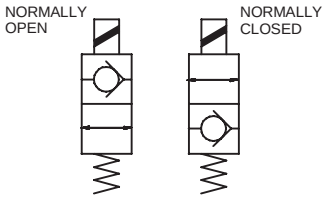
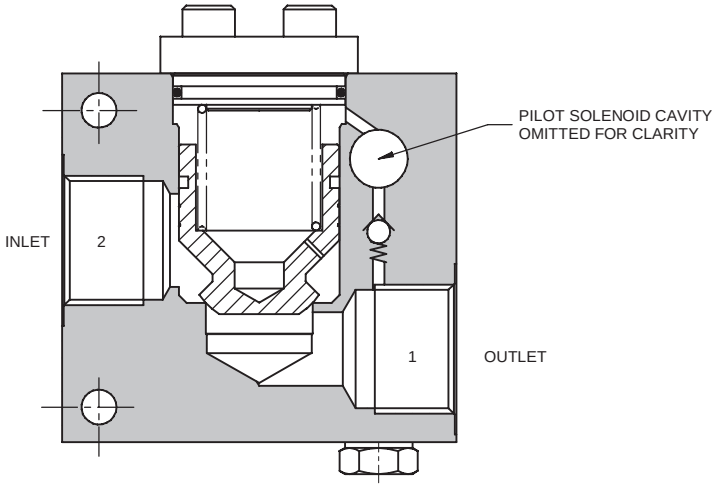
7SP300 DIRECTIONAL CONTROL VALVE

2 WAY POPPET • 300 litres/min (80 US GPM) • 210 bar (3000 psi)

7SP300





APPLICATION

To give on-off control of flows of 300 litres/min (80 US GPM) and pressures up to 210 bar (3000 psi) in any hydraulic system. Can also be used as a high capacity, fast acting, dump valve.

OPERATION

The normally open or normally closed pilot cartridge controls the vent flow through the main poppet. When in the open mode, pilot flow passes through the orifice in the poppet and the resultant pressure imbalance causes the main section to open. As the movement of the main poppet or spool is not limited by the solenoid stroke, the valves have a flow capacity of 300 litres/min (80 US GPM) with a low pressure drop.

REVERSE PRESSURE

The valves are normally used for the bidirectional control of flow and the integral check valve ensures that the main section will open and pass reverse flow regardless of the pilot mode. The normally closed valve is typically used in line to an actuator to allow free flow in and control the flow out.

FEATURES

Through port line body construction for ready installation into hydraulic lines. Fast resposne, high flow capacity. Cartridge pilot section for easy maintenance. A range of coils is available, see the Ordering Code Example for voltage and termination options.

SPECIFICATIONS

Figures based on: Oil Temp = 40°C Viscosity = 40 cSt

Rated Flow	300 litres/min (80 US GPM)
Working Pressure	210 bar (3000 psi)
Cartridge Material	Working parts hardened and ground steel. External surfaces electroless nickel plated.
Body Material	Aluminium
Mounting Position	Line mounted
Weight (exc. coil)	1.90 kg (4.18 lbs)
Seal Kit Number	SK433 (Nitrile) SK433V (Viton)
Recommended Filtration Level	BS5540/4 Class 18/13 (25 micron nominal)
Operating Temp	-20°C to +90°C
Leakage	1 millilitre/min max (15 dpm)
Nominal Viscosity Range	5 to 500 cSt
Pilot Valve	S203 / S204 (See page 11-141)

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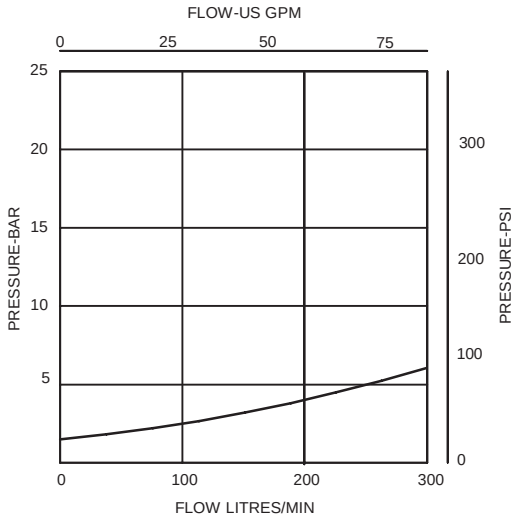
PRESSURE DROP

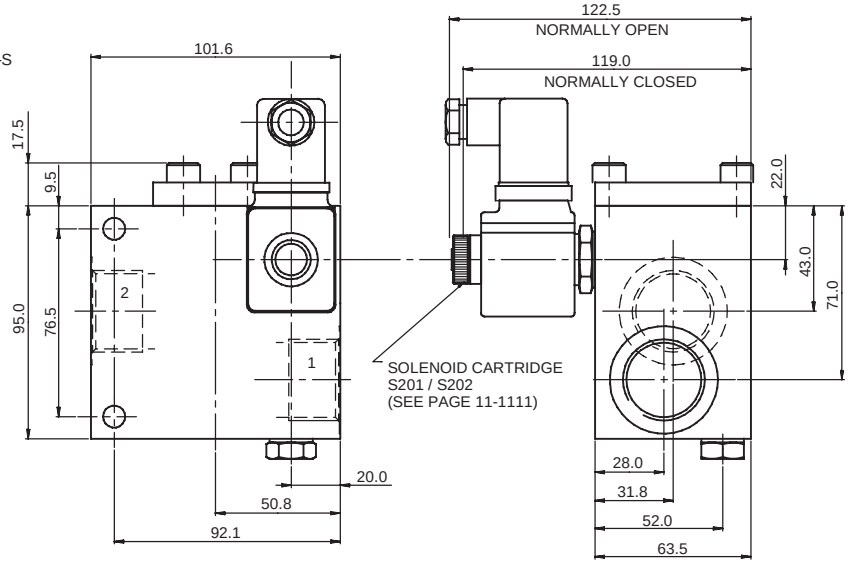


COMPLETE VALVE 3/4" 1" PORTS

BASIC CODE: 7SP300

Sub-assembly part numbers

BSP, aluminium		*SAE, aluminium*	
3/4"	CXP3122-6W-S		
1"	CXP3122-8W-S	1"	CXP3122-16T-S



Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

7SP300	1	6W	H	24	S

Basic Code
7SP300 = Complete valve

Solenoid Configuration
1 = Normally open
2 = Normally closed

Port Sizes - Bodied Valves Only
6W = 3/4" BSP
8W = 1" BSP **16T** = 1" SAE

Coil Termination
H = ISO4400 (plug included)
F = Flying Leads DC only
DM = Deutsch Moulded
Other terminations available on request

Seals
S = Nitrile (For use with most industrial hydraulic oils)
SV = Viton (For high temperature and most special fluid applications)

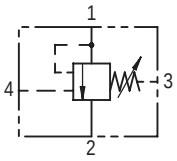
Coil Voltage
12 = 12VDC
24 = 24VDC
110 = 110VAC 50 Hz
220 = 220VAC 50 Hz
Other voltages available on request

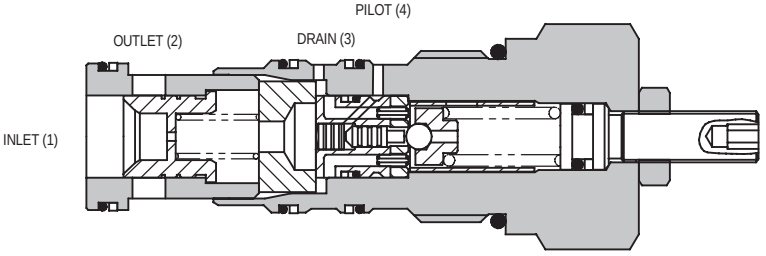
We reserve the right to change specifications without notice

1PUL200 PRIORITY UNLOADING VALVE

PILOT OPERATED - SLIDING SPOOL TYPE

1PUL200





APPLICATION

These unloader valves are used to divert pump flow to a secondary circuit when pressure in the priority line reaches a pre-set level. The valves will close, causing the circuit to reload, when the pressure drops to approximately 85% of the unload pressure. The most common application is to maintain a pressure in an accumulator which may be used in an emergency to operate an essential hydraulic function (eg, a brake circuit). This valve has a drain port to ensure correct valve function while allowing the bypassed oil to be used for a secondary circuit requirement.

OPERATION

Inlet pressure is seen on the nose of the valve and system pressure (downstream of the system check valve) operates on the system pilot port. When pressure rises to the valve setting, the relief section opens and the system pressure acts on the pilot piston to hold the valve in the open position. The ratio between the pilot piston diameter and the seat diameter of the relief valve pilot section ensures that the valve will be maintained in the fully open position until the system pressure drops to approximately 85% of the unload pressure.

FEATURES

Valves are available as cartridges for installation into line bodies or into custom designed Hydraulic Integrated Circuits. (NOTE: Provision must be made for a system check valve and a pilot line to signal the system pressure). Valve assemblies can be supplied complete in a line body for ready installation into a hydraulic system. Bodied valves include a check valve and the required connection from the system to the valve pilot port.

SPECIFICATIONS

Figures based on: Oil Temp = 40°C Viscosity = 40 cSt

Rated Flow	200 litres/min (52 US GPM)
Max Setting	350 bar (5000 psi)
Differential Unload/Reload	10-15%
Cartridge Material	All working parts hardened and ground steel. External surfaces zinc plated
Body Material	Standard steel
Mounting Position	Unrestricted
Cavity Number	A3145 (See Section 17)
Torque Cartridge into Cavity	100 Nm (73 lbs ft)
Weight	1PUL200 0.74 kg (1.63 lbs) 1PUL250 6.8 kg (14.96 lbs)
Seal Kit Number	1PUL200 SK670 (Nitrile) SK670V (Viton) 1PUL250 SK452 (Nitrile) SK452V (Viton)
Recommended Filtration Level	BS5540/4 Class 18/13 (25 micron nominal)
Operating Temp	-20°C to +90°C
Leakage	35 millilitres/min @ 210 bar
Nominal Viscosity Range	5 to 500 cSt

12

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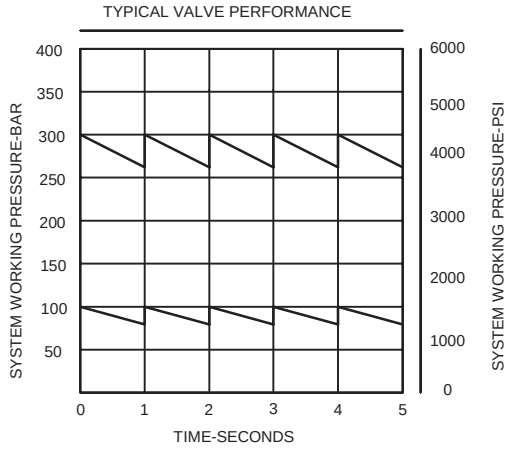
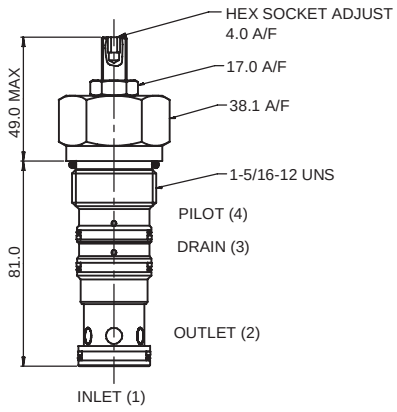
PERFORMANCE CURVE



CARTRIDGE ONLY

BASIC CODE: 1PUL200

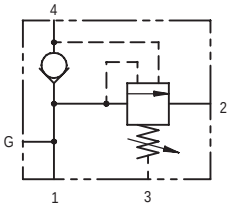


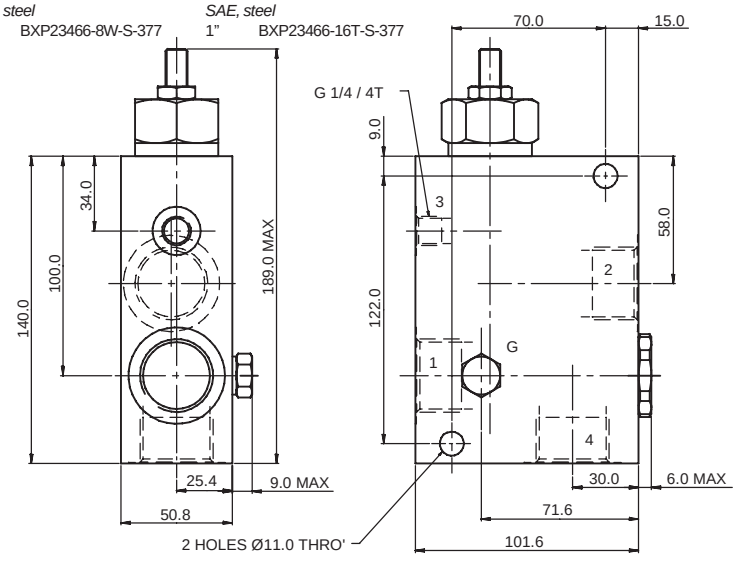
COMPLETE VALVE 1" PORTS

BASIC CODE: 1PUL250 (WITH SYSTEM CHECK)

Sub-assembly part numbers

SAE, aluminium		*BSP, steel*		*SAE, steel*	
1"	BXP23466-16T-S	1"	BXP23466-8W-S-377	1"	BXP23466-16T-S-377





Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

1PUL***	P	8W	35	S	377

Basic Code
1PUL200 = Cartridge Only
1PUL250 = Cartridge and Body

Adjustment Means
P = Leakproof Screw Adjustment
G = Tamperproof Cap
(See page 12-102 for dimensions)

Port Sizes - Bodied Valves Only
8W = 1" BSP. 1/4" BSP Drain Port
16T = 1" SAE. 1/4" SAE Drain Port

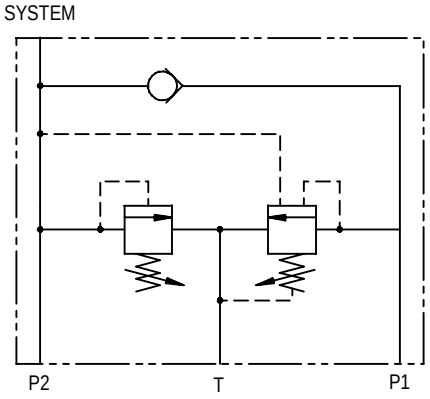
Body Material
377 - Steel
Omit for Aluminium (up to 210 bar)

Seals
S = Nitrile (For use with most industrial hydraulic oils)
SV = Viton (For high temperature and most special fluid applications)

Adjustable Pressure Range
20 = 30-210 bar. Std setting 100 bar
35 = 150-350 bar. Std setting 200 bar

1UL255 TWO PUMP UNLOADING VALVE

1UL255



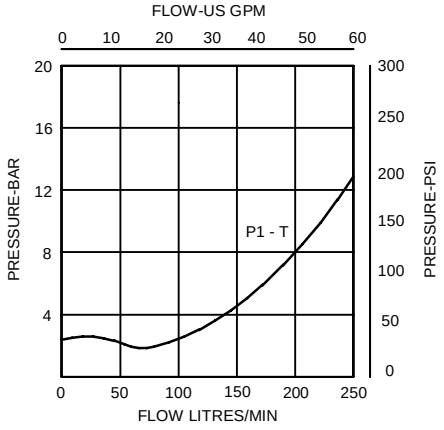
APPLICATION

Two-pump unloader valves are used in systems with combinations of two (or more) pumps to give high flow at low pressure and high pressure at low flow. The valves bypass the flow from the low pressure pump(s) to tank at a pre-set pressure. This allows pump selection to give, for example, rapid advance and high power compaction with the most economic usage of system components and energy requirements.

OPERATION

Pump inlet to P1 and P2 is combined to give maximum flow at low pressure. When the load pressure increases to the valve setting the high flow (low pressure) pump is bypassed from P1 to tank allowing nearly all system power to be used for the high pressure pump. (See graph for the pressure drop of the dumped flow). The system relief valve provides protection by limiting the maximum pressure in the system line.

PRESSURE DROP



FEATURES

This is a self contained system including two replaceable cartridges with full adjustment through their respective ranges. Hardened working components give long, trouble-free life and single body reduces plumbing to a minimum.

