



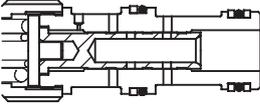
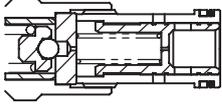
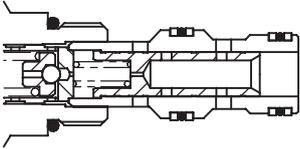
SECTION 5 - PRESSURE REDUCING VALVES

CONTENTS

This section contains pressure control valves which limit the downstream pressure to a set level. Direct acting and pilot operated versions with and without reverse reliefs are available. Flows up to 200 litres/min (52 US GPM) and pressures up to 350 bar (5000 psi).

SELECTION

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SECTION	SERIES	APPLICATION	RANGE	PAGE
	1PD Direct acting with reverse relief sliding spool	Ideal for low flow applications such as brake circuits, clutch control or pilot systems. Also pump swash control	140 bar (2000 psi) 30 litres/min (8 US GPM)	5-111 to 5-115
	1PA Pilot style sliding spool	Uses include two pressure systems where high flow coupled with very stable outlet pressure is required. These valves do not have reverse relief protection	350 bar (5000 psi) 200 litres/min (52 US GPM)	5-121 to 5-141
	1PAA Pilot style with reverse flow relief sliding spool	For use with two pressure systems as with the 1PA series but including reverse relief protection.	350 bar (5000 psi) 30 litres/min (8 US GPM)	5-151

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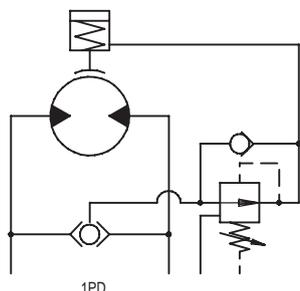
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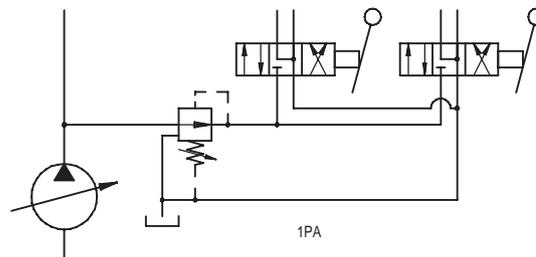
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TYPICAL CIRCUIT EXAMPLES



BRAKE PRESSURE LIMITATION



SECONDARY CIRCUIT

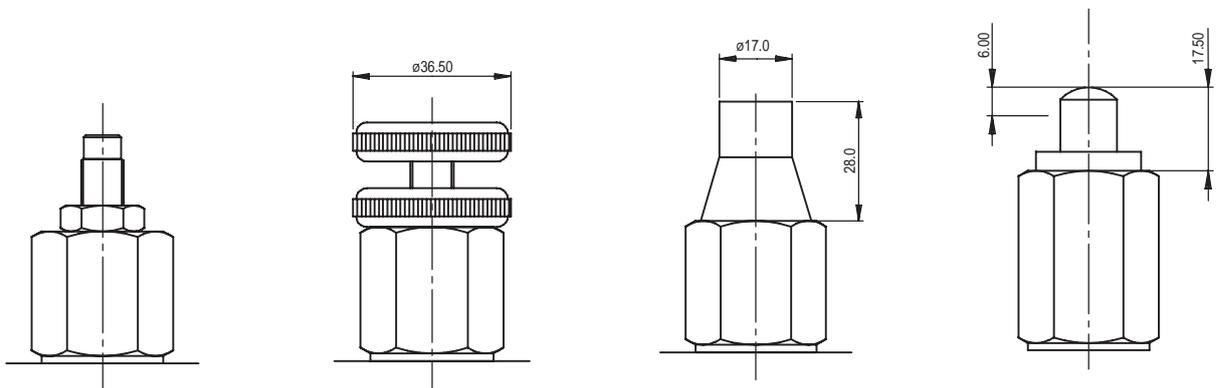
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PRESSURE EQUIPMENT DIRECTIVE

All pressure control valves manufactured by Integrated Hydraulics are designed to be "Pressure Accessories" in accordance with article 3 section 3 of the Pressure Equipment Directive and Sound Engineering Practice and sold in good faith as such. For "Safety Accessories" as defined in article 3 section 1.4 of the Pressure Equipment Directive please contact the UK Technical Sales Department.

ADJUSTMENTS

The adjustment range and Max setting figures shown throughout this catalogue give the design range for each valve, higher or lower values may be attainable but should not be used without first contacting our Engineering department. Setting must ALWAYS be carried out using an appropriate gauge and it must NOT be assumed that screwing an adjuster to its maximum or minimum position will yield the maximum or minimum stated design setting for that valve.



