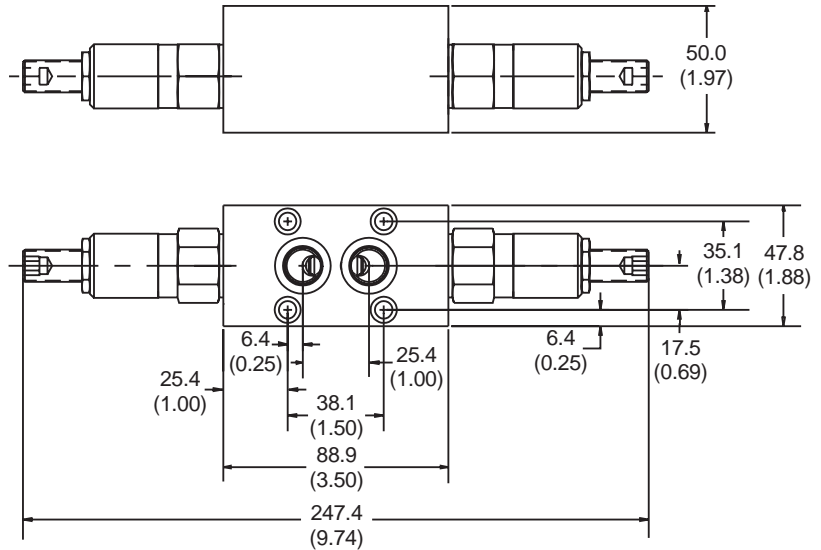
Dimensions

*Inch equivalents for millimeter dimensions are shown in (**)

**Single P.C. Flow Control
 Meter-In or Meter-Out**



**Double P.C. Flow Control
 Meter-In or Meter-Out**



Single Flow Control

Description	Part Number	Qty
Block Meter-In	1500168	1
Block Meter-Out	1500167	1
Cartridge	FC101	1

Double Flow Control

Description	Part Number	Qty
Block Meter-In	1500170	1
Block Meter-Out	1500169	1
Cartridge	FC101	2

Ordering Information

BV

Bankable Valve

06

Size

[]

Location

[]

Adjustment Style

[]

Adjustment Range

Code	Description
06	22.7 LPM (6 GPM) Nominal Flow

Code	Description
G	A Port Meter-In
H	B Port Meter-In
J	A & B Port Meter-In
K	A Port Meter-Out
L	B Port Meter-Out
M	A & B Port Meter-Out

Code	Description
S	Screw Adjust
K	Knob Adjust
T	Tamper Resistant

Code	Description
050	1.1-3.8 LPM (0.3-1.0 GPM) Setting: @ 1.88 LPM (0.56 GPM)
100	3.0-8.3 LPM (0.8-2.2 GPM) Setting: @ 3.75 LPM (1.0 GPM)
300	7.6-15.1 LPM (2.0-4.0 GPM) Setting: @ 11.25 LPM (3.0 GPM)
600	15.1-30.3 LPM (4.0-8.0 GPM) Setting: @ 22.5 LPM (6.0 GPM)

Weights:

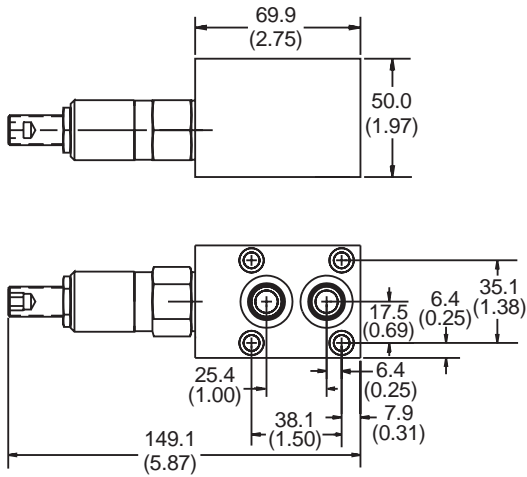
BV06-G, BV06-H, BV06-K & BV06-L .54 kg (19 oz.)
 BV06-J & BV06-M .76 kg (27 oz.)

bv06so.p65, dd, jk

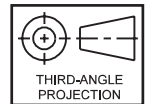
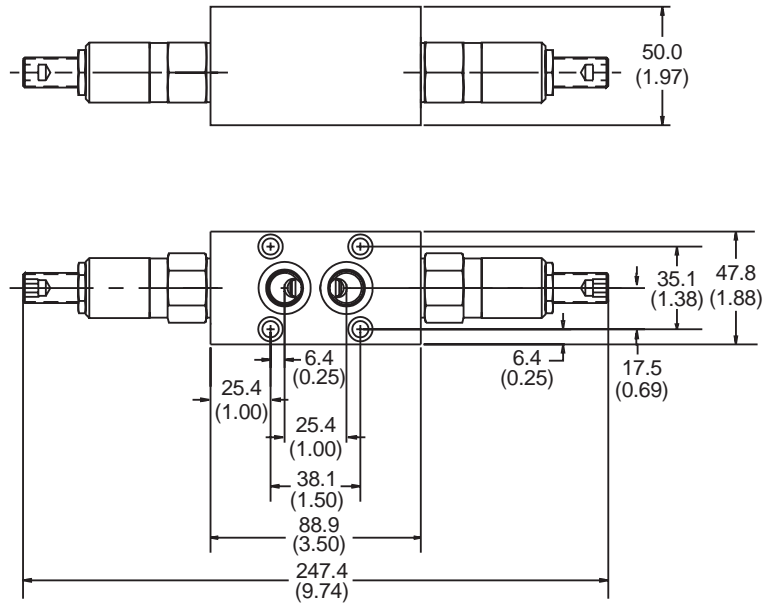
Dimensions

*Inch equivalents for millimeter dimensions are shown in (**)

**Single Flow Control
 Meter-In or Meter-Out**



**Double Flow Control
 Meter or Meter-Out**



Single Flow Control

Description	Part Number	Qty
Block Meter-In	1500167	1
Block Meter-Out	1500168	1
Cartridge	FV101	1

Dual Flow Control

Description	Part Number	Qty
Block Meter-In	1500169	1
Block Meter-Out	1500170	1
Cartridge	FV101	2

Ordering Information

BV

Bankable Valve

06

Size

Location

Adjustment Style

Code	Description
06	22.7 LPM (6 GPM) Nominal Flow

Code	Description
G5	A Port Meter-In
H5	B Port Meter-In
J5	A & B Port Meter-In
K5	A Port Meter-Out
L5	B Port Meter-Out
M5	A & B Port Meter-Out

Code	Description
S	Screw Adjust
K	Knob Adjust

Weights:

- BV06-G5, BV06-H5, BV06-K5 & BV06-L5 .54 kg (19 oz.)
- BV06-J5 & BV06-M5 .76 kg (27 oz.)

bv06so.p65, dd, jk

Valve Assemblies with or without Stack-On Options

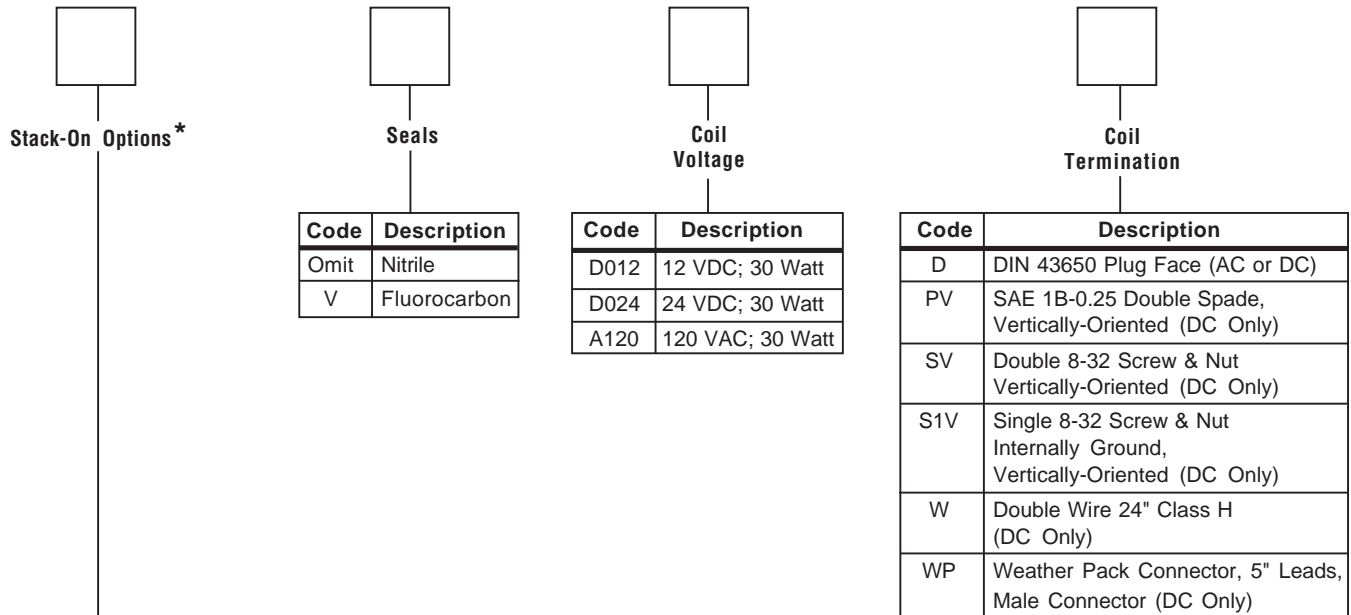
BV		06					
Bankable Valves		Size		Inlet Function		Spools	
Code	Description	Code	Description	Symbol	Code	Description	Symbol
06	22.7 LPM (6 GPM) Nominal Flow	Omit	Std Inlet No Relief No Unloader		P1	30.0 LPM (8 GPM) Max. Flow* without Malfunction; Parallel Circuit Only	
		MR	Main Relief		P4	22.7 LPM (6 GPM) Max. Flow* without Malfunction; Parallel Circuit Only	
		U	Unloader		P11	26.5 LPM (7 GPM) Max. Flow* without Malfunction; Parallel Circuit Only	
		UR	Unloader & Relief		P20	22.7 LPM (6 GPM) Max. Flow* without Malfunction; Parallel Circuit Only	
		PU3	Proportional Unloader 11.3 LPM (3 GPM) with 17 Watt Coil		P21	22.7 LPM (6 GPM) Max. Flow* without Malfunction; Parallel Circuit Only	
		PU6	Proportional Unloader 22.5 LPM (6 GPM) with 17 Watt Coil		P23	30.0 LPM (8 GPM) Max. Flow* without Malfunction; Parallel Circuit Only	
		PU8	Proportional Unloader 30.0 LPM (8 GPM) with 30 Watt Coil		S2	26.5 LPM (7 GPM) Max. Flow* without Malfunction; Series Circuit Only	
					S8	26.5 LPM (7 GPM) Max. Flow* without Malfunction; Series Circuit Only	
					S24	26.5 LPM (7 GPM) Max. Flow* without Malfunction; Series Circuit Only	

Note: Standard setting 2500 PSI @ 6 GPM, with screw adjustments on all relief cartridges.
 Standard setting 1000 PSI @ crack, with screw adjustments on all counterbalance cartridges.

*At 70 PSI ΔP

Note: Maximum of six spools per assembly. For each additional spool repeat spool option after stack-on option.

Service Parts	
Bodies BV06-6T Parallel or Series Individual Body BV06-E6T Parallel Inlet/Outlet Body BV06-M6T Parallel Middle Body BV06-SI6T Series Inlet Body BV06-SM6T Series Middle Body BV06-SO6T Series Outlet Body (No Spool)	Spools P/N 118736-00 Code P1 Spool P/N 118737-00 Code P4 Spool P/N 118767-00 Code P11 Spool P/N 118731-00 Code P20 Spool P/N 118731-00 Code P21 Spool P/N 118736-00 Code P23 Spool P/N 710025-00 Code S2 Spool P/N 710015-00 Code S8 Spool P/N 710015-00 Code S24 Spool
Coils P/N 851050***** Double Spade Coil P/N 851052***** Double Wire Coil P/N 851054***** Double Screw Coil P/N 851056***** Single Screw Coil P/N 851020***** DIN Plug Face Coil (AC or DC) P/N 1500189 Weather Pack Coil	Tube Assemblies P/N 709780-01 Tube Assembly with heavy spring - use with P1, P11, & P23 spools P/N 1500051 Tube Assembly with light spring - use with P4, S2, S8, & S24 spools P/N 1500056 Tube Assembly with heavy spring - use with P20 & P21 spools
Note: Coils are available in 12 VDC, 24 VDC, & 120 VAC versions only. P/N 851052-012 VDC is a 12 VDC Double Wire Coil.	Plug Assemblies (Single Solenoid Valve only) P/N 710020-01 Plug Assembly with Heavy Spring - use with P1, P11, & P23 spools P/N 710020-02 Plug Assembly with Light Spring - use with P4, P20, P21, S2, S8, & S20 spools
	Tube End Nut P/N 118113-00 Seals P/N 2013N-7 (Between sections) P/N 2018N-7 (Between stacks)

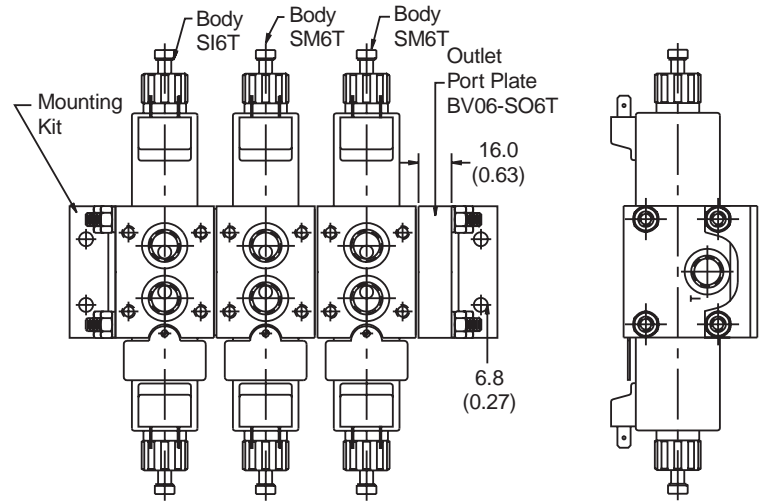
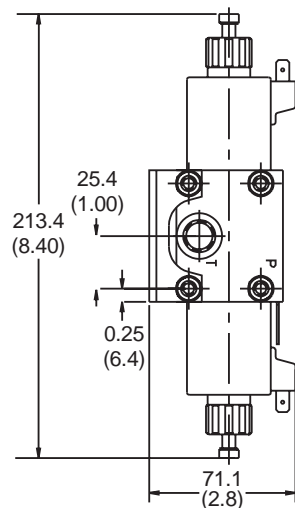
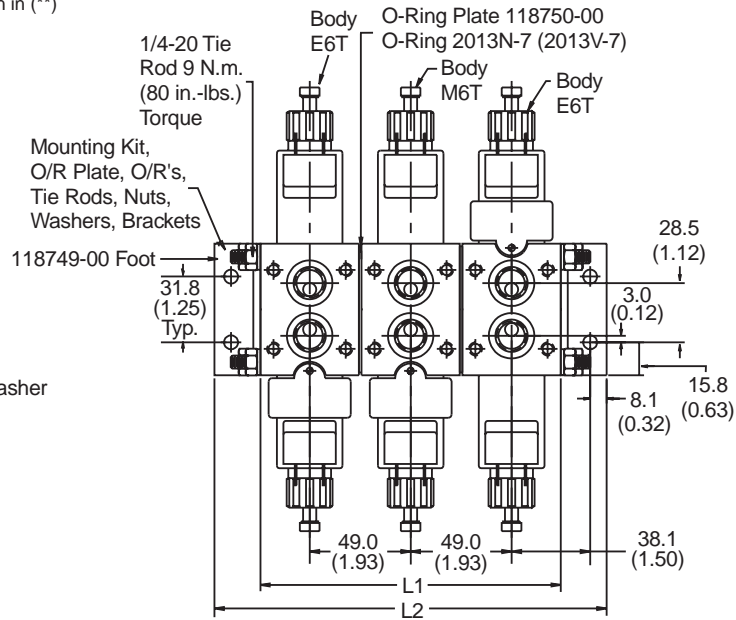
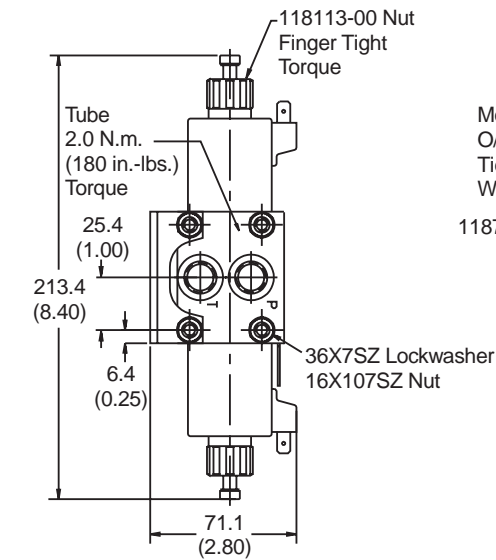
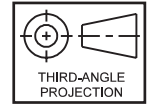


Code	Description	Symbol	Code	Description	Symbol
A	A Port P.O. Check		M	A & B Port Meter-Out Pressure Comp.	
B	B Port P.O. Check		G5	A Port Meter-In Flow Control Non-Pressure Comp.	
C	A & B Port P.O. Checks		H5	B Port Meter-In Flow Control Non-Pressure Comp.	
D	A Port to B Port Crossover Relief		J5	A & B Port Meter-In Flow Control Non-Pressure Comp.	
E	B Port to A Port Crossover Relief		K5	A Port Meter-Out Flow control Non-Pressure Comp.	
F	A & B Ports Dual Crossover Relief		L5	B Port Meter-Out Flow Control Non-Pressure Comp.	
G	A Port Meter-In Flow Control Pressure Comp.		M5	A & B Port Meter-Out Non-Pressure Comp.	
H	B Port Meter-In Flow Control Pressure Comp.		NN	A Port Counterbalance 56.8 LPM (15 GPM) Max.	
J	A & B Port Meter-In Flow Control Pressure Comp.		PP	B Port Counterbalance 56.8 LPM (15 GPM) Max.	
K	A Port Meter- Out Flow Control Pressure Comp.		RR	A & B Port Counterbalance 56.8 LPM (15 GPM) Max.	
L	B Port Meter-Out Flow Control Pressure Comp.				

Weights:
 Single Solenoid
 Spool Section 1.26 kg (2.8 lbs.)
 Double Solenoid
 Spool Section 1.50 kg (3.3 lbs.)