SPECIFICATIONS

Figures based on: Oil Temp = 40°C Viscosity = 40 cSt

Rated Flow	150 litres/min (40 US GPM) low flow/high pressure (P2) 200 litres/min (52 US GPM) high flow/low pressure (P1)
Max Setting	350 bar (5000 psi)
Cartridge Material	All working parts hardened and ground steel. External surfaces zinc plated
Body Material	Standard - steel
Mounting Position	Unrestricted
Weight	3.15 kg (6.93 lbs)
Seal Kit Number	SK671 (Nitrile) SK671V (Viton)
Recommended Filtration Level	BS5540/4 Class 18/13 (25 micron nominal)
Operating Temp	-20°C to +90°C
Nominal Viscosity Range	5 to 500 cSt

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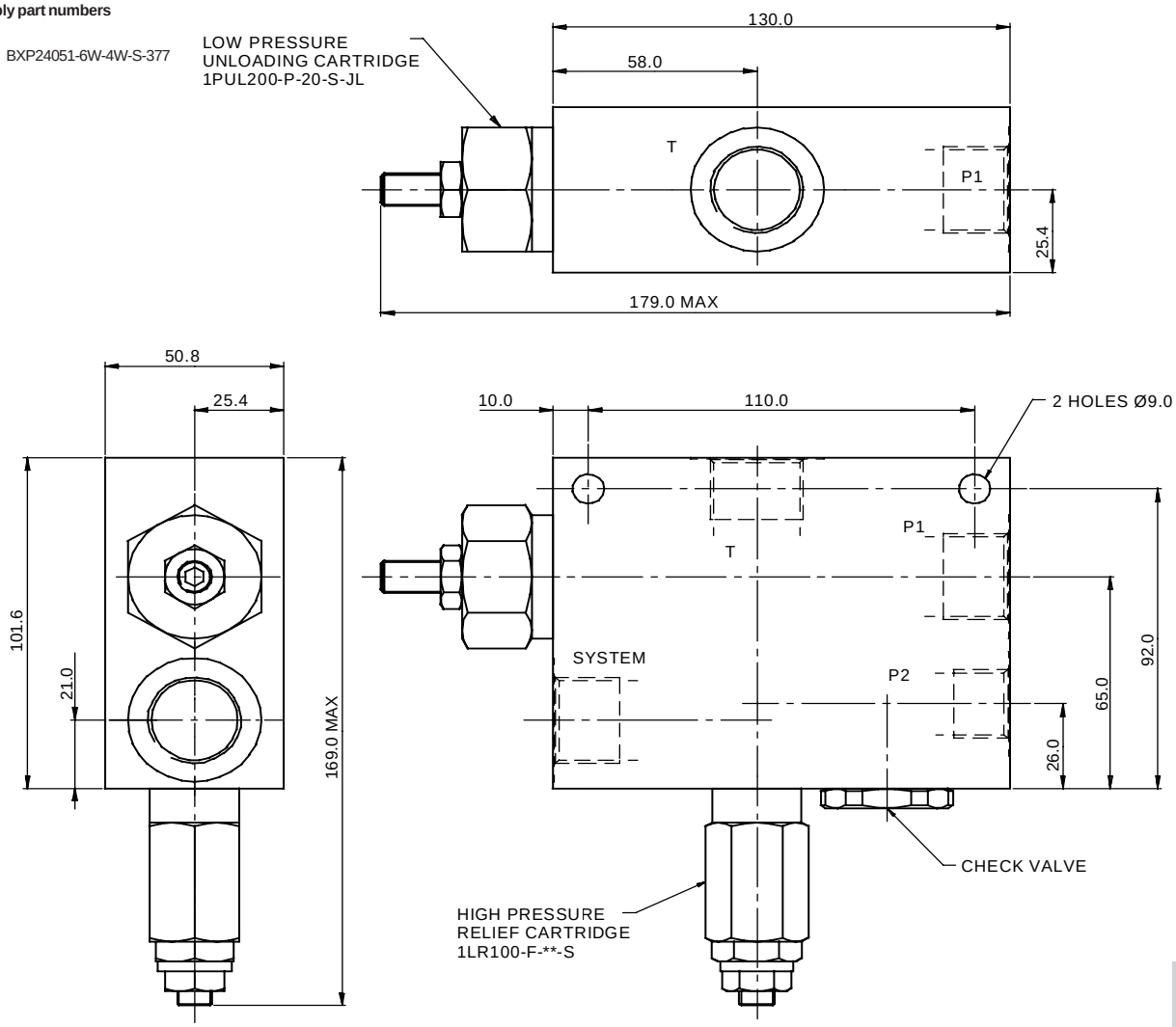
COMPLETE VALVE

BASIC CODE: 1UL255

Sub-assembly part numbers

BSP, steel
3/4" - 1/2" BXP24051-6W-4W-S-377



12

Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

1UL255	P	6W- 4W	20	35	S

Basic Code
1UL255 = Complete Valve

Adjustment Means
P = Leakproof Screw Adjustment

Port Sizes - Bodied Valves Only
6W - 4W = 3/4" BSP System, P1 and T. 1/2" BSP P2

Adjustable Low Pressure Range
20 = 30-210 bar. Std setting 100 bar
35 = 150-350 bar. Std setting 200 bar

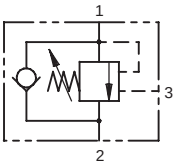
Adjustable High Pressure Range
17 = 35-175 bar. Std setting 105 bar
28 = 75-285 bar. Std setting 175 bar
35 = 114-350 bar. Std setting 280 bar

Seals
S = Nitrile (For use with most industrial hydraulic oils)
SV = Viton (For high temperature and most special fluid applications)

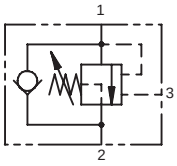
CETOP 03 OVERCENTRE STACKING SLICES

PILOT ASSISTED RELIEF WITH CHECK

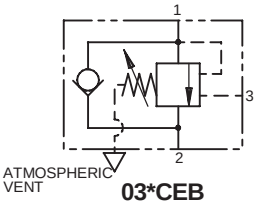
03*CE/ 03*CER/ 03*CEB



03*CE



03*CER



03*CEB

APPLICATION

Overcentre valves give static and dynamic control of loads by regulating the flow into and out of hydraulic actuators. When installed close to or within an actuator, the overcentre valve will stop runaway in the event of hose burst and if open centre directional control valves are used, will allow thermal expansion relief of the hydraulic fluid.

Single overcentre valves are normally used when the load is unidirectional, for example an aerial platform or crane and dual overcentre valves are used for controlling loads in both directions for motor applications or for cylinders going over centre.

The 1CER series overcentre valve performs all duties of a regular overcentre but is able to relieve and stay open irrespective of downstream pressure. This enables the valve to operate when used with a closed centre directional valve which has service line reliefs. The poppet is pressure balanced, preventing relief setting increase due to back pressure.--

In the 1CEB series pressure balanced overcentre relief setting is unaffected by back pressure, enabling the valve to stay open when the valve port pressure rises. This will allow the control of regenerative or meter out proportional systems.

OPERATION

The check section allows free flow into the actuator then holds and locks the load against movement. The pilot assisted relief valve section will give controlled movement when pliot pressure is applied. The relief section is normally set to open at a pressure at least 1.3 times the maximum load induced pressure but the pressure required to open the valve and allow movement depends on the pilot ratio of the valve. For optimisation of load control and energy usage, a choice of pilot ratios is available.

The pressure required to open the valve and start actuator movement can be calculated as follows:

$$\text{Pilot Pressure} = \frac{\text{(Relief Setting) - (Load Pressure)}}{\text{Pilot Ratio}}$$

FEATURES

Cartridge is economical and fits simple cavity. Allows quick, easy field service - reduces down time.

PILOT RATIOS

1CE30

2.5:1	Best suited for extremely unstable applications such as long booms or flexible frameworks.
5:1 (Std)	Best suited for applications where load varies and machine structure can induce instability
10:1	Best suited for applications where the load remains relatively constant.

1CER30

4:1	Best suited for applications where the load remains relatively constant.
	Other ratios available upon request.

1CEB30

5:1	Best suited for systems where back pressure varies frequently and for re-generative systems.

SPECIFICATIONS

Figures based on: Oil Temp = 40°C Viscosity = 40 cSt

Rated Flow	30 litres/min (8 US GPM)
Max Setting	Max Load Induced Pressure: 270 bar (4000 psi) Relief Setting: 350 bar (5000 psi)
Cartridge Material	Working parts hardened and ground steel. External surfaces zinc plated
Body Material	Standard aluminium (up to 210 bar*) Add suffix '377' for steel option
Mounting Position	Unrestricted
Cavity Number	A6610 (See Section 17)
Torque Cartridge into Cavity	45 Nm (33 lbs ft)
Weight (inc Cartridges)	Single 0.62 kg (1.36 lbs) Dual 0.8 kg (1.76 lbs)
Seal Kit Number	SK395 (Nitrile) SK395V (Viton)
Recommended Filtration Level	BS5540/4 Class 18/13 (25 micron nominal)
Operating Temp	-20°C to +90°C
Leakage	0.3 millilitres/min nominal (5 dpm)
Nominal Viscosity Range	5 to 500 cSt

For pressure drop curves please see section 6 (cartridge only).

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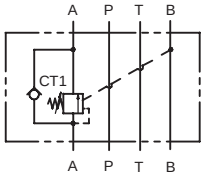
COMPLETE VALVE

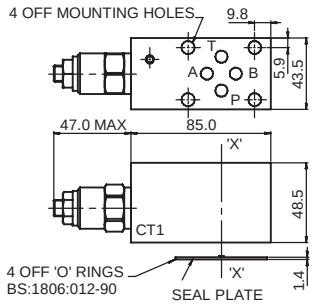
BASIC CODE: 03ACE* Overcentre in A, piloted from B

Sub-assembly part numbers

Aluminium
BXP9150-S



Tightening torque of "F" adjuster locknut - 20 to 25 Nm

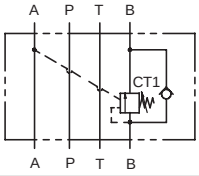


COMPLETE VALVE

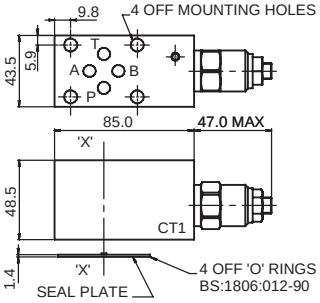
BASIC CODE: 03BCE* Overcentre in B, piloted from A

Sub-assembly part numbers

Aluminium
BXP9150-S



Tightening torque of "F" adjuster locknut - 20 to 25 Nm

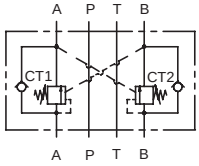


COMPLETE VALVE

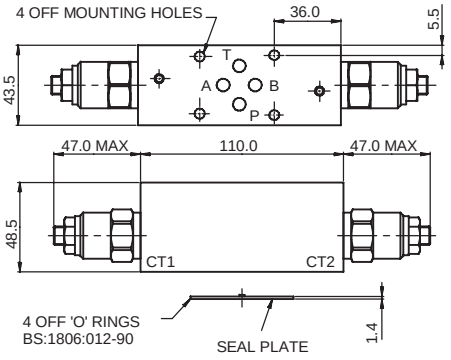
BASIC CODE: 03ABCE* Overcentre in A & B, cross piloted

Sub-assembly part numbers

Aluminium	*Steel*
BXP9151-S	BXP9151-S-377



Tightening torque of "F" adjuster locknut - 20 to 25 Nm



FOR SEAL PLATE INFORMATION SEE PAGE 14-151

Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

03 **	CE*	F	35	S	4	

Basic Code
03A = Overcentre in A
03B = Overcentre in B
03AB = Overcentre in A&B

Overcentre Valve
CE = 1CE30
CER = 1CER30
CEB = 1CEB30
(See Section 6)

Adjustment Means
F = Screw Adjustment
N = Fixed - State pressure setting required
For fixed versions add setting in 10 bar increments to end of part number. Subject to a ±10% tolerance.

Pressure Range @ 4.8 l/min
20 = (All pilot ratios) 70 - 225 bar. Std setting 100 bar (CE)
35 = (2.5:1, 4:1, 5:1) 70 - 350 bar. Std setting 210 bar (CE, CER)
35 = (10:1) 90 - 350 bar. Std setting 210 bar (CE)
35 = (5:1) 75 - 350 bar. Std setting 210 bar (CEB)
Other pressure ranges available on request

Body Material
Omit = Aluminium. (Up to 210 bar*)
377 = Steel.

Pilot Ratio
2.5:1 (03*CE)
4:1 (03*CER)
5:1 (03*CE/03*CEB)
10:1 (03*CE)

Seals
S = Nitrile (For use with most industrial hydraulic oils)
SV = Viton (For high temperature and most special fluid applications)

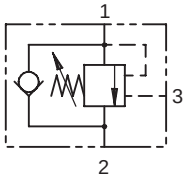
*** For applications above 210 bar please consult our technical department or use the steel body option.**

We reserve the right to change specifications without notice

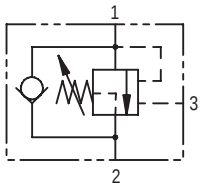
CETOP 05 OVERCENTRE STACKING SLICES

PILOT ASSISTED RELIEF WITH CHECK

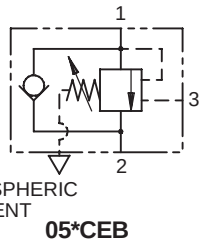
05*CE/ 05*CER/ 05*CEB



05*CE



05*CER



05*CEB

APPLICATION

Overcentre valves give static and dynamic control of loads by regulating the flow into and out of hydraulic actuators. When installed close to or within an actuator, the overcentre valve will stop runaway in the event of hose burst and if open centre directional control valves are used, will allow thermal expansion relief of the hydraulic fluid.

Single overcentre valves are normally used when the load is unidirectional, for example an aerial platform or crane and dual overcentre valves are used for controlling loads in both directions for motor applications or for cylinders going over centre.

The 1CER series overcentre valve performs all duties of a regular overcentre but is able to relieve and stay open irrespective of downstream pressure. This enables the valve to operate when used with a closed centre directional valve which has service line reliefs. The poppet is pressure balanced, preventing relief setting increase due to back pressure.--

In the 1CEB series pressure balanced overcentre relief setting is unaffected by back pressure, enabling the valve to stay open when the valve port pressure rises. This will allow the control of regenerative or meter out proportional systems.

OPERATION

The check section allows free flow into the actuator then holds and locks the load against movement. The pilot assisted relief valve section will give controlled movement when pliot pressure is applied. The relief section is normally set to open at a pressure at least 1.3 times the maximum load induced pressure but the pressure required to open the valve and allow movement depends on the pilot ratio of the valve. For optimisation of load control and energy usage, a choice of pilot ratios is available.

The pressure required to open the valve and start actuator movement can be calculated as follows:

$$\text{Pilot Pressure} = \frac{\text{(Relief Setting) - (Load Pressure)}}{\text{Pilot Ratio}}$$

FEATURES

Cartridge is economical and fits simple cavity. Allows quick, easy field service - reduces down time.

PILOT RATIOS

4:1 Best suited for applications where the load remains relatively constant.

Other ratios available upon request.

SPECIFICATIONS

Figures based on: Oil Temp = 40°C Viscosity = 40 cSt

Rated Flow	90 litres/min (23 US GPM)
Max Setting	Max Load Induced Pressure: 270 bar (4000 psi) Relief Setting: 350 bar (5000 psi)
Cartridge Material	Working parts hardened and ground steel. External surfaces zinc plated
Body Material	Standard aluminium (up to 210 bar*) Add suffix '377' for steel option
Mounting Position	Unrestricted
Cavity Number	A12336 (See Section 17)
Torque Cartridge into Cavity	60 Nm (44 lbs ft)
Weight (inc cartridges)	Single 2.18 kg (4.8 lbs) Dual 3.02 kg (6.64 lbs)
Seal Kit Number **1CEB Seal Kit Number**	SK633 (Nitrile) SK633V (Viton) SK634 (Nitrile) SK634V (Viton)
Recommended Filtration Level	BS5540/4 Class 18/13 (25 micron nominal)
Operating Temp	-20°C to +90°C
Leakage	0.3 millilitres/min nominal (5 dpm)
Nominal Viscosity Range	5 to 500 cSt

For pressure drop curves please see section 6 (cartridge only).

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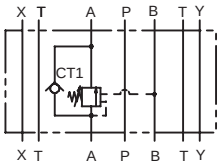
COMPLETE VALVE

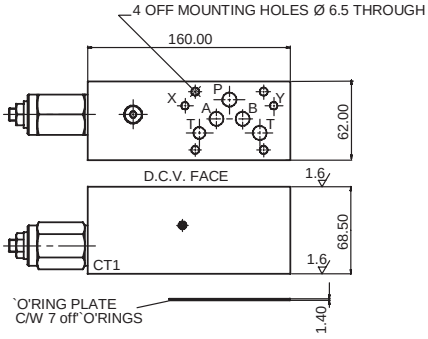
BASIC CODE: 05ACE* Overcentre in A, piloted from B

Sub-assembly part numbers

Aluminium
BXP9206-S



Tightening torque of "F" adjuster locknut - 20 to 25 Nm

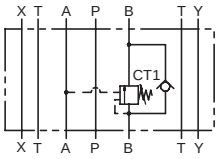


COMPLETE VALVE

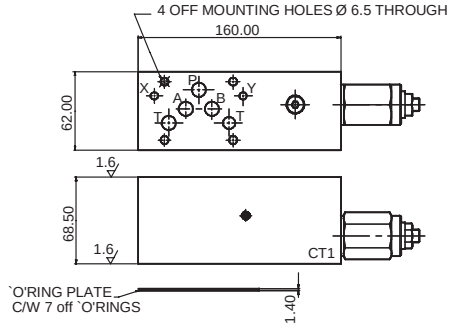
BASIC CODE: 05BCE* Overcentre in B, piloted from A

Sub-assembly part numbers

Aluminium
BXP9207-S



Tightening torque of "F" adjuster locknut - 20 to 25 Nm

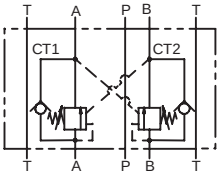


COMPLETE VALVE

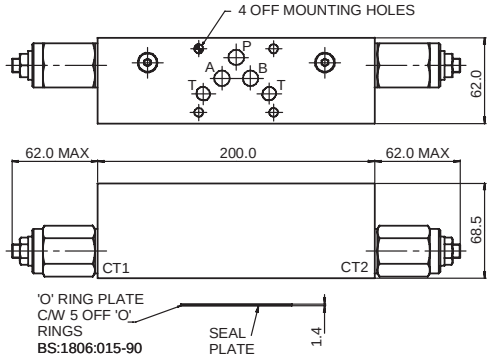
BASIC CODE: 05ABCE* Overcentre in A & B, cross Piloted

Sub-assembly part numbers

Aluminium
BXP9209-S



Tightening torque of "F" adjuster locknut - 20 to 25 Nm



FOR SEAL PLATE INFORMATION SEE PAGE 14-151

Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

05 **	CE*	F	35	S	4	

Basic Code
05A = Overcentre in A
05B = Overcentre in B
05AB = Overcentre in A&B

Overcentre Valve
CE = 1CE90
CER = 1CER90
CEB = 1CEB90
(See Section 6)

Adjustment Means
F = Screw Adjustment
N = Fixed - State pressure setting required
For fixed versions add setting in 10 bar increments to end of part number. Subject to a ±10% tolerance.

