### SECTION 6 - MOTION CONTROL VALVES

#### CONTENTS

This section contains a most extensive range of overcentre and motion control cartridges, including normal, part vented and fully vented versions. Suitable for load holding, load safety and to prevent load runaway, giving low pressure drops, various pilot ratios and excellent stability to all types of moving loads.

#### SELECTION

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<td>To control moving loads and prevent load runaway, giving load holding and hose failure safety</td>
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<td>350 bar (5000 psi) 300 litres/min (80 US GPM)</td>
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<td>350 bar (5000 psi) 300 litres/min (80 US GPM)</td>
</tr>
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<td>This valve is used in systems where the machine framework introduces instability, such as telescopic handlers, cranes and concrete pumps</td>
<td>380 bar (5510 psi) 140 litres/min (37 US GPM)</td>
</tr>
<tr>
<td>6-135</td>
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<td>For use on boom lock applications giving load-holding and hose failure safety. With or without internal relief</td>
<td>400 bar (5800 psi) 300 litres/min (80 US GPM)</td>
</tr>
<tr>
<td>6-137</td>
<td>1CEEC</td>
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<td>350 bar (5000 psi) 300 litres/min (80 US GPM)</td>
</tr>
<tr>
<td>6-301</td>
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<td>As 1CEEC series but with added brake shuttle for removal of spring applied park brakes</td>
<td>350 bar (5000 psi) 300 litres/min (80 US GPM)</td>
</tr>
</tbody>
</table>
**TYPICAL CIRCUIT EXAMPLES**

**MANLIFT**
Load holding and load safety provided by dual overcentre valves protecting the operator from hose failure and giving him a smooth ride.

**WHEEL MOTOR**
Dual overcentres preventing load runaway in transmission systems forward and reverse.

**PROPORTIONAL CONTROL**
Balanced valves are required where back pressures vary as above in proportional valve circuits where flow is metered in and out of the directional control valve.

**WINCH**
Smooth lowering and soft stop for winches using overcentre combined with brake shuttles for spring applied brakes.

**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.
OVERCENTRE VALVES

There are now many types of overcentre or motion control valves available to the designer of hydraulically operated machines, each one has its own place and specific benefits to the user. The function of these valves can be divided into three basic groups.

1. Load Holding; where the overcentre valve prevents the movement of a load when the directional valve is in the neutral position. Permitting the use of open centre directional valves and negating leakage past the spool of closed centre directional valves.

2. Load Control; where the overcentre valve prevents the actuator running ahead of the pump due to the load induced energy thereby eliminating cavitation in the actuator and loss of control.

3. Load Safety. In the case of hose failure an overcentre valve mounted onto or into an actuator will prevent uncontrolled movement of the load. When a boom is used as a crane then hose failure protection is vital as the loss of load control could cause damage to people or property.

Each of these functions is applicable to linear or rotary motion.

The standard overcentre valve (fig 1) can be described as a pilot assisted relief valve with an integral free flow check. The difference between this design of valve and a pilot check is that the check valve will open fully as soon as the pilot pressure is sufficient to open the valve because the only resistance to opening is the pressure locked in to the cylinder port. With an overcentre valve the pilot pressure has to overcome the force of the spring which is reduced by load pressure. This ensures a gradual opening and a metering of the flow as it passes the poppet. Integrated Hydraulics overcentre valves consist of a poppet that seals flow from an actuator, a check element, which permits free flow to the actuator and a pilot section that opens the poppet allowing flow from the actuator at a controlled rate. There are two basic designs, each with several variants. The direct acting design, whereby the pressure in the actuator acts on the full area of the nose of the poppet, is ideal for flows up to 200 L/min whereas the differential area design, whereby the pressure acts on an annular area, is suitable for flows up to 300 L/min.

leakage characteristics with maximum leakage of up to 0.5 ml/min for valves up to 200 L/min capacity and up to 4ml/min for valves with 300 L/min capacity.

The cartridge has three ports, a cylinder port (1), a valve port (2) and a pilot port (3). If pressure, above the setting of the valve, is applied to the cylinder port it will open as a relief. When applied to the valve port pressure will open a low pressure check allowing free flow into the cylinder port. Pressure applied to the pilot port acts over a larger area on the poppet than the area referenced to the cylinder port, so the valve will open at a low pressure.

For most applications the relief setting should be approximately 1.3 times higher than the maximum load induced pressure. This ensures that with the maximum load on the actuator the valve will remain closed until pilot pressure is applied. The pilot pressure required to open the valve will depend on the pilot ratio that is the ratio between the relief area and the pilot area. The pilot pressure can be calculated:

\[
\text{Pilot pressure} = \frac{\text{Valve Setting} - \text{Load Pressure}}{\text{Pilot Ratio}}
\]

A typical application would entail mounting the overcentre valve in or on the end cap of a cylinder (fig 2). The cylinder port of the valve being connected to the full bore area of the cylinder, the valve port to the directional control line A and the pilot connected to the annulus inlet, line B and so to the directional control line B. As soon as the pressure rises in the inlet port of the annulus (line B) to retract the rod to a point where it reaches the required pilot pressure the actuator will...
begin moving at the flow at which the pressure setting was made. If the load causes the flow to increase then the inlet will be starved of oil and the pressure will begin to drop at this point. The reducing pressure will be sensed at the pilot allowing the spring to begin to close the valve preventing load run-away. In this way the valve will continually meter, controlling the load throughout its movement. When the pressure needed to move the load is higher than the pilot pressure needed to fully open the valve the only restriction produced is the pressure drop due to flow in the fully open condition.

Figure 3. 1CER part balanced overcentre

With the standard overcentre the spring chamber is vented through the poppet to the valve port which creates a problem if there are varying or high back pressures.

Pressure in the valve port increases the effective setting of the valve by a factor equivalent to the pilot ratio plus one. This means that if there is a standing back pressure of 50 bar with a pilot ratio of 5:1 the effective relief setting would be increased by 300 bar. This creates problems if the application demands a closed centre directional valve and the utilisation of service line reliefs. The relief valves will operate to limit inlet pressure but will not act if there is an external load which needs to be limited. The overcentre will not allow oil past the seat due to the back pressure created by the service line relief valves. To overcome this problem the part balanced 1CER series was created (figure 3).

The 1CER series overcentre valve performs in the same way as the standard valve under most conditions. But the relief section of the valve is not affected by back pressure.

The poppet is designed to balance back pressure over two areas on the poppet. The first is an annular area between the seat (dia a) and the centre seal (dia b) on the poppet which acts to open the valve and the second at the spring end of the spool (dia c) acting to close the valve. These areas are the same, the poppet is therefore balanced and so pressure in the valve line will not affect the relief performance of the valve. It must be noted that the pilot pressure required to open the valve is still affected on a one to one ratio by any back pressure.

The advantage of this design is the ability to use the valve on closed centre directional valve systems allowing service line relief valves to operate as normal. Most other valves of this type on the market have an atmospheric vent which limits their use in corrosive atmospheres and are prone to leakage.

The 1CER valve does have some draw backs in certain applications. Because the pilot pressure is affected by back pressure the valve can not be used in regenerative circuits on the annular port of the cylinder. Also if used with a meter out proportional system the constantly varying back pressures can cause both the part balanced and the standard valve to go unstable. For this is the reason the fully balanced version, 1CEB series (fig 4) is available. In this case the spring chamber is vented to atmosphere or to a separate drain port.

Any back pressure therefore does not affect the setting of the valve or the amount of pilot pressure needed.

For the standard, Part Balanced and Balanced valves there are various pilot ratios available to the system designer, which is best for his circuit? A general rule is that high pilot ratios are suitable for constant, stable loads and low pilot ratios for unstable and varying loads. The pilot ratio does not necessarily affect the working pressure by much given that the normal working pressure of a system is often much higher than the pilot pressure required to fully open the valve. If this is the case then the piloted open pressure drop will determine the systems efficiency.

Graph 1 shows the pressure drop curves of two valves with different pilot ratios. The higher pilot ratio valve is more restrictive than the low pilot ratio valve. This shows that above a certain pressure the lower pilot ratio valve is more efficient than the higher pilot ratio valve. It is important that the total performance is taken into account before specifying an overcentre valve.

The two stage overcentre valve, 1CEL (Fig 5) has been developed to overcome a problem which has been a continual nuisance to designers of machines incorporating long unstable booms. Instability problems affect many machines, most noticeably those with high capacity cylinders particularly in conjunction with slender booms that are subject varying frictional forces. The best example is the Telescopic Handler that usually has a long cylinder to extend or retract its boom. At the end of its stroke the pressure of the oil within a cylinder rises to the setting of the main relief valve for that part of the system and by its nature, the motion control valve re-seats in that pressure (irrespective of any load induced
When the operator lowers the load, this stored energy gives the valve the message that a heavy load is on the cylinder; therefore it takes less pilot pressure to open. As a result, the valve opens very quickly and allows the stored energy to dissipate causing a momentary runaway condition, this causes a rapid acceleration of the load that is then checked by the motion control valve and brought under control. The consequence of this is an initial instability as a boom is retracted; the number of jerks will depend on the stiffness of the system at the time of lowering. This instability can sometimes continue through the whole of the cylinder’s stroke, its magnitude, in extreme cases, can cause severe operator insecurity or even the loss of a load.