Note: Maximum of two stack-ons per spool section.
 * Meter-In is from the valve to the actuator. Meter-Out is from the actuator to the valve.

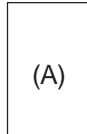
*Inch equivalents for millimeter dimensions are shown in (**)



Number of Spool Sections	1		2		3		4		5		6	
	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2
Dimensions												
Individual-Parallel or Series	47.8 (1.88)	92.2 (3.63)										
Parallel			96.8 (3.81)	141.2 (5.56)	145.8 (5.74)	190.3 (7.49)	194.8 (7.67)	239.3 (9.42)	243.8 (9.60)	288.3 (11.35)	325.9 (12.83)	370.3 (14.58)
Parallel, Parallel with Inlet Relief, Inlet Unloader with Relief	80.8 (3.18)	125.2 (4.93)	129.8 (5.11)	174.2 (6.86)	178.8 (7.04)	223.3 (8.79)	227.8 (8.97)	272.3 (10.72)	276.9 (10.90)	321.3 (12.65)	329.2 (12.96)	373.6 (14.71)
Series			113.9 (4.49)	158.4 (6.24)	162.9 (6.42)	207.4 (8.17)	212.0 (8.35)	256.4 (10.10)	261.0 (10.28)	305.4 (12.03)	310.0 (12.21)	354.5 (13.96)
Series with Inlet Relief	80.8 (3.18)	125.2 (4.93)	149.2 (5.79)	191.4 (7.54)	196.0 (7.72)	240.4 (9.47)	244.9 (9.65)	289.4 (11.40)	294.8 (11.58)	338.5 (13.33)	343.0 (13.51)	387.5 (15.26)
Mounting Kit												
Individual-Parallel or Series	BV06-MK1											
Parallel			BV06-MK2		BV06-MK3		BV06-MK4		BV06-MK5		BV06-MK6	
Parallel with Inlet Relief, Inlet Unloader with Relief	BV06-MK1A		BV06-MK2A		BV06-MK3A		BV06-MK4A		BV06-MK5A		BV06-MK6A	
Series	BV06-MK1B		BV06-MK2B		BV06-MK3B		BV06-MK4B		BV06-MK5B		BV06-MK6B	
Series with Inlet Relief	BV06-MK1C		BV06-MK2C		BV06-MK3C		BV06-MK4C		BV06-MK5C		BV06-MK6C	

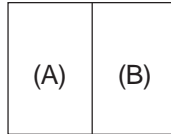
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One spool section – parallel or series



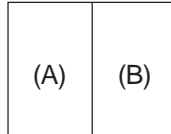
1 — BV06-6T Body (A)

One spool section with inlet relief, inlet unloader, or inlet unloader with relief – parallel only



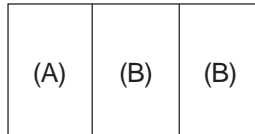
1 — BV06-MR,U, or, UR-6T Body (A)
1 — BV06-E6T Body (B)
1 — Mounting kit, BV06-MK1A

Two spool sections – parallel only



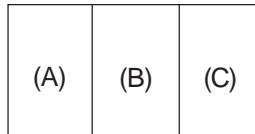
1 — BV06-E6T (A)
1 — BV06-E6T (B)
1 — Mounting kit, BV06-MK2

Two spool sections with inlet relief, inlet unloader, or inlet unloader with relief – parallel only



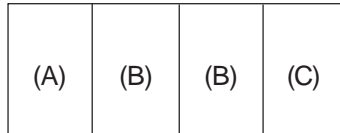
1 — BV06-MR,U, or, UR-6T Body (A)
1 — BV06-M6T Body (B)
1 — BV06-E6T Body (C)
1 — Mounting kit, BV06-MK2A

Three spool sections – parallel only



1 — BV06-E6T (A)
1 — BV06-M6T Body (B)
1 — BV06-E6T Body (C)
1 — Mounting kit, BV06-MK3

Three spool sections with inlet relief, inlet unloader, or inlet unloader with relief – parallel only

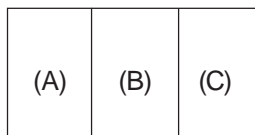


1 — BV06-MR,U, or, UR-6T Body (A)
2 — BV06-M6T Body (B)
1 — BV06-E6T Body (C)
1 — Mounting kit, BV06-MK3A

For four to six section parallel assemblies, use the three spool section – parallel only assembly as shown as a starting point. For each additional section, add one BV06-M6T section between the BV06-E6T sections. Mounting kits will be BV06-MK4 to MK6 respectively.

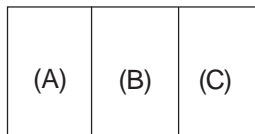
For four to six section parallel assemblies with an inlet relief, inlet unloader, inlet unloader with relief, use the three spool parallel assembly as shown as a starting point. For each additional section, add one BV06-M6T section between the BV06-MR, U, or UR6T and BV06-E6T sections. Mounting kits will be BV06-MK4A to MK6A respectively.

One spool section with inlet relief, inlet unloader, or inlet unloader with relief — series only



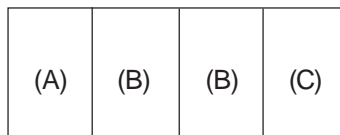
1 — BV06-MR,U, or, UR-6T Body (A)
1 — BV06-SM6T Body (B)
1 — BV06-SO6T Body (C)
1 — Mounting kit, BV06-MK1C

Two spool sections – series only



1 — BV06-SI6T Body (A)
1 — BV06-SM6T Body (B)
1 — BV06-SO6T Body (C)
1 — Mounting kit, BV06-MK2B

Two spool sections with inlet relief, inlet unloader, or inlet unloader with relief – series only



1 — BV06-MR,U, or, UR-6T Body (A)
2 — BV06-SM6T Body (B)
1 — BV06-SO6T Body (C)
1 — Mounting kit, BV06-MK2C

For three to six section series assemblies, use the two spool section – series only assembly as shown as a starting point. For each additional section, add one BV06-SM6T section between the BV06-SI6T and BV06-SO6T sections. Mounting kits will be BV06-MK3B to MK6B respectively.

For three to six section series assemblies with an inlet relief, inlet unloader, inlet unloader with relief, use the three spool series assembly as shown as a starting point. For each additional section, add one BV06-SM6T section between the BV06-MR, U, or UR6T and BV06-SO6T bodies. Mounting kits will be BV06-MK3C to MK6C respectively.

Stack Mounting Kit Matrix

Single Stack Valve: Choose stack valve in column to left. Follow chart to column labeled Single Stack. Choose stack mounting kit part number.

Double Stack Valves: Choose bottom stack from column at left. Follow chart over to top stack valve. Choose stack mounting kit part number.

Bottom or Single Stack		Top Stack			
Stacking Kit P/N Nitrile O-rings Fluorocarbon O-rings	Single Stack	Single and Double P.O. Check	Single Flow and Double Control	Single Counterbalance (A or B)	Double Crossover Relief
Single and Double P.O. Check	BV06-SK1 BV06-SK1V	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Single and Double Flow Control	BV06-SK1 BV06-SK1V	BV06-SK4A BV06-SK4AV	Not Applicable	BV06-SK5A BV06-SK5AV	BV06-SK7A BV06-SK7AV
Single Counter- balance (A or B)	BV06-SK1A BV06-SK1AV	BV06-SK3A BV06-SK3AV	BV06-SK3A BV06-SK3AV	Not Applicable	Not Applicable
Double Counterbalance	BV06-SK3A BV06-SK3AV	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Single Crossover Relief (A or B)	BV06-SK1A BV06-SK1AV	BV06-SK3A BV06-SK3AV	BV06-SK3A BV06-SK3AV	BV06-SK4A BV06-SK4AV	Not Applicable
Double Crossover Relief	BV06-SK2A BV06-SK2AV	BV06-SK6A BV06-SK6AV	BV06-SK6A BV06-SK6AV	BV06-SK7A BV06-SK7AV	Not Applicable

Stack Valve Component Data

Alternate Method of Determining Stack Valve Mounting Kits:

Determine Cap Screw Minimum Length (L) using formula below and choose next longest cap screw and associated mounting kit from the Cap Screw Data chart:

$$\text{Single Stack Cap Screw Minimum Length (L) = Stack Valve Height (H) - Stack Valve Counterbore (CB) + 9.5 mm (0.38")}$$

$$\text{Double Stack Cap Screw Minimum Length (L) = Bottom Stack Valve Height (H) + Top Stack Valve Height (H) - Top Stack Valve Counterbore (CB) + 9.5 mm (0.38")}$$

Stack Valve	Single and Double P.O. Check	Single and Double Flow Control	Single Counterbalance (A or B)	Double Counterbalance	Single Cross- over Relief (A or B)	Double Crossover Relief
Stack Valve Height (H)	37.3 mm (1.47")	50.0 mm (1.97")	44.4 mm (1.75")	80.8 mm (3.18")	44.2 mm (1.74")	62.7 mm (2.47")
Stack Valve Counterbore (CB)	7.6 mm (0.30")	20.3 mm (0.80")	6.6 mm (0.26")	7.6 mm (0.30")	6.4 mm (0.25")	11.2 mm (0.44")

Stacking Kits

Cap Screw Length	44.4 mm (1.75")	50.8 mm (2.00")	63.5 mm (2.50")	88.9 mm (3.50")	95.2 mm (3.75")	101.6 mm (4.00")	108.0 mm (4.25")	114.3 mm (4.50")
Mounting Kit Number w/Nitrile	BV06-SK1	BV06-SK1A	BV06-SK2A	BV06-SK3A	BV06-SK4A	BV06-SK5A	BV06-SK6A	BV06-SK7A
Mounting Kit Number w/Fluorocarbon	BV06-SK1V	BV06-SK1AV	BV06-SK2AV	BV06-SK3AV	BV06-SK4AV	BV06-SK5AV	BV06-SK6AV	BV06-SK7AV

Stack valve mounting kits are furnished complete with socket head cap screws, lock washers, and o-ring seals. Please contact the factory for combinations not shown in the chart for application approval.

Mounting Kits

BV

Bankable Valve

06

Size

—

MK

Mounting Kit

No. of Spool Sections
(1 to 6)

Combinations

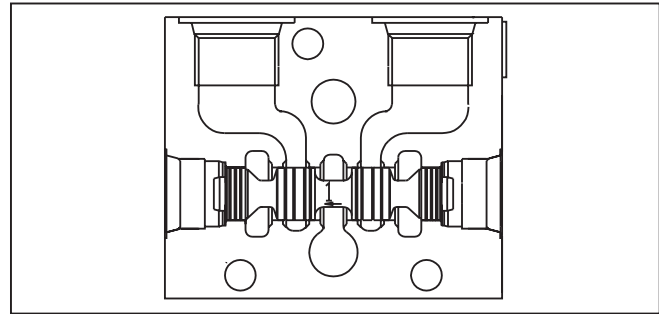
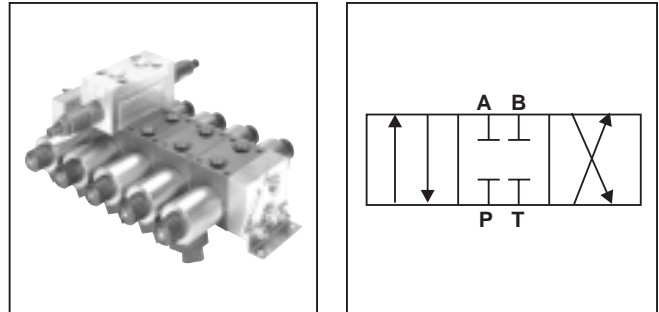
Code	Description
Omit	Individual parallel spool sections. (Note: When only one section is used, the individual spool section can be either parallel or series.)
A	Parallel assemblies with inlet relief, inlet unloader, or unloader with relief.
B	Two through six section series assemblies without inlet relief, inlet unloader, or unloader with relief.
C	Series assemblies with inlet relief, inlet unloader, or unloader with relief.

General Description

Series BV18 Bankables are 2 or 3 position, 4-way, directional control valves. They provide a spool valve that can be used either individually or in multiple spool banks. BV18 bankable valves have auxiliary banking sections that can be mounted to provide auxiliary functions such as an inlet relief or unloading function. In addition, stack-on sections can be mounted on the cylinder port face of the BV18 bankable valve spool sections to provide additional functions such as crossover reliefs, cylinder port reliefs, P.O. checks, flow controls, and counterbalances. BV18 bankable valves are also available with two different proportional spool options, and can be used to create custom, multi-functional circuits.

Operation

The spool is shifted from its center position by either energizing one of the solenoids, applying air or hydraulic pressure, or by shifting the lever. Three-position spring centered and two-position spring offset valves are available. The spools of the proportional BV18 bankable valves are shifted by energizing one of the solenoid coils. The travel of the spool is in direct proportion to the amperage applied to the solenoid coil. The more amperage that is applied, the further the spool shifts until it is at full travel. As long as the coil amperage is held steady, the spool will hold its position. As the amperage decreases, the spool will travel back towards its neutral position. Metering notches on the spool vary the pressure drop across the spool. As the spool travels, the flow varies. Once the spool is held in a given position, the pressure drop across the metering notches of the spool determines the flow.

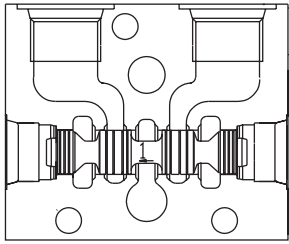


Features

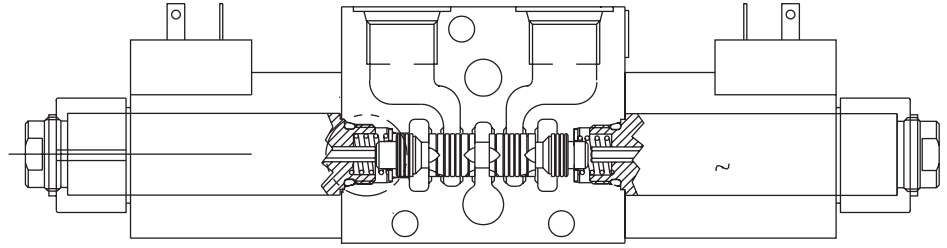
- High flow capacity with reduced space requirements.
- High back pressure; all ports withstand maximum working pressure.
- Precision machined valve body is made from high tensile cast iron.
- A five chamber style body ensures high pressure operation.
- Six different spool styles are available; all are four land spools for smoother shifting.
- Available operators include single or double solenoids, lever, hydraulic pilot, or air pilot.
- All solenoids are a one-piece coil featuring numerous voltages and terminations.

	BV18	BV18 Proportional
Nominal Flow (at 70 PSI ΔP)	30-90 LPM (8-24 GPM) depending on spool	Up to 22.5 LPM (6 GPM) depending on spool
Maximum Inlet & Tank Pressure	Parallel: 350 Bar (5000 PSI) Inlet 210 Bar (3000 PSI) Tank Series: 210 Bar (3000 PSI) Inlet & Tank	Parallel: 350 Bar (5000 PSI) Inlet 210 Bar (3000 PSI) Tank
Porting	SAE -8	SAE -8
Maximum Internal Leakage (3000 PSI) (110 SSU oil)	#1 Spool: 22.9 cc per land/min. (1.40 cu. in. per land/min.) #2 Spool: 47.2 cc per land/min. (2.88 cu. in. per land/min.) #9 Spool: 24.4 cc per land/min. (1.49 cu. in. per land/min.) #11 Spool: 87.4 cc per land/min. (5.33 cu. in. per land/min.)	#81 Spool: 22.9 cc per land/min. (1.40 cu. in. per land/min.) #82 Spool: 22.9 cc per land/min. (1.40 cu. in. per land/min.)
Hysteresis	Not Applicable	8%
Frequency	Not Applicable	200 Hz PWM
Air Pressure to Shift	Crack - 3.5 Bar (50 PSIA) Full Shift - 6.9 Bar (100 PSIA)	Not Applicable Not Applicable
Maximum Air Pressure	10.3 Bar (150 PSIA)	Not Applicable
Air Piston Area	506 sq. mm (.785 sq. in.)	Not Applicable
Air Piston Stroke	3.4 mm (.135 in.)	Not Applicable
Hydraulic Pressure to Shift	Crack - 15.2 Bar (200 PSI) Full Shift- 20.7 Bar (300 PSI)	Not Applicable
Max. Hydraulic Pilot Pressure	210 Bar (3000 PSI)	Not Applicable
Hydraulic Piston Area	198 sq. mm (.307 sq. in.)	Not Applicable
Hydraulic Piston Stroke	3.4 mm (.135 in.)	Not Applicable
Operating Temperature Range (Ambient)	Nitrile: -40°C to +93°C (-40°F to +200°F) Fluorocarbon: -32°C to +121°C (-25°F to +250°F)	Nitrile: -40°C to +93°C (-40°F to +200°F) Fluorocarbon: -32°C to +121°C (-25°F to +250°F)
Material	Body: Precision machined and honed from cast iron Spool: Hardened and ground steel	Body: Precision machined and honed from cast iron Spool: Hardened and ground steel
Filtration	ISO Code 16/13, SAE Class 4 or better	ISO Code 16/13, SAE Class 4 or better
Mounting Position	No restrictions	No restrictions
Mounting Type	Line mounted	Line mounted

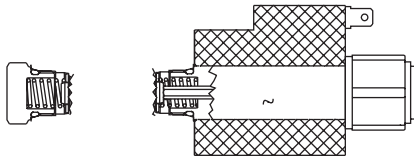
Valve Body With Spool



Proportional Valve Body With Spool

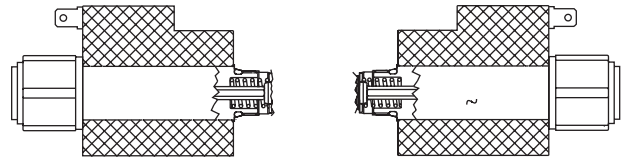


Single Solenoid



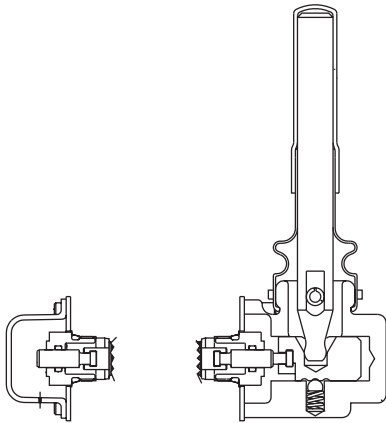
BV18SA (A Side) - BV18SB (B Side)