Pressure Range @ 4.8 l/min
20 = 70 - 225 bar. Std setting 100 bar
35 = 200 - 350 bar. Std setting 210 bar
Std setting made at 4.8 litres/min
Other pressure ranges available on request

Body Material
Omit = Aluminium. (Up to 210 bar*)
377 = Steel.

Pilot Ratio
4 = 4:1

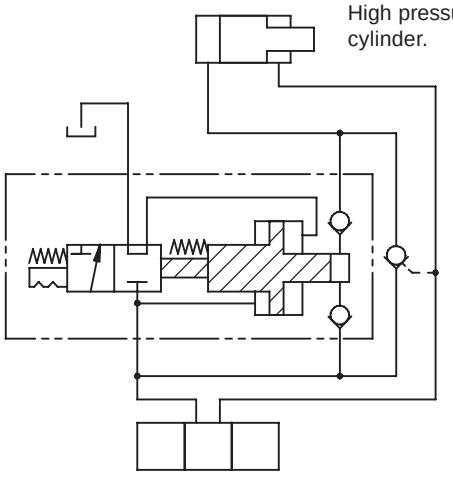
Seals
S = Nitrile (For use with most industrial hydraulic oils)
SV = Viton (For high temperature and most special fluid applications)

*** For applications above 210 bar please consult our technical department or use the steel body option.**

1T16 PRESSURE INTENSIFIER

APPLICATION

This valve is used to convert low input pressure from a small low pressure pump or sub-circuit to high pressure up to 700 bar (10000 psi) and can eliminate the need for high pressure pump, or high-low type circuit. It is best suited for use with low horsepower, variable volume pumps. Contact main office for full specifications.

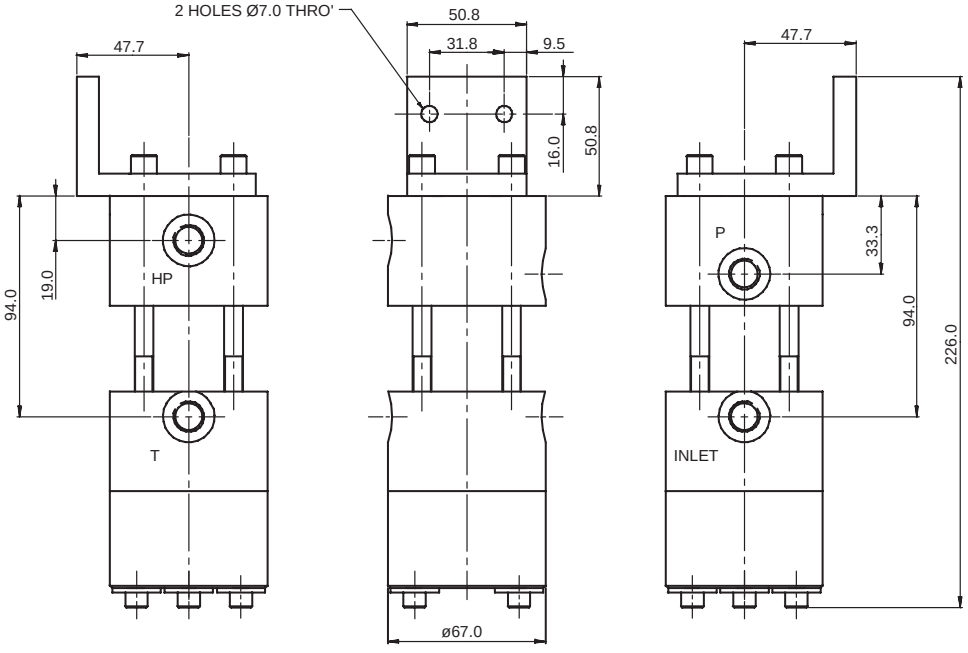


MAXIMUM PRESSURE

Inlet: 110 bar (1600 psi)
Output: 700 bar (10000 psi)

RATED FLOW

Inlet: 1.5 litres/min (0.4 US GPM) max
Output: 165 millilitres/min (10 in³/min)



Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

1T16	2W	6	S

Basic Code
1T16 = Intensifier

Port Sizes - Bodied Valves Only
2W = 1/4" BSP

Seals
S = Nitrile (For use with most industrial hydraulic oils)
SV = Viton (For high temperature and most special fluid applications)

Pressure Intensification Ratio
6 = 6.5:1

16

We reserve the right to change specifications without notice

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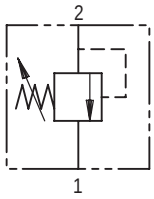
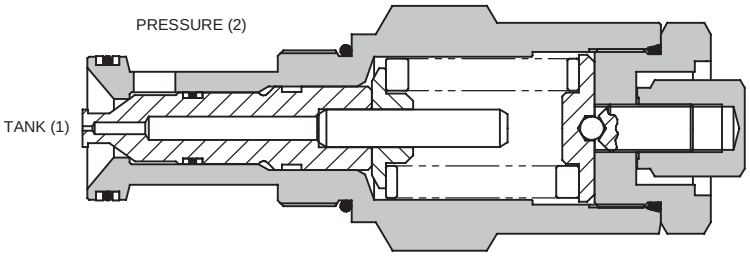
1LR SERIES RELIEF VALVE

DIRECT ACTING DIFFERENTIAL AREA

1LR300

POPPET TYPE





APPLICATION

Ideal for intermittent duty as protection against overload or surge conditions for all types of actuators. Very fast acting and extremely dirt tolerant.

FEATURES

Dirt tolerant, robust and consistent with good pressure rise to increase in flow characteristics for a direct acting valve. Cartridge construction provides for maximum flexiblity in mounting at the point where it is most needed.

OPERATION

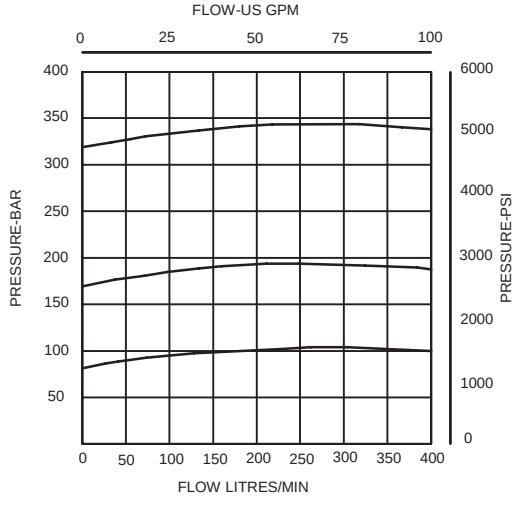
Pressure acts over the differentail area between the seat and seal on the poppet. When the pressure exceeds the setting, the valve opens, allowing relief flow to tank, washing contaminant away from the seat.

SPECIFICATIONS

Figures based on: Oil Temp = 40°C Viscosity = 40 cSt

Rated Flow	380 litres/min (100 US GPM)
Max Setting	350 bar (5000 psi)
Cartridge Material	Working parts hardened and ground steel. External surfaces zinc plated
Body Material	Standard aluminium (up to 210 bar*) Add Suffix '377' for steel option
Mounting Position	Unrestricted
Cavity Number	A1126 (See Section 17)
Torque Cartridge into Cavity	150 Nm (110 lbs ft)
Weight	1LR300 1.04 kg (2.3 lbs) 1LR350 2.08 kg (4.6 lbs)
Seal Kit Number	SK207 (Nitrile) SK207V (Viton)
Recommended Filtration Level	BS5540/4 Class 18/13 (25 micron nominal)
Operating Temp	-20°C to +90°C
Leakage	1 millilitre/min nominal (15 dpm)
Nominal Viscosity Range	5 to 500 cSt

PRESSURE DROP



***For applications above 210 bar please consult our technical department or use the steel body option.**

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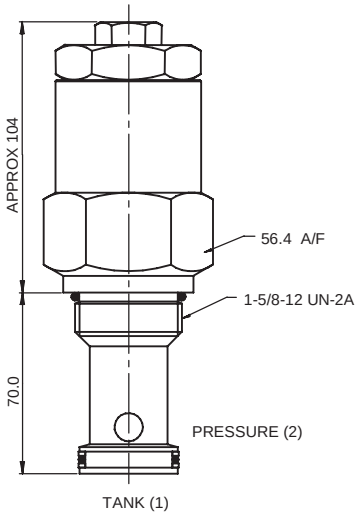
CARTRIDGE ONLY

BASIC CODE: 1LR300



Tightening torque of "F" adjuster locknut - 20 to 25 Nm

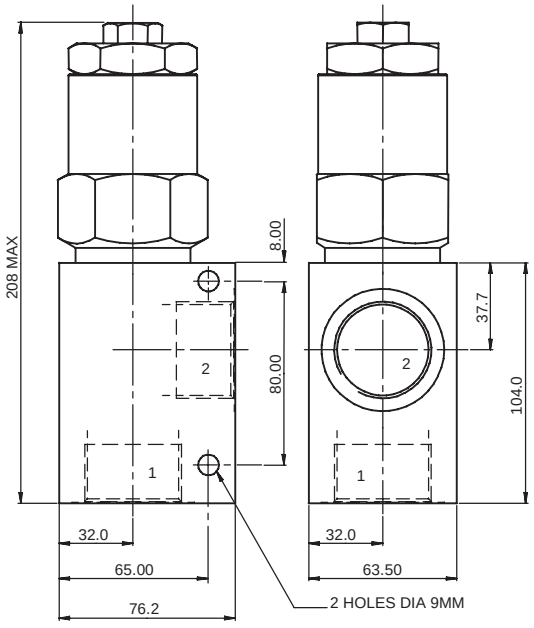
COMPLETE VALVE

1 1/4" PORTS

BASIC CODE: 1LR350

Body ONLY part numbers

BSP, aluminium	*SAE, aluminium*	*BSP, steel*	*SAE, steel*
1 1/4" B5134	1 1/4" B7783	1 1/4" B882	1 1/4" B11553



Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

1LR***	F	10W	35	S

Basic Code
1LR300 = Cartridge Only
1LR350 = Cartridge and Body

Adjustment Means
F = Screw Adjustment

Port Sizes - Bodied Valves Only
10W = 1 1/4" BSP **20T** = 1 1/4" SAE

Seals
S = Nitrile (For use with most industrial hydraulic oils)
SV = Viton (For high temperature and most special fluid applications)

Pressure Range @ 30 l/min
20 = 35-210 bar. Std setting 100 bar
35 = 70-350 bar. Std setting 280 bar
Std setting made at 30 litres/min

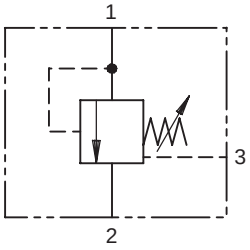
1VR SERIES VENTABLE RELIEF VALVE

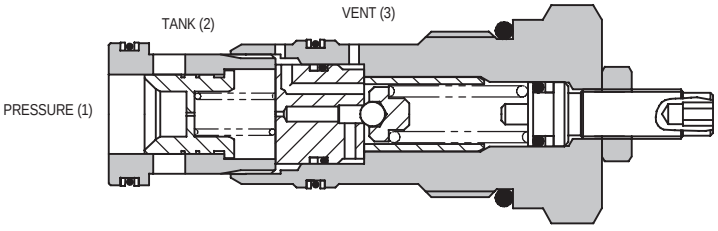
PILOT OPERATED

1VR200

SLIDING SPOOL TYPE

2





APPLICATION

To limit pressure in a system. Good for continuous duty and accurate pressure control with constant or varying flows. The vent feature can be used with a remote pilot section for a two-pressure system or to allow manual or remote 'unloading' of the pump.

OPERATION

When inlet pressure exceeds the setting of the valve, the pilot section opens. The pilot flow causes a pressure imbalance across the main section spool causing it to open, allowing relief flow to tank. When 'vented', pilot flow is referenced directly to tank, bypassing the pilot section. This flow through the vent port causes a pressure imbalance, opening the main section and dumping the pump at minimum pressure drop.

FEATURES

High accuracy of pilot operated design. Hardened working parts give long, reliable, trouble-free life. Ventible for versatility of application. Cartridge construction for installation into your own manifold.

SPECIFICATIONS

Figures based on: Oil Temp = 40°C Viscosity = 40 cSt

Rated Flow	200 litres/min (52 US GPM)
Max Setting	350 bar (5000 psi)
Cartridge Material	Working parts hardened and ground steel. External surfaces zinc plated
Body Material	Standard aluminium (up to 210 bar*) Add Suffix '377' for steel option
Mounting Position	Unrestricted
Cavity Number	A16102 (See Section 17)
Torque Cartridge into Cavity	100 Nm (73 lbs ft)
Weight	1VR200 0.74 kg (1.6 lbs) 1VR250 1.82 kg (4.0 lbs)
Seal Kit Number	SK173 (Nitrile) SK173V (Viton)
Recommended Filtration Level	BS5540/4 Class 18/13 (25 micron nominal)
Operating Temp	-20°C to +90°C
Leakage	35 millilitres/min @ 280 bar
Nominal Viscosity Range	5 to 500 cSt

***For applications above 210 bar please consult our technical department or use the steel body option.**

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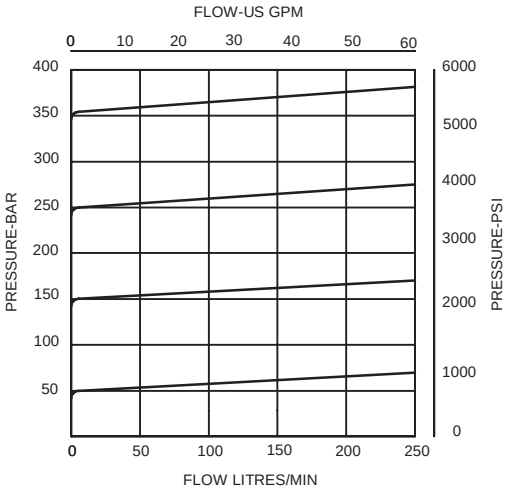
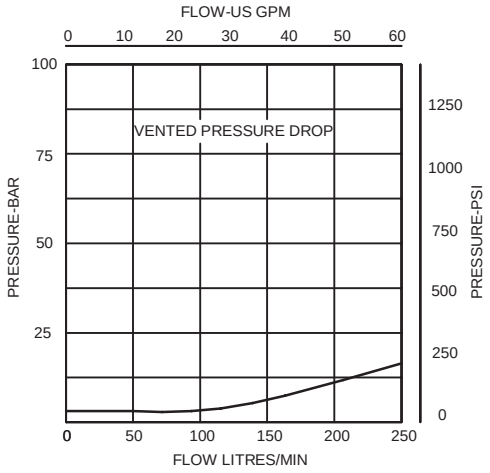
PRESSURE DROP

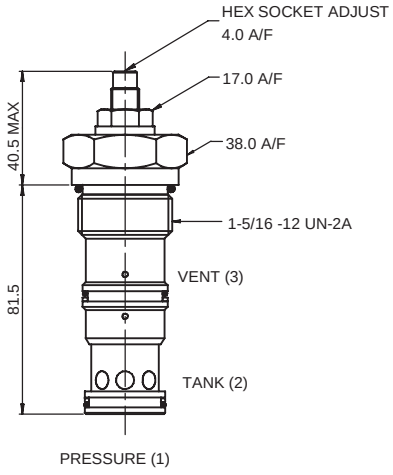




2

CARTRIDGE ONLY

BASIC CODE: 1VR200

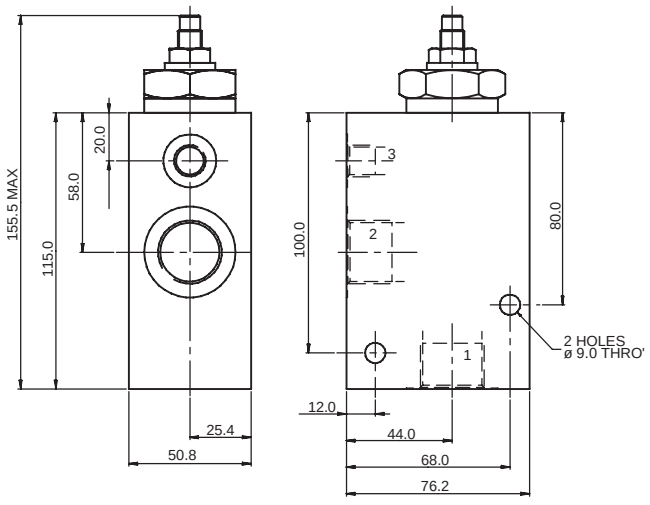


COMPLETE VALVE 1" PORTS

BASIC CODE: 1VR250

Body ONLY part numbers

BSP, aluminium	*SAE, aluminium*	*BSP, steel*	*SAE, steel*
1" *B3496*	*1"* *B6807*	*1"* *B3497*	1" B11555



Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

1VR***	P	8W	35	S

Basic Code
1VR200 = Cartridge Only
1VR250 = Cartridge and Body

Adjustment Means
P = Leakproof Screw Adjustment
G = Tamperproof Cap
(See page 2-102 for dimensions)

Port Sizes - Bodied Valves Only
8W = 1" BSP **16T** = 1" SAE

Seals
S = Nitrile (For use with most industrial hydraulic oils)
SV = Viton (For high temperature and most special fluid applications)

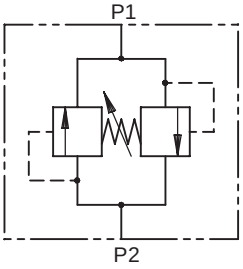
Pressure Range @ 14 l/min
20 = 10-210 bar. Std setting 100 bar
35 = 30-350 bar. Std setting 210 bar
Std setting made at 14 litres/min

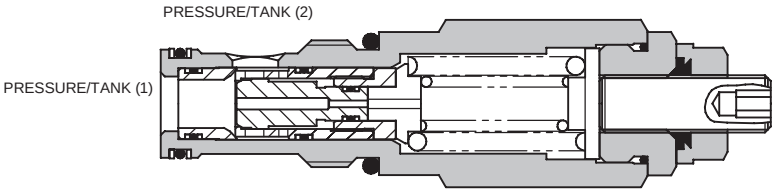
1CLLR SERIES DUAL RELIEF VALVE

DIRECT ACTING DIFFERENTIAL AREA

1CLLR100

POPPET TYPE





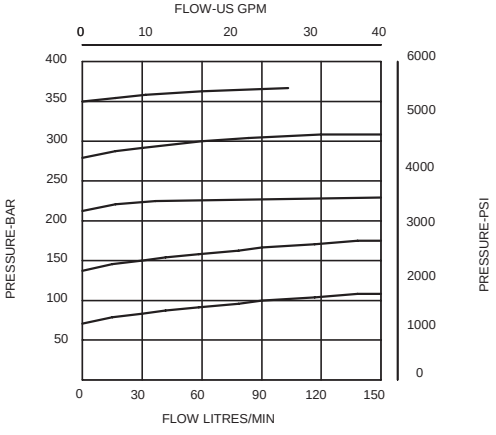
APPLICATION

To protect both lines in a circuit from over pressurisation by relieving oil to the other line. Ideal for use with motors or directional valves as a safety relief. Differential area, fast acting, poppet valve.

OPERATION

Pressure acts over one of two differential areas forcing the poppet back allowing relief flow to the other port. This being a single cartridge is ideal for mounting on to the motor in a special housing.

PRESSURE DROP



FEATURES

Single cartridge relieving in both directions cutting down space requirements, giving full adjustment through its range on both pressures at the same time.

SPECIFICATIONS

Figures based on: Oil Temp = 40°C Viscosity = 40 cSt

Rated Flow	150 litres/min (40 US GPM)
Max Setting	350 bar (5000 psi)
Cartridge Material	Working parts hardened and ground steel. External steel surfaces black oxide
Body Material	Standard aluminium (up to 210 bar*) Add Suffix '377' for steel option
Mounting Position	Unrestricted
Cavity Number	A878 (See Section 17)
Torque Cartridge into Cavity	60 Nm (44 lbs ft)
Weight	1CLLR100 0.23 kg (0.5 lbs) 1CLLR150 0.8 kg (1.8 lbs) 1CLLR155 1.1 kg (2.4 lbs)
Seal Kit Number	SK614 (Nitrile) SK614V (Viton)
Recommended Filtration Level	BS5540/4 Class 18/13 (25 micron nominal)
Operating Temp	-20°C to +90°C
Leakage	5 millilitres/min
Nominal Viscosity Range	5 to 500 cSt

***For applications above 210 bar please consult our technical department or use the steel body option.**

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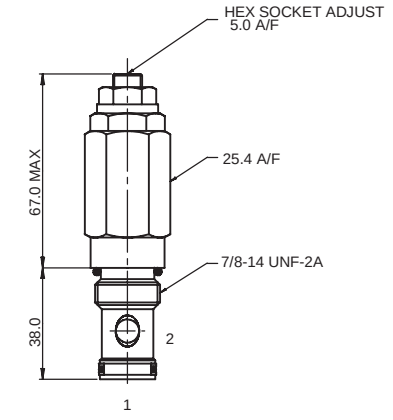
CARTRIDGE ONLY

BASIC CODE: 1CLLR100



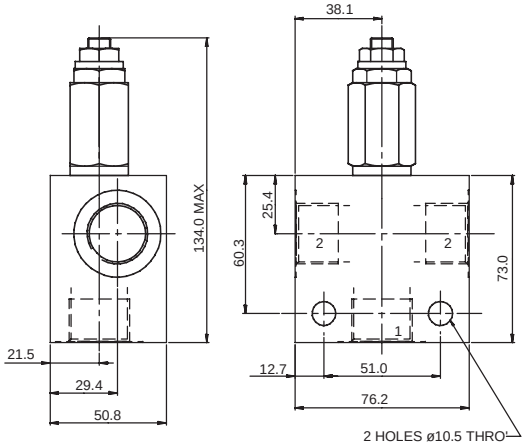
Tightening torque of "F" adjuster locknut - 20 to 25 Nm

COMPLETE VALVE 3/4" 1" PORTS

BASIC CODE: 1CLLR150

Body ONLY part numbers

BSP, aluminium		*SAE, aluminium*		*BSP, steel*		*SAE, steel*	
3/4"	B1067	3/4"	B4409	3/4"	B5614		
1"	B1069	1"	B10827	1"	B542	1"	B11801

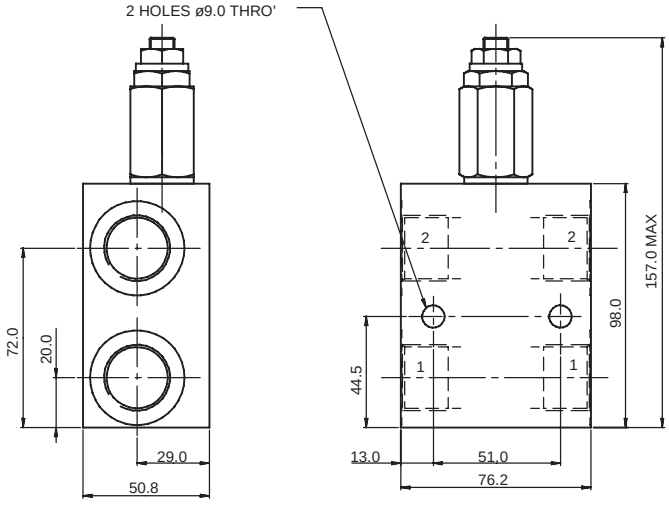


COMPLETE VALVE 3/4" PORTS

BASIC CODE: 1CLLR155

Body ONLY part numbers

BSP, aluminium		*SAE, aluminium*		*BSP, steel*	
3/4"	B2216	3/4"	B10623	3/4"	B7147



Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

1CLLR***	F	6W	35	S

Basic Code
1CLLR100 = Cartridge Only
1CLLR150 = Cartridge and Body
1CLLR155 = Cartridge and Body through ported

Adjustment Means
F = Screw Adjustment

Port Sizes - Bodied Valves Only
6W = 3/4'' BSP **12T** = 3/4'' SAE
8W = 1" BSP **16T** = 1" SAE

Seals
S = Nitrile (For use with most industrial hydraulic oils)
SV = Viton (For high temperature and most special fluid applications)

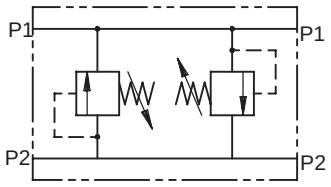
Pressure Range @ 14 l/min
35 = 114-350 bar. Std setting 280 bar
Std setting made at 14 litres/min

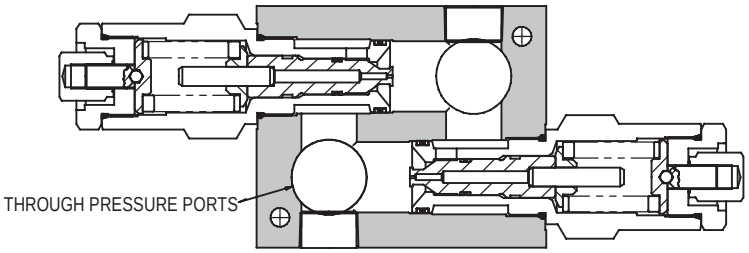
1LLR SERIES DUAL RELIEF VALVE

DIRECT ACTING DIFFERENTIAL AREA

1LLR350

POPPET TYPE





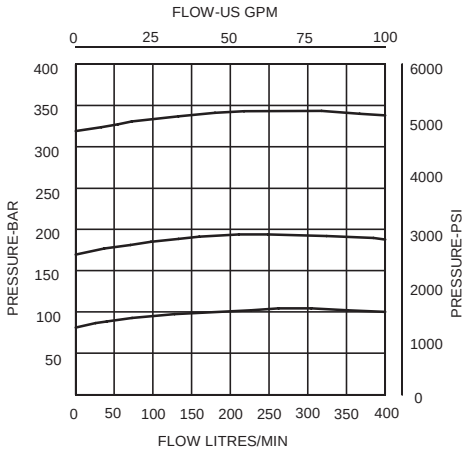
APPLICATION

To protect directional control valves from shock or surge pressures induced by changes in direction or sudden stops which create excessive load conditions.

OPERATION

The dual relief is of the cross line type, where exhaust oil from one line is transferred to the other, negating the need for a separate tank line. It also prevents cavitation when used in conjunction with a closed centre directional valve. For greatest protection the valve should be mounted as close to the actuator or motor as possible.

PRESSURE DROP



FEATURES

Soft start and stop with fast acting operation to give maximum protection to expensive actuators. Reduces plumbing to a minimum and cartridge construction makes for easy maintenance.

SPECIFICATIONS

Figures based on: Oil Temp = 40°C Viscosity = 40 cSt

Rated Flow	380 litres/min (100 US GPM)
Max Setting	350 bar (5000 psi)
Cartridge Material	Working parts hardened and ground steel. External steel surfaces zinc plated
Body Material	Standard aluminium (up to 210 bar*) Add Suffix '377' for steel option
Mounting Position	Unrestricted
Weight	5.50 kg (12.0 lbs)
Seal Kit Number	SK685 (Nitrile) SK685V (Viton)
Recommended Filtration Level	BS5540/4 Class 18/13 (25 micron nominal)
Operating Temp	-20°C to +90°C
Leakage	1.2 millilitres/min max (20 dpm)
Nominal Viscosity Range	5 to 500 cSt

***For applications above 210 bar please consult our technical department or use the steel body option.**

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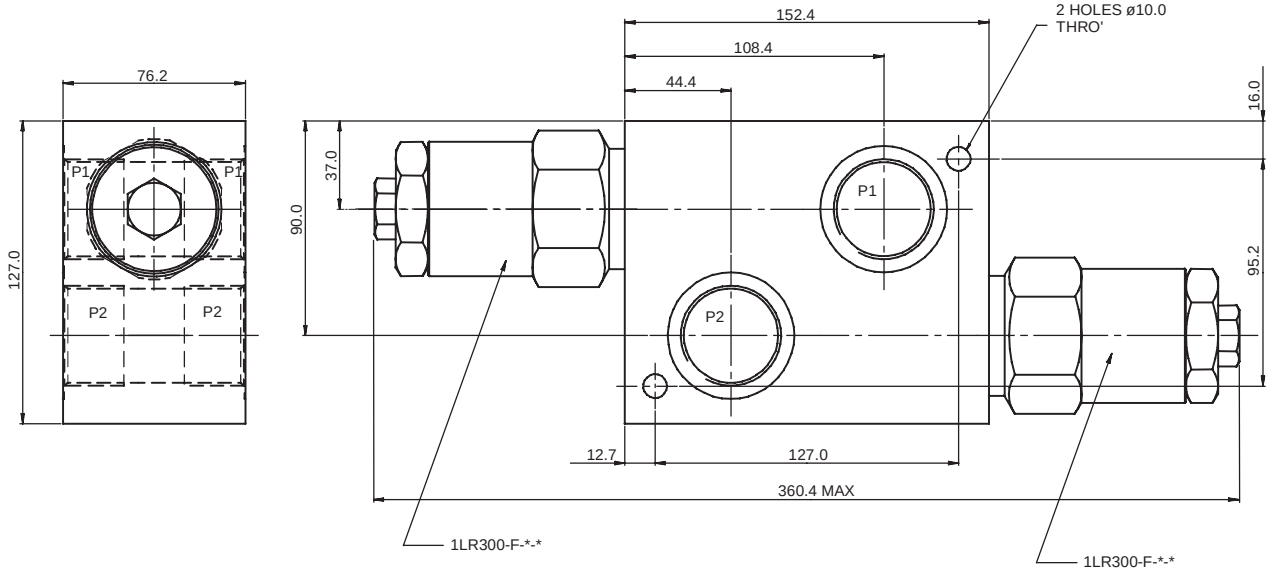
COMPLETE VALVE 1 1/4" PORTS

BASIC CODE: 1LLR350

Sub-assembly part numbers

BSP, aluminium	*SAE, aluminium*	*BSP, steel*	*SAE, steel*
1 1/4" BXP24047-10W-S	1 1/4" BXP24047-20T-S	1 1/4" BXP24047-10W-S-377	1 1/4" BXP24047-20T-S-377



Tightening torque of "F" adjuster locknut - 20 to 25 Nm

Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

1LLR350	F	10W	20	S

Basic Code
1LLR350 = Cartridge and Body

Adjustment Means
F = Screw Adjustment

Port Sizes - Bodied Valves Only
10W = 1 1/4" BSP **20T** = 1 1/4" SAE

Seals
S = Nitrile (For use with most industrial hydraulic oils)
SV = Viton (For high temperature and most special fluid applications)

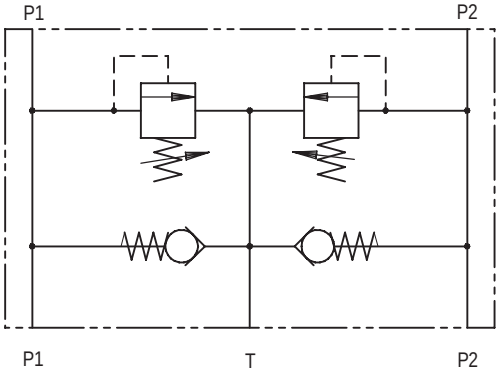
Pressure Range @ 30 l/min
20 = 35-210 bar. Std setting 100 bar
35 = 70 -350 bar. Std setting 280 bar
Std setting made at 30 litres/min

1DDRC SERIES DUAL RELIEF VALVE

WITH MAKE UP CHECKS - DIRECT ACTING

1DDRC35

POPPET TYPE



3

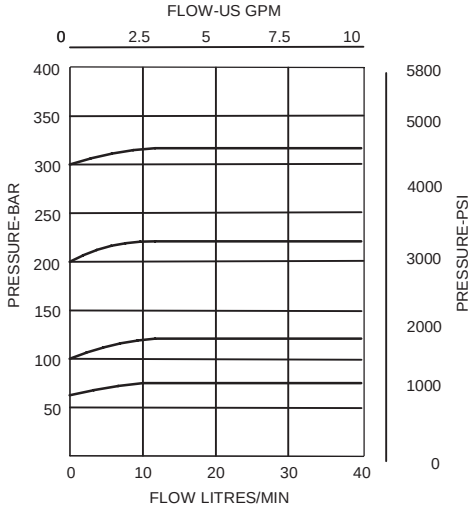
APPLICATION

This is a dual relief with make up checks. Ideal for use to protect a system where relief volumes are different such as in a single rod cylinder or where leakage may cause cavitation as in the case of motors with a case drain. It can also be used to protect directional valves when they have a closed centre condition.

OPERATION

The valve functions as a cross line relief passing oil from one line to the other but with an extra tank port which allows make up flow or extra exhaust flow to take place.

PRESSURE DROP



FEATURES

Soft start and stop with fast acting operation to give maximum protection to expensive actuators. Reduces plumbing to a minimum and cartridge construction makes for easy maintenance.