The 1CEL valve uses two springs to control the poppet, only the outer spring being effected by the pilot piston, leaving the inner to generate a counterbalance pressure. The two-stage valve has overcome many instability problems by preventing the total decay of the stored energy in the cylinder and stopping the valve over reacting. It allows the pressure to fall to the counterbalance setting, which can be adjusted dependant upon the severity of the application. This back pressure can also help to stiffen the boom during its movement further through its stroke, for example when wear pads on the box sections of a telescopic boom create changing frictional forces. This works well but with some systems, the backpressure created by this valve causes problems due to the reduction in available force. On certain machines, when for instance a crowd cylinder is bottomed, the oil from a slave cylinder has to be forced across a relief valve; the boom cylinder creates an induced pressure by virtue of its downward force. It is possible that an unloaded boom will not lower due to the counterbalance pressure. Also in the fully piloted open position the valve still generates a backpressure heating the oil and creating inefficiency.

To overcome these problems another variant is available in which the counterbalance pressure is reduced as the pilot pressure increases. This design has a second pilot ratio, which acts to reduce the backpressure applied by the centre spring. Indeed the valve can be piloted fully open, eliminating the counterbalance pressure altogether so improving the efficiency of the system. With a primary pilot ratio of 4:1 and a secondary ratio of 0.5:1 the initial unloading of the stored pressure happens at a low pilot pressure followed by a more gentle reduction as the pilot pressure increases. The overall setting of the valve is a combination of the outer and the inner spring forces divided by the seat area.

The practical application of either of these valves involves the establishing a range of acceptable settings. For example, the requirement is for the valve to be set at 200 bar (3000psi) with a counterbalance pressure between 35 and 70 bar (500-1000psi) - there are two springs within the valve, the outer one is fixed and the inner adjustable. For this application the outer spring would be set to give 165 bar (2400psi) and the inner adjustable between 35 and 70 bar (500-1000psi). This would give the valve an adjustable range of 165-235 bar (2400-3400psi). Given a pilot ratio of 6:1 or 4:1 depending on the type this extra pressure setting would have little effect on the pilot pressure needed to open the valve during normal operation.

Graph 2 shows a typical recorded instability picking up machine frequencies and getting worse and Graph 3 shows the counterbalanced overcentre valves preventing the problem getting worse, dampening out the initial instability and the counterbalance pressure falling as the pilot pressure increases.

The zero differential range of load control valves 1CPB (fig 6) have been designed with 'BoomLoc' hose rupture valve applications in mind. Typically the valve is piloted open from the hydraulic remote control operating the main directional spool valve. By setting the overcentre to open just after the main valve it will control the flow rate at low speed but as the overcentre opens more rapidly than the directional valve the directional valve will control the flow rate at higher speeds. It is a pilot operated metered poppet valve. The poppet seals against a tapered seat, as the pilot pressure increases the poppet will move off the seat. Flow is dependant upon the axial movement of the poppet which in turn is dependant upon the force exerted by pilot pressure balanced by that exerted by the spring. The poppet is hydraulically balanced so this valve is unaffected by valve line AND cylinder pressure but it will not provide any relief function. If over pressure, shock or thermal relief are required a second relief element is required.

Graph 1. The effect of pilot ratio on flow

Graph 2. Typical recorded instability of overcentre valves

Graph 3. Counterbalanced overcentre valves

Figure 5. 1CEL counterbalanced overcentre valve
The successful application of motion control valves, particularly in areas that are demanding involves the anticipation and resolution of numerous factors only some of which can be discussed in this article. Motion control valves are adjustable, are available in several pressure ranges with many pilot ratio options. Most of the valves fit in a common cavity (the exception being the fully balanced, 1CEB and zero differential, 1CPB versions when required with an external rather than an atmospheric vent) and are available in sizes from 30 to 300 L/min. The flexibility of cartridge valve technology can therefore be easily applied to bring stability. The standard range of valves described here can be used to solve the vast majority of motion control problems and we are constantly developing new valves that will further improve stability and load control.

Graph 2. Unstable system

Graph 3. Stable system using counterbalance valve

Figure 6. 1CPB(D) zero differential overcentre valve

solve the vast majority of motion control problems and we are constantly developing new valves that will further improve stability and load control.
**1CE SERIES OVERCENTRE VALVE**

**PILOT ASSISTED RELIEF WITH CHECK**

**1CE30**

![Diagram of 1CE30 Valve](image)

**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 directional 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**

Cartridge is economical and fits simple cavity. Allows quick, easy field service - reduces down time. Directly interchangeable with 30 litres/min pilot check valve. See catalogue page 7-151.

**SPECIFICATIONS**

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tr>
<td>Rated Flow</td>
<td>30 litres/min (8 US GPM)</td>
</tr>
<tr>
<td>Max Setting</td>
<td>Max Load Induced Pressure: 270 bar (4000 psi)</td>
</tr>
<tr>
<td></td>
<td>Relief Setting: 350 bar (5000 psi)</td>
</tr>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel. External surfaces zinc plated</td>
</tr>
<tr>
<td>Body Material</td>
<td>Standard aluminum (up to 210 bar) Add suffix '377' for steel option</td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Unrestricted</td>
</tr>
<tr>
<td>Cavity Number</td>
<td>A6610 (See Section 17)</td>
</tr>
<tr>
<td>Torque Cartridge into Cavity</td>
<td>45 Nm (33 lbs ft)</td>
</tr>
<tr>
<td>Weight</td>
<td>1CE30: 0.15 kg (0.33 lbs)</td>
</tr>
<tr>
<td></td>
<td>1CE35: 0.41 kg (0.90 lbs)</td>
</tr>
<tr>
<td></td>
<td>1CEE34: 0.90 kg (1.98 lbs)</td>
</tr>
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<td>Seal Kit Number</td>
<td>SK395 (Nitrile) SK395V (Viton)</td>
</tr>
<tr>
<td>Recommended Filtration Level</td>
<td>BS5540/4 Class 18/13 (25 micron nominal)</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-20°C to +90°C</td>
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<tr>
<td>Leakage</td>
<td>0.3 millilitres/min nominal (5 dpm)</td>
</tr>
<tr>
<td>Nominal Viscosity Range</td>
<td>5 to 500 cSt</td>
</tr>
</tbody>
</table>

**PILOT RATIOS**

- **2.5:1** Best suited for extremely unstable applications such as long booms or flexible frameworks.
- **5:1** (Standard) 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.

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

2.5:1 & 5:1 version

10:1 version

**CARTRIDGE ONLY**

BASIC CODE: 1CE30

**SINGLE VALVE**

BASIC CODE: 1CE35

**DUAL VALVE**

BASIC CODE: 1CEE34 (INTERNALLY CROSSED PILOTTED)

**ORDERING CODE EXAMPLE**

<table>
<thead>
<tr>
<th>1CE***</th>
<th>F</th>
<th>3W</th>
<th>35</th>
<th>S</th>
<th>5</th>
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</table>

**Basic Code**

1CE30 = Cartridge Only  
1CE35 = Cartridge and Body  
1CEE34 = Cartridges and Dual Body

**Adjustment Means**

F = Screw Adjustment  
N = Fixed - State pressure setting required

**Port Sizes - Bodied Valves Only**

3W = 3/8” BSP Valve & Cyl Port. 1/4” BSP Pilot Port  
8T = 1/2” SAE Valve & Cyl Port. 1/4” SAE Pilot Port

**Pressure Range @ 4.8 l/min**

20 = (2.5:1 and 5:1): 70-210 bar. Std setting 100 bar  
35 = (2.5:1 and 5:1): 100-350 bar. Std setting 210 bar

Other pressure ranges available on request

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6 - 112.H

We reserve the right to change specifications without notice.
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.

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:

\[ \text{Pilot Pressure} = (\text{Relief Setting}) - (\text{Load Pressure}) \times \text{Pilot Ratio} \]

### SPECIFICATIONS

#### APPLICATION
- Cartridge is economical and fits simple cavity. Allows quick, easy field service - reduces down time. Directly interchangeable with 30 litres/min pilot check valve. See catalogue page 7-151.

#### PILOT RATIOS
- **2.5:1** Best suited for extremely unstable applications such as long booms or flexible frameworks.
- **4:1** Best suited for applications where load varies and machine structure can induce instability.

#### FEATURES
- Cartridge is economical and fits simple cavity. Allows quick, easy field service - reduces down time. Directly interchangeable with 30 litres/min pilot check valve. See catalogue page 7-151.

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

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Fax: (440) 974 3170  
Website: www.integratedhydraulics.com
Integrated Hydraulics

**PRESSURE DROP**

**CARTRIDGE ONLY**

**SINGLE VALVE**

**3/8” 1/2” PORTS**

Basic Code: 1CER35

Body Only part numbers

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<thead>
<tr>
<th>BSP, aluminium</th>
<th>SAE, aluminium</th>
<th>BSP, steel</th>
<th>SAE, steel</th>
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<th>SAE, aluminium</th>
<th>BSP, steel</th>
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<td>1/2” B3833</td>
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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.