Double Solenoid



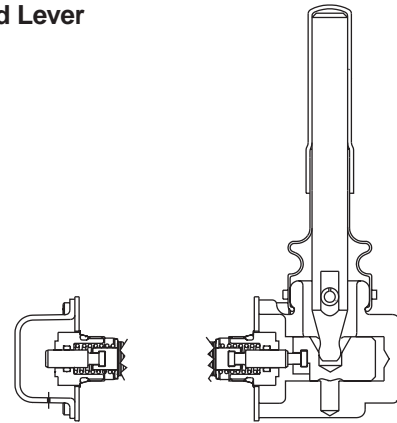
BV18S

Lever



BV18LA (A Side) - BV18LB (B Side)

Detented Lever



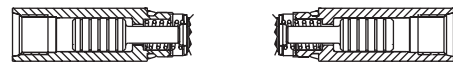
BV18DA (A Side) - BV18DB (B Side)

Single Hydraulic Pilot



BV18-HA (A Side) - BV18-HB (B Side)

Double Hydraulic Pilot



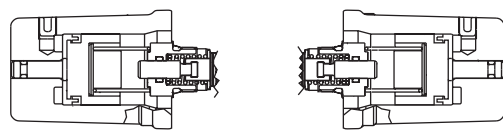
BV18-H

Single Air Pilot



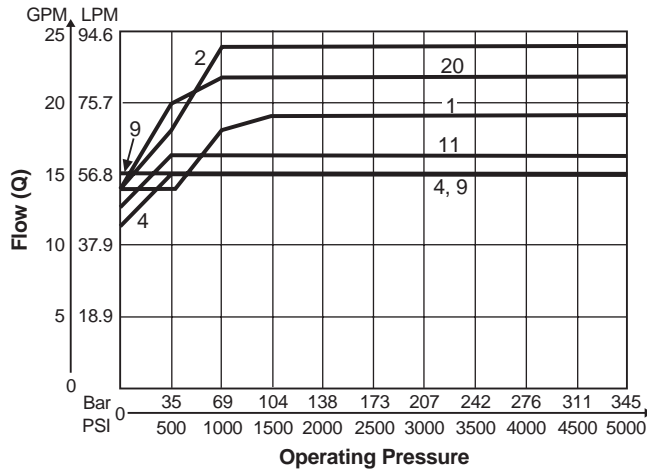
BV18-PA (A Side) - BV18-PB (B Side)

Double Air Pilot



BV18-P

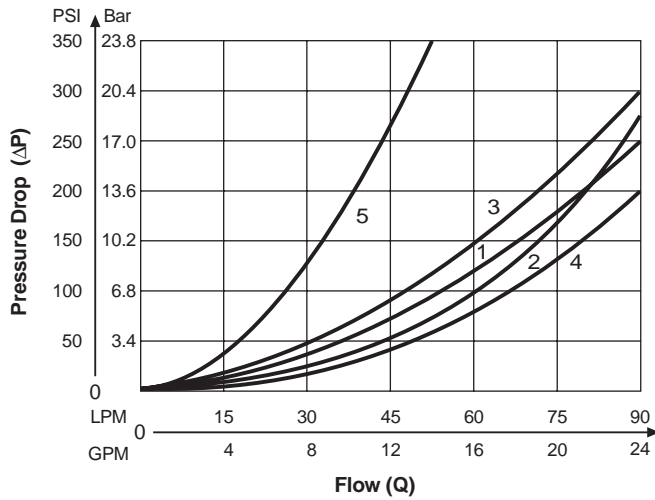
Switching Limits



Notes:

1. Shift limits apply to all actuator types.
2. Unless otherwise specified, all curves were generated using solenoid actuators at 90% of rated with voltage.
3. The 4 spool maximum working pressure drop cannot exceed 136 Bar (2000 PSI) from inlet to work port using 24 watt coils, and 204 Bar (3000 PSI) using 30 watt coils.
4. The 1 spool and the 11 spool should be used with 30 watt coils when working pressure exceeds 238 Bar (3500 PSI).
5. All valves tested using 110 SSU oil.
6. Maximum flow for the 2 spool is 45 LPM (12 GPM) using AC coils.
7. All AC coils must be 25 watt rated.

Differential Pressure



		Flow Path				
		P-A	P-B	A-T	B-T	P-T
S	1	1	1	2	2	
	2	1	1	2	2	2
O	4	1	1	1	3	
	9	1	1	2	2	5
L	11	1	1	2	2	
	20	1*	1**	4**	3**	

*20 Spool, De-energized **20 Spool, Energized

Notes:

1. Refer to shift limit curves for flow capabilities of individual spools.
2. Curves were generated using 110 SSU hydraulic oil.

Solenoid Coil Specifications

Solenoid Code	Nominal Voltage/Hz	In Rush Amps	Holding Amps	Wattage
D10	10 VDC	—	3.0	24
D10H	10 VDC	—	3.5	30
D12	12 VDC	—	2.0	24
D12H	12 VDC	—	2.5	30
D24	24 VDC	—	1.0	24
D24H	24 VDC	—	1.25	30
A120H	120 VAC/60 Hz	2.00	0.49	25
A120H	110 VAC/50 Hz	2.10	0.58	27
A240H	240 VAC/60 Hz	1.00	0.26	25
A240H	220 VAC/60 Hz	1.05	0.31	27

Typical Solenoid Response Times

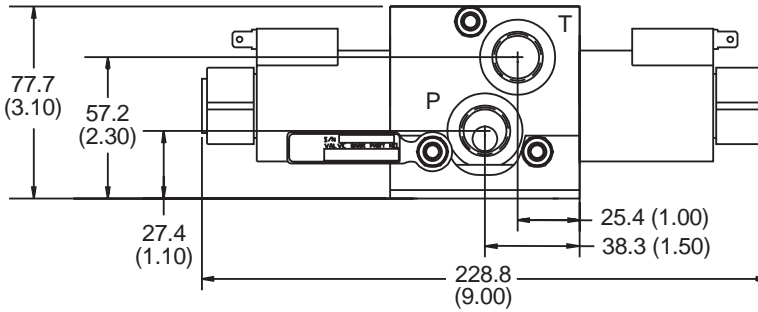
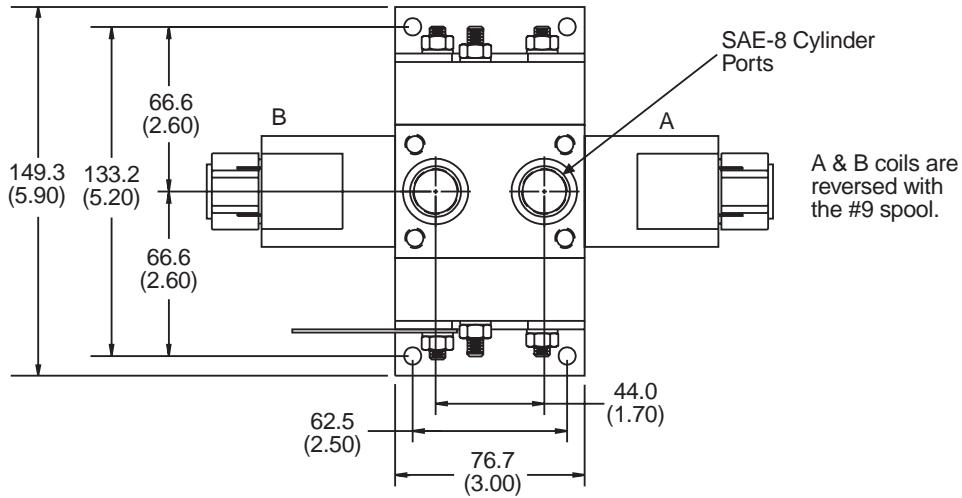
DC COILS				
Spool	Coil Type	Pull In	Pressure Response Drop Out	Full Shift Drop Out
1	12 VDC, 24 Watt (12)	65 ms	40 ms	239 ms
1	12 VDC, 30 Watt (12H)	42 ms	40 ms	239 ms
2	12 VDC, 24 Watt (12)	174 ms	40 ms	140 ms
2	12 VDC, 30 Watt (12H)	155 ms	40 ms	144 ms
4	12 VDC, 24 Watt (12)	44 ms	40 ms	294 ms
4	12 VDC, 30 Watt (12H)	40 ms	40 ms	292 ms
9	12 VDC, 24 Watt (12)	426 ms	40 ms	340 ms
9	12 VDC, 30 Watt (12H)	191 ms	40 ms	431 ms
11	12 VDC, 24 Watt (12)	45 ms	40 ms	233 ms
11	12 VDC, 30 Watt (12H)	38 ms	40 ms	257 ms
20	12 VDC, 24 Watt (12)	69 ms	20 ms	23 ms
20	12 VDC, 30 Watt (12H)	47 ms	20 ms	27 ms
AC COILS				
Spool	Coil Type	Pull In	Pressure Response Drop Out	Full Shift Drop Out
1	120 VAC/60 Hz, (11H)	12 ms	20 ms	279 ms
1	110 VAC/50 Hz, (11H)	12 ms	20 ms	279 ms
2	120 VAC/60 Hz, (11H)	12 ms	20 ms	278 ms
2	110 VAC/50 Hz, (11H)	12 ms	20 ms	278 ms
4	120 VAC/60 Hz, (11H)	12 ms	20 ms	278 ms
4	110 VAC/50 Hz, (11H)	12 ms	20 ms	278 ms
9	120 VAC/60 Hz, (11H)	16 ms	20 ms	242 ms
9	110 VAC/50 Hz, (11H)	16 ms	20 ms	242 ms
11	120 VAC/60 Hz, (11H)	16 ms	20 ms	249 ms
11	110 VAC/50 Hz, (11H)	16 ms	20 ms	249 ms
20	120 VAC/60 Hz, (11H)	17 ms	20 ms	236 ms
20	110 VAC/50 Hz, (11H)	17 ms	20 ms	236 ms

Proportional Solenoid Coil Specifications

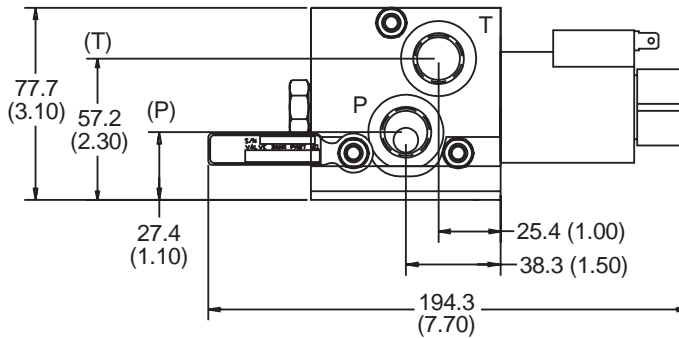
Solenoid Code	Nominal Voltage/Hz	Watts	Step Response	Ramp Time
D012	12 VDC	24	96 ms	Up to 3 seconds
D024	24 VDC	24	96 ms	Up to 3 seconds

*Inch equivalents for millimeter dimensions are shown in (**)

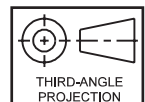
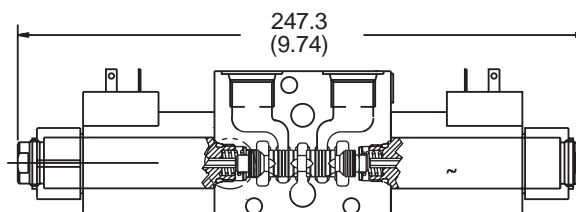
Double Solenoid



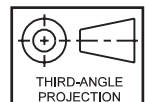
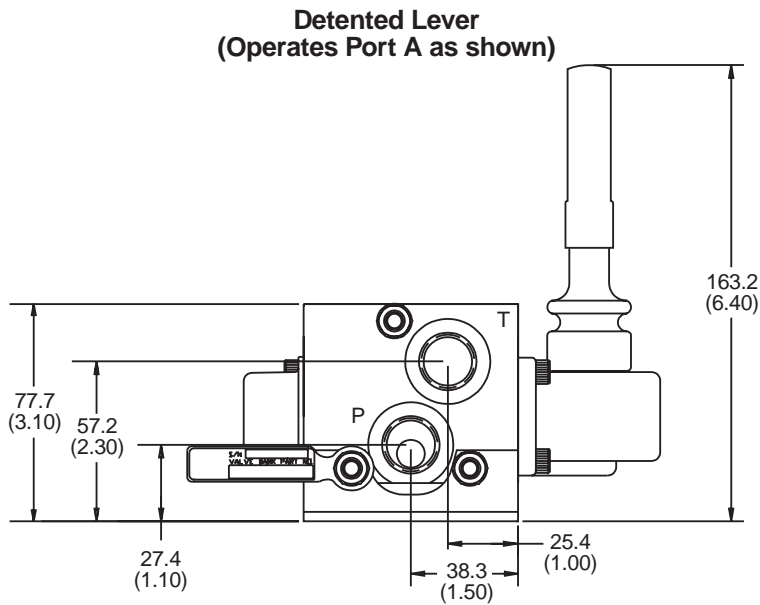
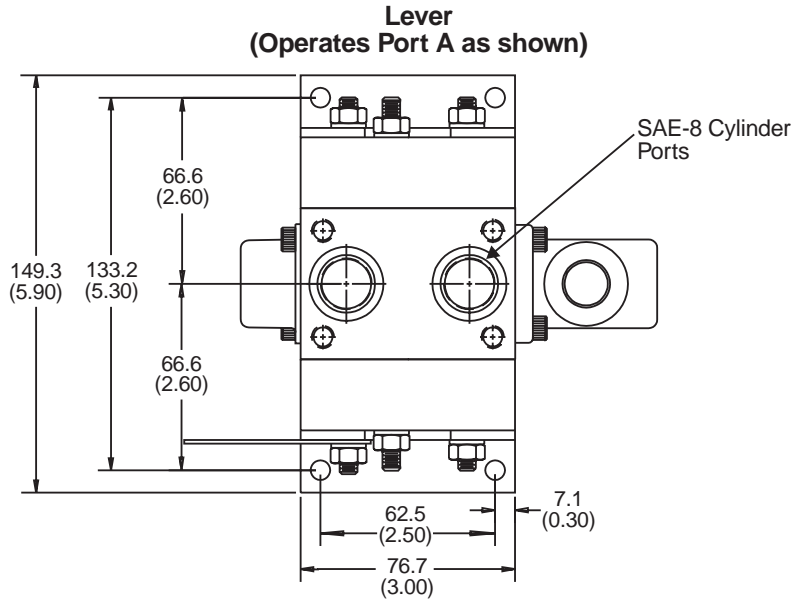
Single Solenoid



Proportional Double Solenoid

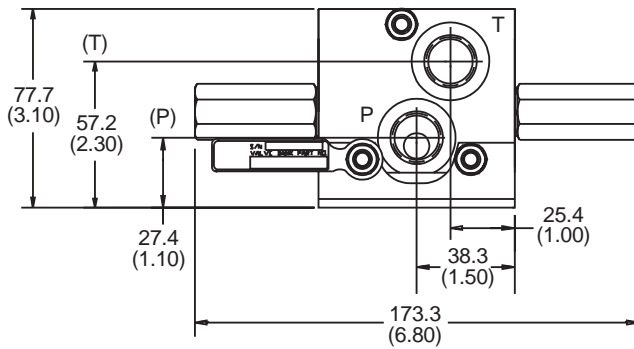
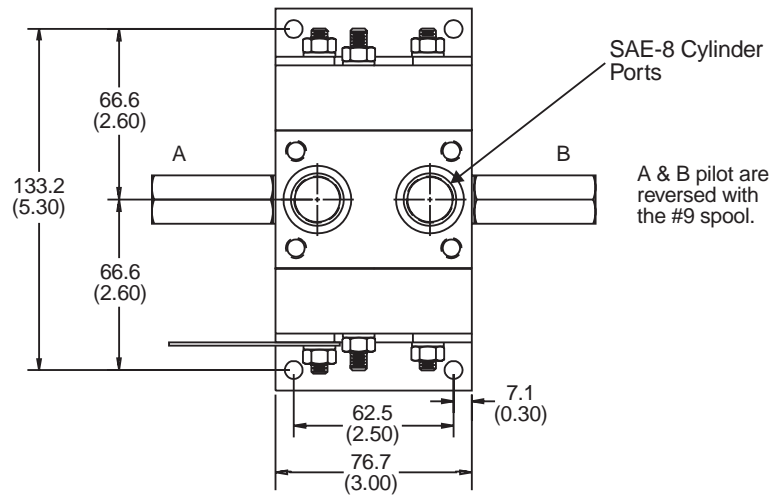


*Inch equivalents for millimeter dimensions are shown in (**)

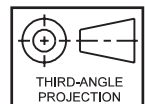
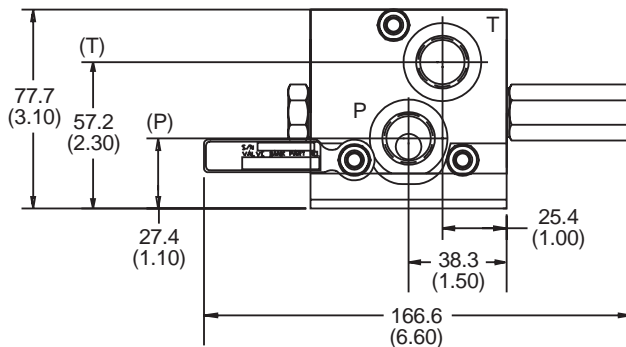


*Inch equivalents for millimeter dimensions are shown in (**)

