Vickers®

SystemStak™

SystemStak Service Line Counterbalance Valve

DGMR-3-50: ISO 4401-03; NFPA-D03

Description

Vickers SystemStak counterbalance valves are available with single and double control. A relief valve controls flow in one direction, and a check valve allows for free reverse flow. A pilot pressure connection controls the relief valve setting in its counterbalance function.

Counterbalance valves control negative or overrunning loads by preventing an actuator from running ahead of the required flow rate. This capability to provide precise, stable, motion control makes counterbalance valves ideally suited for use in moving and positioning systems.

Qualification to NFPA 350 bar (5000 psi) ensures the user of both rugged construction and extended life as the valve has been qualified to a worldwide high pressure, multi-million operating cycle specification established by both users and suppliers

Features and Benefits

- Compact hydraulic system through stack mounting.
- Improved system response.
- Eliminates system resonance.
- Excellent reliability through high strength components.
- Cartridge design permits service without removing valve from stack.
- No intervalve piping eliminates leaks and reduces installed cost.
- Choice of two pilot ratios for smooth control of loads.

Applications

When used with paired cylinders, counterbalance valves will assist balancing of the load by transferring part of the load from the heavily loaded cylinder to the less loaded cylinder. When used with open center directional control valves, deceleration control can also be provided.

Two pilot ratios are offered; 4:1 and 10:1. Normally the lower pilot ratio will provide better motion control and stability in systems with high capacitance and high inertia loads. The high pilot ratio is best applied to the control of motors.

A high pilot ratio improves the efficiency of a hydraulic system, but motion control and stability may suffer.

Operating Tips

The minimum pressure setting of a counterbalance valve should be 1,3 times the maximum pressure induced by the load. It is recommended that the pressure adjustment setting of the valve be made on a test stand as it is difficult to achieve an accurate setting when the valve is installed in a system. Normally, a counterbalance valve should not be used in closed loop hydrostatic systems, as it may cause overheating.

Counterbalance valves usually work well with the opening characteristics of most directional valve spools (which open P to A and B to T almost simultaneously). In general they work best with meter-in directional valve spools (which open B to T before opening P to A).

Important Notes

CAUTION
Counterbalance valves can be damaged by severe decompression shock. To help prevent this damage, a restriction may be added between the cylinder and the counterbalance valve.

Care should be taken to ensure that the load is supported by mechanical means when servicing or removing the valve cartridge.

Counterbalance valves are not relief valves or energy saving devices.Stability problems may be encountered when system operating pressures go below 48 bar (700 psi)

NOTE
Hydraulically released “deadman” brakes should be used to prevent movement due to motor leakage.

These valves adjust in the opposite direction to other pressure control valves i.e. turning the adjuster counterclockwise increases the valve setting, turning clockwise releases the load.

Model Code

DGMR-3-* * - * * * - (B * - * * *)-5 *

1 2 3 4 5 6 7 8 9 10 11 12 13

1 Valve function
Manifold or subplate mounted counterbalance valve

2 Interface
3 = ISO4401–0, NFPA D03

3 Port acted upon
A = Counterbalance on A, piloted from B
B = Counterbalance on B, piloted from A

4 Pilot ratio
1 = 4:1
2 = 10:1

5 Pressure adjustment range
F = 62 to 210 bar (900–3000 psi)
G = 186 to 345 bar (2700–4800 psi)

6 Adjustment options
W = Setscrew with locknut
C = Cap over setscrew
H = Handknob

7 Free flow cracking pressure
A = 1,40 bar (20 psi)
B = 0,28 bar (4 psi)

8 Port acted upon. (Dual models only)

9 Pilot ratio
Options as 4

10 Pressure adjustment range
Options as 5

11 Adjustment options
Options as 6

12 Free flow cracking pressure
Options as 7

13 Design number, 50 series
Subject to change. Installation dimensions unchanged for design numbers 50 to 59 inclusive.

Ratings

Performance data is typical with fluid at 28 cSt (312 SUS) and 38°C (100°F)

Maximum pressure (all ports) = 310 bar (4500 psi)

Rated flow = 57 L/min (15 USgpm)