**DUAL VALVE**

**3/8” 1/2” PORTS**

Basic Code: 1CEER34

Body Only part numbers

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<thead>
<tr>
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<table>
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<th>SAE, aluminium</th>
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<th>SAE, steel</th>
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<td>1/2” B11814</td>
<td>1/2” B3037</td>
<td>1/2” B3040</td>
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2 HOLES ø9.0 THRO’

For fixed ‘N’ adjust

**Seals**

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

**Tightening torque of ‘F’ adjuster locknut**

20 to 25 Nm

**ORDERING CODE EXAMPLE**

1CE**** F 3W 35 S 4

Pilot Ratio

2 = 2.5:1
4 = 4:1

Pressure Range @ 4.8 l/min

35 = 100-350 bar. Std setting 210 bar

Std setting made at 4.8 litres/min

We reserve the right to change specifications without notice

6-122.F
Overcentre valves give static and dynamic control of loads by supplying a counterbalance pressure to the actuator. They prevent runaway in the event of hose burst and hold the load with minimal leakage.

The pressure balanced valve is unaffected by back pressure, allowing service line reliefs to operate and for the valve to be used in regenerative or proportional valve systems.

The overcentre valve should be mounted either into, onto or as close to the actuator as possible to give maximum protection.

Single overcentre valves control unidirectional loads such as in aerial platforms, cranes or winches and dual overcentres are suited to bi-directional motion such as wheel motor applications or cylinders going over centre.

APPLICATION

Overcentre valves give static and dynamic control of loads by supplying a counterbalance pressure to the actuator. They prevent runaway in the event of hose burst and hold the load with minimal leakage.

The pressure balanced valve is unaffected by back pressure, allowing service line reliefs to operate and for the valve to be used in regenerative or proportional valve systems.

The overcentre valve should be mounted either into, onto or as close to the actuator as possible to give maximum protection.

Single overcentre valves control unidirectional loads such as in aerial platforms, cranes or winches and dual overcentres are suited to bi-directional motion such as wheel motor applications or 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:

\[
\text{Pilot Pressure} = (\text{Relief Setting}) - (\text{Load Pressure})
\]

FEATURES

Cartridge is economical and fits simple ‘dual purpose’ cavity. Allows quick, easy field service - reduces down time. Directly interchangeable with 30 litres/min pilot check valve. See page 7-151.

Pilot Ratio

\[
P = \frac{P_{\text{Relief}}}{P_{\text{Load}}}
\]

Note: This valve is not suitable for high frequency applications and aggressive environmental conditions.

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

**Cavity Number**

A6610 (See Section 17)

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

**Mounting Position**

Unrestricted

**Filtration Level**

BS5540/4 Class 18/13 (25 micron nominal)

**Leakage**

0.3 millilitres/min nominal (5 dpm)

**Nominal Viscosity Range**

5 to 500 cSt
### Pressure Drop

![Graph showing pressure drop vs flow for single valve with 3/8" and 1/2" ports.](image)

### Cartridge Only

**Basic Code:** 1CEB30

![Diagram of cartridge only valve](image)

- **Adjustment Means:**
  - **F:** Screw Adjustment
  - **N:** Fixed - State pressure setting required

**Adjustment:**
- For fixed versions, add setting in 10 bar increments to end of part number. Subject to a ±10% tolerance.

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

**Port Sizes - Bodied Valves Only:**
- **3W:** 3/8" BSP Valve & Cyl Port, 1/4" BSP Pilot Port
- **6T:** 3/8" SAE Valve & Cyl Port, 1/4" SAE Pilot Port
- **8T:** 1/2" SAE Valve & Cyl Port, 1/4" SAE Pilot Port

**Ordering Code Example:**

- **1CEB35** = Cartridge Only
- **1CEB30** = Cartridge and Body
- **1CEB34** = Cartridges and Dual Body

**Adjustment Means:**
- **F:** Screw Adjustment
- **N:** Fixed - State pressure setting required

**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:**
- **35:** 100-350 bar. Std setting 210 bar

---

We reserve the right to change specifications without notice.
The 1CEL30 overcentre valve performs all duties of a regular overcentre but maintains a counterbalance pressure to provide dampening of 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.

**APPLICATION**

The 1CEL30 overcentre valve performs all duties of a regular overcentre but maintains a counterbalance pressure to provide dampening of 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.

---

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Flow</td>
<td>30 litres/min (8 US GPM)</td>
</tr>
<tr>
<td>Max Setting</td>
<td>380 bar (5510 psi)</td>
</tr>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel. External surfaces zinc plated</td>
</tr>
<tr>
<td>Body Material</td>
<td>Standard aluminium (up to 210 bar*)</td>
</tr>
<tr>
<td>Add suffix '377 for steel option</td>
<td></td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Unrestricted</td>
</tr>
<tr>
<td>Cavity Number</td>
<td>A6610</td>
</tr>
<tr>
<td>Torque Cartridge</td>
<td>45 Nm (33 lbs ft)</td>
</tr>
<tr>
<td>Weight</td>
<td>0.15 kg (0.33 lbs)</td>
</tr>
<tr>
<td>Seal Kit Number</td>
<td>SK395 (Nitrile) SK395V (Viton)</td>
</tr>
<tr>
<td>Recommended</td>
<td>BS5546/4 Class 18/13 (25 micron nominal)</td>
</tr>
<tr>
<td>Filtration Level</td>
<td></td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-20°C to +90°C</td>
</tr>
<tr>
<td>Leakage</td>
<td>0.3 millilitres/min nominal (5 dpm)</td>
</tr>
<tr>
<td>Nominal Viscosity</td>
<td>5 to 500 cSt</td>
</tr>
</tbody>
</table>

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

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>Basic Code</th>
<th>F</th>
<th>3W</th>
<th>S</th>
<th>230</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>1CEL30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1CEL35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Adjustment Means:
- **F** = Screw Adjustment
- **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 = 170-300; Std setting 220 (170/50)
- 30 = 240-370; Std setting 280 (230/50)
- 40 = 270-380; Std setting 350 (300/50) Std setting made at 4.8 l/min

Counterbalance setting bar (10 bar increments).
High pressure setting bar (10 bar increments).

Port sizes - Bodied Valves Only
- **3W** = 3/8" BSP Valve & Cyl Port, 1/4" BSP Pilot Port
- **8T** = 3/8" SAE Valve & Cyl Port, 1/4" SAE Pilot Port
- **1/2"** = SAE Valve & Cyl Port, 1/4" SAE Pilot Port

We reserve the right to change specifications without notice.
6 APPLICATION

Zero differential overcentre valves give static and dynamic control of loads by supplying a restriction to flow related to the opening of the valve created by the pilot pressure. The valve is used in conjunction with a remote pilot source to provide hose failure protection, load control and load holding functions.

If over-pressure or shock pressure protection is required then a separate relief valve should be used.

OPERATION

The check section allows free flow into the actuator then holds and locks the load against movement. By the application of pilot pressure to the pilot port the poppet moves back against the main spring opening the cylinder port to the valve port. The metering characteristic of the valve is controlled by the rate of the spring, the seat angle and the pilot pressure applied.

Due to the balanced poppet design load induced pressure will not open the valve and once open valve port pressure will not increase the pilot pressure required to keep the valve open.

FEATURES

The cartridge fits a simple cavity allowing quick, easy field service reducing down time. Hardened poppet and seat provide for long leak free performance. Fits standard 30 litre overcentre cavity.

SPECIFICATIONS

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>1CPB30</th>
<th>1CPB35</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Flow</td>
<td>30 litres/min (8 US GPM)</td>
<td></td>
</tr>
<tr>
<td>Max Working Pressure</td>
<td>350 bar (5000 psi)</td>
<td></td>
</tr>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel. External surfaces zinc plated</td>
<td></td>
</tr>
<tr>
<td>Body Material</td>
<td>Standard aluminium (up to 210 bar*) Add suffix ‘377’ for steel option</td>
<td></td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Unrestricted</td>
<td></td>
</tr>
<tr>
<td>Cavity Number</td>
<td>A6610 (See section 17)</td>
<td></td>
</tr>
<tr>
<td>Torque Cartridge into Cavity</td>
<td>45 Nm (33 lbs ft)</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>SK1151 (Nitrile) 0.15 kg (0.33 lbs) SK1151V (Viton) 0.41 kg (0.90 lbs)</td>
<td>SK1151P (Polyurethane/Nitrile)</td>
</tr>
<tr>
<td>Seal Kit Number</td>
<td>SK1151 (Nitrile) SK1151V (Viton) SK1151P (Polyurethane/Nitrile)</td>
<td></td>
</tr>
<tr>
<td>Recommended Filtration Level</td>
<td>BS5540/4 Class 18/13 (25 micron nominal)</td>
<td></td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-20°C to +90°C</td>
<td></td>
</tr>
<tr>
<td>Leakage</td>
<td>0.3 millilitres/min max (5 dpm)</td>
<td></td>
</tr>
<tr>
<td>Nominal Viscosity Range</td>
<td>5 to 500 cSt</td>
<td></td>
</tr>
</tbody>
</table>

*For applications above 210 bar please consult our technical department or use the steel body option.
17.0 A/F
25.4 A/F

VALVE (2)
PILOT (3)

HEX SOCKET ADJUST
4.0 A/F
M20 X 1.5x6g

CYL (1)
VENT (4)

FREE FLOW
FLOW-US GPM
FLOW-LITRES/MIN
PRESSURE-PSI
PRESSURE-BAR

ORDERING CODE EXAMPLE

Basic Code
1CPB30 = Cartridge Only
1CPB35 = Cartridge and Body

Adjustment Means
F = Screw Adjustment

Port Sizes - Bodied Valves Only
3W = 3/8" BSP Valve & Cyl Port, 1/4" BSP Pilot Port
6T = 3/8" SAE Valve & Cyl Port, 1/4" SAE Pilot Port
8T = 1/2" SAE Valve & Cyl Port, 1/4" SAE Pilot Port

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

Pilot Adjustment Range
2 = 5 - 20 bar. Std setting 10 bar
Std setting made at 4.8 litres/min

We reserve the right to change specifications without notice

6-138.B
1CPBD SERIES ZERO DIFFERENTIAL
OVERCENTRE VALVE
FULLY BALANCED - PILOT ASSISTED

1CPBD30

APPLICATION
Zero differential overcentre valves give static and dynamic control of loads by supplying a restriction to flow related to the opening of the valve created by the pilot pressure. The valve is used in conjunction with a remote pilot source to provide hose failure protection, load control and load holding functions.