Double Hydraulic Pilot

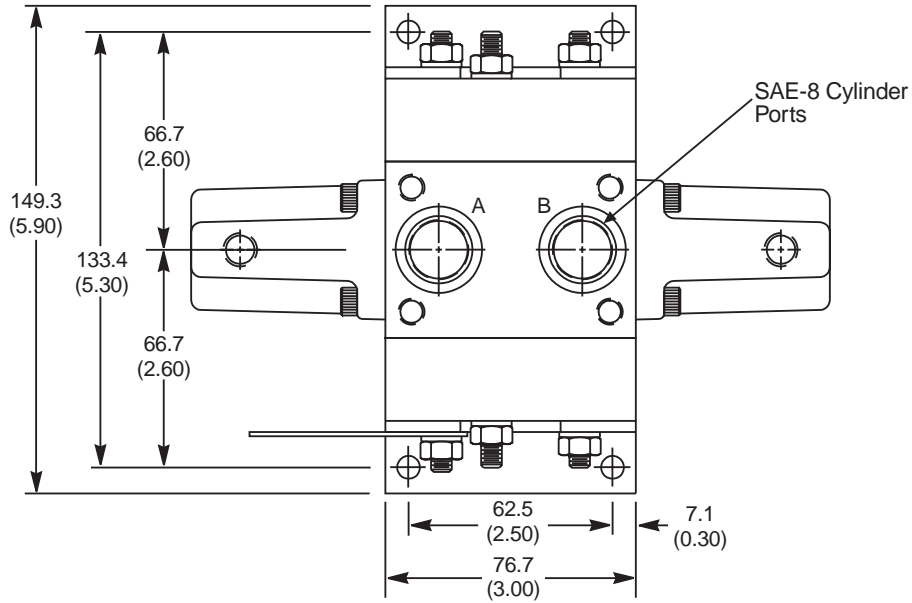


**Single Hydraulic Pilot
(Operates A Port as shown)**

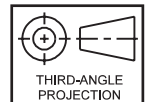
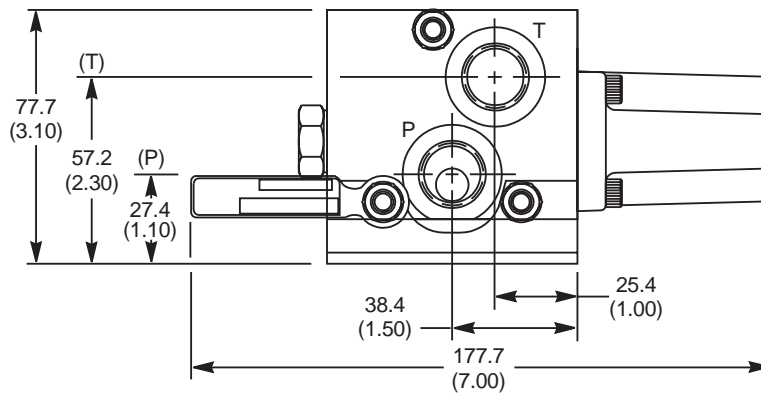


*Inch equivalents for millimeter dimensions are shown in (**)

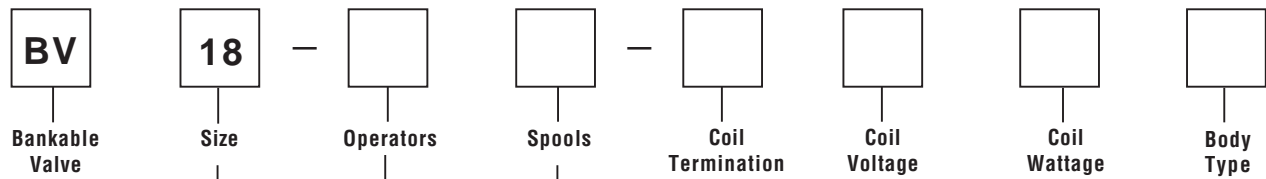
Double Air Pilot



Single Air Pilot



Spool Assemblies (Individual Sections)



Code	Description
18	68.1 LPM (18 GPM) Nominal Flow

Code	Description
S	Dual Solenoids
SA	Single Solenoid on A
SB	Single Solenoid on B
LA	Lever on A
LB	Lever on B
DA	Lever w/detent on A
DB	Lever w/detent on B
H	Dual Hydraulic Pilot
HA	Hydraulic Pilot on A
HB	Hydraulic Pilot on B
P	Dual Air Pilot
PA	Air Pilot on A
PB	Air Pilot on B
F	Proportional; Dual Solenoids
FA	Proportional; Single Solenoid on A
FB	Proportional; Single Solenoid on B

Code	Description
1	Closed Center; 68.1 LPM (18 GPM) Nominal; Parallel
2	Open Center 90.8 LPM (24 GPM) Nominal; Series or Parallel
4	Motor; 90.8 LPM (24 GPM); Parallel
9	Tandem; 68.1 LPM (15 GPM); Series
11	Bleeder; 56.8 LPM (15 GPM); Parallel
20	Two Position; 64.3 LPM (17 GPM); Parallel
81	Closed Center; Closed Transition; Proportional 22.7 LPM (6 GPM)
82	Motor; Meter-In; Proportional 22.7 LPM (6 GPM)

Code	Description
Omit	Non-Solenoid
D10	10 VDC
D12	12 VDC
D24	24 VDC
A120	120 VAC (60 Hz) 110 VAC (50 Hz)
A240	240 VAC (60 Hz) 220 VAC (50 Hz)

Code	Description
Omit	Non-Solenoid
L	24 Watt DC Only
H	30 Watt - DC (& Proportional) 24 Watt - AC

Code	Description
Omit	Non-Solenoid
D	DIN 43650 Plug Face (AC or DC)
P	SAE 1B-0.25 Double Spade (DC Only)
S	Double 8-32 Screw & Nut (DC & non-Proportional Only)
S1	Single 8-32 Screw & Nut; Internally Ground (DC & non-Proportional Only)
W	Double Wire 24" Class H (DC & non-Proportional Only)
WP	Weather Pack Connector, 5" Leads, Male Connector (DC & non-Proportional Only)

Note: Proportional coils are available in 12 VDC and 24 VDC voltages with DIN and Dual Spade coils only.

Code	Description
Omit	Without Inlet/Outlet - Spool Section Only
T	Without Inlet/Outlet - Spool Section Only with Added Tank Port for Tank Port Reliefs

Weights:

Double Solenoid 2.93 kg (6 lbs.)
 Single Solenoid 2.03 kg (4.5 lbs.)

bv18.p65, dd, jk

Service Parts

Bodies

BV18-W Individual Body - Series or Parallel
 BV18-WT Individual Body - Series or Parallel
 with added Tank Port for Tank Port Reliefs

Coils

1550090-10 10 VDC, 24 Watt Dual Spade Coil
 1550090-12 12 VDC, 24 Watt Dual Spade Coil
 1550090-24 24 VDC, 24 Watt Dual Spade Coil
 1550091-10 10 VDC, 30 Watt Dual Spade Coil
 1550091-12 12 VDC, 30 Watt Dual Spade Coil
 1550091-24 24 VDC, 30 Watt Dual Spade Coil
 1550092-10 10 VDC, 24 Watt Dual Wire Coil
 1550092-12 12 VDC, 24 Watt Dual Wire Coil
 1550092-24 24 VDC, 24 Watt Dual Wire Coil
 1550093-10 10 VDC, 30 Watt Dual Wire Coil
 1550093-12 12 VDC, 30 Watt Dual Wire Coil
 1550093-24 24 VDC, 30 Watt Dual Wire Coil
 1550094-10 10 VDC, 24 Watt DIN Plug Face Coil
 697228 120 VAC 60 Hz/110 VAC 50 Hz
 25 Watt DIN Plug Face Coil
 1550094-12 12 VDC, 24 Watt DIN Plug Face Coil
 697229 240 VAC 60 Hz/220 VAC 50 Hz
 25 Watt DIN Plug Face Coil
 1550094-24 24 VDC, 24 Watt DIN Plug Face Coil
 1550095-10 10 VDC, 30 Watt DIN Plug Face Coil
 1550095-12 12 VDC, 30 Watt DIN Plug Face Coil
 1550095-24 24 VDC, 30 Watt DIN Plug Face Coil
 1550177-12 12 VDC, 30 Watt Double Spade Proportional Coil
 1550177-24 24 VDC, 30 Watt Double Spade Proportional Coil
 1550178-12 12 VDC, 30 Watt Double Wire Proportional Coil
 1550178-24 24 VDC, 30 Watt Double Wire Proportional Coil
 1550174-12 12 VDC, 30 Watt DIN Plug Face Proportional Coil
 1550174-24 24 VDC, 30 Watt DIN Plug Face Proportional Coil

Tube Assemblies

P/N 697632 AC Tube Assembly
 P/N 697633 DC Tube Assembly
 P/N 697188 DC Proportional Tube Assembly

Spools

P/N 697601 #1 Spool
 P/N 697602 #2 Spool
 P/N 697604 #4 Spool
 P/N 1302128 #9 Spool
 P/N 697611 #11 Spool
 P/N 697620 #20 Spool
 P/N 1210011 #81 Proportional Spool
 P/N 1210012 #82 Proportional Spool

Seals

2013N-9 Body Seals (two required per Body)
 3907N-9 Tube/End Cap Seal (one required per
 Tube/End Cap)

General Description

Bankable Inlet Reliefs, Bankable Unloaders, Bankable Reliefs with Unloaders, and Proportional Bankable Unloaders are used in conjunction with BV18 bankable valve sections. They are used to regulate system pressure, unload the pump in a closed center circuit, or regulate pressure and unload the pump in a closed center circuit.

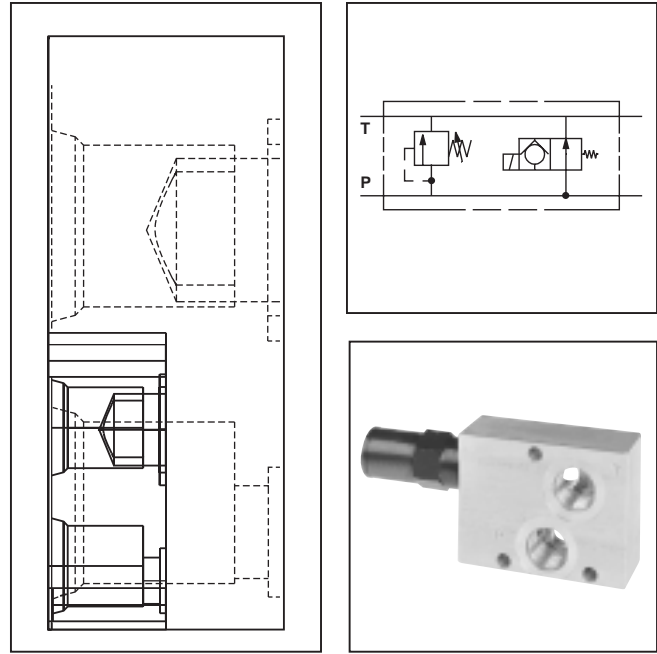
Operation

Inlet Relief — The inlet relief on the bankable valves is used to regulate the maximum system pressure. The inlet relief on the BV18 is a RDH103 series cartridge valve.

Unloading Valve — The inlet unloader is normally used with closed center directional valves to unload the pump when the directional control valves are in a neutral position. This is a normally open solenoid valve that is energized whenever one of the directional control valves are shifted out of neutral. The inlet unloader on a BV18 is a DSH101NR series cartridge valve.

Inlet Relief with Unloader — This valve is normally used with closed center directional control valves to provide a system relief and to unload the pump when the directional control valves are in the neutral position.

Proportional Unloader — This valve is used in systems with single or multiple non-proportional directional controls valves. The unloader is a normally open proportional flow control valve. By actuating one of the directional control valves and varying the input current to the proportional valve; the actuated directional control valve receives the benefit of proportional flow from the proportional unloader. As less flow is directed to tank by the proportional unloader, more flow is available to the actuated directional control valve. Once the optimum speed is achieved to the actuator from the directional control valve, the current to the proportional unloader can then be held constant.



Features

- High flow capacity with reduced space requirements.
- Full cartridge design — no loose parts — standard cartridge valves.
- Relief valve is differential area, direct-acting, poppet design.
- Manual override optional for unloading valve.
- Manual override standard for proportional unloader.

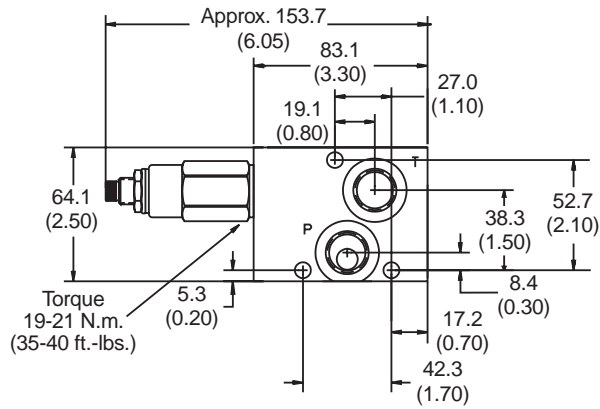
Specifications

	Inlet Relief	Unloader	Proportional Unloader
Rated Flow	75 LPM (20 GPM)	56.3 LPM (15 GPM)	52.5 LPM (14 GPM)
Max. Inlet Pressure	375 Bar (5500 PSI)	350 Bar (5000 PSI)	210 Bar (3000 PSI)
Max. Setting Pressure	350 Bar (5000 PSI)	Not Applicable	Not Applicable
Reseat Pressure	80% of Crack Pressure	Not Applicable	Not Applicable
Max. Internal Leakage	2/3 cc/min. (10 drops/min.) at 350 Bar (5000 PSI)	2/3 cc/min. (10 drops/min.) at 350 Bar (5000 PSI)	82 cc/min. (5 cu. in./min.)
Cavity	C10-2	C10-2	C12-2
Operating Temperature Range (Ambient)	Nitrile: -40°C to +93°C (-40°F to +200°F) Fluorocarbon: -23°C to +121°C (-10°F to +250°F)		
Cartridge Material	All parts steel. All working parts hardened, ground, and lapped.		
Body Material	High Tensile Aluminum or Continuous Cast Steel		
Filtration	ISO Code 16/13, SAE Class 4 or better		
Mounting	No restrictions		

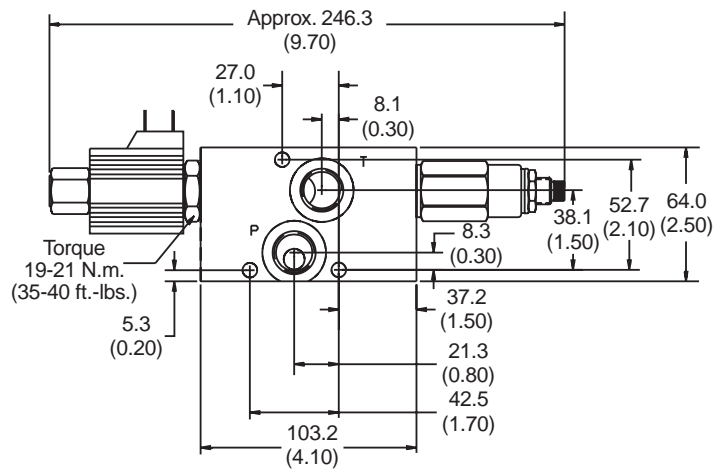
bv18i.p65, dd, jk

*Inch equivalents for millimeter dimensions are shown in (**)

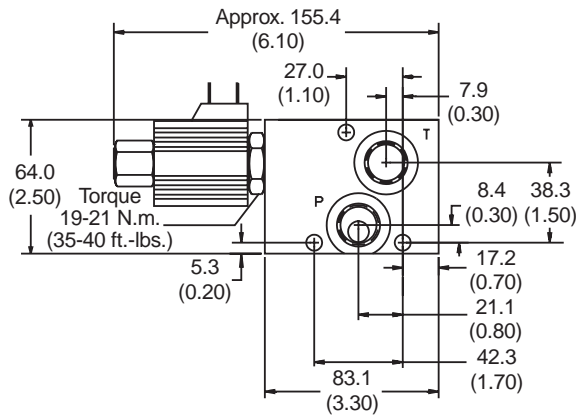
Inlet Relief



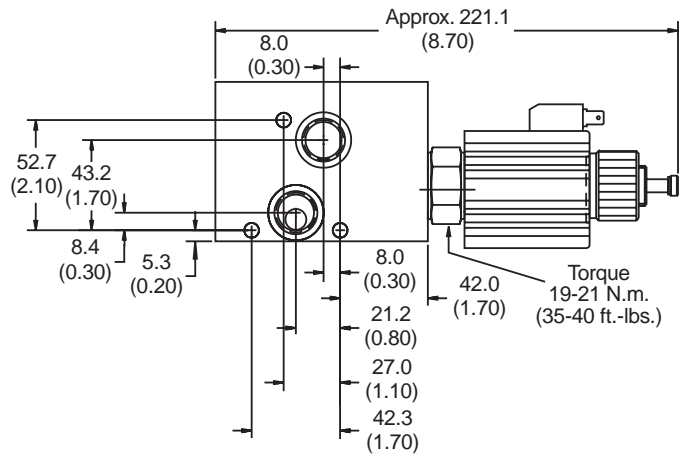
Inlet Unloading/Relief



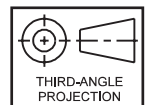
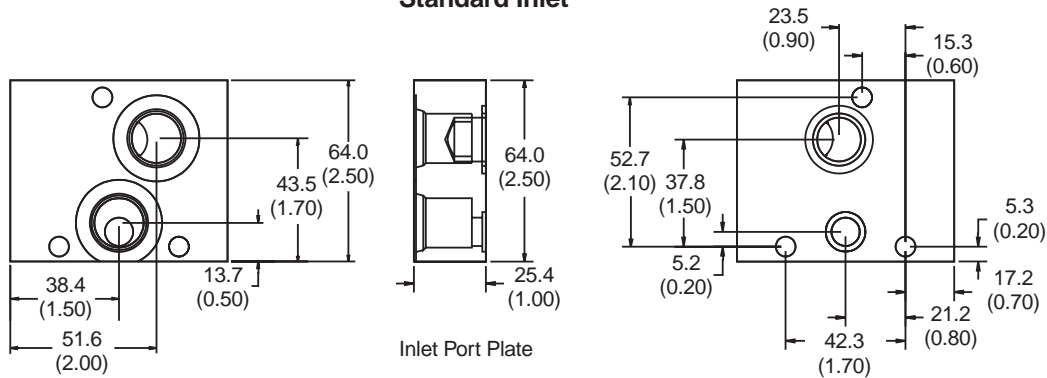
Inlet Unloading