'P' - LEAKPROOF SCREW

'R' - HANDKNOB

'G' - TAMPERPROOF CAP

'C' - PLUNGER ACTUATED

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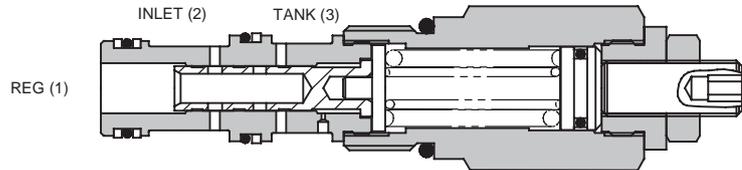
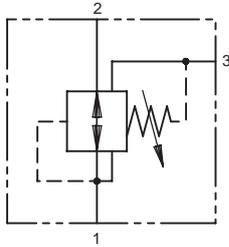


1PD SERIES PRESSURE REDUCING VALVE

DIRECT ACTING WITH REVERSE RELIEF

1PD20

SLIDING SPOOL TYPE



5

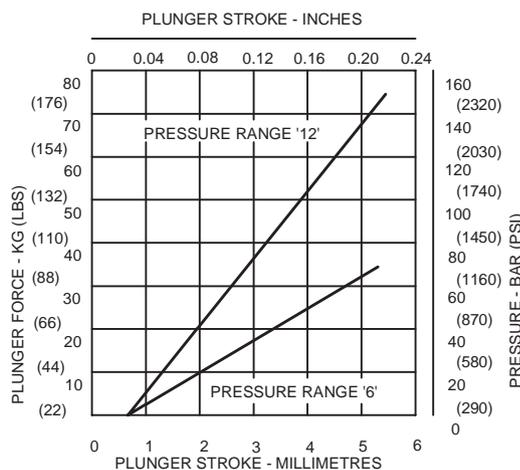
APPLICATION

To provide an adjustable regulated pressure which is lower than supply pressure, as when more than one operating pressure is required from one pump. Direct acting models are suited to lower flow applications and regulated pressures to 140 bar (2000 psi). This valve also acts as a relief valve, relieving from regulated line to tank if shock or surge pressures occur in the regulated line.

OPERATION

Normally open, the valve throttles or closes to maintain constant pressure in the regulated line. As in the other direct acting valves, the spring force holds the valve open.

PLUNGER ADJUSTMENT RANGE



FEATURES

Hardened steel working parts are individually match ground to assure long life, reliability and high accuracy.

SPECIFICATIONS

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

Rated Flow	30 litres/min (8 US GPM)
Max Setting	Up to 140 bar (2000 psi)
Max Inlet Pressure	350 bar (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	A5572 (See Section 17)
Torque Cartridge into Cavity	60 Nm (44 lbs ft)
Weight	1PD20 0.24 kg (0.53 lbs) 1PD25 1.15 kg (2.53 lbs) 1PDC25 1.25 kg (2.75 lbs)
Seal Kit Number	SK339 (Nitrile) SK339V (Viton)
Recommended Filtration Level	BS5540/4 Class 18/13 (25 micron nominal)
Operating Temp	-20°C to +90°C
Leakage	35 millilitres/min nominal
Nominal Viscosity Range	5 to 500 cSt

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

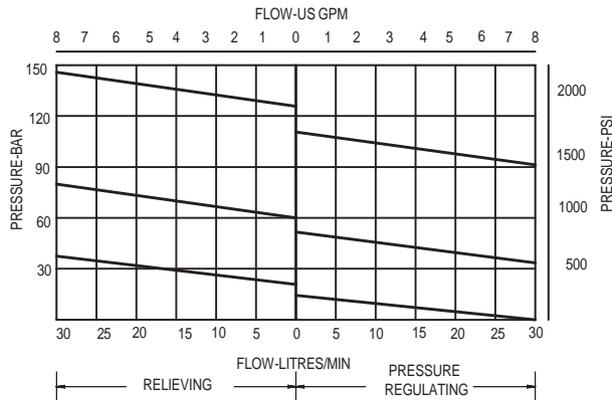
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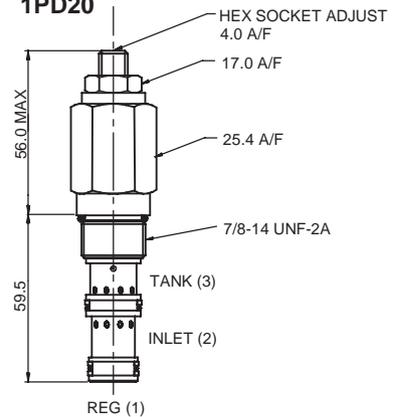
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PRESSURE DROP



CARTRIDGE ONLY

BASIC CODE: 1PD20



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COMPLETE VALVE

3/8" 1/2" PORTS

BASIC CODE: 1PD25

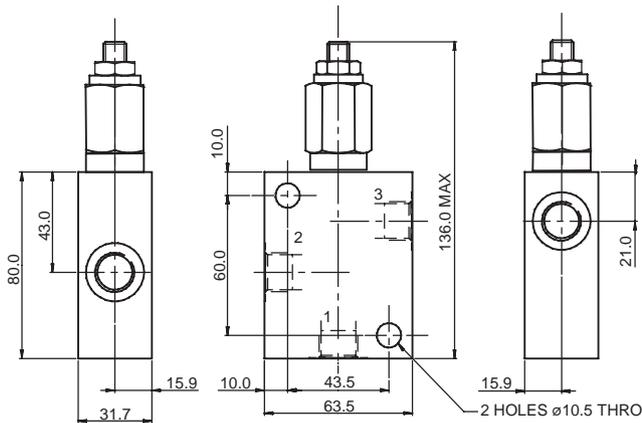
Body ONLY part numbers

BSP, aluminium
3/8" B13837

SAE, aluminium
3/8" B10645
1/2" B7784

BSP, steel
3/8" B13838

SAE, steel
1/2" B11805



COMPLETE VALVE

3/8" 1/2" PORTS

BASIC CODE: 1PDC25

(WITH REVERSE FLOW CHECK)