If over-pressure or shock pressure protection is required then a separate relief valve should be used.

OPERATION
The check section allows free flow into the actuator then holds and locks the load against movement. By the application of pilot pressure to the pilot port the poppet moves back against the main spring opening the cylinder port to the valve port. The metering characteristic of the valve is controlled by the rate of the spring, the seat angle and the pilot pressure applied.

Due to the balanced poppet design load induced pressure will not open the valve and once open valve port pressure will not increase the pilot pressure required to keep the valve open.

FEATURES
The cartridge fits a simple cavity allowing quick, easy field service reducing down time. Hardened poppet and seat provide for long leak free performance.

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Flow</td>
<td>30 litres/min (8 US GPM)</td>
</tr>
<tr>
<td>Max Working Pressure</td>
<td>350 bar (5000 psi)</td>
</tr>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel, external surfaces zinc plated</td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Unrestricted</td>
</tr>
<tr>
<td>Cavity Number</td>
<td>AXP 20530</td>
</tr>
<tr>
<td>Torque Cartridge into Cavity</td>
<td>45 Nm (33 lbs ft)</td>
</tr>
<tr>
<td>Weight</td>
<td>1CPBD30 0.15 kg (0.33 lbs)</td>
</tr>
<tr>
<td>Seal Kit Number</td>
<td>SK1159 (Nitrile) SK1159V (Viton) SK1159P (Polyurethane)</td>
</tr>
<tr>
<td>Recommended Filtration Level</td>
<td>BS5544/4 Class 18/13 (25 micron nominal)</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-20°C to +90°C</td>
</tr>
<tr>
<td>Leakage</td>
<td>0.3 millilitres/min max (5 dpm)</td>
</tr>
<tr>
<td>Nominal Viscosity Range</td>
<td>5 to 500 cSt</td>
</tr>
</tbody>
</table>
**PRESSURE DROP**

**CARTRIDGE ONLY**

**BASIC CODE:** 1CPBD30

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

**Pilot Adjustment Range**
- **2** = 5 to 20 bar. Std setting 10 bar
- Std setting made at 4.8 litres/min

**Basic Code**
- 1CPBD** = Cartridge Only

**Adjustment Means**
- **F** = Screw Adjustment

**ORDERING CODE EXAMPLE**

- **1CPBD**
- **F** 2 **P**
1CE SERIES OVERCENTRE VALVE

ALTERNATIVE BODY ARRANGEMENTS for 30 Litres/min Valves

COMPLETE VALVE 3/8" PORTS
BASIC CODE: 1CEG35 / 1CEBG35 / 1CERG35 / 1CELG35
GASKET MOUNTED

COMPLETE VALVE 3/8" PORTS
BASIC CODE: 1CBE35 / 1CEB35 / 1CBER35 / 1CBE35
BANJO MOUNTED

COMPLETE VALVE 3/8" PORTS
BASIC CODE: 1CE36 / 1CEB36 / 1CER36 / 1CEL36
THROUGH PORTED

COMPLETE VALVE 3/8" PORTS
BASIC CODE: 1CEE35 / 1CEEB35 / 1CEER35 / 1CEEL35
DUAL OVERCENTRE (INTERNALLY CROSSED PILOTTED)

ORDERING CODE EXAMPLE

Basic Code
1C***** = Cartridge & Body Thro' Ported
1CE36/1CEB36 = Cartridge & Body Banjo
1CER36/1CEB36 = Cartridge & Body Gasket
1CEG35/1CEBG35 = Cartridge & Dual Body
1CERG35/1CELG35
1CEE35/1CEEB35

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

Port Sizes
3W = 3/8" BSP

Pressure Range @ 4.8 l/min
3W = 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)

Counterbalance setting
(1CEL30 based options only) bar in 10 bar increments.
High pressure setting
(1CEL30 based options only) bar in 10 bar increments.

Pilot Ratio
(omit for 1CEL30 based options)
2 = 2.5:1
4 = 4:1
5 = 5:1
10 = 10:1
(See cartridge details)

We reserve the right to change specifications without notice

6-141.F
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.

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:

\[ \text{Pilot Pressure} = (\text{Relief Setting}) - (\text{Load Pressure}) \]

PILOT RATIOS

<table>
<thead>
<tr>
<th>Pilot Ratio</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4:1</td>
<td>Best suited for applications where the load varies and machine structure can induce instability.</td>
</tr>
<tr>
<td>8:1</td>
<td>Best suited for applications where the load remains relatively constant.</td>
</tr>
<tr>
<td>Other ratios available upon request.</td>
<td></td>
</tr>
</tbody>
</table>

SPECIFICATIONS

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>1CE90</th>
<th>1CEE95</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Flow</td>
<td>90 litres/min (23 US GPM)</td>
<td></td>
</tr>
<tr>
<td>Max Setting: Load</td>
<td>270 bar (4000 psi)</td>
<td>350 bar (5000 psi)</td>
</tr>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel. External surfaces zinc plated</td>
<td></td>
</tr>
<tr>
<td>Body Material</td>
<td>Standard aluminium (up to 210 bar*) Add suffix '377' for steel option</td>
<td></td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Unrestricted</td>
<td></td>
</tr>
<tr>
<td>Cavity Number</td>
<td>A12336 (See Section 17)</td>
<td></td>
</tr>
<tr>
<td>Torque Cartridge into Cavity</td>
<td>60 Nm (44 lbs ft)</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>1CE90 0.29 kg (0.63 lbs)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1CE95 1.35 kg (2.97 lbs)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1CEE95 2.10 kg (4.62 lbs)</td>
<td></td>
</tr>
<tr>
<td>Seal Kit Number</td>
<td>SK633 (Nitrile)</td>
<td>SK633V (Viton)</td>
</tr>
<tr>
<td>Recommended Filtration Level</td>
<td>BS5540/4 Class 18/13</td>
<td>(25 micron nominal)</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-20°C to +90°C</td>
<td></td>
</tr>
<tr>
<td>Leakage</td>
<td>0.3 millilitres/min nominal (5 dpm)</td>
<td></td>
</tr>
<tr>
<td>Nominal Viscosity Range</td>
<td>5 to 500 cSt</td>
<td></td>
</tr>
</tbody>
</table>

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

4:1 VERSION

<table>
<thead>
<tr>
<th>FLOW US GPM</th>
<th>PIPED LITRES/MIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
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<tr>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>200</td>
<td>200</td>
</tr>
</tbody>
</table>

2:1 VERSION

<table>
<thead>
<tr>
<th>FLOW US GPM</th>
<th>PIPED LITRES/MIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>50</td>
<td>50</td>
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<tr>
<td>75</td>
<td>75</td>
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<tr>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>200</td>
<td>200</td>
</tr>
</tbody>
</table>

**CARTRIDGE ONLY**

BASIC CODE: 1CE90

HEX SOCKET ADJEST M27 X 1.5-6g

Tightening torque for M10 - 20 to 25Nm

**SINGLE VALVE**

BASIC CODE: 1CE95

Body ONLY part numbers

BSP aluminium

1/2"  1CE90  1/2"  1CE95

SAE aluminium

1/2"  1CE90  1/2"  1CE95

1/2" 1CE90  1/2" 1CE95

1/2" 1CE90  1/2" 1CE95

**DUAL VALVE**

BASIC CODE: 1CEE95

Body ONLY part numbers

BSP Aluminium

1/2"  1CEE95  1/2"  1CEE95

SAE aluminium

1/2"  1CEE95  1/2"  1CEE95

1/2" 1CEE95  1/2" 1CEE95

1/2" 1CEE95  1/2" 1CEE95

**ORDERING CODE EXAMPLE**

<table>
<thead>
<tr>
<th>1CE****</th>
<th>F</th>
<th>4W</th>
<th>35</th>
<th>S</th>
<th>4</th>
</tr>
</thead>
</table>

Basic Code

1CE90 = Cartridge Only
1CE95 = Cartridge and Body
1CEE95 = Cartridges and Dual Body

Adjustment Means

F = Screw Adjustment
M = Fixed - State pressure setting required

For fixed versions add setting in 10 bar increments to end of part number. Subject to a ±10% tolerance.

Port Sizes - Bodied Valves Only

4W = 1/2" BSP Valve & Cyl Port. 1/4" BSP Pilot Port

8T = 1/2" SAE Valve & Cyl Port. 1/4" SAE Pilot Port

Pilot Ratio

4 = 4:1
8 = 8:1

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 = 70-225 bar. Std setting 100 bar
35 = 200-350 bar. Std setting 210 bar
Std setting made at 4.8 litres/min

We reserve the right to change specifications without notice.