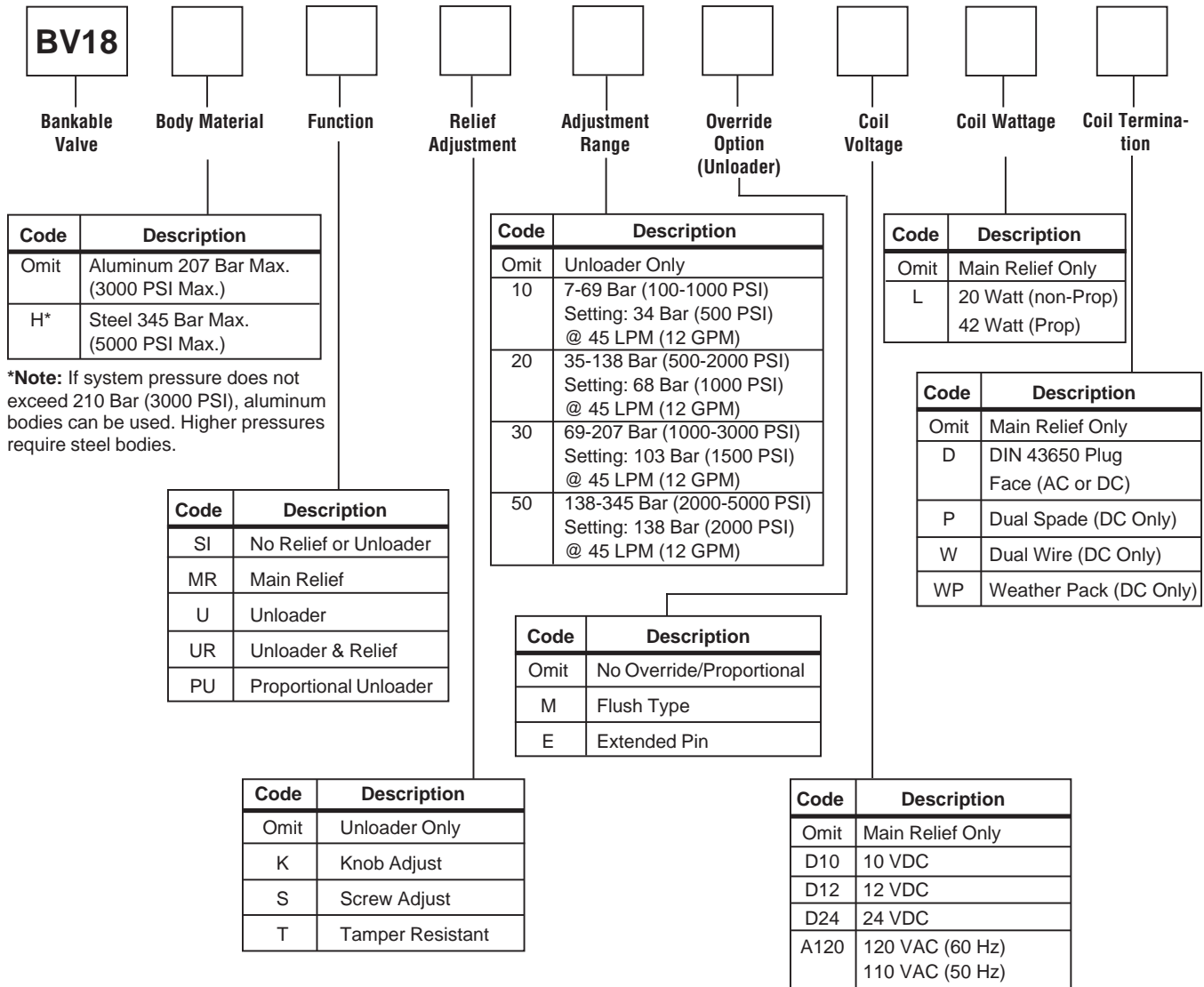


Proportional Inlet



Standard Inlet





Service Parts	
Inlet Relief	RDH103***
Inlet Unloader	DSH101N
Proportional Unloader	DF122N14
Solenoid Coils	
S10LD*****	DIN (Hirschman) Coil - Non Proportional
S10LP*****	Double Shade Coil - Non Proportional
S10LW*****	Double Wire Coil - Non Proportional
S10LWT*****	Double Wire Coil with weather pack connector - Non Proportional
P/N 851058*****	DIN (Hirschman) Coil - Proportional
P/N 851060*****	Double Shade Coil - Proportional
P/N 851062*****	Double Wire Coil - Proportional
P/N 852855*****	Double Wire Coil with weather pack connector - Proportional
Seals	
2013N-9	Body Seal
2019N-9	Body Seal

Weights:

- BV18SI - 0.3 kg (12 oz.)
- BV18MR - 0.5 kg (17 oz.)
- BV18U - 1.1 kg (37 oz.)
- BV18UR - 1.5 kg (54 oz.)
- BV18PU - 1.2 kg (40 oz.)

General Description

Bankable Stack-On valves are available on the BV18. These include single and double P.O. check valves, single and double crossover relief valves, single and double meter-in and meter-out, pressure compensated and non-compensated flow controls, single and double reliefs to tank, and single and double counterbalance valves.

All stack-on valves fit on top of their respective Bankable spool sections to provide secondary functions. Up to two different stack-on valves can be installed on top of their respective bankable spool sections.

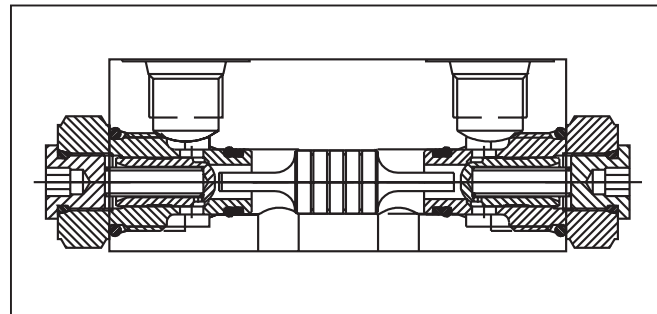
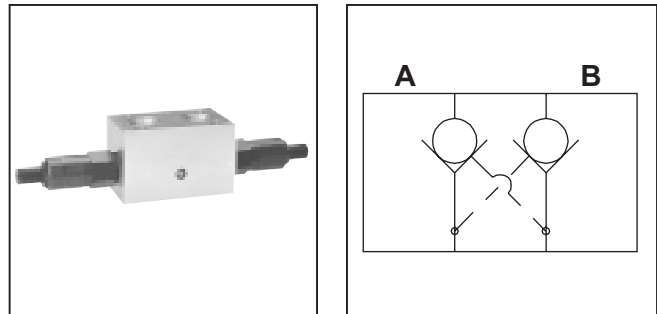
Operation

Stack-On single and double P.O. check valves are used in load holding operations. These should only be used in conjunction with a motor spool, a bleeder spool, or a series spool.

Single and double reliefs to tank are used to vent any shocks that occur at the cylinder to tank. Single and dual crossover reliefs are used to vent shocks that occur at a motor. Any spool can be used in conjunction with these reliefs.

Meter-in and meter-out flow controls are used to control speed either to or from the actuator. The pressure compensated version will provide constant flow regardless of changes in load or pressure. Any spool can be used in conjunction with these flow controls.

Single and double counterbalances are used in load holding and over center applications. These should only be used in conjunction with a motor spool, a bleeder spool, or a series spool.



Features

- Cartridge design eliminates leak points.
- High flow capacity with reduced space requirements.
- Reduced cumulative pressure drop.
- Easy to service.

Specifications

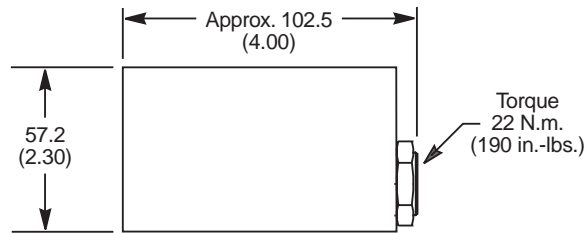
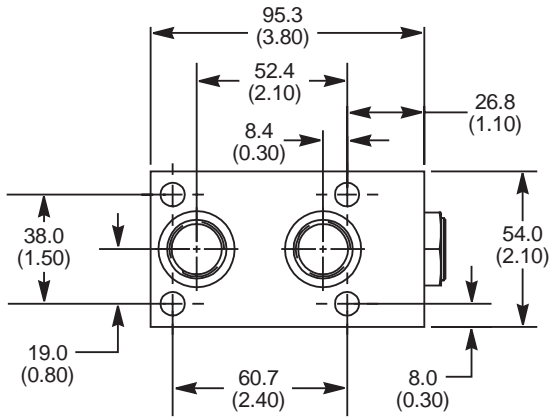
	P.O. Checks	Tank Port & Crossover Reliefs	Flow Controls	P.C. Flow Controls	Counterbalances
Rated Flow	79.5 LPM (21 GPM)	75.7 LPM (20 GPM)	45.4 LPM (12 GPM)	30.3 LPM (8 GPM)	56.8 LPM (15 GPM)
Max. Operating Pressure	350 Bar (5000 PSI)	350 Bar (5000 PSI)	210 Bar (3000 PSI)	210 Bar (3000 PSI)	275 Bar (4000 PSI)
Max. Leakage @ Rated Pressure	1/3 cc/min. (5 drops/min.)	2/3 cc/min. (10 drops/min.)	1/3 cc/min. (5 drops/min.)	Not Applicable	1/3 cc/min. (5 drops/min.)
Oper. Temp. Range (Ambient)	-25°C to +93°C (-40°F to +200°F)				
Cartridge Material	All parts steel. All working parts hardened, ground and lapped.				
Body Material	Aluminum alloy for 210 Bar (3000 PSI) or continuous cast steel for over 210 Bar (3000 PSI)				
Porting	SAE -8	SAE -8	SAE -8	SAE -8	SAE -8
Filtration	ISO Code 16/13, SAE Class 4 or better				
Mounting	No restrictions				
Cavity	C10-2	C10-2	C10-2	C10-2	Special

bv18so.p65, dd, jk

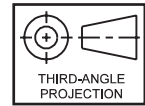
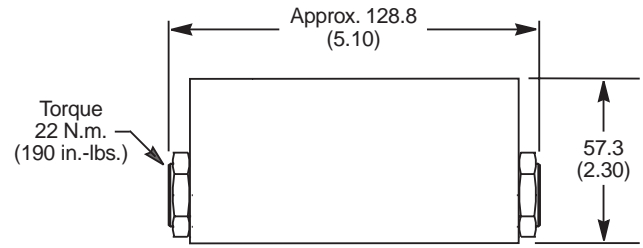
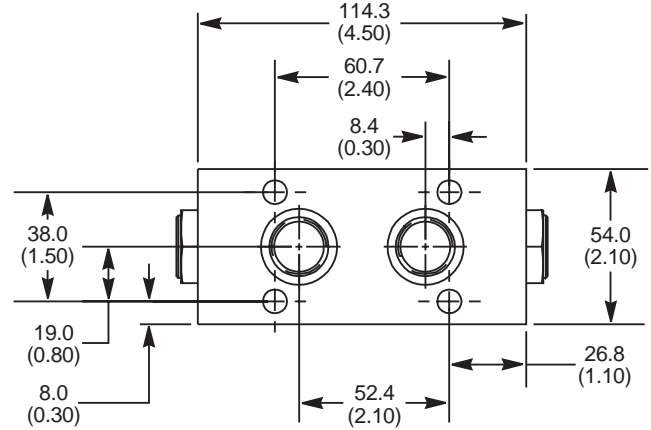
Dimensions

*Inch equivalents for millimeter dimensions are shown in (**)

Single P.O. Check



Double P.O. Check



Single P.O. Check

Description	Part Number
Body	1550014
Piston	5/10 PSI - 830739 20/65 PSI - 830306
Check Valve	CVH103

Double P.O. Check

Description	Part Number
Body	1550012
Piston	5/10 PSI - 823263 20/65 PSI - 830307
Check Valve	CVH103

Ordering Information

BV18

Bankable Valve

Location

Location

Cracking Pressure

Cracking Pressure

Code	Description
A	A Port P.O. Check
B	B Port P.O. Check
C	A & B Port P.O. Checks

Code	Description
Omit	.68 Bar (10 PSI)
5	.34 Bar (5 PSI)
20	1.4 Bar (20 PSI)
65	4.4 Bar (65 PSI)

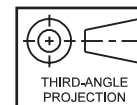
Weights:

BV18A & BV18B .54 kg (19 oz.)
 BV18C .77 kg (27 oz.)

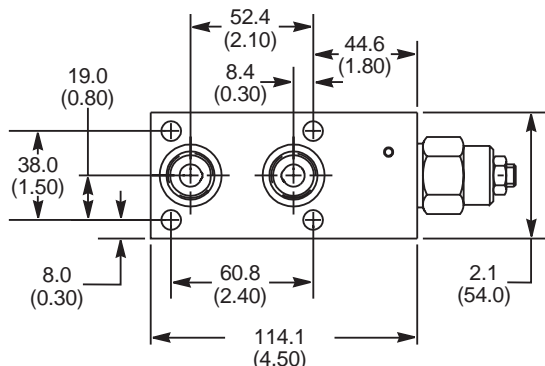
bv18so.p65, dd, jk

Dimensions

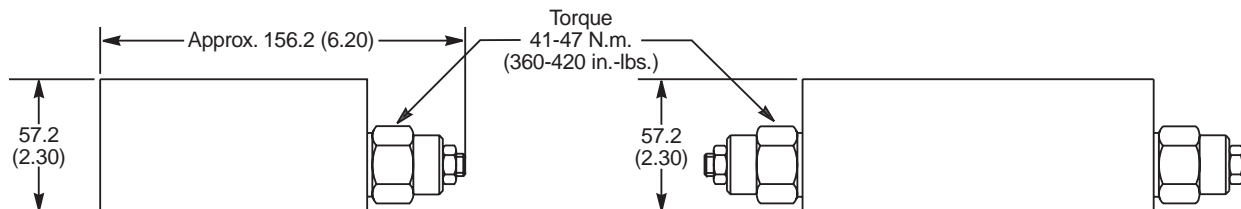
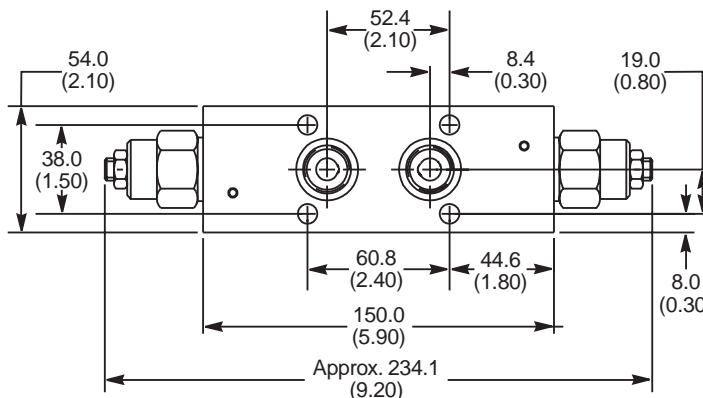
*Inch equivalents for millimeter dimensions are shown in (**)



Single Counterbalance



Double Counterbalance



Single Counterbalance

Description	Part Number
Body (N or P)	1550030
Body (NN or PP)	1550148
Counterbalance Valves	Consult Factory

Double Counterbalance

Description	Part Number
Body (R)	1550028
Body (RR)	1550146
Counterbalance Valves	Consult Factory

Ordering Information

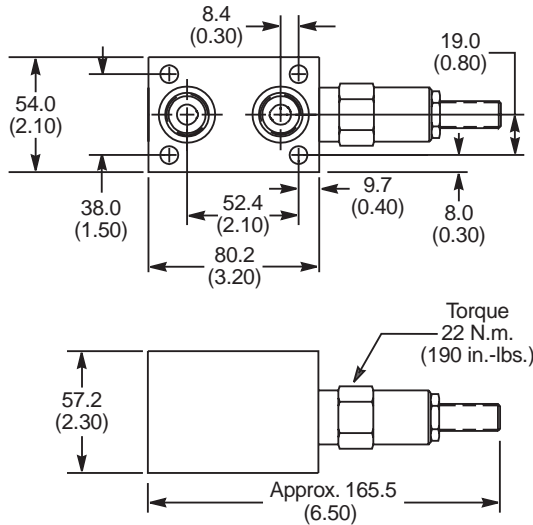
BV	18		3	S																																
Bankable Valve	Size	Location	Pilot Ratio	Adjustment Style	Adjustment Range																															
<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>18</td> <td>68.1 LPM (18 GPM) Nominal Flow</td> </tr> </tbody> </table>	Code	Description	18	68.1 LPM (18 GPM) Nominal Flow	<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>N</td> <td>A Port Counterbalance 75.5 LPM (0-20 GPM)</td> </tr> <tr> <td>NN</td> <td>A Port Counterbalance 56.8 LPM (0-15 GPM)</td> </tr> <tr> <td>P</td> <td>B Port Counterbalance 75.7 LPM (0-20 GPM)</td> </tr> <tr> <td>PP</td> <td>B Port Counterbalance 56.8 LPM (0-15 GPM)</td> </tr> <tr> <td>R</td> <td>A & B Port Counterbalance 75.7 LPM (0-20 GPM)</td> </tr> <tr> <td>RR</td> <td>A & B Port Counterbalance 56.8 LPM (0-15 GPM)</td> </tr> </tbody> </table>	Code	Description	N	A Port Counterbalance 75.5 LPM (0-20 GPM)	NN	A Port Counterbalance 56.8 LPM (0-15 GPM)	P	B Port Counterbalance 75.7 LPM (0-20 GPM)	PP	B Port Counterbalance 56.8 LPM (0-15 GPM)	R	A & B Port Counterbalance 75.7 LPM (0-20 GPM)	RR	A & B Port Counterbalance 56.8 LPM (0-15 GPM)	<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>3.1</td> </tr> </tbody> </table>	Code	Description	3	3.1	<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>S</td> <td>Screw</td> </tr> </tbody> </table>	Code	Description	S	Screw	<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>15</td> <td>27.3-102.0 Bar (400-1500 PSI)</td> </tr> <tr> <td>40</td> <td>68.0-272.1 Bar (1000-4000 PSI)</td> </tr> </tbody> </table>	Code	Description	15	27.3-102.0 Bar (400-1500 PSI)	40	68.0-272.1 Bar (1000-4000 PSI)
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15	27.3-102.0 Bar (400-1500 PSI)																																			
40	68.0-272.1 Bar (1000-4000 PSI)																																			

Weights:
 BV18N, BV18NN, BV18P & BV18PP .74 kg (26 oz.)
 BV18R & BV18RR 1.25 kg (44 oz.)