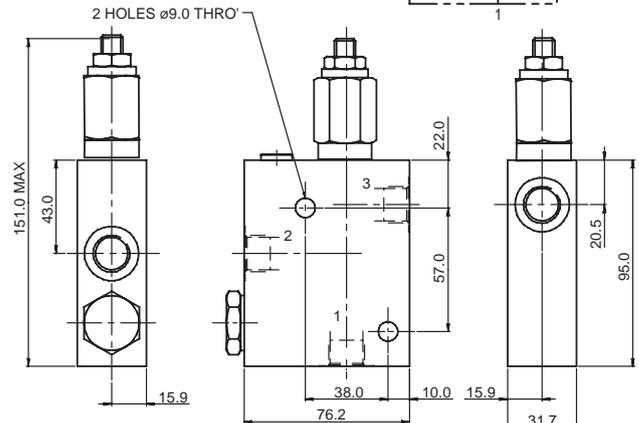
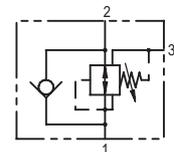
Sub-assembly part numbers

BSP, aluminium
3/8" BXP21795-3W-S

SAE, aluminium
3/8" BXP21795-6T-S
1/2" BXP21795-8T-S

BSP, steel
3/8" BXP21795-3W-S-377

SAE, steel
1/2" BXP21795-8T-S-377



Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

1PD P 3W 12 S**

Basic Code

- 1PD20** = Cartridge Only
- 1PD25** = Cartridge and Body
- 1PDC25** = Cartridge, Body and Check

Adjustment Means

- P** = Leakproof Screw Adjustment
 - R** = Handknob Adjustment
 - C** = Plunger Actuated
 - G** = Tamperproof Cap
- (See page 5-102 for dimensions)

Port Sizes - Bodied Valves Only

- 3W** = 3/8" BSP
- 6T** = 3/8" SAE
- 8T** = 1/2" SAE

Seals

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

Pressure Range @ zero flow

- 2** = 5 - 25 bar. Std setting 15 bar
 - 6** = 20 - 75 bar. Std setting 30 bar
 - 12** = 30 - 140 bar. Std setting 60 bar
- Std setting made at zero flow (dead head)

We reserve the right to change specifications without notice

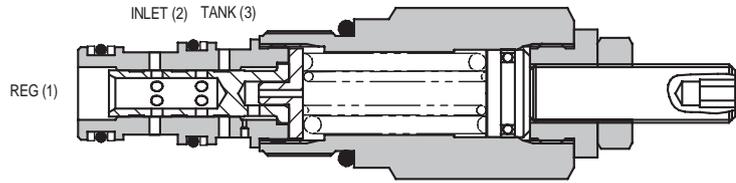
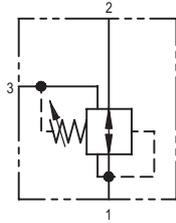


1PD SERIES PRESSURE REDUCING VALVE

DIRECT ACTING WITH REVERSE RELIEF

1PD50

SLIDING SPOOL TYPE



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APPLICATION

To provide an adjustable regulated pressure which is lower than supply pressure, as when more than one operating pressure is required from one pump. Direct acting models are suited to lower flow applications and regulated pressures to 140 bar (2000 psi). This valve also acts as a relief valve, relieving from regulated line to tank if shock or surge pressures occur in the regulated line.

OPERATION

Normally open, the valve throttles or closes to maintain constant pressure in the regulated line. As in the other direct acting valves, the spring force holds the valve open.

FEATURES

Hardened steel working parts are individually match ground to assure long life, reliability and high accuracy.

SPECIFICATIONS

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

Rated Flow	30 litres/min (8 US GPM)
Max Setting	Up to 140 bar (2000 psi)
Max Inlet Pressure	350 bar (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	A12743 (See Section 17)
Torque Cartridge into Cavity	60 Nm (44 lbs ft)
Weight	1PD50 0.24 kg (0.53 lbs) 1PD55 1.15 kg (2.53 lbs)
Seal Kit Number	SK1260 (Nitrile) SK1260V (Viton)
Recommended Filtration Level	BS5540/4 Class 18/13 (25 micron nominal)
Operating Temp	-20°C to +90°C
Leakage	35 millilitres/min nominal
Nominal Viscosity Range	5 to 500 cSt

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

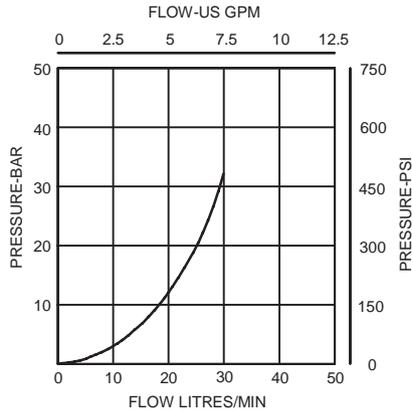
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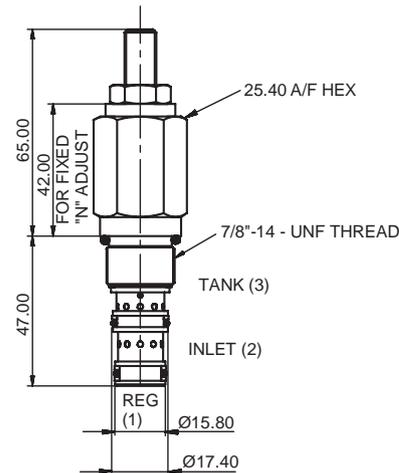
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PRESSURE DROP