6-152.E
1CER SERIES OVERCENTRE VALVE
PART BALANCED - PILOT ASSISTED

1CER90
PUPPET RELIEF

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:

Pilot Pressure = (Relief Setting) - (Load Pressure) / Pilot Ratio

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

PILOT RATIOS

<table>
<thead>
<tr>
<th>Pilot Ratio</th>
<th>Best suited for applications where the load varies and machine structure can induce instability.</th>
<th>Other ratios available upon request.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4:1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SPECIFICATIONS

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Flow</td>
<td>90 litres/min (23 US GPM)</td>
</tr>
<tr>
<td>Max Setting</td>
<td>Max Load Induced Pressure: 270 bar (4000 psi)  Relief Setting: 350 bar (5000 psi)</td>
</tr>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel. External surfaces zinc plated</td>
</tr>
<tr>
<td>Body Material</td>
<td>Standard aluminium (up to 210 bar*) Add suffix '377' for steel option</td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Unrestricted</td>
</tr>
<tr>
<td>Cavity Number</td>
<td>A12336 (See Section 17)</td>
</tr>
<tr>
<td>Torque Cartridge into Cavity</td>
<td>60 Nm (44 lbs ft)</td>
</tr>
<tr>
<td>Weight</td>
<td>1CER90 0.29 kg (0.63 lbs) 1CER95 1.35 kg (2.97 lbs) 1CEE95 2.10 kg (4.62 lbs)</td>
</tr>
<tr>
<td>Seal Kit Number</td>
<td>SK533 (Nitrile) SK533V (Viton)</td>
</tr>
<tr>
<td>Recommended Filtration Level</td>
<td>BS5540/4 Class 18/13 (25 micron nominal)</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-20°C to +90°C</td>
</tr>
<tr>
<td>Leakage</td>
<td>0.3 millilitres/min nominal (5 dpm)</td>
</tr>
<tr>
<td>Nominal Viscosity Range</td>
<td>5 to 500 cSt</td>
</tr>
</tbody>
</table>

*For applications above 210 bar please consult our technical department or use the steel body option.
PRES SS/A TOP  

HEX SOCKET ADJUST

M27 X 1.5-6g

CYL (1)

PILOT (3)

VALVE (2)

54.0

40.5

36.0

58.0

38.1

19.0

62.0 MAX

127.0

10.0 107.0

240

19.5 26

180

150

210

136.50

16

12

10

14

FREE FLOW

FLOW-US GPM

PRESSURE-PSI

PRESSURE-BAR

C2

2 HOLES ø11.0 THRO'

C1

V1

V2

Seals

S = Nitrile (For use with most industrial hydraulic oils)

SV = Viton (For high temperature and most special fluid applications)

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.

Port Sizes - Bodied Valves Only

4W = 1/2” BSP Valve & Cyl Port. 1/4” BSP Pilot Port

8T = 1/2” SAE Valve & Cyl Port. 1/4” SAE Pilot Port

ORDERING CODE EXAMPLE

Basic Code

1CER90 = Cartridge Only

1CER95 = Cartridge and Body

1CEER95 = Cartridges and Body

Pilot Ratio

4 = 4:1

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 = 70-225 bar. Std setting 100 bar

35 = 200-350 bar. Std setting 210 bar

Std setting made at 4.8 litres/min

We reserve the right to change specifications without notice

6-162.D
1CEB SERIES OVERCENTRE VALVE

FULLY BALANCED - PILOT ASSISTED

APPLICATION

Overcentre valves give static and dynamic control of loads by supplying a counterbalance pressure to the actuator. They will stop runaway in the event of hose burst and hold the load with minimal leakage.

The 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 service line reliefs to work normally and will also allow the control of regenerative or proportional systems.

The overcentre valve should be mounted either into, onto or as close to the actuator as possible, using a machined cavity into the actuator or a suitable machined body, either gasket or line mounted.

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:

Pilot Pressure = (Relief Setting) - (Load Pressure)

PILOT RATIOS

4:1 Best suited for applications where the load varies and machine structure can induce instability.

Other ratios available upon request.

SPECIFICATIONS

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

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Flow</td>
<td>90 litres/min (23 US GPM)</td>
</tr>
<tr>
<td>Max Induced Pressure</td>
<td>270 bar (4000 psi)</td>
</tr>
<tr>
<td>Relief Setting</td>
<td>350 bar (5000 psi)</td>
</tr>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel. External surfaces zinc plated</td>
</tr>
<tr>
<td>Body Material</td>
<td>Standard aluminium (up to 210 bar*) Add suffix ‘377’ for steel option</td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Unrestricted</td>
</tr>
<tr>
<td>Cavity Number</td>
<td>A12336 (See Section 17)</td>
</tr>
<tr>
<td>Torque Cartridge into Cavity</td>
<td>60 Nm (44 lbs ft)</td>
</tr>
<tr>
<td>Weight</td>
<td>0.29 kg (0.63 lbs) 1CEB90</td>
</tr>
<tr>
<td></td>
<td>1.35 kg (2.97 lbs) 1CEB95</td>
</tr>
<tr>
<td></td>
<td>2.10 kg (4.62 lbs) 1CEBB95</td>
</tr>
<tr>
<td>Seal Kit Number</td>
<td>SK634 (Nitrile) SK634V (Viton)</td>
</tr>
<tr>
<td>Recommended Filtration Level</td>
<td>BS5545/4 (Class 18/13 25 micron nominal)</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-20°C to +90°C</td>
</tr>
<tr>
<td>Leakage</td>
<td>0.3 millilitres/min (5 dpm)</td>
</tr>
<tr>
<td>Nominal Viscosity Range</td>
<td>5 to 500 cSt</td>
</tr>
</tbody>
</table>

*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.

ORDERING CODE EXAMPLE

Basic Code    
1CE**** = Cartridge Only
1CEB95 = Cartridge and Body
1CEEB95 = Cartridges and Dual Body

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 ±10% tolerance.

Port Sizes - Bodied Valves Only
4W = 1/2” BSP Valve & Cyl Port, 1/4” BSP Pilot Port
8T = 1/2” SAE Valve & Cyl Port, 1/4” SAE Pilot Port

Pilot Ratio
4 = 4:1
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 = 70225 bar, Std setting 100 bar
35 = 200350 bar, Std setting 210 bar
Std setting made at 4.8 l/min

We reserve the right to change specifications without notice.

6-172.D
Overcentre valves give static and dynamic control of loads by supplying a counterbalance pressure to the actuator. They will stop runaway in the event of hose burst and hold the load with minimal leakage.

The 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 service line reliefs to work normally and will also allow the control of regenerative or proportional systems.

The overcentre valve should be mounted either into, onto or as close to the actuator as possible, using a machined cavity into the actuator or a suitable machined body, either gasket or line mounted.

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 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:

\[
\text{Pilot Pressure} = \frac{\text{Relief Setting} - \text{Load Pressure}}{\text{Pilot Ratio}}
\]

**FEATURES**

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

**APPLICATION**

Overcentre valves give static and dynamic control of loads by supplying a counterbalance pressure to the actuator. They will stop runaway in the event of hose burst and hold the load with minimal leakage.

The 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 service line reliefs to work normally and will also allow the control of regenerative or proportional systems.

The overcentre valve should be mounted either into, onto or as close to the actuator as possible, using a machined cavity into the actuator or a suitable machined body, either gasket or line mounted.

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:

\[
\text{Pilot Pressure} = \frac{\text{Relief Setting} - \text{Load Pressure}}{\text{Pilot Ratio}}
\]

**SPECIFICATIONS**

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Flow</td>
<td>90 litres/min (23 US GPM)</td>
</tr>
<tr>
<td>Max Load Induced Pressure</td>
<td>270 bar (4000 psi)</td>
</tr>
<tr>
<td>Relief Setting</td>
<td>350 bar (5000 psi)</td>
</tr>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel. External surfaces zinc plated</td>
</tr>
<tr>
<td>Body Material</td>
<td>Standard aluminium (up to 210 bar*) Add suffix ‘377’ for steel option</td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Unrestricted</td>
</tr>
<tr>
<td>Torque Cartridge into Cavity</td>
<td>60 Nm (44 lbs ft)</td>
</tr>
<tr>
<td>Weight</td>
<td>1CEBD90 0.29 kg (0.63 lbs)</td>
</tr>
<tr>
<td>Seal Kit Number</td>
<td>SK634 (Nitrile) SK634V (Viton) SK634P (Polyurethane/Nitrile)</td>
</tr>
<tr>
<td>Recommended Filtration Level</td>
<td>BS5544/4 Class 18/13 (25 micron nominal)</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-20°C to +90°C</td>
</tr>
<tr>
<td>Leakage</td>
<td>0.3 millilitres/min (5 dpm)</td>
</tr>
<tr>
<td>Nominal Viscosity Range</td>
<td>5 to 500 cSt</td>
</tr>
</tbody>
</table>

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

CARTRIDGE ONLY
BASIC CODE: 1CEBD90

ORDERING CODE EXAMPLE

Basic Code
1CEBD90

Adjustment Means
F = Screw Adjustment

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

Pilot Ratio
4: 4:1
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)
P = Polyurethane/Nitrile (For arduous applications)