SPECIFICATIONS

Figures based on: Oil Temp = 40°C Viscosity = 40 cSt

Rated Flow	30 litres/min (8 US GPM)
Max Setting	400 bar (5800 psi)
Cartridge Material	Working parts hardened and ground steel. External steel surfaces zinc plated
Body Material	Standard aluminium (up to 210 bar*) Add Suffix '377' for steel option
Mounting Position	Unrestricted
Weight	1.32 kg (2.904 lbs)
Seal Kit Number	SK615 (Nitrile) SK615V (Viton)
Recommended Filtration Level	BS5540/4 Class 18/13 (25 micron nominal)
Operating Temp	-20°C to +90°C
Leakage	0.3 millilitres/min max (5 dpm)
Nominal Viscosity Range	5 to 500 cSt

***For applications above 210 bar please consult our technical department or use the steel body option.**

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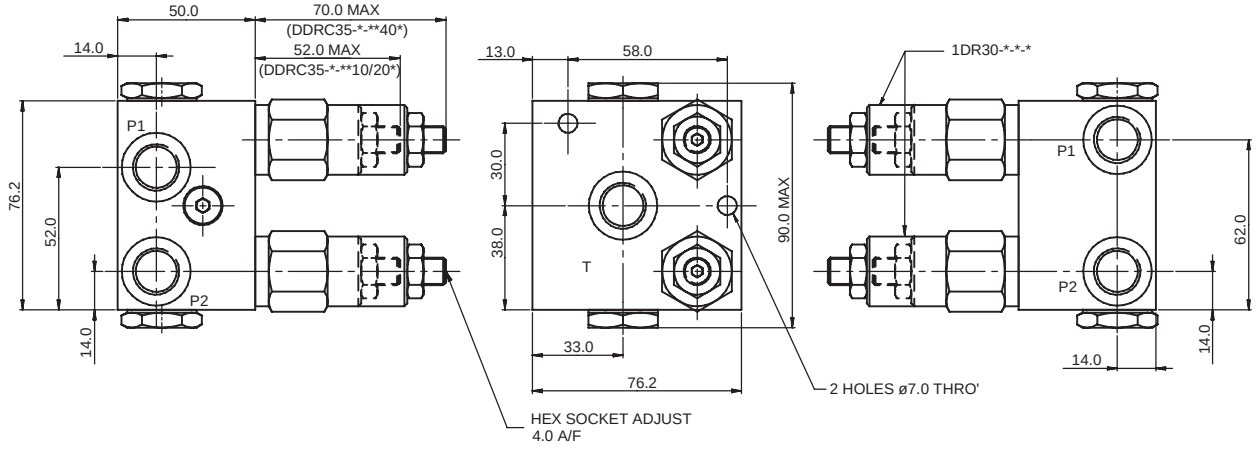
COMPLETE VALVE 3/8" PORTS

BASIC CODE: 1DDRC35

Sub-assembly part numbers

BSP, aluminium	*SAE, aluminium*	*BSP, steel*	*SAE, steel*
3/8" BXP21096-3W-S	3/8" BXP21096-6T-S	3/8" BXP21096-3W-S-377	3/8" BXP21096-6T-S-377



Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

1DDRC35	P	3W	40	S

Basic Code
1DDRC35 = Cartridges and Body

Adjustment Means
P = Leakproof Screw Adjustment
R = Handknob Adjustment
G = Tamperproof Cap

Port Sizes - Bodied Valves Only
3W = 3/8" BSP **6T** = 3/8" SAE

Seals
S = Nitrile (For use with most industrial hydraulic oils)
SV = Viton (For high temperature and most special fluid applications)

Pressure Range @ 4.8 l/min
10 = 7-100 bar. Std setting 70 bar
20 = 35-210 bar. Std setting 100 bar
40 = 50-400 bar. Std setting 280 bar
Std setting made at 4.8 litres/min

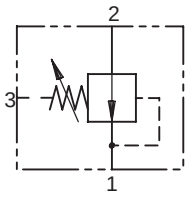
We reserve the right to change specifications without notice

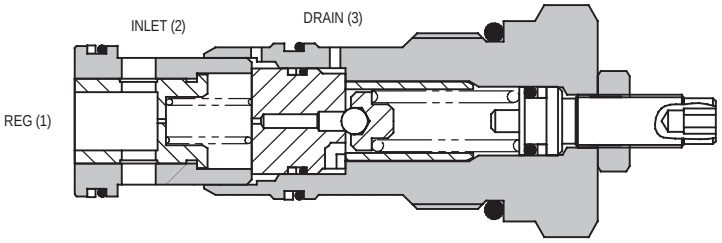
1PA SERIES PRESSURE REDUCING VALVE

PILOT OPERATED

1PA200

SLIDING SPOOL TYPE





5

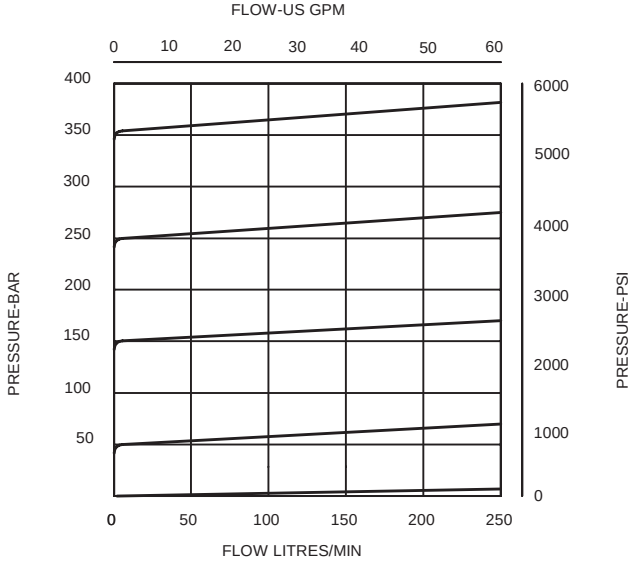
APPLICATION

To maintain a constant downstream pressure lower than the inlet pressure. Ideal for use in two pressure systems or to protect low pressure actuators such as brake cylinders. Note: where reverse flow is required, see 1PAA95, page number 5-161.

OPERATION

This valve is normally open, allowing oil from the inlet to pass through to the regulated port of the cartridge. When the regulated pressure reaches the valve setting, the pilot section opens causing a pressure imbalance across the main spool which moves, throttling the inlet flow, preventing any further pressure rise in the regulated line.

REGULATED PRESSURE



FEATURES

Internal parts hardened, match ground and honed to give long, trouble-free life. Pilot style design allows for high flows and accurate performance.

SPECIFICATIONS

Figures based on: Oil Temp = 40°C Viscosity = 40 cSt

Rated Flow	200 litres/min (52 US GPM)
Max Setting	Inlet: 350 bar (5000 psi) Reg: 30-350 bar (435-5000 psi)
Max Differential	210 bar (3000 psi) between 1 and 2
Cartridge Material	Working parts hardened and ground steel. External surfaces zinc plated
Body Material	Standard aluminium (up to 210 bar*) Add Suffix '377' for steel option
Mounting Position	Unrestricted
Cavity Number	A16102 (See Section 17)
Torque Cartridge into Cavity	100 Nm (76 lbs ft)
Weight	1PA200 0.72 kg (1.59 lbs) 1PA250 1.06 kg (2.34 lbs)
Seal Kit Number	SK173 (Nitrile) SK173V (Viton)
Recommended Filtration Level	BS5540/4 Class 18/13 (25 micron nominal)
Operating Temp	-20°C to +90°C
Pilot Flow	550 millilitres/min @ standard setting
Nominal Viscosity Range	5 to 500 cSt

***For applications above 210 bar please consult our technical department or use the steel body option.**

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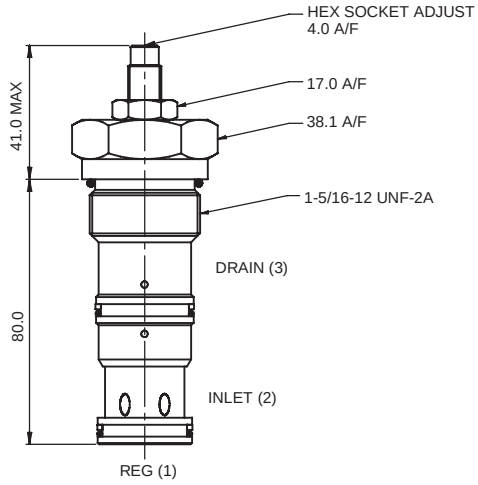
CARTRIDGE ONLY

BASIC CODE: 1PA200



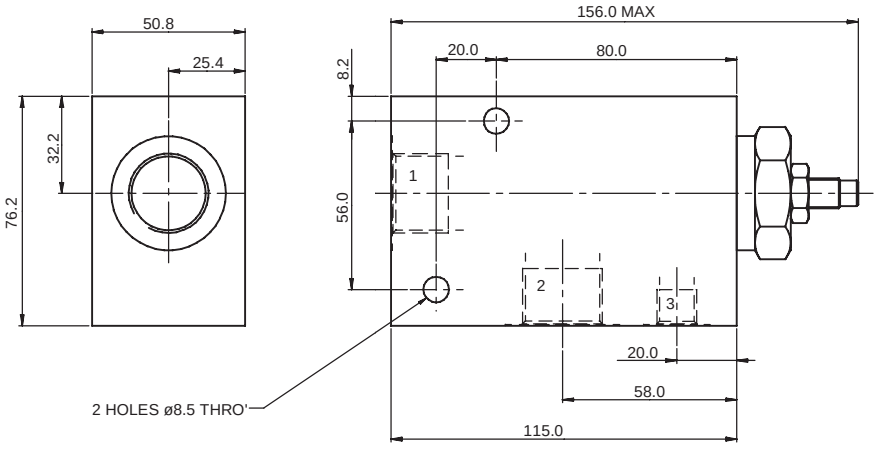
COMPLETE VALVE

3/4" 1" PORTS

BASIC CODE: 1PA250

Body ONLY part numbers

BSP, aluminium		*SAE, aluminium*		*BSP, steel*		*SAE, steel*	
		3/4"	B10786				
1"	B3496	1"	B6807	1"	B3497	1"	B11555



Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

1PA***	P	8W	35	S

Basic Code
1PA200 = Cartridge Only
1PA250 = Cartridge and Body

Adjustment Means
P = Leakproof Screw Adjustment
R = Handknob Adjustment
G = Tamperproof Cap
(See page 5-102 for dimensions)

Port Sizes - Bodied Valves Only

	12T = 3/4" SAE
8W = 1" BSP	**16T** = 1" SAE
1/4" BSP Drain Ports	1/4" SAE Drain Ports

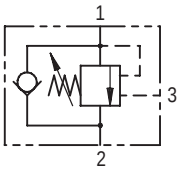
Seals
S = Nitrile (For use with most industrial hydraulic oils)
SV = Viton (For high temperature and most special fluid applications)

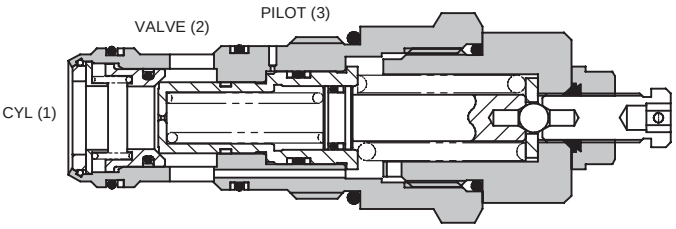
Pressure Range @ zero flow
20 =10-210 bar. Std setting 100 bar
35 =30-350 bar. Std setting 280 bar
Std setting made at zero flow (dead head)

1CE SERIES OVERCENTRE VALVE

PILOT ASSISTED RELIEF WITH CHECK

1CE120





APPLICATION

Overcentre valves give static and dynamic control of loads by regulating the flow into and out of hydraulic actuators. When installed close to or within an actuator, the overcentre valve will stop runaway in the event of hose burst and if open centre directional control valves are used, will allow thermal expansion relief of the hydraulic fluid.

The overcentre cartridge is ideal for mounting directly into a cavity machined in the body of the cylinder, motor or rotary actuator. The cartridge can also be mounted directly to the ports via a specifically machined body as part of a Hydraulic Integrated Circuit or single unit, or contained within one of our standard line bodies.

Single overcentre valves are normally used when the load is unidirectional, for example an aerial platform or crane and dual overcentre valves are used for controlling loads in both directions for motor applications or for cylinders going over centre.

OPERATION

The check section allows free flow into the actuator then holds and locks the load against movement. The pilot assisted relief valve section will give controlled movement when pilot pressure is applied. The relief section is normally set to open at a pressure at least 1.3 times the maximum load induced pressure but the pressure required to open the valve and allow movement depends on the pilot ratio of the valve. For optimisation of load control and energy usage, a choice of pilot ratios is available.

The pressure required to open the valve and start actuator movement can be calculated as follows:

$$\text{Pilot Pressure} = \frac{\text{(Relief Setting) - (Load Pressure)}}{\text{Pilot Ratio}}$$

FEATURES

Allows quick, easy field service - reduces down time. Smooth, sure performance.

PILOT RATIOS

3.5:1 (Standard)	Best suited for applications where load varies and machine structure can induce instability.
8:1	Best suited for applications where load remains relatively constant.

SPECIFICATIONS

Figures based on: Oil Temp = 40°C Viscosity = 40 cSt

Rated Flow	120 litres/min (32 US GPM)
Max Setting	Max Load Induced Pressure: 270 bar (4000 psi) Relief Setting 350 bar (5000 psi)
Cartridge Material	Working parts hardened and ground steel. External surfaces zinc plated
Body Material	Standard aluminium (up to 210 bar*) Add suffix '377' for steel option
Mounting Position	Unrestricted
Cavity Number	A877 (See Section 17)
Torque Cartridge into Cavity	100 Nm (74 lbs ft)
Weight	1CE120 0.59 kg (1.30 lbs) 1CE150 1.46 kg (3.20 lbs) 1CEE150 2.58 kg (5.70 lbs)
Seal Kit Number	SK417 (Nitrile) SK417V (Viton)
Recommended Filtration Level	BS5540/4 Class 18/13 (25 micron nominal)
Operating Temp	-20°C to +90°C
Leakage	0.3 millilitres/min nominal (5 dpm)
Nominal Viscosity Range	5 to 500 cSt

***For applications above 210 bar please consult our technical department or use the steel body option.**

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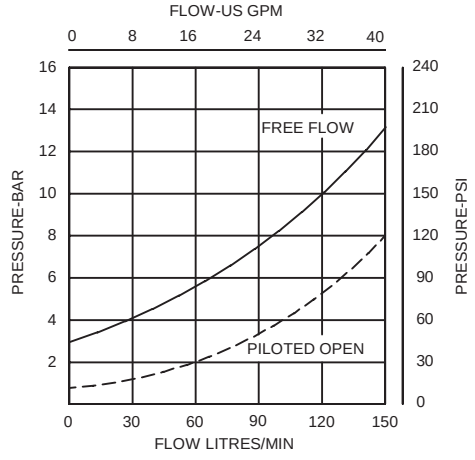
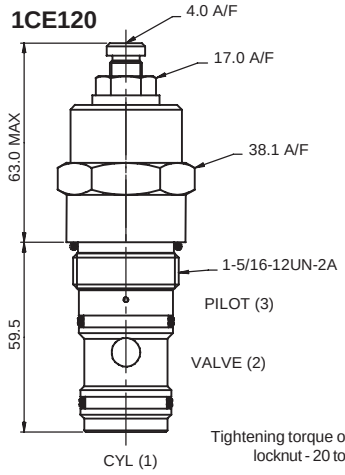
PRESSURE DROP



CARTRIDGE ONLY

BASIC CODE: 1CE120



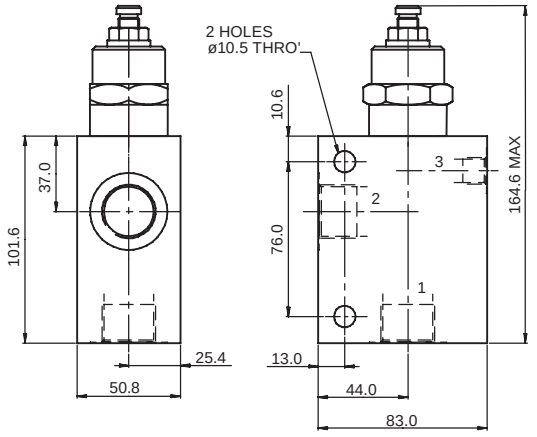
Tightening torque of "F" adjuster locknut - 20 to 25 Nm

SINGLE VALVE 3/4" 1" PORTS

BASIC CODE: 1CE150

Body ONLY part numbers

BSP, aluminium	*SAE, aluminium*	*BSP, steel*	*SAE, steel*
3/4" B6898	3/4" B8200	3/4" B5544	
	1" B10708		1" B11814

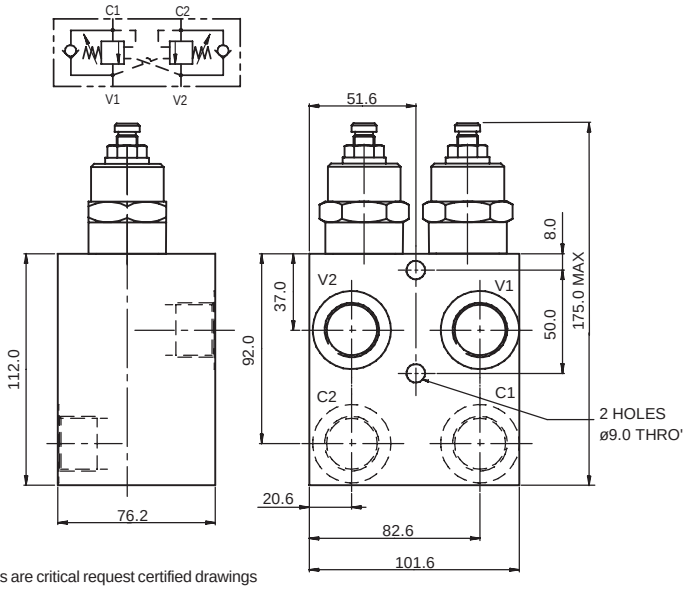


DUAL VALVE 3/4" PORTS

BASIC CODE: 1CEE150 (INTERNALLY CROSS PILOTED)

Body ONLY part numbers

BSP, aluminium	*SAE, aluminium*	*BSP, steel*	*SAE, steel*
3/4" C2543	3/4" C10629	3/4" C1200	3/4" C16434



Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

1CE****	F	6W	35	S	3

Basic Code
1CE120 = Cartridge Only
1CE150 = Cartridge and Body
1CEE150 = Cartridges and Body

Adjustment Means
F = Screw Adjustment

Port Sizes - Bodied Valves Only
6W = 3/4" BSP Valve & Cyl Port. 1/4" BSP Pilot Port
12T = 3/4" SAE Valve & Cyl Port. 1/4" SAE Pilot Port
16T = 1" SAE Valve & Cyl Port. 1/4" SAE Pilot Port

Pressure Range @ 4.8 l/min
35 = 70-350 bar. Std setting 210 bar
Std setting made at 4.8 litres/min

Pilot Ratio
3 = 3.5:1
8 = 8:1

Seals
S = Nitrile (For use with most industrial hydraulic oils)
SV = Viton (For high temperature and most special fluid applications)

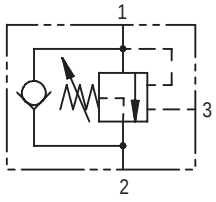
We reserve the right to change specifications without notice

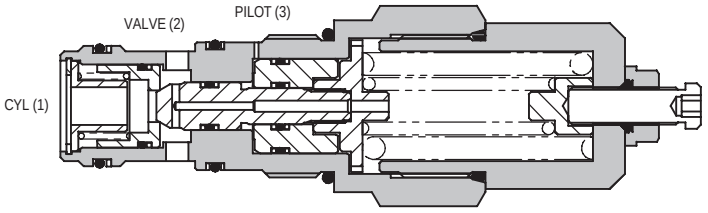
1CER SERIES OVERCENTRE VALVE

PART BALANCED - PILOT ASSISTED

1CER140

POPPET RELIEF





6

APPLICATION

The 1CER series overcentre valve performs all duties of a regular overcentre but is able to relieve and stay open irrespective of downstream pressure. This enables the valve to operate when used with a closed centre directional valve which has service line reliefs. The poppet is pressure balanced, preventing relief setting increase due to back pressure.