CARTRIDGE ONLY

BASIC CODE: 1PD50



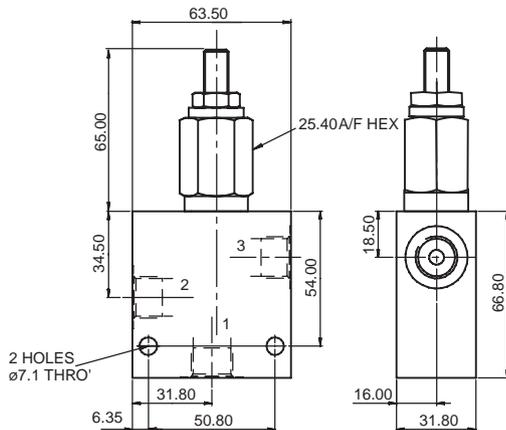
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COMPLETE VALVE 3/8" 1/2" PORTS

BASIC CODE: 1PD55

Body ONLY part numbers

BSP, aluminium	SAE, aluminium
3/8" B18982	3/8" B19359
1/2" B19358	1/2" B19360

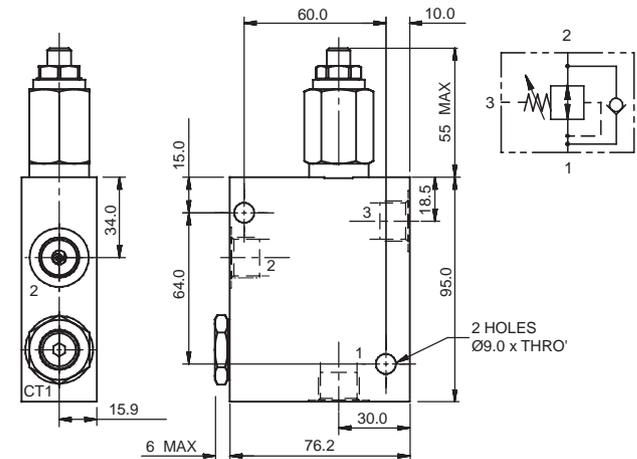


COMPLETE VALVE 3/8" 1/2" PORTS

BASIC CODE: 1PDC55

Sub assembly part number

BSP, aluminium	SAE, aluminium
3/8" BXP23990-3W-S	3/8" BXP23990-6T-S
1/2" BXP23990-4W-S	1/2" BXP23990-8T-S



Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

1PD P 3W 12 S**

Basic Code

- 1PD50 = Cartridge Only
- 1PD55 = Cartridge and Body
- 1PDC55 = Cartridge, Body and Check

Adjustment Means

- P = Leakproof Screw Adjustment
- N = Fixed (For fixed versions add setting in 10 bar increments to end of part number. Subject to a ±10% tolerance.)

Port Sizes - Bodied Valves Only

- 3W = 3/8" BSP 6T = 3/8" SAE
- 4W = 1/2" BSP 8T = 1/2" SAE

Seals

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

Pressure Range @ zero flow

- 2 = 5 - 25 bar. Std setting 15 bar
 - 6 = 20 - 75 bar. Std setting 30 bar
 - 12 = 30 - 140 bar. Std setting 60 bar
- Std setting made at zero flow (dead head)

We reserve the right to change specifications without notice

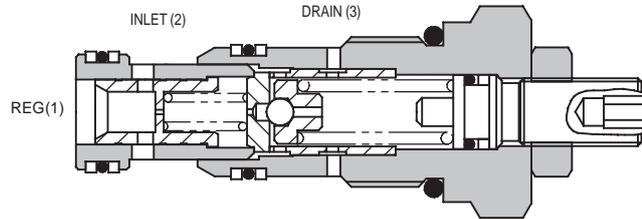
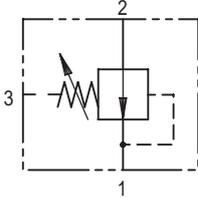


1PA SERIES PRESSURE REDUCING VALVE

PILOT OPERATED (ISO CAVITY NUMBER: 7789-22-6-0-90)

1PA60

SLIDING SPOOL
TYPE



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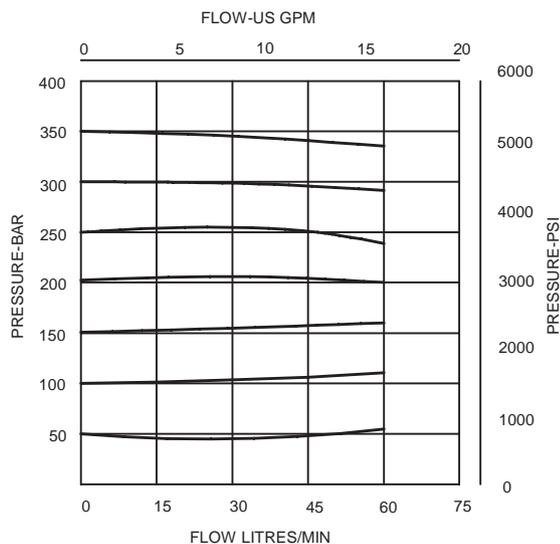
APPLICATION

To maintain a constant downstream pressure lower than the inlet pressure. Ideal for use in two systems or to protect low pressure actuators such as brake cylinders.

OPERATION

Normally open, the valve throttles or closes to maintain constant pressure in the regulated line. As in the other pilot operated valves, flow through the pilot section causes a pressure imbalance which closes the main section.