We reserve the right to change specifications without notice
1CEL SERIES OVERCENTRE VALVE
PILOT ASSISTED RELIEF WITH CHECK AND COUNTERBALANCE

1CEL90

APPLICATION
The 1CEL series 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. 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 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 5.6:1
Secondary 0.7:1

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

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Flow</td>
<td>90 litres/min (23 US GPM)</td>
</tr>
<tr>
<td>Max Setting</td>
<td>380 bar (5510 psi)</td>
</tr>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel. External surfaces zinc plated</td>
</tr>
<tr>
<td>Body Material</td>
<td>Standard aluminum (up to 210 bar*) Add suffix '377' for steel option</td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Unrestricted</td>
</tr>
<tr>
<td>Cavity Number</td>
<td>A12356 (See Section 17)</td>
</tr>
<tr>
<td>Torque Cartridge into Cavity</td>
<td>60 Nm (44 lbs ft)</td>
</tr>
<tr>
<td>Weight</td>
<td>1CEL90 0.29 kg (0.63 lbs) 1CEL95 1.35 kg (2.97 lbs) 1CEEL95 2.10 kg (4.62 lbs)</td>
</tr>
<tr>
<td>Seal Kit Number</td>
<td>SK633 (Nitrile) SK633V (Viton)</td>
</tr>
<tr>
<td>Recommended Filtration Level</td>
<td>BS5540/4 Class 18/13 (25 micron nominal)</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-20°C to +90°C</td>
</tr>
<tr>
<td>Leakage</td>
<td>0.3 millilitres/min nominal (5 dpm)</td>
</tr>
<tr>
<td>Nominal Viscosity Range</td>
<td>5 to 500 cSt</td>
</tr>
</tbody>
</table>

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

Basic Code
1CEL90 = Cartridge Only
1CEL95 = Cartridge and Body
1CEEL95 = Cartridges and Dual Body

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.

Port Sizes - Bodied Valves Only
4W = 1/2" BSP Valve & Cyli Port. 1/4" BSP Pilot Port
8T = 1/2" SAE Valve & Cyli 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 = 170-350. Std 220 (160/60)
30 = 210-380. Std 280 (220/60)
Std setting made at 4.8 litres/min

6-176.D
1CPBD SERIES ZERO DIFFERENTIAL
OVERCENTRE VALVE FULLY BALANCED - PILOT ASSISTED

1CPBD90
POPPET RELIEF

APPLICATION
Zero differential overcentre valves give static and
dynamic control of loads by supplying a restriction to
flow related to the opening of the valve created by the
pilot pressure.
The valve is used in conjunction with a remote pilot
source to provide hose failure protection, load control
and load holding functions.
If over-pressure or shock pressure protection is
required then a separate relief valve should be used.

OPERATION
The check section allows free flow into the actuator then
holds and locks the load against movement. By the
application of pilot pressure to the pilot port the poppet
moves back against the main spring opening the
cylinder port to the valve port. The metering characteristic
of the valve is controlled by the rate of the spring, the seat
angle and the pilot pressure applied.
Due to the balanced poppet design load induced
pressure will not open the valve and once open valve port
pressure will not increase the pilot pressure required to
keep the valve open.

FEATURES
The cartridge fits a simple cavity allowing quick, easy
field service reducing down time.
Hardened poppet and seat provide for long leak free
performance.

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

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Flow</td>
<td>90 litres/min (23 US GPM)</td>
</tr>
<tr>
<td>Max Working Pressure</td>
<td>350 bar (5000 psi)</td>
</tr>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel. External surfaces zinc plated</td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Unrestricted</td>
</tr>
<tr>
<td>Cavity Number</td>
<td>A12196 (See Section 17)</td>
</tr>
<tr>
<td>Torque Cartridge into Cavity</td>
<td>60 Nm (44 lbs ft)</td>
</tr>
<tr>
<td>Weight</td>
<td>1CPBD90 0.29 kg (0.63 lbs)</td>
</tr>
<tr>
<td>Seal Kit Number</td>
<td>SK634 (Nitrile) SK634V (Viton) SK634P (Polyurethane/Nitrile)</td>
</tr>
<tr>
<td>Recommended Filtration Level</td>
<td>BS5549/4 Class 18/13 (25 micron nominal)</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-20°C to +90°C</td>
</tr>
<tr>
<td>Leakage</td>
<td>0.3 millilitres/min (5 dpm)</td>
</tr>
<tr>
<td>Nominal Viscosity Range</td>
<td>5 to 500 cSt</td>
</tr>
</tbody>
</table>
**PRESSURE DROP**

**CARTRIDGE ONLY**

**BASIC CODE: 1CPBD90**

We reserve the right to change specifications without notice.

**ORDERING CODE EXAMPLE**

```
Basic Code 1CPBD** F 2 P
```

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

Pilot Adjustment Range
- Z = 5 - 20 bar. Std setting 10 bar
- Std setting made at 4.8 litres/min

Where measurements are critical, request certified drawings.
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.

**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.

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

\[
\text{Pilot Pressure} = (\text{Relief Setting} - \text{Load Pressure}) \times \text{Pilot Ratio}
\]

**FEATURES**

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

**SPECIFICATIONS**

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>1CE120</th>
<th>1CE150</th>
<th>1CEE150</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Flow</td>
<td>120 litres/min (32 US GPM)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max Setting</td>
<td>270 bar (4000 psi)</td>
<td>350 bar (5000 psi)</td>
<td></td>
</tr>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel. External surfaces zinc plated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body Material</td>
<td>Standard aluminium (up to 210 bar*)</td>
<td>Add suffix '377' for steel option</td>
<td></td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Unrestricted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cavity Number</td>
<td>A877 (See Section 17)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torque Cartridge into Cavity</td>
<td>100 Nm (74 lbs ft)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>0.89 kg (1.90 lbs)</td>
<td>1.46 kg (3.20 lbs)</td>
<td>2.58 kg (5.70 lbs)</td>
</tr>
<tr>
<td>Seal Kit Number</td>
<td>SK417 (Nitrile)</td>
<td>SK417V (Viton)</td>
<td></td>
</tr>
<tr>
<td>Recommended Filtration Level</td>
<td>BS5540/4 Class 18/13</td>
<td></td>
<td>(25 micron nominal)</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-20°C to +90°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leakage</td>
<td>0.3 millilitres/min nominal (5 dpm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal Viscosity Range</td>
<td>5 to 500 cSt</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

CARTRIDGE ONLY

SINGLE VALVE

DUAL VALVE

ORDERING CODE EXAMPLE

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

Body ONLY part numbers

BSP, aluminium

SAE, aluminium

BSP steel

SAE steel

Pressure Range @ 4.8 l/min

36 = 70-350 bar. Std setting 210 bar

Std setting made at 4.8 litres/min

We reserve the right to change specifications without notice

6-182.G
Overcentre valves give static and dynamic control of loads by supplying a counterbalance pressure to the actuator. They prevent runaway in the event of hose burst and hold the load with minimal leakage.

The pressure balanced valve is unaffected by back pressure, allowing service line reliefs to operate and for the valve to be used in regenerative or proportional valve systems.

The overcentre valve should be mounted either into, onto or as close to the actuator as possible to give maximum protection.

Single overcentre valves control unidirectional loads such as in aerial platforms, cranes or winches and dual overcentres are suited to bi-directional motion such as wheel motor applications or cylinders going over centre.

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:

\[
P_{\text{Pilot}} = \left( P_{\text{Relief Set}} - P_{\text{Load}} \right) \times \text{Pilot Ratio}
\]

Cartridge is economical and fits simple 'dual purpose' cavity. Allows quick, easy field service - reduces down time. Overcentre is interchangeable with 120 litres/min pilot check cartridge. See page 7-171.

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

![Pressure Drop Graph]

### Single Valve

<table>
<thead>
<tr>
<th>Ports</th>
<th>3/4” 1”</th>
<th>3/4” 1”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body Only part numbers</td>
<td>3/4” BSP</td>
<td>3/4” BSP</td>
</tr>
<tr>
<td>Basic Code</td>
<td>1CEB150</td>
<td>1CEB150</td>
</tr>
<tr>
<td>Port Sizes - Bodied Valves Only</td>
<td>6W</td>
<td>12T</td>
</tr>
<tr>
<td>Basic Code: 1CEB150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic Code: 1CEEB150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic Code: Internally Cross Piloted</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Ordering Code Example

<table>
<thead>
<tr>
<th>Basic Code</th>
<th>1CEB120</th>
<th>1CEB150</th>
<th>1CEEB150</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustment Means</td>
<td>Cartridge Only</td>
<td>Cartridge and Body</td>
<td>Cartridges and Dual Body</td>
</tr>
<tr>
<td>Port Sizes</td>
<td>3/4” BSP</td>
<td>3/4” BSP</td>
<td>1” BSP</td>
</tr>
<tr>
<td>6W</td>
<td>1/4” BSP &amp; Cyl Port</td>
<td>1/4” BSP Pilot Port</td>
<td></td>
</tr>
<tr>
<td>12T</td>
<td>1/4” SAE &amp; Cyl Port</td>
<td>1/4” SAE Pilot Port</td>
<td></td>
</tr>
<tr>
<td>16T</td>
<td>1” SAE &amp; Cyl Port</td>
<td>1/4” SAE Pilot Port</td>
<td></td>
</tr>
</tbody>
</table>

| Pilot Ratio | 3 = 3:1 (Standard) | 8 = 8:1 |
| Seals | S = Nitrile (For use with most industrial hydraulic oils) | SV = Viton (For high temperature and most special fluid applications) |
| P = Polyurethane/Nitrile (For arduous applications) | |

---

**Where measurements are critical request certified drawings**

**We reserve the right to change specifications without notice**
Overcentre valves give static and dynamic control of loads by supplying a counterbalance pressure to the actuator. They prevent runaway in the event of hose burst and hold the load with minimal leakage.