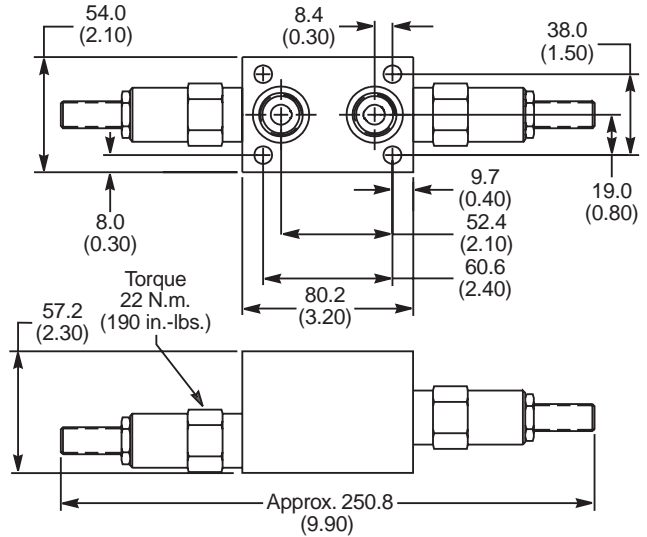
Dimensions

*Inch equivalents for millimeter dimensions are shown in (**)

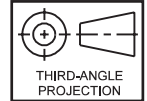
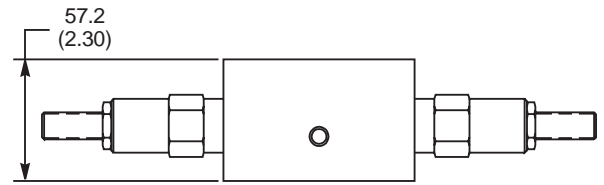
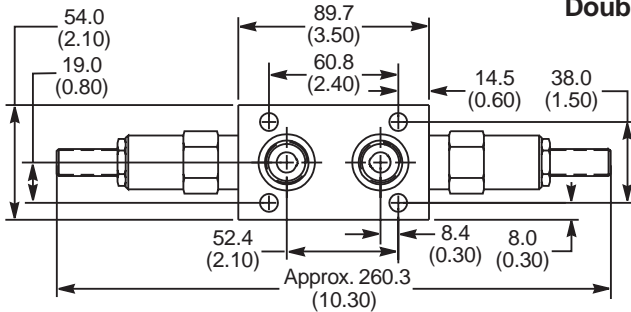
Single Crossover Relief/Single Port Relief



Double Crossover Relief



Double Port Relief



Single Port Relief

Description	Part Number
Body	1550034
Relief Valves	RDH103

Double Port Relief

Description	Part Number
Body	1550036
Relief Valves	RDH103

Single Cross-Over Relief

Description	Part Number
Body	1550018
Relief Valves	RDH103

Double Cross-Over Relief

Description	Part Number
Body	1550017
Relief Valves	RDH103

Ordering Information

BV

Bankable Valve

18

Size

Location

Location

Adjustment Style

Adjustment Style

Adjustment Range

Adjustment Range

Code	Description
18	68.1 LPM (18 GPM) Nominal Flow

Code	Description
D	A Port to B Port Crossover Relief
E	B Port to A Port Crossover Relief
F	A Port & B Port Crossover Relief
T	A Port to Tank Relief
W	B Port to Tank Relief
Y	A & B Port to Tank Relief

Code	Description
S	Screw Adjust
K	Knob Adjust

Code	Description
10	7-69 Bar (100-1000 PSI) Setting: 35 Bar (500 PSI) @ 11.4 LPM (10 GPM)
20	35-138 Bar (500-2000 PSI) Setting: 69 Bar (1000 PSI) @ 11.4 LPM (10 GPM)
30	69-207 Bar (1000-3000 PSI) Setting: 104 Bar (1500 PSI) @ 11.4 LPM (10 GPM)
50	138-345 Bar (2000-5000 PSI) Setting: 173 Bar (2500 PSI) @ 11.4 LPM (10 GPM)

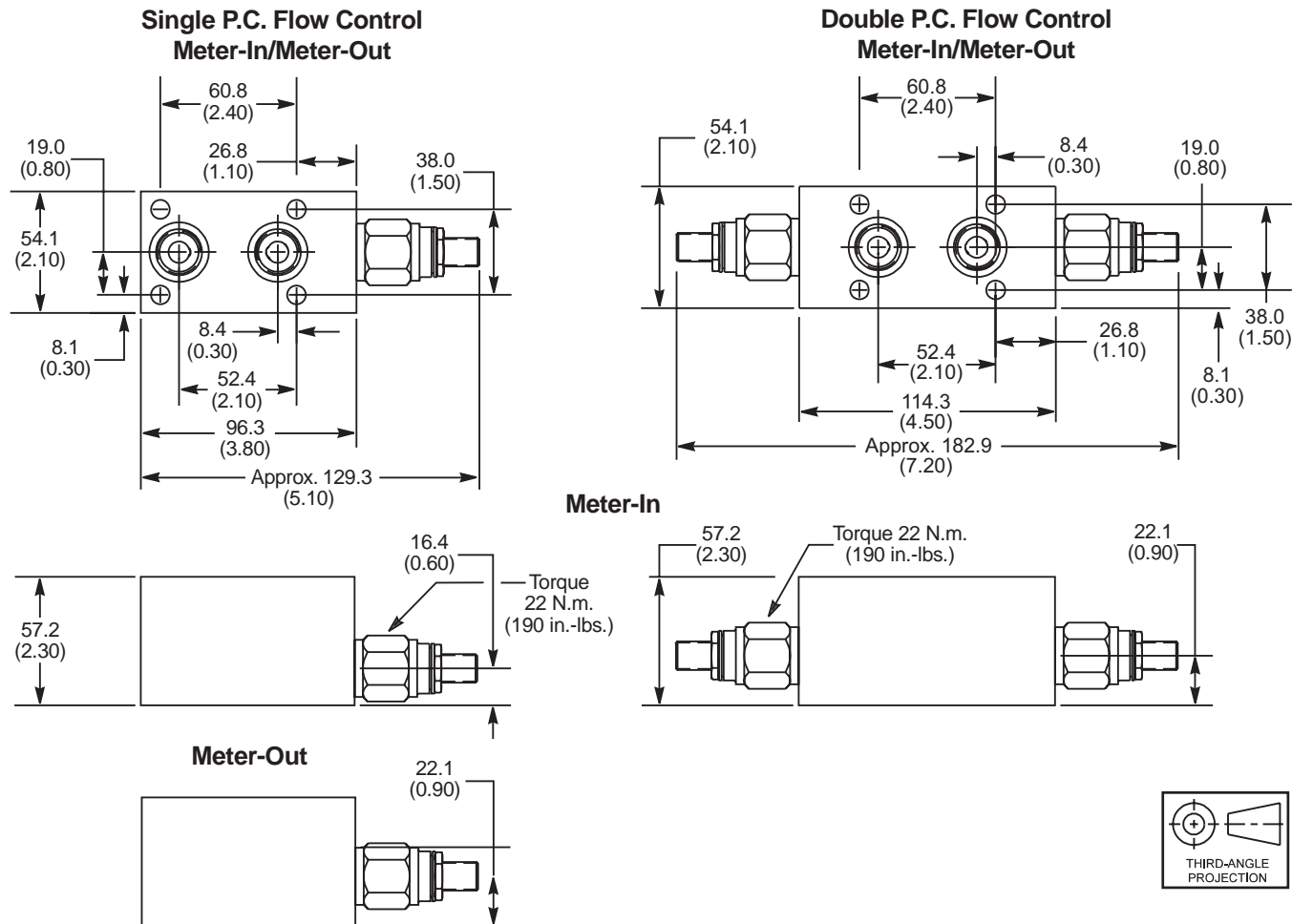
Weights:

BV18D, BV18E, BV18T, BV18W .54 kg (19 oz.)
 BV18F, BV18Y .79 kg (28 oz.)

bv18so.p65, dd, jk

Dimensions

*Inch equivalents for millimeter dimensions are shown in (**)



Single — Meter-In P.C. Flow Controls

Description	Part Number
Body	1550026
Flow Control	FC101

Double — Meter-In P.C. Flow Controls

Description	Part Number
Body	1550020
Flow Control	FC101

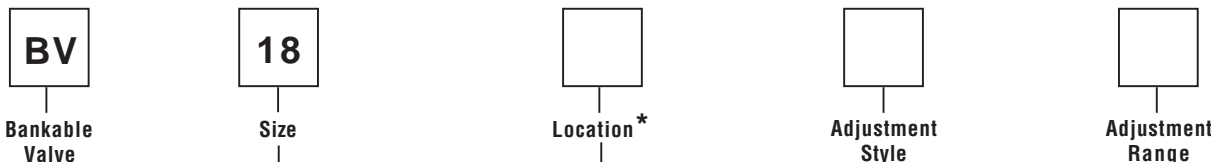
Single — Meter-Out P.C. Flow Controls

Description	Part Number
Body	1550024
Flow Control	FC101

Double — Meter-Out P.C. Flow Controls

Description	Part Number
Body	1550023
Flow Control	FC101

Ordering Information



Code	Description
18	68.1 LPM (18 GPM) Nominal Flow

Code	Description
G	A Port Meter-In
H	B Port Meter-In
J	A & B Port Meter-In
K	A Port Meter-Out
L	B Port Meter-Out
M	A & B Port Meter-Out

Code	Description
S	Screw Adjust
K	Knob Adjust
T	Tamper Resistant

Code	Description
050	1.13-3.75 LPM (0.3-1.0 GPM)
100	2.81-8.25 LPM (0.75-2.2 GPM)
300	7.5-15.0 LPM (2.0-4.0 GPM)
600	15.1-30.3 LPM (4.0-8.0 GPM)

Weights:

- BV18G, BV18H, BV18K, BV18L .65 kg (23 oz.)
- BV18J, BV18M .79 kg (28 oz.)

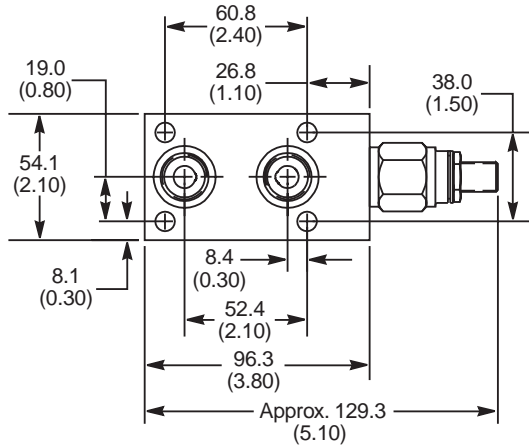
*Meter-in is from the valve to the actuator. Meter-Out is from the actuator to the valve.

bv18so.p65, dd, jk

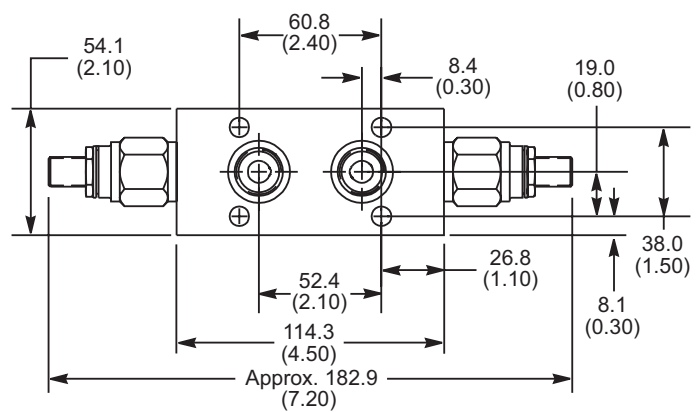
Dimensions

*Inch equivalents for millimeter dimensions are shown in (**)

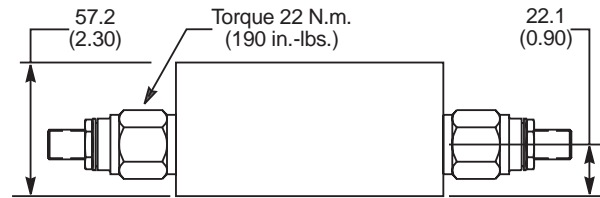
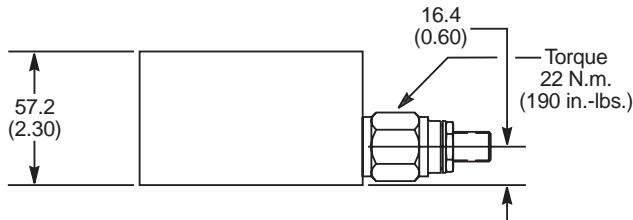
Single — Meter-In/Meter-Out



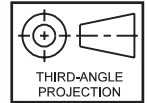
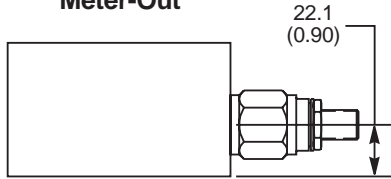
Double — Meter-In/Meter-Out



Meter-In



Meter-Out



Single — Meter-In

Description	Part Number
Body	1550024
Flow Control	FV101

Double — Meter-In

Description	Part Number
Body	1550023
Flow Control	FV101

Single — Meter-Out

Description	Part Number
Body	1550026
Flow Control	FV101

Double — Meter-Out

Description	Part Number
Body	1550020
Flow Control	FV101

Ordering Information

BV

Bankable Valve

18

Size

Location*

Location*

Adjustment Style

Adjustment Style

Code	Description
18	68.1 LPM (18 GPM) Nominal Flow

Code	Description
G5	A Port Meter-In
H5	B Port Meter-In
J5	A & B Port Meter-In
K5	A Port Meter-Out
L5	B Port Meter-Out
M5	A & B Port Meter-Out

Code	Description
S	Screw Adjust
K	Knob Adjust

Weights:

- BV18G5, BV18H5,
- BV18K5, BV18L5 .65 kg (23 oz.)
- BV18J5, BV18M5 .79 kg (28 oz.)

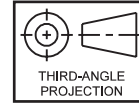
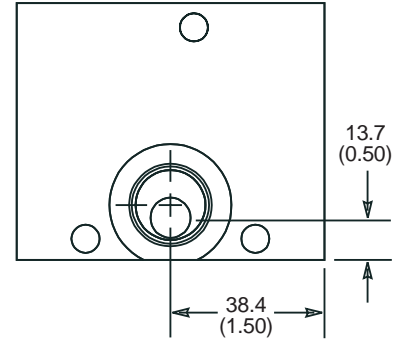
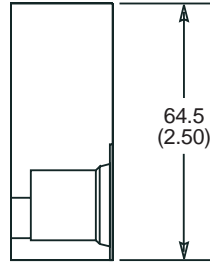
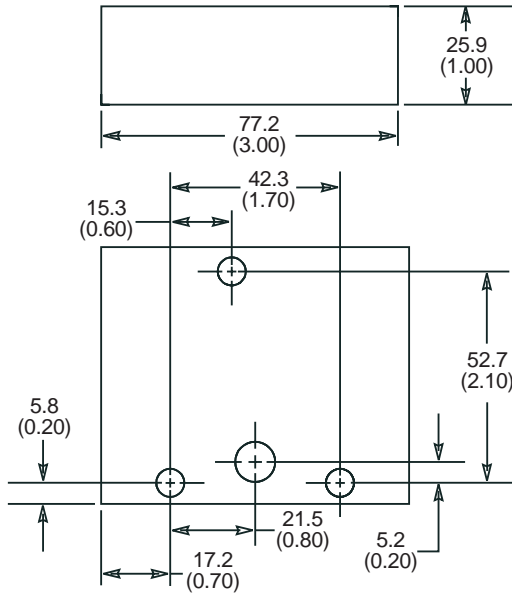
*Meter-in is from the valve to the actuator. Meter-Out is from the actuator to the valve.

bv18so.p65, dd, jk

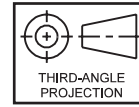
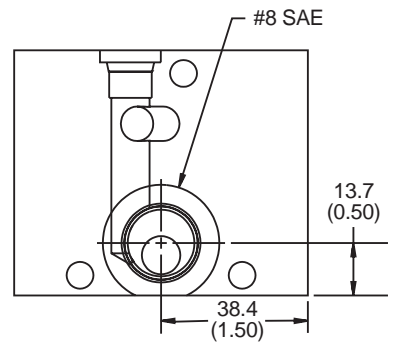
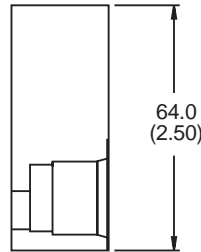
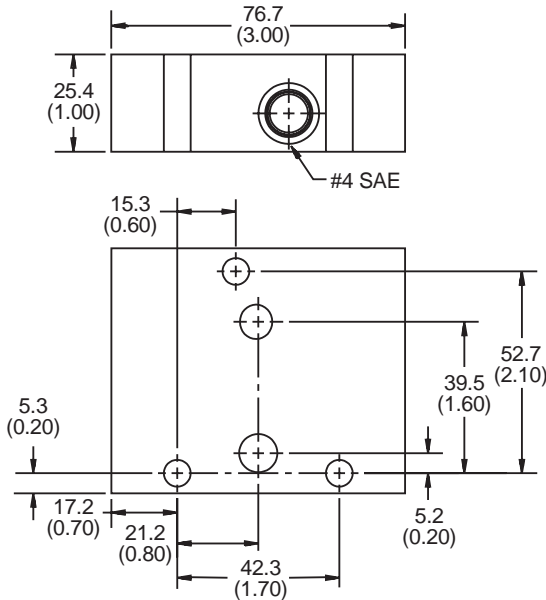
Dimensions

*Inch equivalents for millimeter dimensions are shown in (**)

End Plates
BV18* — EP1



BV18* — EP2



Ordering Information

BV18
 Bankable Valve

Material

Code	Description
Omit	Aluminum
S	Steel

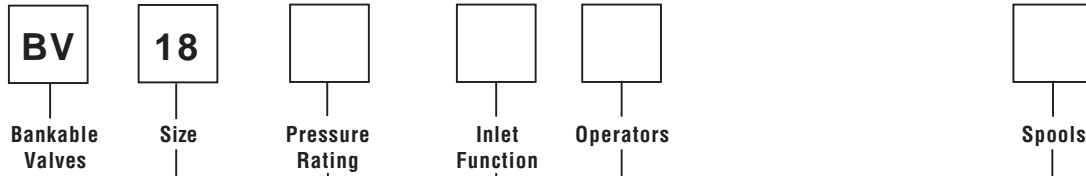
EP
 End Plate

Variation

Code	Description
1	P & T Porting
2	Turn Around Plate

Weight: 0.3 kg (12 oz.)

Valve Assemblies with or without Stack-On Options



Code	Description
18	67.5 LPM (18 GPM)

Code	Description
Omit	210 Bar (3000 PSI)
H	350 Bar (5000 PSI)

Code	Description	Symbol
SI	No Relief No Unloader	
MR	Main Relief	
U	Unloader	
UR	Unloader & Relief	
PU8	Proportional Unloader 52.5 LPM (14 GPM) with 17 Watt Coil	

Note: Specify pressure times 100.
 Example: 20 x 100 = 2000 PSI.

Code	Description	Symbol
1	Closed Center; 68.1 LPM (18 GPM) Nominal; Parallel	
2	Open Center 90.8 LPM (24 GPM) Nominal; Series or Parallel	
4	Motor; 90.8 LPM (24 GPM); Parallel	
9	TandemCenter; 68.1 LPM (15 GPM); Series	
11	Bleeder; 56.8 LPM (15 GPM); Parallel	
20	Two Position; 64.3 LPM (17 GPM); Parallel	
81	Closed Center; Closed Transition; Proportional 22.7 LPM (6 GPM)	
82	Motor; Meter-In; Proportional 22.7 LPM (6 GPM)	

Note: Each bank must consist of all parallel spools or all series spools.