REGULATED PRESSURE



FEATURES

High capacity - of pilot operated design. Cartridge construction for use in your own manifold. Selectively matched, precision ground steel working parts assure long life.

SPECIFICATIONS

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

Rated Flow	60 litres/min (16 US GPM)
Max Setting	Inlet: 350 bar (5000 psi) Reg: 10-350 bar (150-5000 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	CVA-22-06-0 (See Section 17)
Torque Cartridge into Cavity	60 Nm (44 lbs ft)
Weight	1PA60 0.16 kg (0.35 lbs) 1PA65 0.50 kg (1.11 lbs) 1PA66 0.76 kg (1.62 lbs)
Seal Kit Number	SK618 (Nitrile) SK618V (Viton)
Recommended Filtration Level	BS5540/4 Class 18/13 (25 micron nominal)
Operating Temp	-20°C to +90°C
Pilot Flow	300 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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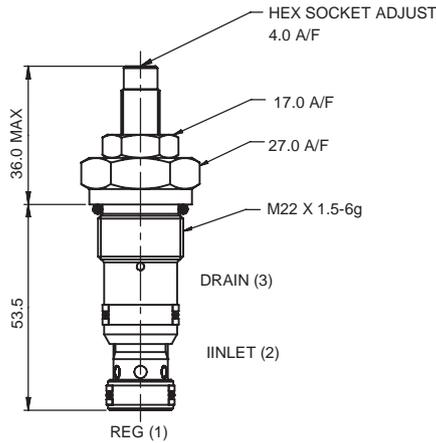
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CARTRIDGE ONLY

BASIC CODE: 1PA60



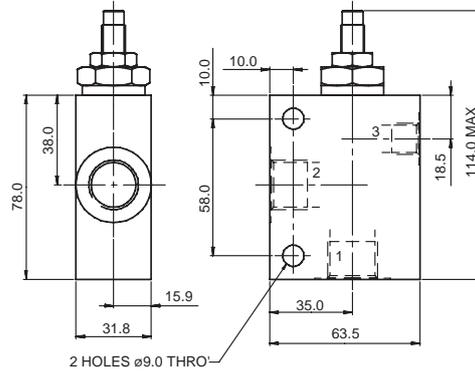
COMPLETE VALVE

3/8" 1/2" PORTS

BASIC CODE: 1PA65

Body ONLY part numbers

BSP, aluminium	SAE, aluminium	BSP Steel	SAE, steel
3/8" B12751	3/8" B10796	3/8" B17070	1/2" B11802
1/2" B8533	1/2" B10797		



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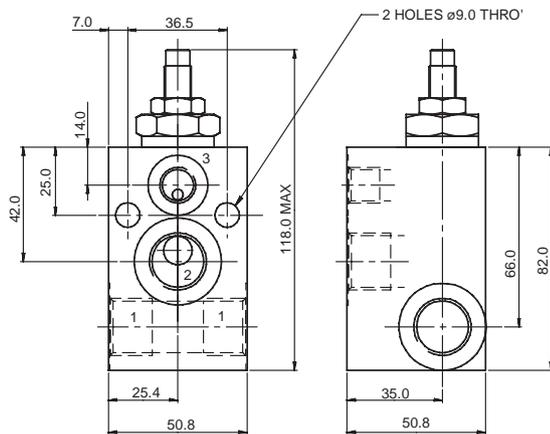
COMPLETE VALVE

1/2" PORTS

BASIC CODE: 1PA66

Body ONLY part numbers

BSP, aluminium	BSP, steel
1/2" B13482	1/2" B13483



COMPLETE VALVE

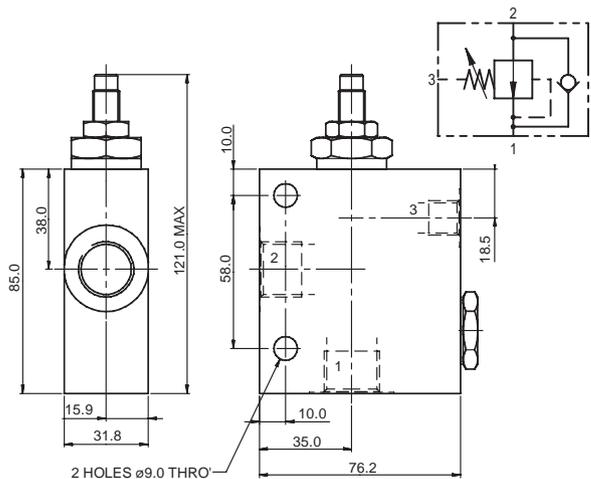
1/2" PORTS

BASIC CODE: 1PAC65

(WITH BUILT-IN CHECK)

Sub-assembly part numbers

BSP, aluminium	SAE, aluminium	SAE, steel
1/2" BXP16302-4W-S	1/2" BXP16302-8T-S	1/2" BXP16302-8T-S-377



Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

1PA P 3W 35 S**

Basic Code

- 1PA60** = Cartridge Only
- 1PA65** = Cartridge and Body
- 1PA66** = Cartridge and Body through ported
- 1PAC65** = Cartridge, Body and Check

Adjustment Means

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

Port Sizes - Bodied Valves Only

- 3W** = 3/8" BSP **6T** = 3/8" SAE
- 4W** = 1/2" BSP **8T** = 1/2" 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