OPERATION

The check section allows free flow into the actuator then holds and locks the load against movement. The pilot assisted relief valve section will give controlled movement when pilot pressure is applied. The relief section is normally set to open at a pressure at least 1.3 times the maximum load induced pressure but the pressure required to open the valve and allow movement depends on the pilot ratio of the valve. For optimisation of load control and energy usage, a choice of pilot ratios is available.

The pressure required to open the valve and start actuator movement can be calculated as follows:

$$\text{Pilot Pressure} = \frac{\text{(Relief Setting) - (Load Pressure)}}{\text{Pilot Ratio}}$$

FEATURES

Cartridge is economical and fits simple cavity. Allows quick, easy field service - reduces down time.

PILOT RATIOS

4:1	Best suited where the load varies and machine structure can induce instability.
6:1	Best suited for applications where the load remains relatively constant.
	Other ratios available upon request.

SPECIFICATIONS

Figures based on: Oil Temp = 40°C Viscosity = 40 cSt

Rated Flow	140 litres/min (37 US GPM)
Max Setting	Max Load Induced Pressure: 340 bar (4930 psi) Relief Setting: 420 bar (6090 psi)
Cartridge Material	Working parts hardened and ground steel. External surfaces zinc plated
Body Material	Standard aluminium (up to 210 bar*) Add suffix '377' for steel option
Mounting Position	Unrestricted
Cavity Number	A20081
Torque Cartridge into Cavity	150 Nm (110 lbs ft)
Weight	1CER140 1.2 kg (2.6 lbs) 1CER145 (aluminium) 2.2 kg (4.8 lbs) 1CER145 (steel) 4.0 kg (8.8 lbs) 1CEER145 (aluminium) 2.9 kg (6.4 lbs) 1CEER145 (steel) 6.0 kg (13.2 lbs)
Seal Kit Number	SK1108 (nitrile) SK1108V (Viton)
Recommended Filtration Level	BS5540/4 Class 18/13 (25 micron nominal)
Operating Temp	-20°C to +90°C
Leakage	0.3 millilitres/min nominal (5 dpm)
Nominal Viscosity Range	5 to 500 cSt

***For applications above 210 bar please consult our technical department or use the steel body option.**

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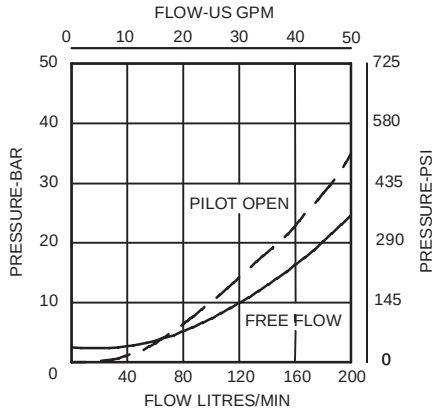
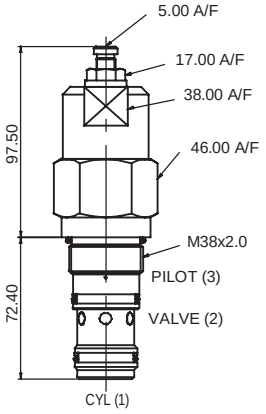
PRESSURE DROP



CARTRIDGE ONLY

BASIC CODE: 1CER140



Tightening torque of "F" adjuster locknut - 20 to 25 Nm

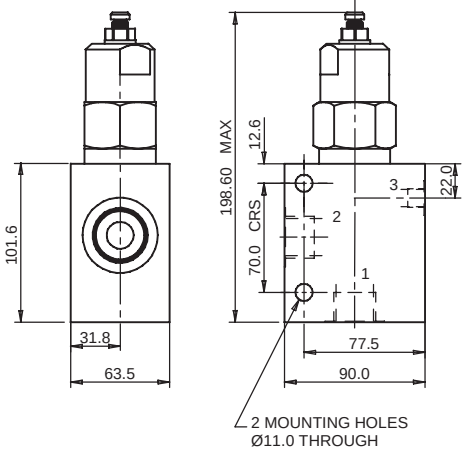
SINGLE VALVE

3/4" 1" PORTS

BASIC CODE: 1CER145

Body ONLY part numbers

BSP, aluminium		*SAE, aluminium*		*BSP, steel*		*SAE, steel*	
3/4"	B20105	3/4"	B11952	3/4"	B20106	3/4"	B11953
1"	B20107	1"	B11946	1"	B20108	1"	B11947



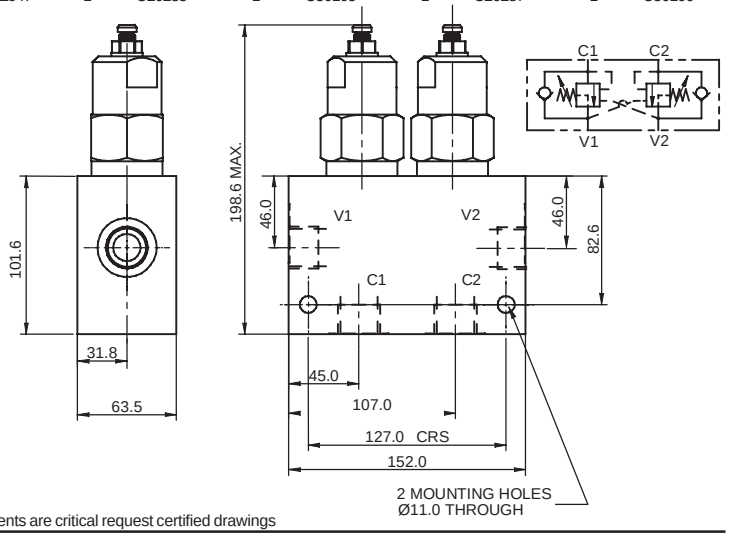
DUAL VALVE

1" PORTS

BASIC CODE: 1CEER145 (INTERNALLY CROSS PILOTED)

Body ONLY part numbers

BSP, aluminium		*SAE, aluminium*		*BSP, steel*		*SAE, steel*	
1"	C20285	1"	C30105	1"	C20287	1"	C30106



Where measurements are critical request certified drawings

6

ORDERING CODE EXAMPLE

1CER***	F	6W	40	S	4

Basic Code
1CER140 = Cartridge Only
1CER145 = Cartridge and Body
1CEER145 = Cartridges and Body

Adjustment Means
F = Screw Adjustment

Port Sizes - Bodied Valves Only
6W = 3/4" BSP Valve & Cyl Port. 1/4" BSP Pilot Port
8W = 1" BSP Valve & Cyl Port. 1/4" BSP Pilot Port
16T = 1" SAE Valve & Cyl Port. 1/4" SAE Pilot Port

Pilot Ratio
4 = 4:1
6 = 6:1
Other ratios available upon request

Seals
S = Nitrile (For use with most industrial hydraulic oils)
SV = Viton (For high temperature and most special fluid applications

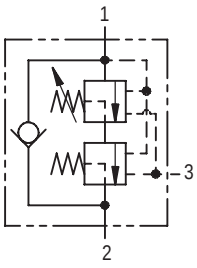
Pressure Range @ 4.8 l/min
20 = 140-250 bar. Std setting 190 bar
30 = 220-330 bar. Std setting 270 bar
40 = 310-420 bar. Std setting 370 bar
Std setting made at 4.8 litres/min

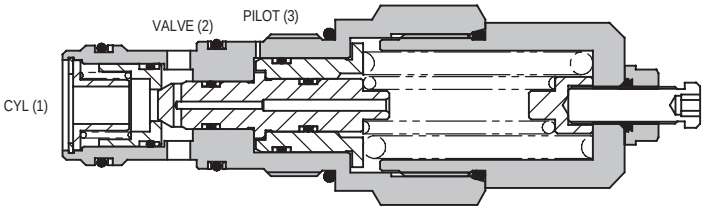
1CEL SERIES OVERCENTRE VALVE

PILOT ASSISTED RELIEF WITH CHECK AND COUNTERBALANCE

1CEL140

POPPET RELIEF





6

APPLICATION

The 1CEL overcentre valve performs all duties of a regular overcentre but maintains a counterbalance pressure to provide dampening to cylinders when there is a rapid loss in stored pressure. This counterbalance pressure reduces as the pilot pressure increases. Typical applications include extension cylinders on telescopic handlers where it is important to have a smooth operation when retracting from full extension.

OPERATION

The check section allows free flow and then locks the load against movement. The pilot assisted relief valve section will give controlled movement when pilot pressure is applied, maintaining a counterbalance pressure to prevent initial pressure loss and therefore instability. The total pressure setting will normally be set at 1.3 times the load induced pressure. The counterbalance pressure reduces as the pilot pressure increases.

FEATURES

Cartridge is economical and fits simple cavity. Allows quick, easy field service - reduces down time.

PILOT RATIOS

Primary	6.1:1
Secondary	0.5:1

SPECIFICATIONS

Figures based on: Oil Temp = 40°C Viscosity = 40 cSt

Rated Flow	140 litres/min (37 US GPM)
Max Setting	380 bar (5510 psi)
Cartridge Material	Working parts hardened and ground steel. External surfaces zinc plated
Body Material	Standard aluminium (up to 210 bar*) Add suffix '377' for steel option
Mounting Position	Unrestricted
Cavity Number	A20081
Torque Cartridge into Cavity	150 Nm (110 lbs ft)
Weight	1CEL140 1.2 kg (2.6 lbs) 1CEL145 (aluminium) 2.2 kg (4.8 lbs) 1CEL145 (steel) 4.0 kg (8.8 lbs) 1CEEL145 (aluminium) 2.9 kg (6.4 lbs) 1CEEL145 (steel) 6.0 kg (13.2 lbs)
Seal Kit Number	SK1108 (Nitrile) SK1108V (Viton)
Recommended Filtration Level	BS5540/4 Class 18/13 (25 micron nominal)
Operating Temp	-20°C to +90°C
Leakage	0.3 millilitres/min nominal (5 dpm)
Nominal Viscosity Range	5 to 500 cSt

***For applications above 210 bar please consult our technical department or use the steel body option.**

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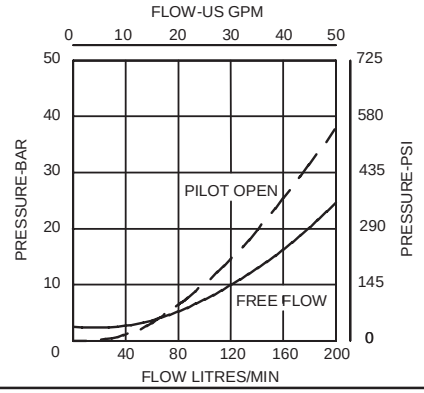
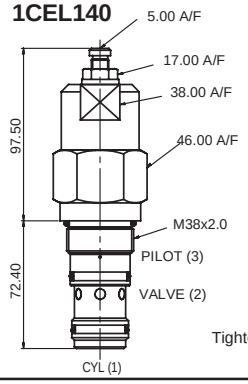
PRESSURE DROP



CARTRIDGE ONLY

BASIC CODE: 1CEL140



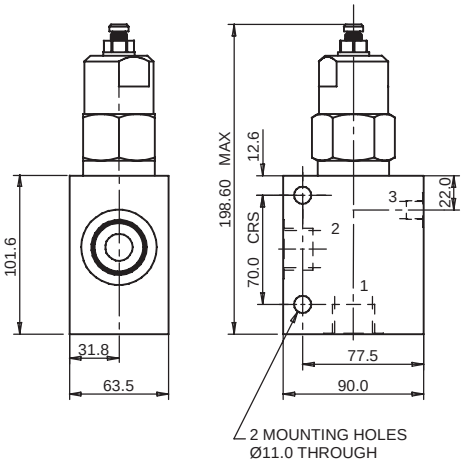
Tightening torque of "F" adjuster locknut - 20 to 25 Nm

SINGLE VALVE 3/4" 1" PORTS

BASIC CODE: 1CEL145

Body ONLY part numbers

BSP, aluminium		*SAE, aluminium*		*BSP, steel*		*SAE, steel*	
3/4"	B20105			3/4"	B20106		
1"	B20107	1"	B11946	1"	B20108	1"	B11947

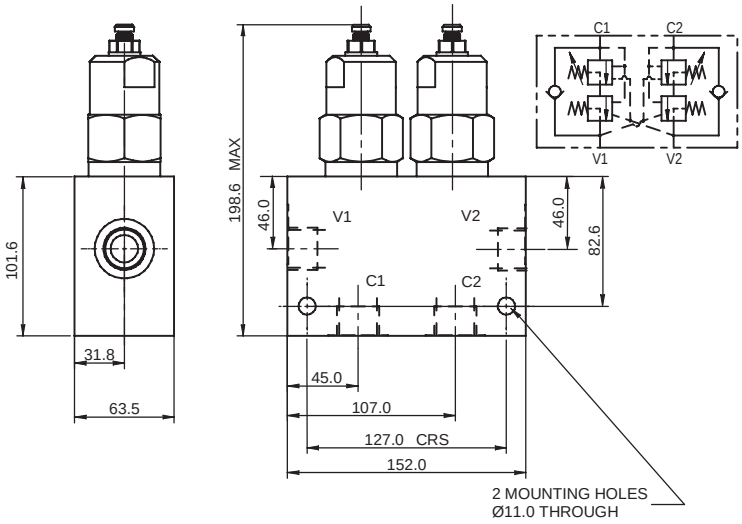


DUAL VALVE 1" PORTS

BASIC CODE: 1CEEL145 (INTERNALLY CROSS PILOTED)

Body ONLY part numbers

BSP, aluminium		*SAE, aluminium*		*BSP, steel*		*SAE, steel*	
1"	C20285	1"	C30105	1"	C20287	1"	C30106



This valve has been designed to eliminate instability from flexible boom applications or where the load induced pressure varies greatly. To get the best results, the settings should be adjusted for each application and then factory set for production quantities. Please contact Integrated Hydraulics for more information.

Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

1CEL***	F	6W	30	S	220	60

Basic Code
1CEL140 = Cartridge Only
1CEL145 = Cartridge and Body
1CEEL145 = Cartridges and Body

Adjustment Means
F = Screw Adjustment

Port Sizes - Bodied Valves Only
6W = 3/4" BSP Valve & Cyl Port. 1/4" BSP Pilot Port
8W = 1" BSP Valve & Cyl Port. 1/4" BSP Pilot Port
16T = 1" SAE Valve & Cyl Port. 1/4" SAE Pilot Port

Counterbalance setting bar
(10 bar increments).

High pressure setting bar
(10 bar increments).

Seals
S = Nitrile (For use with most industrial hydraulic oils)
SV = Viton (For high temperature and most special fluid applications)

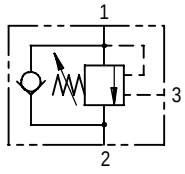
Pressure Range, bar @ 4.8 l/min
20 = 170-320. Std 220 (160/60)
30 = 230-380. Std 280 (220/60)
40 = 310-380. Std 350 (290/60)

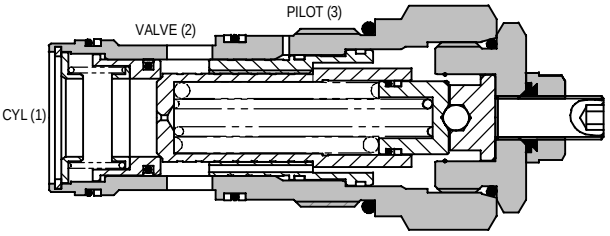
We reserve the right to change specifications without notice

1CE SERIES OVERCENTRE VALVE

PILOT ASSISTED RELIEF WITH CHECK

1CE300





APPLICATION

Overcentre valves give static and dynamic control of loads by regulating the flow into and out of hydraulic actuators. When installed close to or within an actuator, the overcentre valve will stop runaway in the event of hose burst and if open centre directional control valves are used, will allow thermal expansion relief of the hydraulic fluid.