For cracking pressure adjustment range see Model Code

For pilot ratios see Model Code

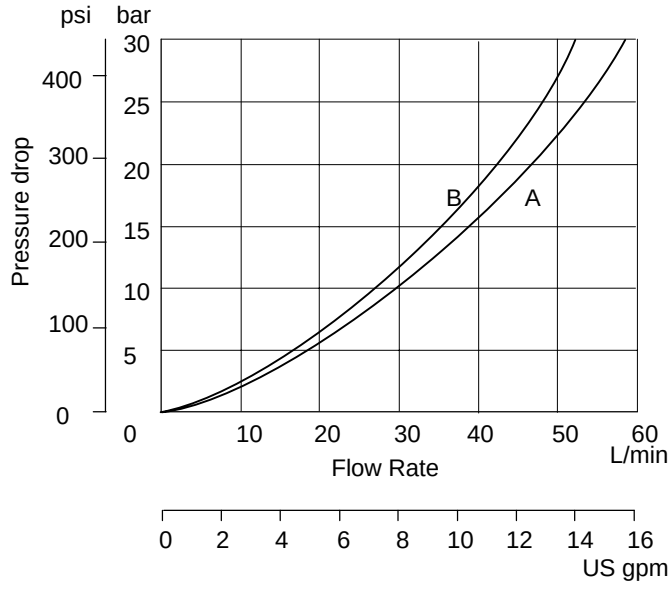
Leakage, ports B to B1 and A to A1
= 5 drops/min at 77% of cracking pressure

Mass,approximate = 2,5 kg (5.5 lbs)

Pressure Drops

These curves show the typical pressure drop for each flowpath in the valve for fluid viscosity 28 cSt (130 SUS)

Curve A = Free flow, B1 to B or A1 to A
Curve B = Piloted open, B to B1 or A to A1



Pilot Pressure Calculation

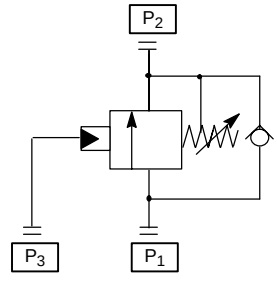
4:1 Ratio

$$P_3 = \frac{P_0 + (5 \times P_2) - P_1}{4}$$

10:1 Ratio

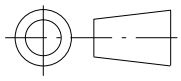
$$P_3 = \frac{P_0 + (11 \times P_2) - P_1}{10}$$

Where:
P_3 = Pilot pressure
P_1 = Pressure at port 1
P_0 = Cracking pressure
P_2 = Pressure at port 2

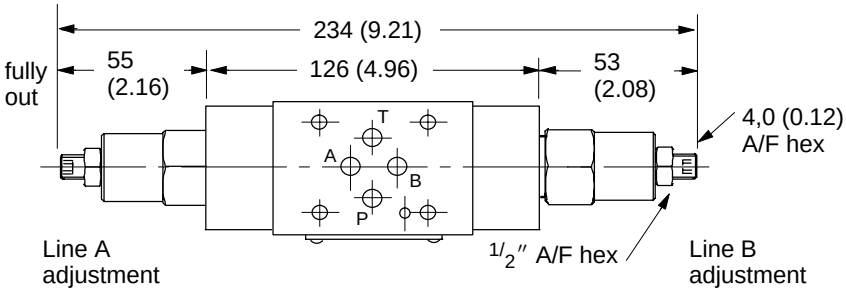


Installation dimensions in mm (inches)

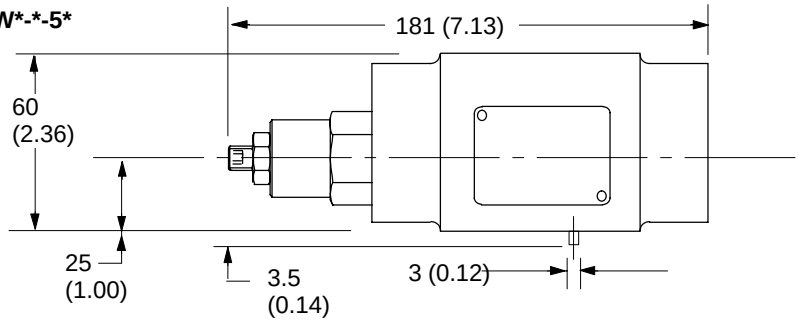
Models with Type W Adjuster
To adjust valve setting slacken off locknut and turn adjuster screw out to increase pressure. Re-tighten locknut after completing adjustment.