Code	Description	Symbol	Code	Description	Symbol
S	Dual Solenoids		HA	Hydraulic Pilot on A	
SA	Single Solenoid on A		HB	Hydraulic Pilot on B	
SB	Single Solenoid on B		P	Dual Air Pilots	
LA	Lever on A		PA	Air Pilot on A	
LB	Lever on B		PB	Air Pilot on B	
DA	Lever w/Detent on A		F	Proportional; Dual Solenoids	
DB	Lever w/Detent on B		FA	Proportional; Single Solenoid on A	
H	Dual Hydraulic Pilots		FB	Proportional; Single Solenoid on B	

bv18ep.p65,dd,jk

Stack-On Options			Coil Termination			Coil Voltage		Coil Wattage		End Plate		Mounting Kit	
Code	Description	Symbol	Code	Description		Code	Description	Code	Description	Code	Description	Code	Description
A	A Port P.O. Check		Omit	Non-Solenoid		Omit	Non-Solenoid	Omit	P and T Porting				
B	B Port P.O. Check		D	DIN 43650 Plug Face (AC or DC)		D10	10 VDC	2	Turn Around Plate				
C	A & B Port P.O. Checks		P	SAE 1B-0.25 Double Spade (DC Only)		D12	12 VDC						
D	A Port to B Port Crossover Relief		S	Double 8-32 Screw & Nut (DC & non-Proportional Only)		D24	24 VDC						
E	B Port to A Port Crossover Relief		S1	Single 8-32 Screw & Nut; Internally Ground (DC & non-Proportional Only)		A120	120 VAC (60 Hz) 110 VAC (50 Hz)						
F	A & B Ports Dual Crossover Relief		W	Double Wire 24" Class H (DC & non-Proportional Only)		A240	240 VAC (60 Hz) 220 VAC (50 Hz)						
G	A Port Meter-In Flow Control Pressure Comp.		WP	Weather Pack Connector, 5" Leads, Male Connector (DC & non-Proportional Only)									
H	B Port Meter-In Flow Control Pressure Comp.		Note: Proportional coils are available in 12 VDC and 24 VDC voltages with DIN coils only.										
J	A & B Port Meter-In Flow Control Pressure Comp.		Code	Description	Symbol								
K	A Port Meter- Out Flow Control Pressure Comp.		N	A Port Counterbalance									
L	B Port Meter- Out Flow Control Pressure Comp.		P	B Port Counterbalance									
M	A & B Port Meter- Out Flow Control Pressure Comp.		R	A & B Port Counterbalance									
G5	A Port Meter-In Flow Control Non-Pressure Comp.		NN	A Port Counterbalance 56.8 LPM (15 GPM) Max.									
H5	B Port Meter-In Flow Control Non-Pressure Comp.		PP	B Port Counterbalance 56.8 LPM (15 GPM) Max.									
J5	A & B Port Meter-In Flow Control Non-Pressure Comp.		RR	A & B Port Counterbalance 56.8 LPM (15 GPM) Max.									
K5	A Port Meter- Out Flow control Non-Pressure Comp.		T	A Port to Tank Relief									
L5	B Port Meter- Out Flow Control Non-Pressure Comp.		W	B Port to Tank Relief									
M5	A & B Port Meter- Out Flow Control Non-Pressure Comp.		Y	A & B Port to Tank Relief									

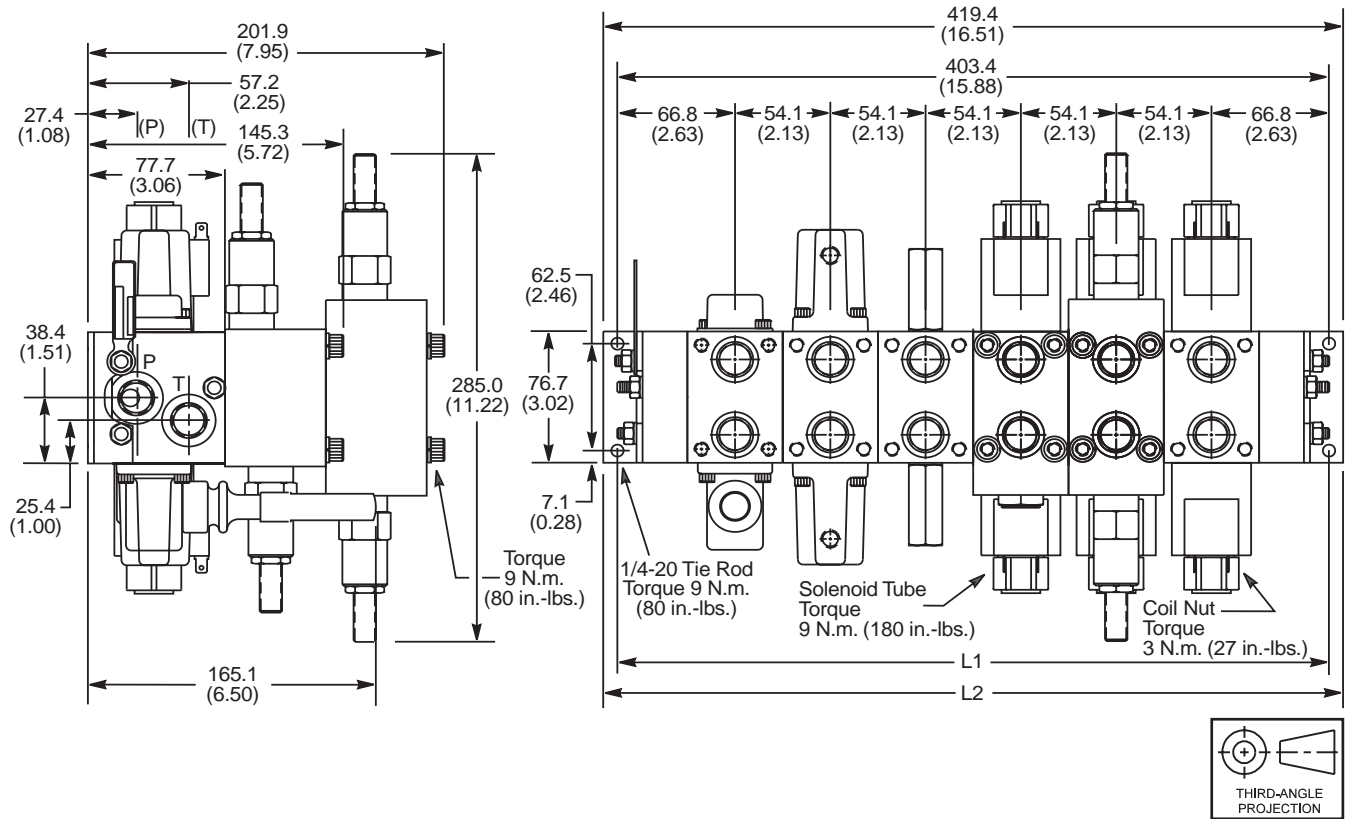
Note: Maximum of two stack-ons per spool section.

bv18ep.p65, dd, jk

Weights:

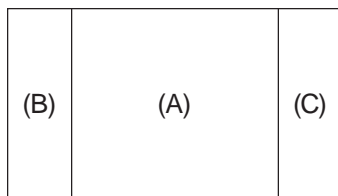
Double Solenoid 2.93 kg (6 lbs.)
Single Solenoid 2.03 kg (4.5 lbs)

*Inch equivalents for millimeter dimensions are shown in (**)



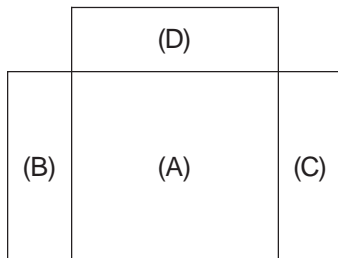
Number of Spool Sections	1		2		3		4		5		6	
Dimensions	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2
Mounting Hole to Mounting Hole	133.4 (5.25)		187.5 (7.38)		241.3 (9.50)		295.4 (11.63)		349.3 (13.75)		403.4 (15.88)	
End to End		149.4 (5.88)		203.2 (8.00)		257.3 (10.13)		311.2 (12.25)		365.3 (14.38)		419.4 (16.51)
Dimensions with MR, U or UR	139.7 (5.50)	155.7 (6.13)	193.8 (7.63)	209.6 (8.25)	247.7 (9.75)	257.3 (10.13)	301.8 (11.88)	317.5 (12.50)	355.6 (14.00)	371.6 (14.63)	409.7 (16.13)	425.7 (16.76)
Height	Without Stack-On 77.7 (3.06)				With One Stack-On 145.3 (5.72)				With Two Stack-Ons 202.4 (7.97)			

One spool section — parallel or series



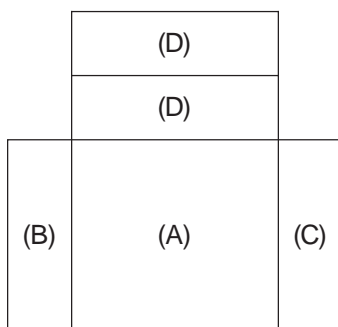
- 1 — Valve section (A)
- 1 — Inlet section (one required) (Standard, unloader, inlet relief or unloading relief) (B)
- 1 — End plate, BV18EP-1 (required) (C)
- 1 — Mounting Kit, BV18MK-1

One spool section — parallel or series



- 1 — Valve section (A)
- 1 — Inlet section (one required) (Standard, unloader, inlet relief or unloading relief) (B)
- 1 — End plate, BV18EP-1 (required) (C)
- 1 — Mounting Kit, BV18MK-1
- 1 — Stacking Kit, BV18SK-1
- 1 — Stack-on section (Relief, flow control, p.o. check or counterbalance) (D)

One spool section — parallel or series



- 1 — Valve section (A)
- 1 — Inlet section (one required) (Standard, unloader, inlet relief or unloading relief) (B)
- 1 — End plate, BV18EP-1 (required) (C)
- 1 — Mounting Kit, BV18MK-1
- 1 — Stacking Kit, BV18SK-2
- 2 — Stack-on sections (Relief, flow control, p.o. check or counterbalance) (D)

Note: For two spool sections through six spool sections use one spool section as a starting point. Mounting kits will be — BV18MK-2, BV18MK-3, BV18MK-4, BV18MK-5 and BV18MK-6 respectively.

Mounting Kits

BV18

Bankable Valve

MK

Bolt Kit
 (Section to Section)

—

Number of Sections
 (1-6)

Circuit

Code	Circuit
Omit	Series or Parallel without Inlet Relief and/or Unloader
A	Series or Parallel with Inlet Relief and/or Unloader

Stack-on Kits

BV18

Basic Valve

SK

Stack Kit
 (Stack-on to Section)

—

Number of Stack-ons
 (1-2)

General Description

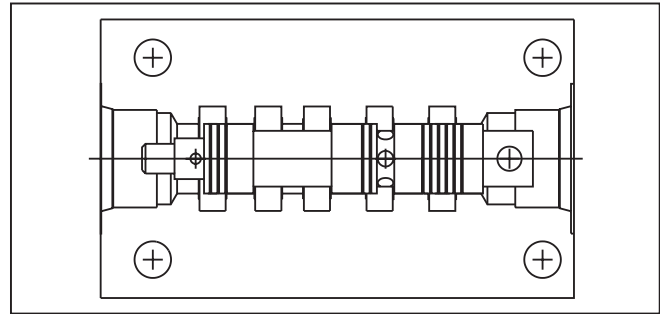
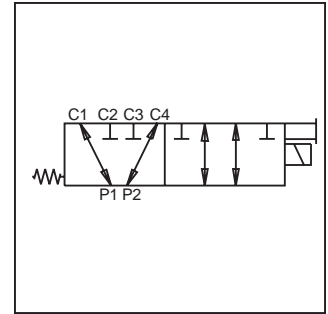
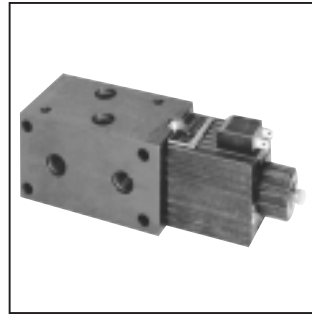
Series BVCS10 Bankables are 2 or 3 position, 4-way circuit selector valves. BVCS10 bankable valves can be used individually or in banks of up to three each. Typically, these are used in fork lift trucks for attachments such as a barrel rolling attachment.

Operation

When the solenoid coil of the BVCS10 is de-energized, the spool connects Port P1 with Port C1 and Port P2 with Port C4; allowing flow to pass in either direction between the connected ports. When the solenoid coil is energized, the spool is shifted connection Port P1 with Port C2 and Port P2 with Port C3; allowing flow to pass in either direction between the connecting ports.

Specifications

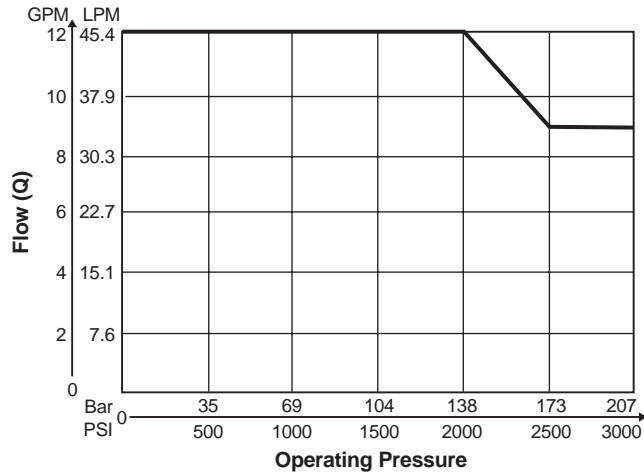
Nominal Flow (at 70 PSI ΔP)	37.5 LPM (10 GPM)
Maximum Inlet & Tank Pressure	Parallel: 210 Bar (3000 PSI) Inlet 210 Bar (3000 PSI) Tank Series: Not Applicable
Porting	SAE -6 & SAE -8
Maximum Internal Leakage (110 SSU oil)	Selector Spool: 10817.4 cc/min. (660 cu. in./min.) @ 210 Bar (3000 PSI)
Operating Temp. Range (Ambient)	Nitrile: -40°C to +93°C (-40°F to +200°F) Fluorocarbon: -32°C to +121°C (-25°F to +250°F)
Material	Body: Precision machined and honed from cast iron Spool: Hardened and ground steel
Filtration	ISO Code 16/13, SAE Class 4 or better
Mounting Position	No restrictions
Mounting Type	Individually or line mounted



Features

- High flow capacity with reduced space requirements.
- High back pressure; all ports withstand maximum working pressure.
- Precision machined valve body is made from high tensile cast iron.
- All solenoids are a one-piece coil featuring numerous voltages and terminations.

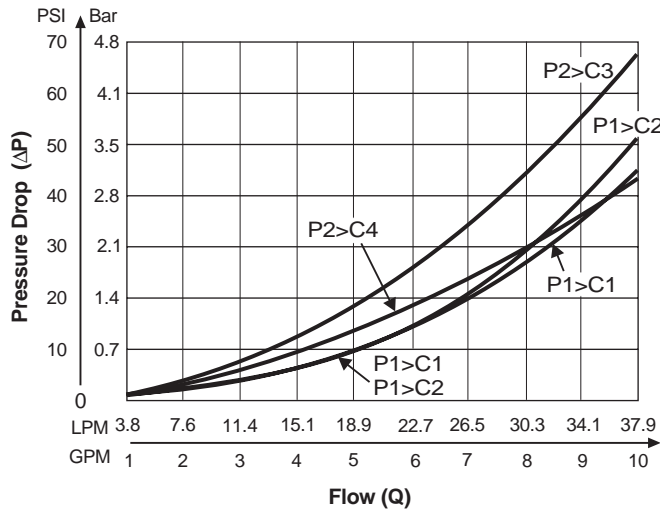
Switching Limits



Notes:

1. Unless otherwise specified, all curves were generated using solenoid actuators at 90% of rated with voltage.
2. All valves tested using 110 SSU oil.

Differential Pressure

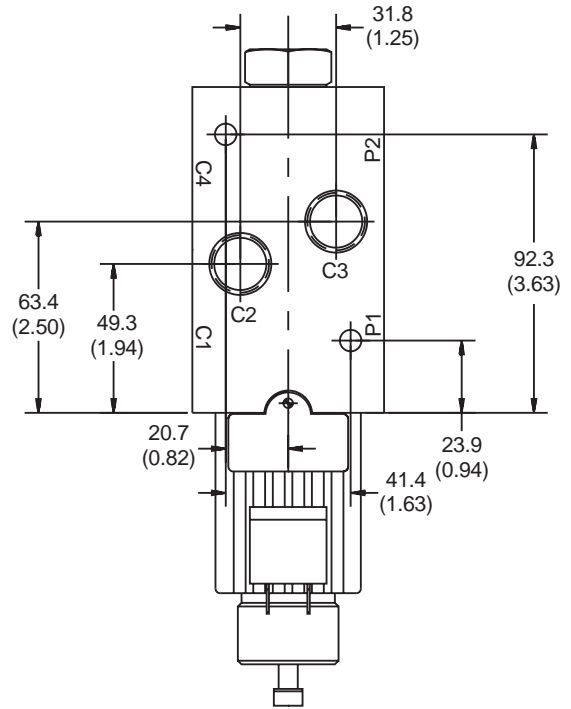
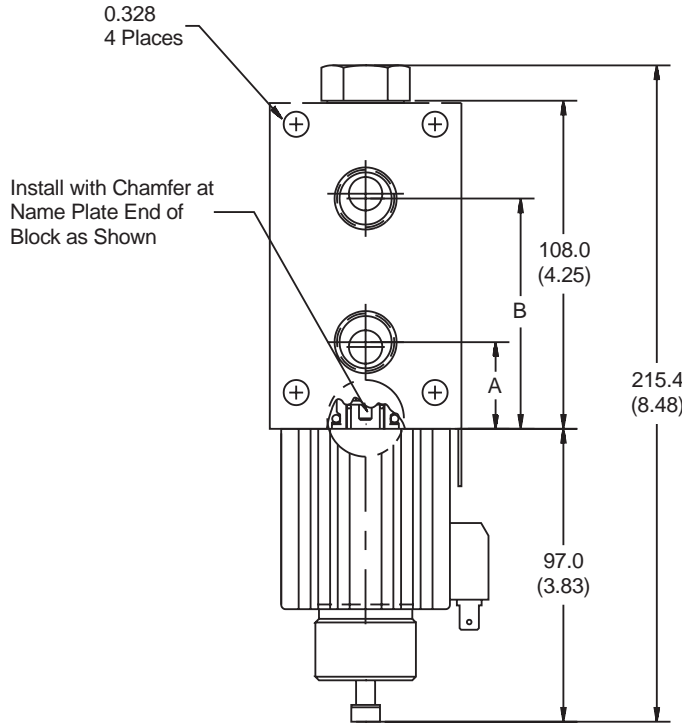