- 10** = 10-100 bar. Std setting 35 bar
 - 20** = 15-210 bar. Std setting 100 bar
 - 35** = 30-350 bar. Std setting 280 bar
- Std setting made at zero flow (dead head)

We reserve the right to change specifications without notice

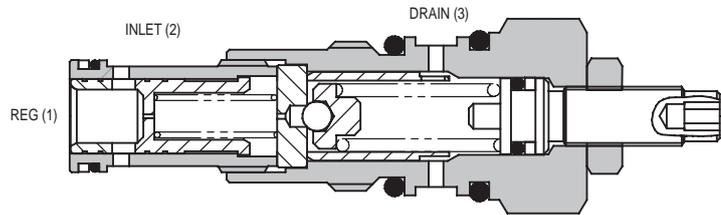
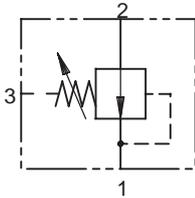


1PA SERIES PRESSURE REDUCING VALVE

PILOT OPERATED

1PA100

SLIDING SPOOL TYPE



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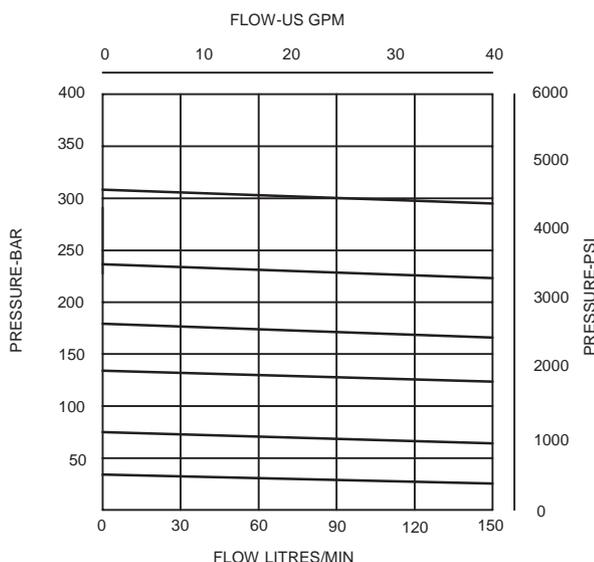
APPLICATION

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.

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



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

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	100 litres/min (26 US GPM)
Pressure Range	10 to 350 bar (150 to 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	A880 (See Section 17)
Torque Cartridge into Cavity	60 Nm (44 lbs ft)
Weight	1PA100 0.17 kg (0.37 lbs) 1PA150 0.60 kg (1.32 lbs)
Seal Kit Number	SK177 (Nitrile) SK177V (Viton)
Recommended Filtration Level	BS5540/4 Class 18/13 (25 micron nominal)
Operating Temp	-20°C to +90°C
Pilot Flow	500 millilitres/min @ standard setting
Nominal Viscosity Range	5 to 500 cSt

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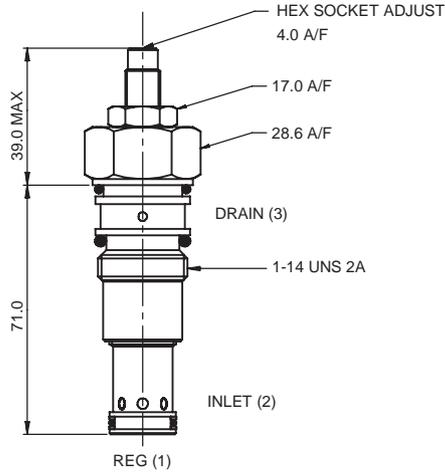
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CARTRIDGE ONLY

BASIC CODE: 1PA100



5

COMPLETE VALVE

1/2" 3/4" PORTS

BASIC CODE: 1PA150

Body ONLY part numbers

BSP, aluminium

1/2" B4821

3/4" B5466

SAE, aluminium

1/2" B6584

3/4" B7883

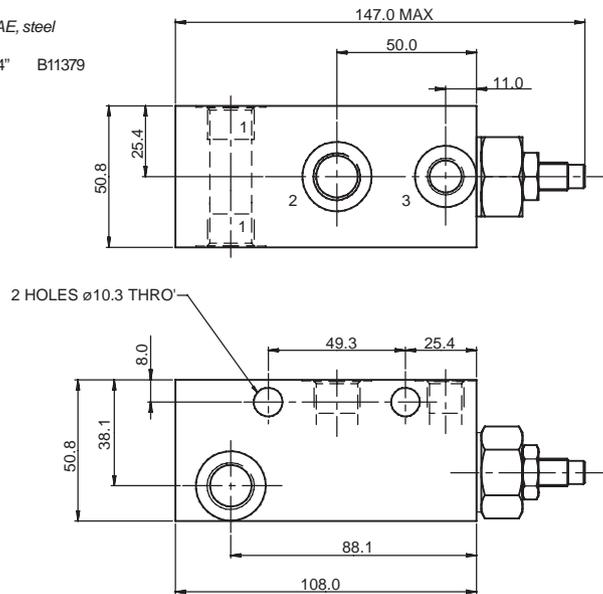
BSP, steel

1/2" B4527

3/4" B4403

SAE, steel

3/4" B11379



Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

1PA***

P

4W

35

S

Basic Code

1PA100 = Cartridge Only

1PA150 = 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

4W = 1/2" BSP **8T** = 1/2" SAE

6W = 3/4" BSP **12T** = 3/4" 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