The overcentre cartridge is ideal for mounting directly into a cavity machined in the body of the cylinder, motor or rotary actuator. The cartridge can also be mounted directly to the ports via a specifically machined body as part of a Hydraulic Integrated Circuit or single unit, or contained within one of our standard line bodies.

Single overcentre valves are normally used when the load is unidirectional, for example an aerial platform or crane and dual overcentre valves are used for controlling loads in both directions for motor applications or for cylinders going over centre.

OPERATION

The check section allows free flow into the actuator then holds and locks the load against movement. The pilot assisted relief valve section will give controlled movement when pilot pressure is applied. The relief section is normally set to open at a pressure at least 1.3 times the maximum load induced pressure but the pressure required to open the valve and allow movement depends on the pilot ratio of the valve. For optimisation of load control and energy usage, a choice of pilot ratios is available.

The pressure required to open the valve and start actuator movement can be calculated as follows:

$$\text{Pilot Pressure} = \frac{\text{(Relief Setting) - (Load Pressure)}}{\text{Pilot Ratio}}$$

FEATURES

Allows quick, easy field service - reduces down time. Smooth, sure performance.

PILOT RATIOS

3:1 (Standard)	Best suited for applications where load varies and machine structure can induce instability.
8:1	Best suited for applications where load remains relatively constant.

SPECIFICATIONS

Figures based on: Oil Temp = 40°C Viscosity = 40 cSt

Rated Flow	300 litres/min (80 US GPM)
Max Setting	Max Load Induced Pressure: 270 bar (4000 psi) Relief Setting 350 bar (5000 psi)
Cartridge Material	Working parts hardened and ground steel. External surfaces zinc plated
Body Material	Standard aluminium (up to 210 bar*) Add suffix '377' for steel option
Mounting Position	Unrestricted
Cavity Number	A6935 (See Section 17)
Torque Cartridge into Cavity	150 Nm (110 lbs ft)
Weight	1CE300 0.91 kg (2.00 lbs) 1CE350 2.71 kg (5.96 lbs) 1CEE350 5.42 kg (11.92 lbs)
Seal Kit Number	SK437 (Nitrile) SK437V (Viton)
Recommended Filtration Level	BS5540/4 Class 18/13 (25 micron nominal)
Operating Temp	-20°C to +90°C
Leakage	4 millilitres/min nominal (60 dpm)
Nominal Viscosity Range	5 to 500 cSt

***For applications above 210 bar please consult our technical department or use the steel body option.**

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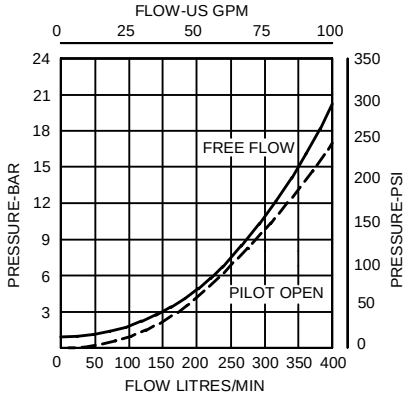
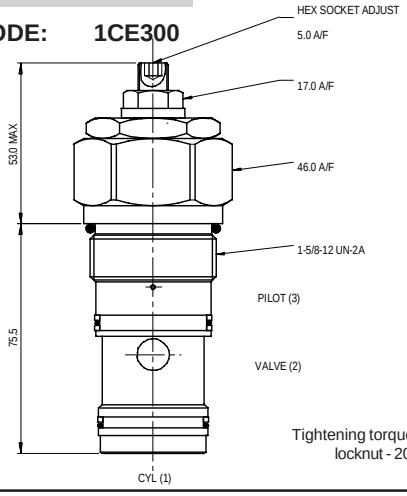
PRESSURE DROP



CARTRIDGE ONLY

BASIC CODE: 1CE300



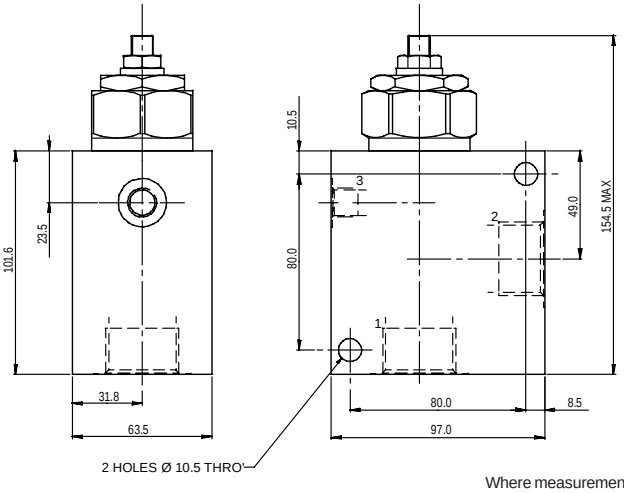
Tightening torque of "F" adjuster locknut - 20 to 25 Nm

SINGLE VALVE

1 1/4" PORTS

BASIC CODE: 1CE350
Body ONLY part numbers

BSP, aluminium	*SAE, aluminium*	*BSP, steel*	*SAE, steel*
1 1/4" B6814	1 1/4" B10630	1 1/4" B8610	1 1/4" B11474

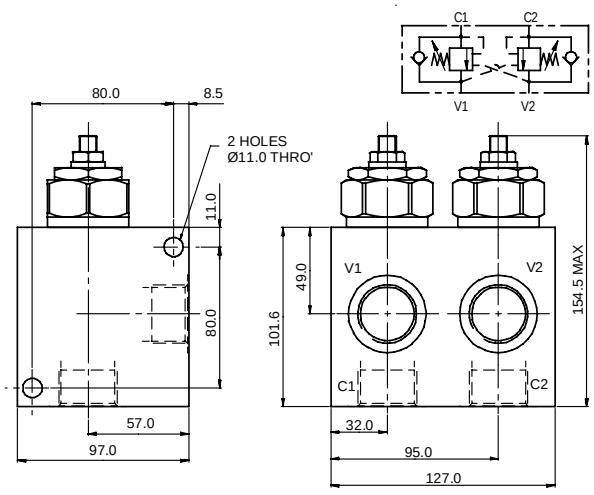


DUAL VALVE

1 1/4" PORTS

BASIC CODE: 1CEE350 (INTERNALLY CROSS PILOTED)
Body ONLY part numbers

BSP, aluminium	*SAE, aluminium*	*BSP, steel*	*SAE, steel*
1 1/4" C8704	1 1/4" C10811	1 1/4" C8705	1 1/4" C11564



Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

1CE****	F	10W	35	S	3

Basic Code
1CE300 = Cartridge Only
1CE350 = Cartridge and Body
1CEE350 = Cartridges and Body

Adjustment Means
F = Screw Adjustment

Port Sizes - Bodied Valves Only
10W = 1 1/4" BSP Valve & Cyl Port. 1/4" BSP Pilot Port
20T = 1 1/4" SAE Valve & Cyl Port. 1/4" SAE Pilot Port

Pressure Range @ 4.8 l/min
35 = 70-350 bar. Std setting 210 bar
Std setting made at 4.8 litres/min

Seals
S = Nitrile (For use with most industrial hydraulic oils)
SV = Viton (For high temperature and most special fluid applications)

Pilot Ratio
3 = 3:1 (Standard)
8 = 8:1

1CE SERIES OVERCENTRE VALVE

ALTERNATIVE BODY ARRANGEMENTS for 300 Litres/min Valves

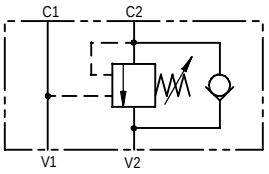
COMPLETE VALVE

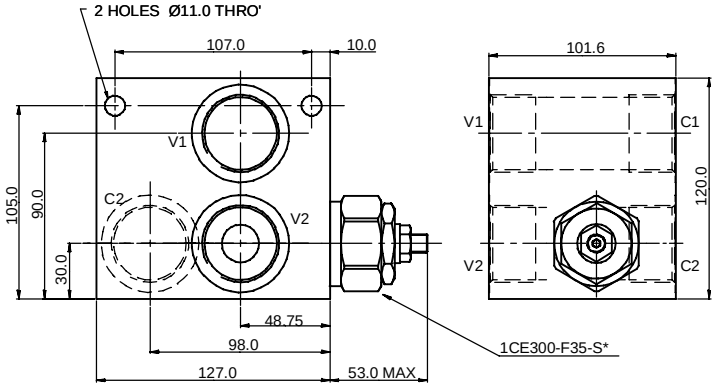
BASIC CODE: 1CE356
THROUGH PORTED

1 1/4" PORTS

Body ONLY part numbers

BSP, aluminium	*BSP, steel*
1 1/4" C13637	1 1/4" C13638





6

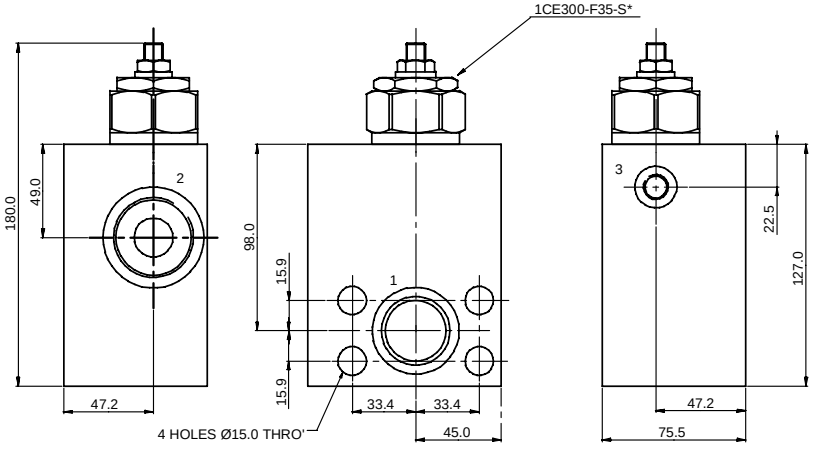
COMPLETE VALVE

BASIC CODE: 1CEG350
GASKET MOUNTED

1 1/4" PORTS

Sub-assembly part numbers

BSP, aluminium	*BSP, steel*
1 1/4" CXP20647-10W-S	1 1/4" CXP20647-10W-S-377



Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

1CE****	F	10W	35	S	3

Basic Code
1CE356 = Catridge and Body Through Ported
1CEG350 = Cartridge and Body Gasket Mounted

Adjustment Means
F = Screw Adjustment

Port Sizes - Bodied Valves Only
10W = 1 1/4" BSP Valve & Cyl Port. 1/4" BSP Pilot Port

Pressure Range @ 4.8 l/min
35 = 70-350 bar. Std setting 210 bar
Std setting made at 4.8 litres/min

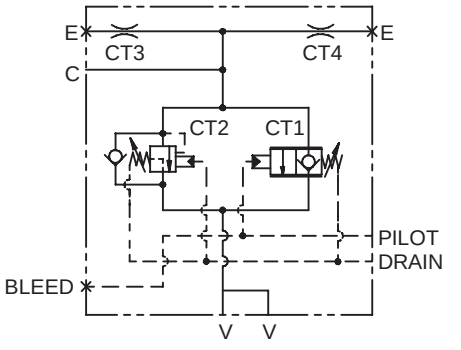
Seals
S = Nitrile (For use with most industrial hydraulic oils)
SV = Viton (For high temperature and most special fluid applications)

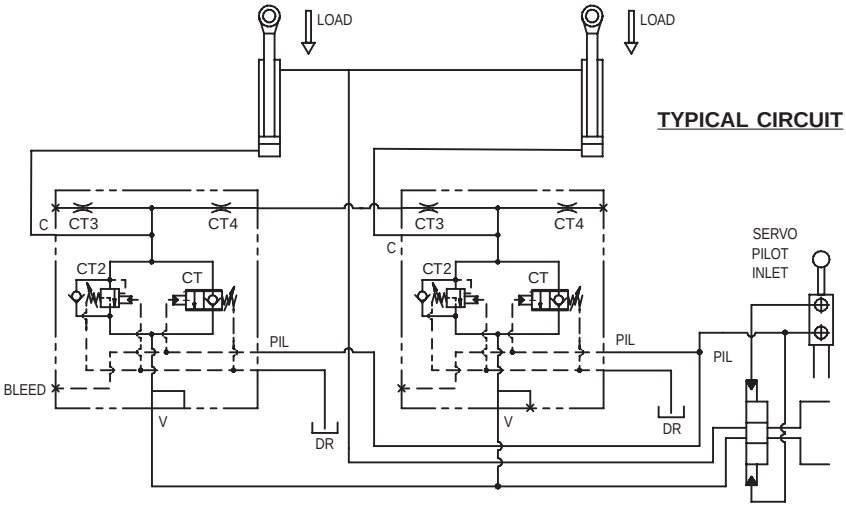
Pilot Ratio
3 = 3:1
8 = 8:1

1CEBL SERIES LOAD CONTROL / HOLDING VALVE c/w Independent Pilot Control

HOSE BURST PROTECTION - SAE FLANGE MOUNTED (REF: ISO 8643)

1CEBL556





6

APPLICATION

These overcentre valves are suitable for use on the boom and dipper cylinders of an excavator to help the manufacturer or user comply with standard ISO8643.

They were designed to give relief, load holding and hose failure protection to systems where a pilot system controls the directional valves.

OPERATION

By connecting the hose rupture valve pilot in parallel with the directional spool valve pilot, and adjusting the opening characteristics of the hose rupture valve to suit that of the spool valve “BoomLoc” may be set so as not to interfere with the normal operation of the machine. Fine adjustment of the pilot pressure permits the optimum setting to be made in differing operating systems.

Both the pilot and the relief sections are unaffected by backpressure, enabling the service line relief’s to operate normally. In the event of hose failure, the control will be passed from the main spool to the “BoomLoc” valve, maintaining control of the cylinder.

Regardless of the load the pilot pressure requirement remains constant as the valve is unaffected by load induced pressure, the poppet being fully balanced with zero differential area.

FEATURES

This is a compact design with good dirt tolerance. Hardened poppets and seats provide excellent load holding characteristics with all the advantages of the cartridge insert.

SPECIFICATIONS

Figures based on: Oil Temp = 40°C Viscosity = 40 cSt

Rated Flow	550 litres/min (145 US GPM)
Max Setting	400 bar (5800 psi)
Cartridge Material	Working parts hardened and ground steel. External surfaces electroless nickel plated and passivated
Body Material	Bright drawn mild steel bar. Zinc plated and passivated
Mounting Position	Flange mounted
Weight	21 kg (46.2 lbs)
Seal Kit Number	SK1163P (Polyurethane/Nitrile)
Recommended Filtration Level	BS5540/4 Class 18/13 (25 micron nominal)
Operating Temp	-20°C to +90°C
Leakage	4.3 millilitres/min max (70 dpm)
Nominal Viscosity Range	5 to 500 cSt

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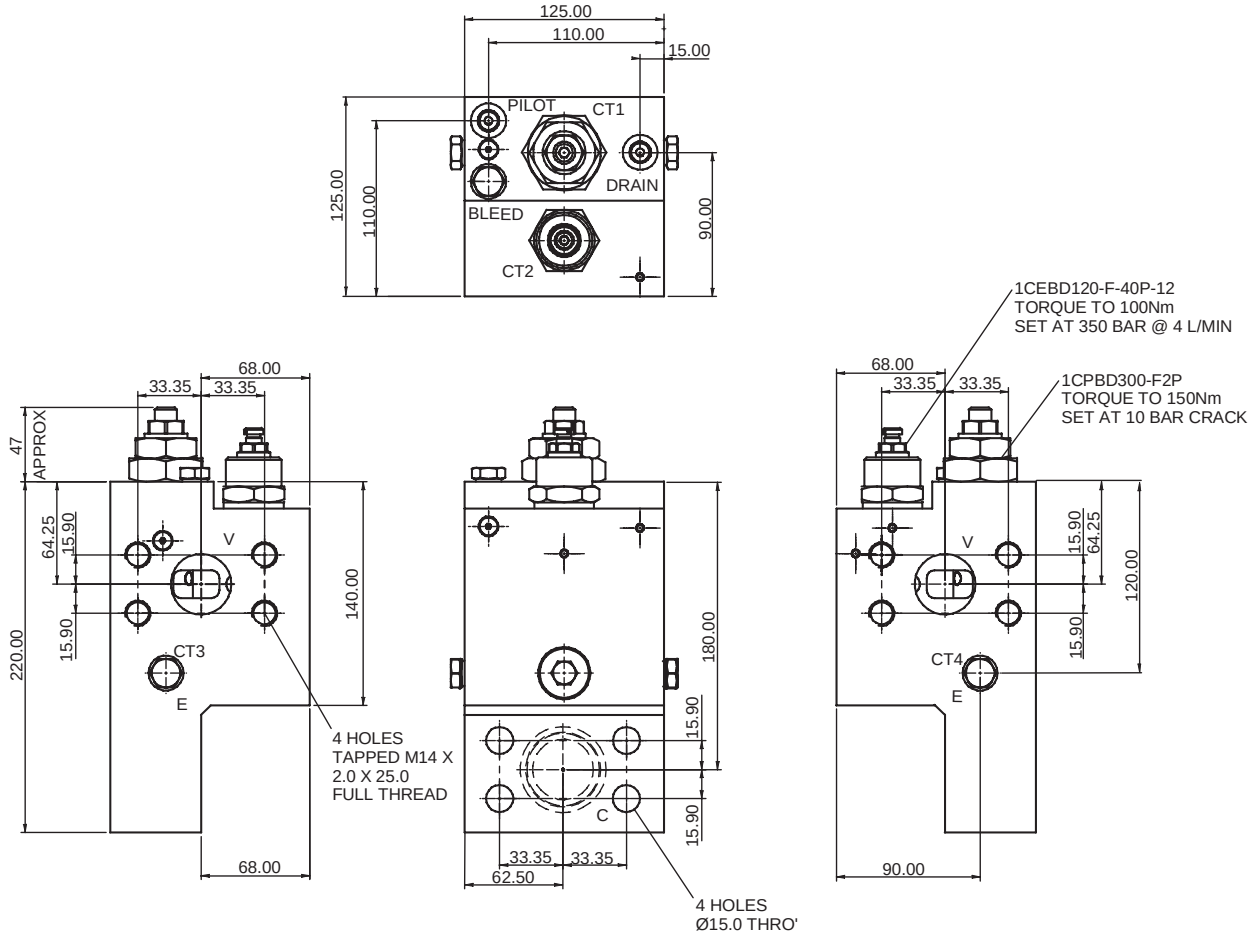
COMPLETE VALVE FLANGE MOUNTED

BASIC CODE: 1CEBL556



Tightening torque of "F" adjuster locknut - 20 to 25 Nm

Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

1CEBL556	F	5/4	6	40	P

Basic Code
1CEBL556 = Cartridges and Body

Adjustment Means
F = Screw Adjustment

Port Size
5/4 = 1 1/4" SAE Flange Cylinder Port
1 1/4" SAE Flange Valve Port
1/4" BSP All Other Ports

SAE Port Type
6 = SAE 6000

Seals
P = Contains polyurethane and standard seal.