The pressure balanced valve is unaffected by back pressure, allowing service line reliefs to operate and for the valve to be used in regenerative or proportional valve systems.

The overcentre valve should be mounted either into, onto or as close to the actuator as possible to give maximum protection.

Single overcentre valves control unidirectional loads such as in aerial platforms, cranes or winches and dual overcentres are suited to bi-directional motion such as wheel motor applications or cylinders going over centre.

**APPLICATION**

Overcentre valves give static and dynamic control of loads by supplying a counterbalance pressure to the actuator. They prevent runaway in the event of hose burst and hold the load with minimal leakage.

The pressure balanced valve is unaffected by back pressure, allowing service line reliefs to operate and for the valve to be used in regenerative or proportional valve systems.

The overcentre valve should be mounted either into, onto or as close to the actuator as possible to give maximum protection.

Single overcentre valves control unidirectional loads such as in aerial platforms, cranes or winches and dual overcentres are suited to bi-directional motion such as wheel motor applications or 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:

\[
P_{\text{Pilot Pressure}} = (\text{Relief Setting}) - (\text{Load Pressure}) \times \text{Pilot Ratio}
\]

**FEATURES**

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

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Application</th>
<th>Pilot Ratios</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overcentre valves give static and dynamic control of loads</td>
<td>3:1 Best suited for applications where load varies and machine structure can induce instability</td>
</tr>
<tr>
<td>The pressure balanced valve is unaffected by back pressure</td>
<td>8:1 Best suited for applications where the load remains relatively constant.</td>
</tr>
<tr>
<td>The overcentre valve should be mounted either into, onto or as close to the actuator as possible to give maximum protection.</td>
<td>12:1</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>1CEBD120</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel. External surfaces electroless nickel plated</td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Unrestricted</td>
</tr>
<tr>
<td>Cavity Number</td>
<td>A6726</td>
</tr>
<tr>
<td>Torque Cartridge into Cavity</td>
<td>100 Nm (74 lbs ft)</td>
</tr>
<tr>
<td>Weight</td>
<td>0.59 kg (1.30 lbs)</td>
</tr>
<tr>
<td>Seal Kit Number</td>
<td>SK830 (Nitrile) SK830V (Viton) SK830P (Polyurethane/Nitrile)</td>
</tr>
<tr>
<td>Recommended Filtration Level</td>
<td>BS5540/4 Class 18/13 (25 micron nominal)</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-20°C to +90°C</td>
</tr>
<tr>
<td>Leakage</td>
<td>0.3 millilitres/min max (5 dpm)</td>
</tr>
<tr>
<td>Nominal Viscosity Range</td>
<td>5 to 500 cSt</td>
</tr>
<tr>
<td>Bar per turn</td>
<td>65 bar</td>
</tr>
</tbody>
</table>
**Pressure Drop**

![Graph showing pressure drop against flow rate]

**Cartridge Only**

Basic Code: 1CEBD120

Adjustment Means
- F = Screw Adjustment

Pressure Range @ 4.8 l/min
- 35 = (8:1 and 22:1): 70-350 bar. Std setting 350 bar
- 40 = (12:1): 70-400 bar. Std setting 350 bar

Std setting made at 4.8 l/min

Pilot Ratio
- 3 = 3:1
- 8 = 8:1
- 12 = 12:1
- 22 = 22:1

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

Where measurements are critical request certified drawings.

We reserve the right to change specifications without notice.

6-194.B
1CPBD SERIES ZERO DIFFERENTIAL

OVERCENTRE VALVE  FULLY BALANCED - PILOT ASSISTED

1CPBD120

APPLICATION

Zero differential overcentre valves give static and dynamic control of loads by supplying a restriction to flow related to the opening of the valve created by the pilot pressure. The valve is used in conjunction with a remote pilot source to provide hose failure protection, load control and load holding functions.

If over-pressure or shock pressure protection is required then a separate relief valve should be used.

OPERATION

The check section allows free flow into the actuator then holds and locks the load against movement. By the application of pilot pressure to the pilot port the poppet moves back against the main spring opening the cylinder port to the valve port. The metering characteristic of the valve is controlled by the rate of the spring, the seat angle and the pilot pressure applied.

Due to the balanced poppet design load induced pressure will not open the valve and once open valve port pressure will not increase the pilot pressure required to keep the valve open.

FEATURES

The cartridge fits a simple cavity allowing quick, easy field service reducing down time. Hardened poppet and seat provide for long leak free performance.

SPECIFICATIONS

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Flow</td>
<td>180 litres/min (47 US GPM)</td>
</tr>
<tr>
<td>Max Working Pressure</td>
<td>400 bar (5800 psi)</td>
</tr>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel. External surfaces zinc plated</td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Unrestricted</td>
</tr>
<tr>
<td>Cavity Number</td>
<td>A6726 (See section 17)</td>
</tr>
<tr>
<td>Torque Cartridge into Cavity</td>
<td>100 Nm (74 lbs ft)</td>
</tr>
<tr>
<td>Weight</td>
<td>0.59 kg (1.30 lbs)</td>
</tr>
<tr>
<td>Seal Kit Number</td>
<td>SK830 (Nitrile) SK830V (Viton) SK832P (Polyurethane/Nitrile)</td>
</tr>
<tr>
<td>Recommended Filtration Level</td>
<td>BS5540/4 Class 18/13 (25 micron nominal)</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-20°C to +90°C</td>
</tr>
<tr>
<td>Leakage</td>
<td>0.3 millilitres/min max (5 dpm)</td>
</tr>
<tr>
<td>Nominal Viscosity Range</td>
<td>5 to 500 cSt</td>
</tr>
<tr>
<td>Bar per turn</td>
<td>5 bar</td>
</tr>
</tbody>
</table>
FREE FLOW
FLOWS - US GPM
FLOW - LITRES/MIN
PRESSURE - PSI
PRESSURE - BAR
ORDERING CODE EXAMPLE
Basic Code
1CPBD120 = Cartridge Only
Adjustment Means
F = Screw Adjustment
Seals
S = Nitrile (For use with most industrial hydraulic oils)
SV = Viton (For high temperature and most special fluid applications)
P = Polyurethane/Nitrile (For arduous applications)
Pilot Adjust Range
2 = 5-20 bar. Std setting 10 bar
Std setting made at 4.8 litres/min
We reserve the right to change specifications without notice
1CE SERIES OVERCENTRE VALVE

ALTERNATIVE BODY ARRANGEMENTS for 100 Litres/min Valves

COMPLETE VALVE 3/4” PORTS
BASIC CODE: 1CE156 / 1CEB156
THROUGH PORTED
Body ONLY part numbers
BSP Aluminium 3/4” B13629
BSP Steel 3/4” B13630

COMPLETE VALVE 3/4” PORTS
BASIC CODE: 1CBE150 / 1CBE150
BANJO MOUNTED
Sub-assembly part numbers
BSP Aluminium 3/4” ASP1530-6W-S

COMPLETE VALVE 3/4” SAE 6000 PSI FLANGE PORTS
BASIC CODE: 1CEG150 / 1CEBG150
GASKET MOUNTED
Sub-assembly part numbers
BSP Aluminium 3/4” ASP1534-6W-S-377
BSP Steel 3/4” ASP1534-6W-S-377

ORDERING CODE EXAMPLE

<table>
<thead>
<tr>
<th>Basic Code</th>
<th>F</th>
<th>6W</th>
<th>35</th>
<th>S</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1C****</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pilot Ratio
3 = 3.5:1 - 1CE156 / 1CBE150 / 1CEG150
3 = 3:1 - 1CBE150 / 1CBE150 / 1CEBG150 (Standard)
8 = 8:1 - 1CBE150 / 1CBE150 / 1CEBG150

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

We reserve the right to change specifications without notice.

Where measurements are critical request certified drawings.
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.

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:

\[
P_{\text{Pilot}} = (P_{\text{Relief}} - P_{\text{Load}}) / \text{Pilot Ratio}
\]

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

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.

**ORDERING CODE EXAMPLE**

Basic Code  
1CE****  
F  6W  40  S  4

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

We reserve the right to change specifications without notice.
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.

**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:

Pilot Pressure = (Relief Setting) / (Load Pressure)

**FEATURES**

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

**SPECIFICATIONS**

**APPLICATION**

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.