7 = 10- 70 bar. Std setting 20 bar

20 = 15-210 bar. Std setting 100 bar

35 = 30-350 bar. Std setting 280 bar

Std setting made at zero flow

(dead head)

We reserve the right to change specifications without notice

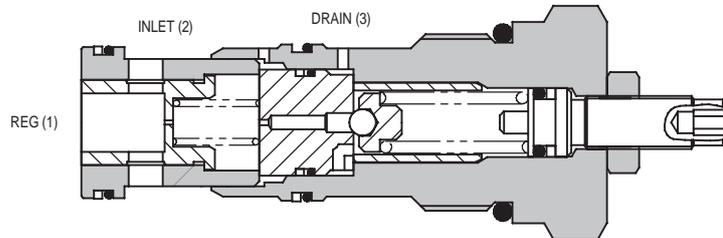
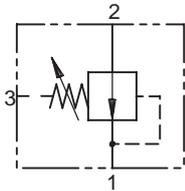


1PA SERIES PRESSURE REDUCING VALVE

PILOT OPERATED

1PA200

SLIDING SPOOL TYPE



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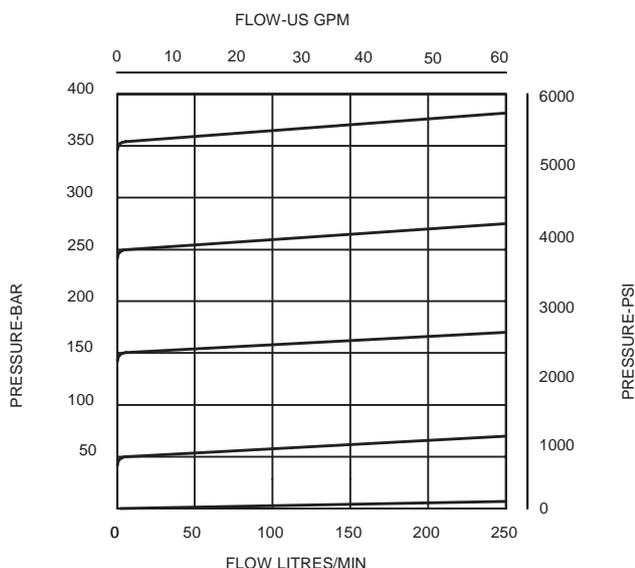
APPLICATION

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



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

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

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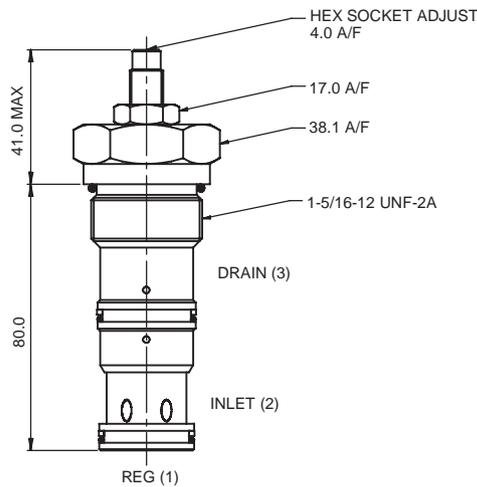
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7047 Spinach Drive, Mentor, Ohio 44060, USA
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CARTRIDGE ONLY

BASIC CODE: 1PA200



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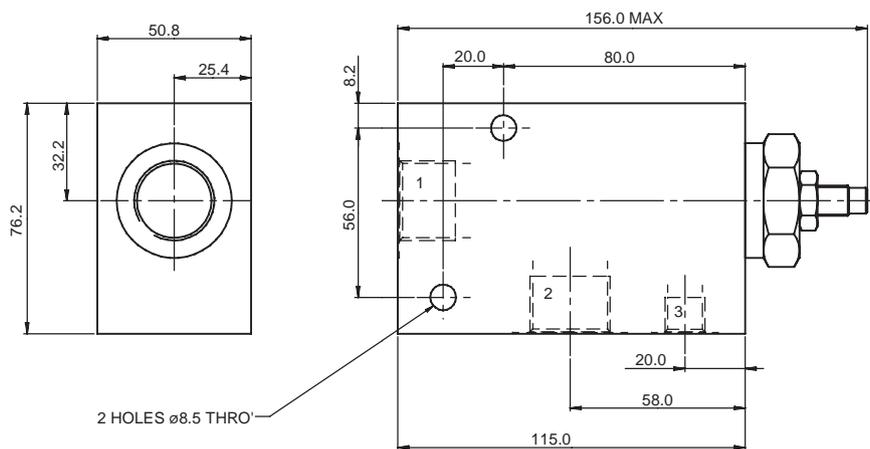
COMPLETE VALVE

3/4" 1" PORTS

BASIC CODE: 1PA250

Body ONLY part numbers

BSP, aluminium		SAE, aluminium		BSP, steel		SAE, steel	
3/4"	B10786	3/4"	B10786	3/4"	B3497	3/4"	B11555
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)

We reserve the right to change specifications without notice

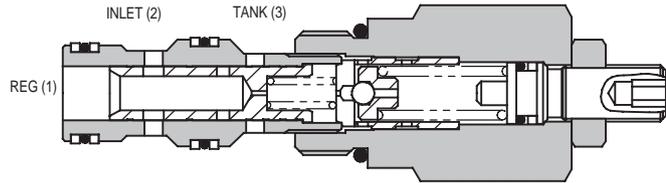
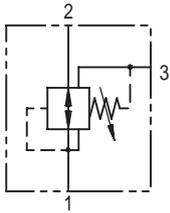