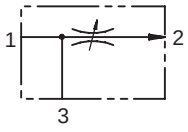
Pressure Range @ 4.8 l/min
40 = 70-400 bar. Std setting 350 bar
Std Setting made at 4.8 litres/min

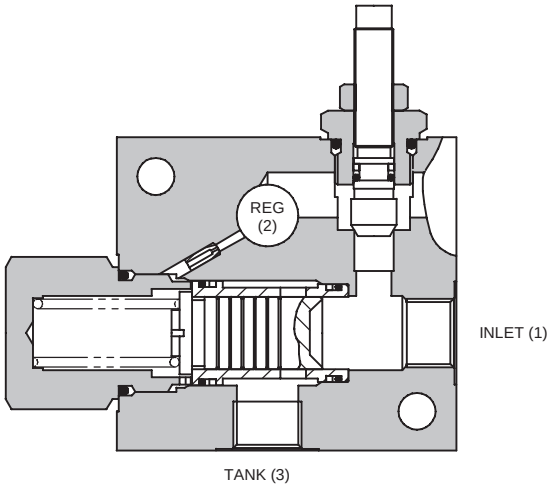
We reserve the right to change specifications without notice

2FB SERIES PRESSURE COMPENSATED

FLOW REGULATOR - BYPASS STYLE

2FB SERIES





APPLICATION

2FB valves are bypass flow regulators. The flow (and actuator speed) will be largely independent of the load and the pressure conditions.

If used to regulate flow from a fixed supply, for example a standard gear or piston pump, the valve will pass the required flow and any surplus flow will be dumped to the tank line at working pressure. The supply pressure requirement will be approximately 7 bar (100 psi) higher than the system pressure, this being the operating pressure of the valve.

9

OPERATION

Inlet flow passes through the adjustable orifice and out of the regulated port. The pressure drop across the orifice is sensed at each end of the spool, producing a force which, at the required flow rate, overcomes the spring force. The resultant movement of the spool regulates the flow by opening the radial valve ports and dumping excess flow.

The valve will pass flow in the return direction but this is restricted by the flow path through the control orifice. For correct valve function the pressure on the tank line MUST be lower than the minimum pressure on the regulated line.

FEATURES

Line body construction allows direct connection into hydraulic systems. Leakproof adjust screw gives easy, accurate adjustment to required flow setting. Hardened and ground working parts give accurate flow control and long working life.

SPECIFICATIONS

Figures based on: Oil Temp = 40°C Viscosity = 40 cSt

Rated Flow	INLET: 2FB25 55 litres/min (14 US GPM) 2FB55 95 litres/min (25 US GPM) 2FB95 150 litres/min (40 US GPM) 2FB195 285 litres/min (70 US GPM) REGULATED: 2FB25 30 litres/min (8 US GPM) 2FB55 55 litres/min (14 US GPM) 2FB95 95 litres/min (25 US GPM) 2FB195 195 litres/min (50 US GPM)
Max Pressure	210 bar (3000 psi)
Material	All working parts hardened, ground and honed steel
Body Material	Standard aluminium (up to 210 bar) Add suffix '377' for steel option
Mounting Position	Line mounted
Weight	2FB25/2FB55 0.79 kg (1.74 lbs) 2FB95 0.82 kg (1.80 lbs) 2FB195 1.57 kg (3.46 lbs)
Seal Kit Number	2FB25/55 SK355 (Nitrile) SK355V (Viton) 2FB95 SK661 (Nitrile) SK661V (Viton) 2FB195 SK374 (Nitrile) SK374V (Viton)
Recommended Filtration Level	BS5540/4 Class 18/13 (25 micron nominal)
Operating Temp	-20°C to +90°C
Nominal Viscosity Range	5 to 500 cSt

***For applications above 210 bar please consult our technical department or use the steel body option.**

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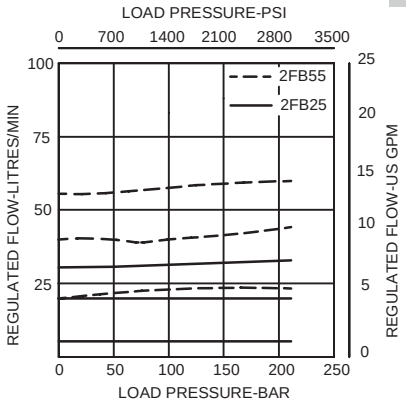
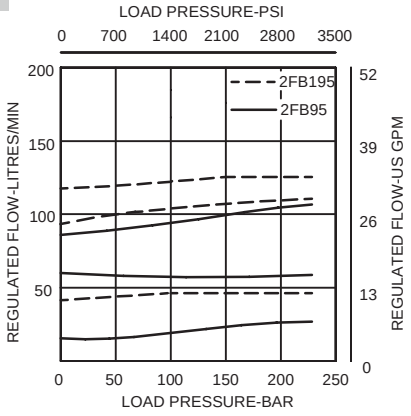
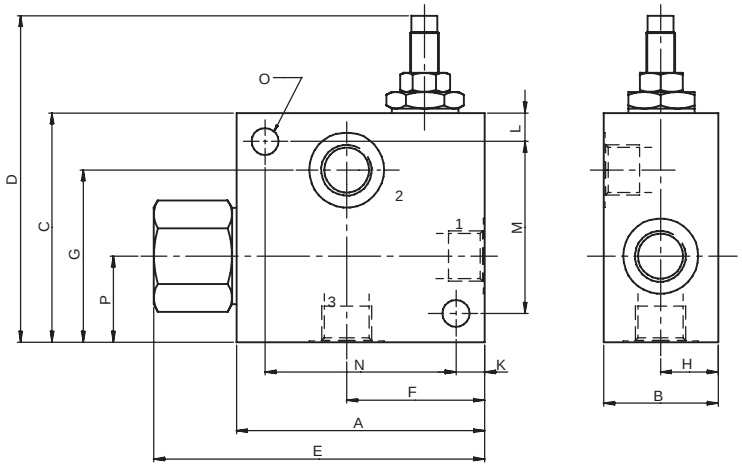
PERFORMANCE





COMPLETE VALVE



Basic Code	Port Size	A	B	C	D	E	F	G	H	K	L	M	N	O	P
2FB25	3/8”	82.5	38	76	111	110	46	57	19	9.5	9.5	57	63.5	9	28.5
2FB55	1/2”	82.5	38	76	111	110	46	57	19	9.5	9.5	57	63.5	9	28.5
2FB95	3/4”	95	38	76	111	123	57	57	19	16	9.5	57	70	10.5	30
2FB195	1”	105	51	102	137	143	61	77.5	25.5	13	10	82.5	79	10.5	38

Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

2FB** **P** **6W** **95** **S**

Basic Code
2FB = Complete Valve

Adjustment Means
P = Leakproof Screw Adjustment
R = Handknob Adjustment
D = Detent Adjustment (2FB95 only)
L = Lever Adjustment (2FB95 only)
(See page 9-102 for dimensions)

Port Sizes - Bodied Valves Only
3W = 3/8” BSP **6T** = 3/8” SAE
4W = 1/2” BSP **8T** = 1/2” SAE
6W = 3/4” BSP **12T** = 3/4” SAE
8W = 1” BSP **16T** = 1” SAE

Adjustable Flow Range
25 = 0- 30 litres/min - 2FB25
55 = 0- 55 litres/min - 2FB55
95 = 0- 95 litres/min - 2FB95
195 = 0-195 litres/min - 2FB195

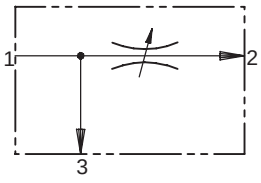
Seals
S = Nitrile (For use with most industrial hydraulic oils)
SV = Viton (For high temperature and most special fluid applications)

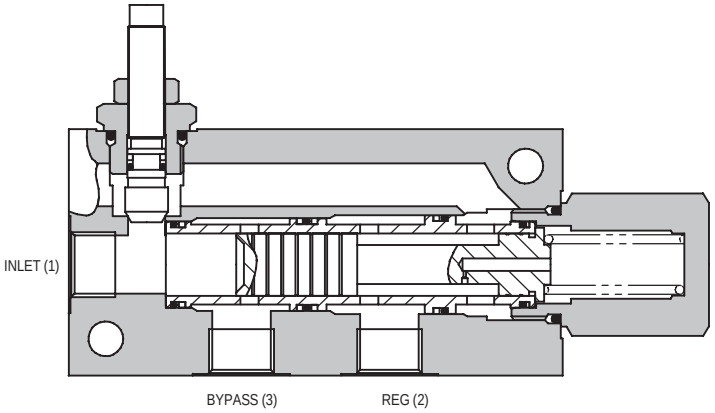
We reserve the right to change specifications without notice

2FP SERIES PRESSURE COMPENSATED

FLOW REGULATOR - PRIORITY STYLE

2FP SERIES





APPLICATION

2FP valves are priority flow regulators. The flow (and actuator speed) will be largely independent of the load and the pressure conditions.

If used to regulate flow from a fixed supply, for example a standard gear or piston pump, the valve will pass the required flow and any surplus flow will be diverted to the bypass port. The bypass flow may be used for a secondary circuit whether the secondary pressure requirement is higher or lower than the regulated pressure.

The valve inlet pressure will be approximately 7 bar (100 psi) more than the regulated or bypass pressure, whichever is higher.

OPERATION

Inlet flow passes through the adjustable orifice and the radial holes in the spool/sleeve assembly then out of the regulated port. The pressure drop across the orifice is sensed at each end of the spool, producing a force which, at the required flow rate, overcomes the spring force. The resultant movement of the spool regulates the flow by opening the radial valve ports to the bypass port and closing the regulated flow ports.

The valve will pass flow in the return direction but this is restricted by the flow path through the control orifice.

FEATURES

Line body construction with three ports allows direct connection into hydraulic systems. Leakproof adjust screw gives easy, accurate adjustment to required flow setting. Hardened and ground working parts give accurate flow control and long working life.

***For applications above 210 bar please consult our technical department or use the steel body option.**

SPECIFICATIONS

Figures based on: Oil Temp = 40°C Viscosity = 40 cSt

Rated Flow	INLET: 2FP25 55 litres/min (14 US GPM) 2FP55 95 litres/min (25 US GPM) 2FP95 150 litres/min (40 US GPM) 2FP195 380 litres/min (100 US GPM) 2FPX5444 380 litres/min (100 US GPM) REGULATED: 2FP25 30 litres/min (8 US GPM) 2FP55 55 litres/min (14 US GPM) 2FP95 95 litres/min (25 US GPM) 2FP195 160 litres/min (42 US GPM) 2FPX5444 160 litres/min (42 US GPM)
Max Pressure	2FP25/55/95/195 210 bar (3000 psi) 2FPX5444 350 bar (5000 psi)
Material	All working parts hardened and ground steel
Body Material	Standard aluminium (up to 210 bar*) Add suffix '377' for steel option
Mounting Position	Line mounted
Weight	2FP25/2FP55 0.99 kg (2.20 lbs) 2FP95 1.83 kg (4.03 lbs) 2FP195 3.77 kg (8.30 lbs) 2FPX5444 10.79 kg (23.75 lbs)
Seal Kit Number	2FP25/55 SK192 (Nitrile) SK192V (Viton) 2FP95 SK222 (Nitrile) SK222V (Viton) 2FP195 SK412 (Nitrile) SK412V (Viton)
Recommended Filtration Level	BS5540/4 Class 18/13 (25 micron nominal)
Operating Temp	-20°C to +90°C
Nominal Viscosity Range	5 to 500 cSt

9

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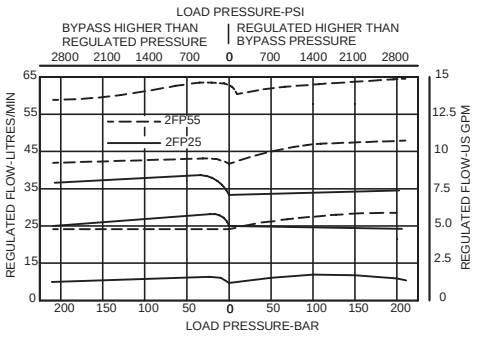
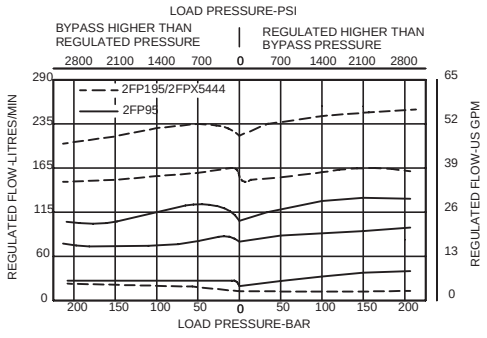
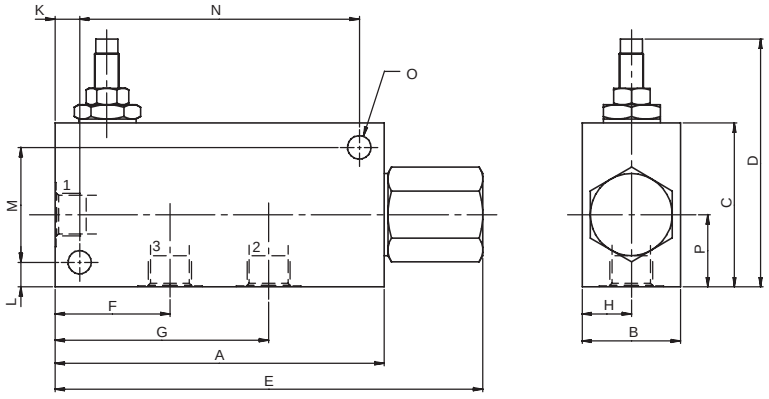
PERFORMANCE





COMPLETE VALVE



Basic Code	Port Size	A	B	C	D	E	F	G	H	K	L	M	N	O	P
2FP25	3/8”	127	38	63.5	99	165	44.5	82.5	19	9.5	9.5	44.5	108	9	28.5
2FP55	1/2”	130	38	63.5	99	168	47.5	85.5	19	12.5	9.5	44.5	108	9	28.5
2FP95	3/4”	152.5	51	76	111	190	54.5	100	25.5	8	8	60	136.5	10.5	32
2FP195	1”	146	63.5	127	162	202	41	99	32	13	13	101.5	120.5	10.5	67
2FPX5444	1”	152	63.5	133	168	242	48	105	32	13	13	108	127	13.5	66.5

Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

2FP**	P	6W	95	S

Basic Code
2FP = Complete Valve

Adjustment Means
P = Leakproof Screw Adjustment
R = Handknob Adjustment
D = Detent Adjustment (2FP95 only)
L = Lever Adjustment (2FP95 only)
(See page 9-102 for dimensions)

Port Sizes - Bodied Valves Only
3W = 3/8” BSP **6T** = 3/8” SAE
4W = 1/2” BSP **8T** = 1/2” SAE
6W = 3/4” BSP **12T** = 3/4” SAE
8W = 1” BSP **16T** = 1” SAE

Adjustable Flow Range
25 = 0- 30 litres/min - 2FP25
55 = 0- 55 litres/min - 2FP55
95 = 0- 95 litres/min - 2FP95
195 = 0-195 litres/min - 2FP195/2FPX5444

Seals
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