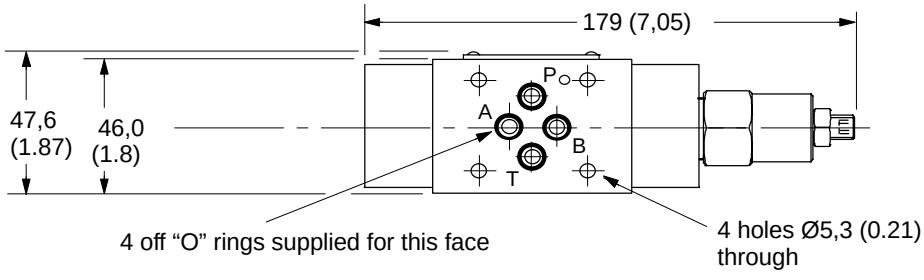
DGMR-3-A*-*W-*-B*-*W*-5*



DGMR-3-A*-*W*-*-5*

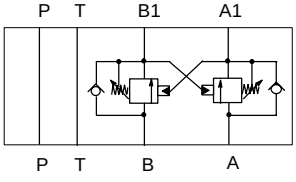


DGMR-3-B*-*W*-5*

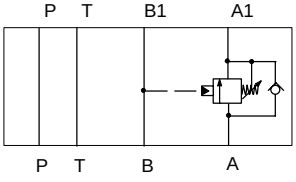


Functional Symbols

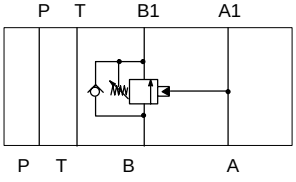
DGMR-3-A*-***-B*-***-5*



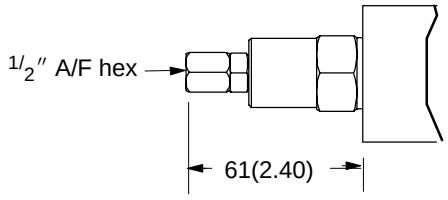
DGMR-3-A*-***-5*



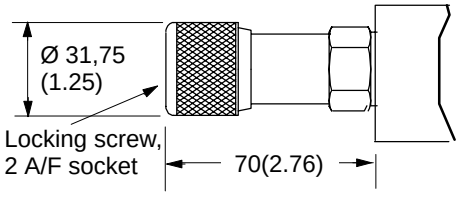
DGMR-3-B*-***-5*



Adjuster Type C



Adjuster Type K



Service Parts

Service parts available for this product are:

Seal kit 02-318317
Valve cartridge . . . Consult your Vickers representative
Cartridge assembly torque . . 47-54 Nm

Hydraulic Fluids

Materials and seals used in these valves are compatible with :

Anti-wear petroleum oils . . . . . L-HM
Water glycols . . . . . L-HFC
Invert emulsions . . . . . L-HFB
Non-alkyl based phosphate esters . . . . . L-HFD

The extreme operating range is 500 to 13 cSt (270 to 70 SUS) but the recommended running range is 54 to 13 cSt (245 to 70 SUS).

Filtration Requirements

Recommendations on filtration methods and the selection of products to control fluid condition are included in Vickers publication 561 or 9132. For products in this catalog the recommended fluid cleanliness levels are:

Up to 210 bar (3000 psi) 18/16/13
Above 210 bar (3000 psi) . . . 17/15/12

Fluid Temperatures

For petroleum oil:

Min. . . . . –40°C (–40°F)
Max.* . . . . . +120°C (248°F)

* *To obtain optimum service life from both fluid and hydraulic system, 65°C (150°F) normally is the maximum temperature.*

For other fluids where limits are outside those of petroleum oil, consult fluid manufacturer or Vickers representative. Whatever the actual temperature range, ensure that viscosities stay within those specified under “Hydraulic Fluids”