Solenoid Coil Specifications

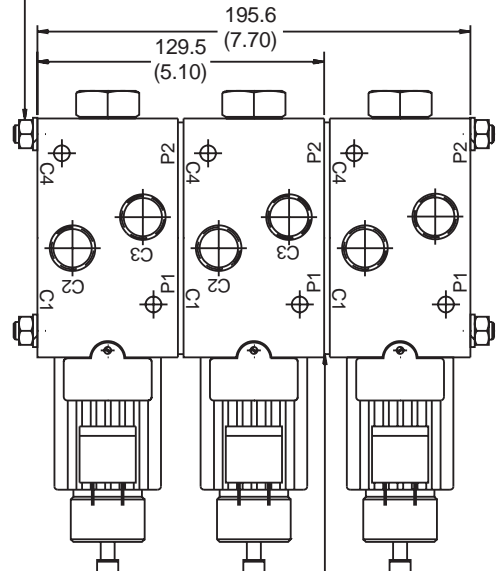
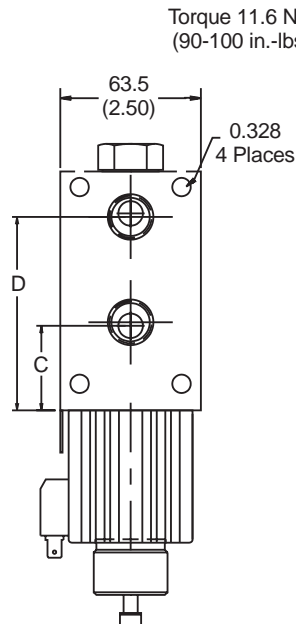
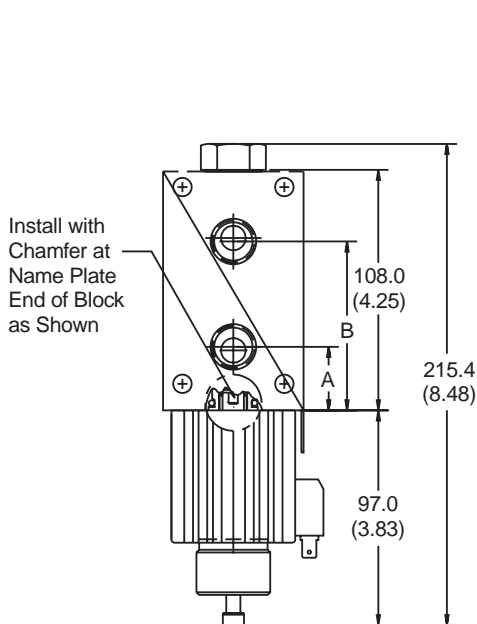
Solenoid Code	Nominal Voltage/Hz	In Rush Amps	Holding Amps	Watts
D012	12 VDC	—	2.0	42
D024	24 VDC	—	2.0	42

Spool	Coil Type	Pull In	Pressure Response Drop Out	Full Shift Drop Out
Selector	12 VDC, 42 Watt	38 ms	18 ms	175 ms
Selector	24 VDC, 42 Watt	36 ms	18 ms	175 ms
Selector	120 VAC, 42 Watt	27 ms	107 ms	180 ms

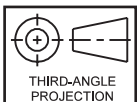
*Inch equivalents for millimeter dimensions are shown in (**)



Assembled Valves



O-Ring Plate with 2 2217N-9 O-Rings



Valve Port	Dimension			
	A	B	C	D
SAE #6	1.06	3.06	1.50	3.50
SAE #8	1.13	3.00	1.56	3.44

bvcs10.p65, dd, jk

BVCS

Bankable
Valve
Circuit
Selector

10

Flow

Seals

Coil
Voltage

Coil
Termination

—

Body Option

Code	Description
10	37.9 LPM (10 GPM) Nominal Flow

Code	Description
Omit	Nitrile
V	Fluorocarbon

Code	Description
D012	12 VDC
D024	24 VDC
A120	120 VAC

Code	Description
6T	9/16-18 SAE Straight Thread Ports
8T	3/4-16 SAE Straight Thread Ports

Weight: 4.05 kg (9.0 lbs.)

Service Parts

Bodies
 BVCS10-6T Body with 9/16-18 SAE Straight Thread Ports
 BVCS10-8T Body with 3/4-16 SAE Straight Thread Ports

Spools P/N 118985-00

Coils
 P/N 851057***** Conduit Coil (AC or DC)
 P/N 851062***** Double Wire Coil (DC Only)
 P/N 851058***** DIN (Hirschman) (AC or DC)
 P/N 851064***** Double Screw Vertically Oriented (DC Only)
 P/N 851060***** Double Spade Vertically Oriented (DC Only)
 P/N 851065***** Single Screw Vertically Oriented (DC Only)

Coils are available in 12 VDC, 24 VDC, or 120 VAC only
 851057-120V AC is a 120V AC Conduit Coil

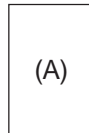
Tube Assemblies P/N 709294-00
Plug Assemblies P/N 711168-00
Tube End Nut P/N 118378-00

Note: All valves furnished with extended push type manual overrides.

Code	Description
C	1/2" NPTF Conduit Class H Wires (AC order)
D	DIN 43650 Hirschman Plug Face (AC or DC)
PV	SAE 1B-0.25 Double Spade, Vertically Oriented (DC only)
SV	Double 8-32 Screw & Nut (DC only)
S1V	Single 8-32 Screw & Nut, Internally Ground (DC only)
W	Double Wire 24" Class H (DC Only)

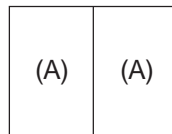
Assembly Configurations

One spool section



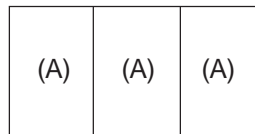
1 — BVCS10-6T or -8T Body (A)

Two spool section



2 — BVCS10-6T or -8T Body (A)
1 — Mounting kit, BVCS10-MK2

Three spool section



3 — BVCS10-6T or -8T Body (A)
1 — Mounting kit, BVCS10-MK3

Mounting Kits

Number of Spool Section in Bank	1	2	3
Mounting Kit	BVCS10-MK1	BVCS10-MK2	BVCS10-MK3

General Recommendations for Using Parker Products

Pressure Ratings

Unless otherwise specified, all Parker valves have the continuous duty pressure ratings as shown in this catalog. All cartridge valve pressure ratings above 3000 PSI apply to cartridge valves installed in steel carrier blocks only. The maximum rated operating pressure for Parker valves installed in aluminum alloy carrier blocks is 207.0 Bar (3000 PSI).

Cartridge Installation

Cartridges must be lubricated prior to installation to prevent seal damage. Install and torque to the following values to prevent leakage and potential cartridge back-out:

Cartridge Size	Torque Specifications
No. 8	12-18 lb.-ft.
No. 9	12-18 lb.-ft.
No. 10	15-20 lb.-ft.
No. 12	18-25 lb.-ft.

Note: Do not exceed these torque values, as it may result in damage to the block or valve malfunction.

Service

Integrated hydraulic circuit valves designed with Parker valves are easily serviced by simply unscrewing the defective valve and replacing with a new one. Parker valves are not field serviceable with the exception of the external seals. Replacement seal kits for the external seals are available for all Parker valves.

Cartridge Porting

Prior to installation of individual cartridges or cartridges in bodies, please review flows on individual cartridges and on bodies.

System Cleanliness

Any hydraulic system that includes Parker valves should be carefully protected against dirt and fluid contamination. Life of the valves, as well as of all other components, will be greatly lengthened. Operation will be smoother and more precise. Maintenance and repairs will be reduced. Lost production because of low pressure and flow will be minimized.

Fluid contamination should be maintained to less than 500 particles larger than 10 micrometers per milliliter of fluid (SAE Class 4 or better/ISO Code 16/13).

Hydraulic Fluids

Parker recommends using top — quality hydraulic fluids having a viscosity range of 150 to 250 SSU (32 to 54 cst.) at 38°C (100°F). The absolute viscosity range should be 80 to 1000 SSU (16 to 220 cst.) Fluids should have highest anti-wear characteristics and be treated to avoid rust and oxidation.

Seals

When used with water — glycol, water/oil emulsions, and high — grade petroleum base hydraulic fluids, Parker standard nitrile seals are suitable.

When using phosphate esters fluids or their blends, specify Parker optional seals made of DuPont Viton. Synthetic fire — resistant fluids require special seal materials which your Parker representative can recommend.

Special Requirements

Consult your Parker representative for factory recommendations on such situations as:

- Installations that will operate regularly at pressures higher than published catalog ratings;
- Use of hydraulic fluids other than those mentioned above;
- Operations where fluid temperature will exceed 121°C (250°F).

Parker

Common Cavity Concept

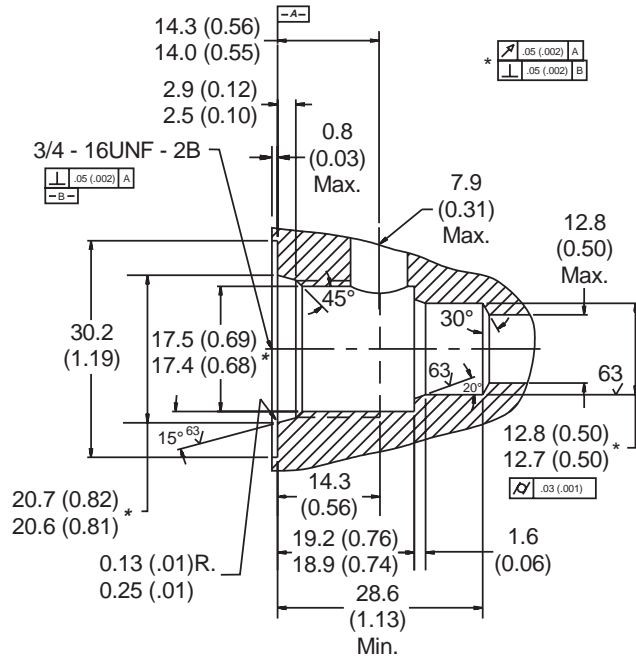
Benefits

- Reduces number of form tools required
- Increases manifold design efficiency
- Increases manifold machining efficiency

Dimensions

*Inch equivalents for millimeter dimensions are shown in (**)

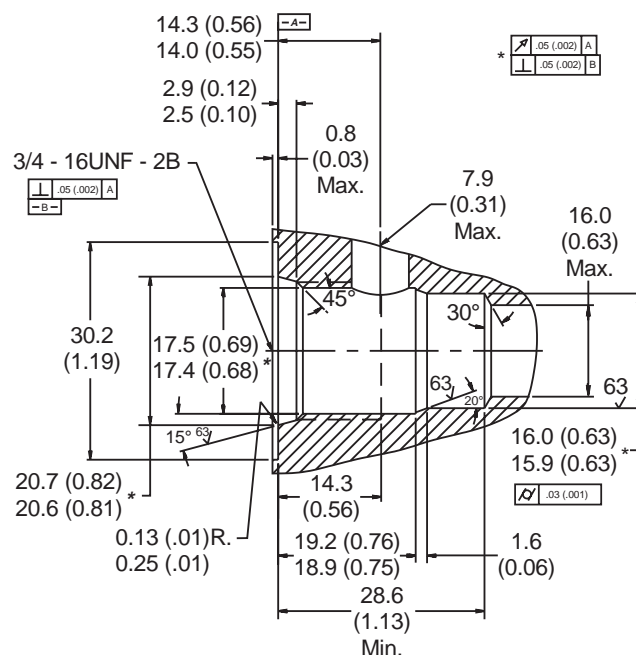
Common Cavity No. C08-2



Ordering Information Installation Tools

Cavity No.	Form Tool No.
C08-2	FT08-2

Common Cavity No. C09-2



Ordering Information Installation Tools

Cavity No.	Form Tool No.
C09-2	FT09-2

Parker

Common Cavity Concept

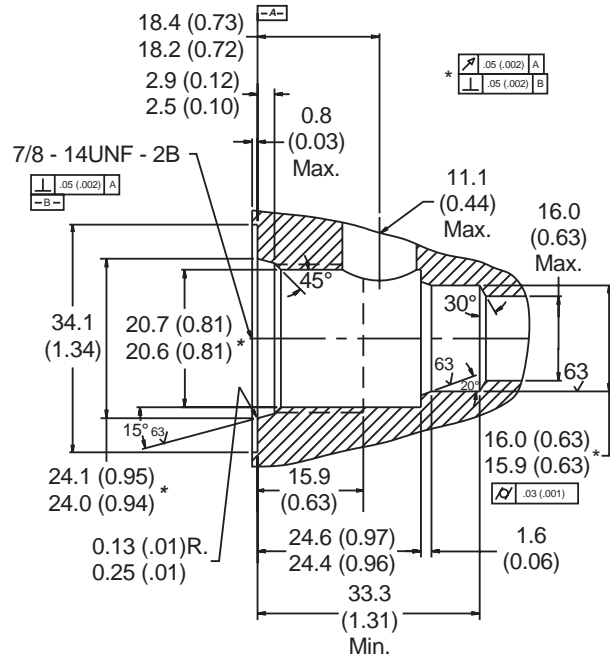
Benefits

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Dimensions

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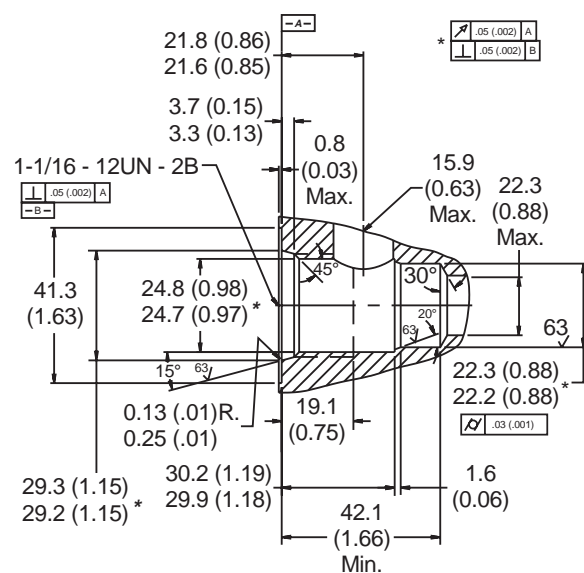
Common Cavity No. C10-2



Ordering Information Installation Tools

Cavity No.	Form Tool No.	
	3/4" Str. Shank	Morse Taper
C10-2	FT10-2	FT10-2-T

Common Cavity No. C12-2



Ordering Information Installation Tools

Cavity No.	Form Tool No.
	3/4" Str. Shank
C12-2	FTP12-2

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The items described in this document and other documents or descriptions provided by Parker Hannifin Corporation, its subsidiaries and its authorized distributors are hereby offered for sale at prices to be established by Parker Hannifin Corporation, its subsidiaries and its authorized distributors. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any such items, when communicated to Parker Hannifin Corporation, its subsidiary or an authorized distributor ("Seller") verbally or in writing, shall constitute acceptance of this offer.

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2. Payment: Payment shall be made by Buyer net 30 days from the date of delivery of the items purchased hereunder. Amounts not timely paid shall bear interest at the maximum rate permitted by law for each month or portion thereof that the Buyer is late in making payment. Any claims by Buyer for omissions or shortages in a shipment shall be waived unless Seller receives notice thereof within 30 days after Buyer's receipt of the shipment.

3. Delivery: Unless otherwise provided on the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

4. Warranty: Seller warrants that the items sold hereunder shall be free from defects in material or workmanship for a period of 18 months from date of shipment from Parker Hannifin Corporation. **THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED.**

NOTWITHSTANDING THE FOREGOING, THERE ARE NO WARRANTIES WHATSOEVER ON ITEMS BUILT OR ACQUIRED WHOLLY OR PARTIALLY, TO BUYER'S DESIGNS OR SPECIFICATIONS.

5. Limitation Of Remedy: SELLER'S LIABILITY ARISING FROM OR IN ANY WAY CONNECTED WITH THE ITEMS SOLD OR THIS CONTRACT SHALL BE LIMITED EXCLUSIVELY TO REPAIR OR REPLACEMENT OF THE ITEMS SOLD OR REFUND OF THE PURCHASE PRICE PAID BY BUYER, AT SELLER'S SOLE OPTION. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY KIND OR NATURE WHATSOEVER, INCLUDING BUT NOT LIMITED TO LOST PROFITS ARISING FROM OR IN ANY WAY CONNECTED WITH THIS AGREEMENT OR ITEMS SOLD HEREUNDER, WHETHER ALLEGED TO ARISE FROM BREACH OF CONTRACT, EXPRESS OR IMPLIED WARRANTY, OR IN TORT, INCLUDING WITHOUT LIMITATION, NEGLIGENCE, FAILURE TO WARN OR STRICT LIABILITY.

6. Changes, Reschedules and Cancellations: Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the items sold hereunder, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges

paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

8. Buyer's Property: Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property, Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. Indemnity For Infringement of Intellectual Property Rights: Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. Patents, U.S. Trademarks, copyrights, trade dress and trade secrets (hereinafter 'Intellectual Property Rights'). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights. If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

11. Force Majeure: Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter 'Events of Force Majeure'). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of the sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.

9/91-P

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Parker Hannifin Corporation

About Parker Hannifin Corporation

Parker Hannifin is a leading global motion-control company dedicated to delivering premier customer service. A Fortune 500 corporation listed on the New York Stock Exchange (PH), our components and systems comprise over 1,400 product lines that control motion in some 1,000 industrial and aerospace markets. Parker is the only manufacturer to offer its customers a choice of hydraulic, pneumatic, and electromechanical motion-control solutions. Our Company has the largest distribution network in its field, with over 7,500 distributors serving more than 350,000 customers worldwide.

The Aerospace Group is a leader in the development, design, manufacture and servicing of control systems and components for aerospace and related high-technology markets, while achieving growth through premier customer service.



The Fluid Connectors Group designs, manufactures and markets rigid and flexible connectors, and associated products used in pneumatic and fluid systems.



The Hydraulics Group designs, produces and markets a full spectrum of hydraulic components and systems to builders and users of industrial and mobile machinery and equipment.



The Automation Group is a leading supplier of pneumatic and electromechanical components and systems to automation customers worldwide.



Parker's Charter

To be a leading worldwide manufacturer of components and systems for the builders and users of durable goods. More specifically, we will design, market and manufacture products controlling motion, flow and pressure. We will achieve profitable growth through premier customer service.

Product Information

North American customers seeking product information, the location of a nearby distributor, or repair services will receive prompt attention by calling the Parker Product Information Center at our toll-free number: 1-800-C-PARKER (1-800-272-7537). In the UK, a similar service is available by calling 0500-103-203.



The Climate & Industrial Controls Group designs, manufactures and markets system-control and fluid-handling components and systems to refrigeration, air-conditioning and industrial customers worldwide.



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