1PAA SERIES PRESSURE REDUCING / RELIEVING VALVE

PILOT OPERATED

1PAA60

GUIDED PISTON TYPE



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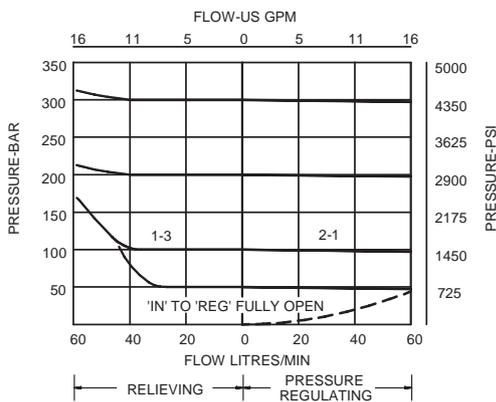
APPLICATION

This pilot operated valve can be used with flows of up to 30 litres/min (8 US GPM) and inlet pressures of up to 350 bar (5000 psi) in both reducing and relieving modes. The inbuilt relief allows externally induced pressures to be relieved back to tank. The valve is ideal for secondary pressure control in any circuit. When using at pressure below 40 bar, consult graph.

Operation

This valve is normally open allowing inlet oil to pass to the regulated line until the outlet (regulated) pressure exceeds the setting of the pilot section. When this setting is achieved a pilot flow occurs, causing a pressure imbalance across the main spool, which then moves throttling the inlet flow and preventing any further pressure rise in the regulated line. If any external force causes the regulated pressure to rise more than 5-10% above the setting, the main spool moves back further, opening the regulated port to the tank line, thus working as a relief valve.

Pressure Drop



Features

Cartridge construction with hardened, ground and honed working parts giving smooth, stable operation over all pressure ranges.

Specifications

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

Rated Flow	30 litres/min (8 US GPM) SEE GRAPH
Max Setting	350 bar (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	CVB-22-06-0 (See Section 17)
Torque Cartridge into Cavity	75 Nm (55 lbs ft)
Weight	1PAA60 0.23 kg (0.50 lbs) 1PA65 1.06 kg (2.30 lbs)
Seal Kit Number	SK632 (Nitrile) SK632V (Viton)
Recommended Filtration Level	BS5540/4 Class 18/13 (25 micron nominal)
Operating Temp	-20°C to +90°C
Pilot Flow	140 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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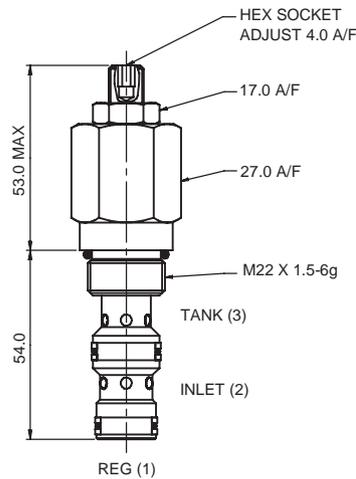
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CARTRIDGE ONLY

Basic Code: 1PAA60



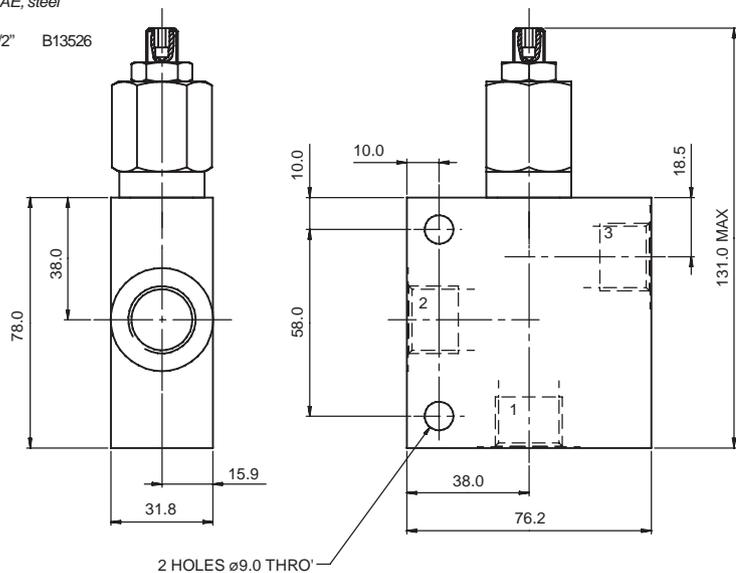
COMPLETE VALVE

3/8" 1/2" PORTS

BASIC CODE: 1PAA65

Body Only Part Numbers

BSP, aluminium		SAE, aluminium		BSP, steel		SAE, steel	
3/8"	B13519	3/8"	B13520	3/8"	B13520	3/8"	B13520
1/2"	B13521	1/2"	B10801	1/2"	B13522	1/2"	B13526



Where measurements are critical request certified drawings

ORDERING CODE EXAMPLE

1PAA P 4W 35 S**

Basic Code

1PAA60 = Cartridge Only
1PAA65 = 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

3W = 3/8" BSP
4W = 1/2" BSP 8T = 1/2" SAE

Seals

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

Pressure Range @ zero flow

10 = 10-100 bar. Std setting 35 bar
20 = 15-210 bar. Std setting 100 bar
35 = 30-350 bar. Std setting 280 bar
Std setting made at zero flow

We reserve the right to change specifications without notice