**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:

Pilot Pressure = (Relief Setting) / (Load Pressure)

**FEATURES**

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

**SPECIFICATIONS**

**APPLICATION**

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.
**ORDERING CODE EXAMPLE**

<table>
<thead>
<tr>
<th>Basic Code</th>
<th>F</th>
<th>6W</th>
<th>40</th>
<th>S</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1CER***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**
N = Nitrile (For use with most industrial hydraulic oils)
V = 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

We reserve the right to change specifications without notice
1CEL SERIES OVERCENTRE VALVE
PILOT ASSISTED RELIEF WITH CHECK AND COUNTERBALANCE

1CEL140
PAPET RELIEF

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

<table>
<thead>
<tr>
<th>Rated Flow</th>
<th>140 litres/min (37 US GPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Setting</td>
<td>380 bar (5510 psi)</td>
</tr>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel. External surfaces zinc plated</td>
</tr>
<tr>
<td>Body Material</td>
<td>Standard aluminium (up to 210 bar*) Add suffix '377' for steel option</td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Unrestricted</td>
</tr>
<tr>
<td>Cavity Number</td>
<td>A20681</td>
</tr>
<tr>
<td>Torque Cartridge into Cavity</td>
<td>150 Nm (110 lbs ft)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1CEL140</td>
</tr>
<tr>
<td>1CEL145 (aluminum)</td>
</tr>
<tr>
<td>1CEL145 (steel)</td>
</tr>
<tr>
<td>1CEEL145 (aluminum)</td>
</tr>
<tr>
<td>1CEEL145 (steel)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Seal Kit Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>SK1108 (Nitrile)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommended Filtration Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>BS5545/4 Class 18/13 (25 micron nominal)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating Temp</th>
</tr>
</thead>
<tbody>
<tr>
<td>-20°C to +90°C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Leakage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3 millilitres/min nominal (5 dpm)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nominal Viscosity Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 500 cSt</td>
</tr>
</tbody>
</table>

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

ORDERING CODE EXAMPLE

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:

Pressure = (Relief Setting - Load Pressure) x Pilot Ratio

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

SPECIFICATIONS

<table>
<thead>
<tr>
<th>PILOT RATIOS</th>
<th>3:1 (Standard)</th>
<th>Best suited for applications where load varies and machine structure can induce instability.</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:1</td>
<td>Best suited for applications where load remains relatively constant.</td>
<td></td>
</tr>
</tbody>
</table>

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

PILOT RATIOS

<table>
<thead>
<tr>
<th>PILOT RATIOS</th>
<th>3:1 (Standard)</th>
<th>Best suited for applications where load varies and machine structure can induce instability.</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:1</td>
<td>Best suited for applications where load remains relatively constant.</td>
<td></td>
</tr>
</tbody>
</table>

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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Integrated Hydraulics Inc
7047 Spinach Dr, Mentor, Ohio 44060, USA
Tel: (440) 974 3171 Fax: (440) 974 3170
Website: www.integratedhydraulics.com

6-241.F
**PRESSURE DROP**

**CARTRIDGE ONLY**

**SINGLE VALVE**  
1 1/4" PORTS  
BASIC CODE: 1CE350  
BSP/aluminium: 1 1/4" B6814  
SAE/aluminium: 1 1/4" 61520  
BSP/steel: 1 1/4" B6815  
SAE/steel: 1 1/4" 61474  
Adjustment Means: F = Screw Adjustment

**DUAL VALVE**  
1 1/4" PORTS  
(INTERNALLY CROSS PILOTED)

**ORDERING CODE EXAMPLE**

<table>
<thead>
<tr>
<th>Basic Code</th>
<th>F</th>
<th>T</th>
<th>S</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1CE****</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1CE300</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1CE350</td>
<td></td>
<td></td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>1CEE350</td>
<td></td>
<td>10W</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

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

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

We reserve the right to change specifications without notice.
Overcentre valves give static and dynamic control of loads by supplying a counterbalance pressure to the actuator. They prevent runaway in the event of hose burst and hold the load with minimal leakage.

The pressure balanced valve is unaffected by back pressure, allowing service line reliefs to operate and for the valve to be used in regenerative or proportional valve systems.

The overcentre valve should be mounted either into, onto or as close to the actuator as possible to give maximum protection.

Single overcentre valves control unidirectional loads such as in aerial platforms, cranes or winches and dual overcentres are suited to bi-directional motion such as wheel motor applications or cylinders going over centre.

### PILOT RATIOS

<table>
<thead>
<tr>
<th>PILOT RATIO</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:1 (Standard)</td>
<td>Best suited for applications where load varies and machine structure can induce instability.</td>
</tr>
<tr>
<td>8:1</td>
<td>Best suited for applications where load remains relatively constant.</td>
</tr>
</tbody>
</table>

### SPECIFICATIONS

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

<table>
<thead>
<tr>
<th>SPECIFICATION</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Flow</td>
<td>300 litres/min (80 US GPM)</td>
</tr>
<tr>
<td>Max Setting</td>
<td>270 bar (4000 psi)</td>
</tr>
<tr>
<td>Relief Setting</td>
<td>350 bar (5000 psi)</td>
</tr>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel. External surfaces zinc plated</td>
</tr>
<tr>
<td>Body Material</td>
<td>Standard aluminium (up to 210 bar*) Add suffix '377' for steel option</td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Unrestricted</td>
</tr>
<tr>
<td>Cavity Number</td>
<td>A6935 (See Section 17)</td>
</tr>
<tr>
<td>Torque Cartridge into Cavity</td>
<td>150 Nm (110 lbs ft)</td>
</tr>
<tr>
<td>Weight</td>
<td>1 CEEB300 0.91 kg (2.00 lbs)</td>
</tr>
<tr>
<td></td>
<td>1 CEEB350 2.71 kg (5.96 lbs)</td>
</tr>
<tr>
<td></td>
<td>1 CEEB350 5.42 kg (11.92 lbs)</td>
</tr>
<tr>
<td>Seal Kit Number</td>
<td>SK6686 (Nitrile) SK6686V (Viton)</td>
</tr>
<tr>
<td>Recommended Filtration Level</td>
<td>BS5540/4 Class 18/13 (25 micron nominal)</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-20°C to +90°C</td>
</tr>
<tr>
<td>Leakage</td>
<td>4 millilitres/min max (60 dpm)</td>
</tr>
<tr>
<td>Nominal Viscosity Range</td>
<td>5 to 500 cSt</td>
</tr>
</tbody>
</table>

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

### FEATURES

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

---

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7047 Spinach Drive, Mentor, Ohio 44060, USA
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Website: www.integratedhydraulics.com
ORDERING CODE EXAMPLE

**Basic Code**
- 1CEB300 = Cartridge Only
- 1CEB350 = Cartridge and Body
- 1CEEB350 = 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 l/min

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

**Seals**
- N = 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.
### 1CEBD SERIES OVERCENTRE VALVE

**FULLY BALANCED - PILOT ASSISTED**

#### 1CEBD300

**Poppet Relief**

---

### Application

Overcentre valves give static and dynamic control of loads by supplying a counterbalance pressure to the actuator. They prevent runaway in the event of hose burst and hold the load with minimal leakage.

The pressure balanced valve is unaffected by back pressure, allowing service line reliefs to operate and for the valve to be used in regenerative or proportional valve systems.

The overcentre valve should be mounted either into, onto or as close to the actuator as possible to give maximum protection.

Single overcentre valves control unidirectional loads such as in aerial platforms, cranes or winches and dual overcentres are suited to bi-directional motion such as wheel motor applications or cylinders going over centre.

### PILOT RATIOS

<table>
<thead>
<tr>
<th>Pilot Ratio</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:1 (Standard)</td>
<td>Best suited for applications where load varies and machine structure can induce instability.</td>
</tr>
<tr>
<td>8:1</td>
<td>Best suited for applications where load remains relatively constant.</td>
</tr>
</tbody>
</table>

### Specifications

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Flow</td>
<td>300 litres/min (80 US GPM)</td>
</tr>
<tr>
<td>Max Setting</td>
<td>Max Load Induced Pressure: 270 bar (4000 psi) Relief Setting: 350 bar (5000 psi)</td>
</tr>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel. External surfaces zinc plated</td>
</tr>
<tr>
<td>Body Material</td>
<td>Standard aluminium A&amp;d suffix 377 for steel option</td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Unrestricted</td>
</tr>
<tr>
<td>Cavity Number</td>
<td>A13098 (See Section 17)</td>
</tr>
<tr>
<td>Torque Cartridge into Cavity</td>
<td>150 Nm (110 lbs ft)</td>
</tr>
<tr>
<td>Weight</td>
<td>1CEBD300: 0.91 kg (2.00 lbs)</td>
</tr>
<tr>
<td>Seal Kit Number</td>
<td>SK686 (Nitrile) SK686V (Viton) SK686P (Polyurethane/Nitrile)</td>
</tr>
<tr>
<td>Recommended Filtration Level</td>
<td>BS5540/4 Class 18/13 (25 micron nominal)</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-20°C to +90°C</td>
</tr>
<tr>
<td>Leakage</td>
<td>4 millilitres/min max (60 dpm)</td>
</tr>
<tr>
<td>Nominal Viscosity Range</td>
<td>5 to 500 cSt</td>
</tr>
</tbody>
</table>

---

### Features

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

---

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Website: www.integratedhydraulics.com
We reserve the right to change specifications without notice.

ORDERING CODE EXAMPLE

- **Basic Code**: 1CEBD300
- **Adjustment Means**
  - F = Screw Adjustment
- **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 = 3:1 (Standard)
  - 8 = 8:1
- **Seals**
  - S = Nitrile (For use with most industrial hydraulic oils)
  - SV = Viton (For high temperature and most special fluid applications)
  - P = Polyurethane/Nitrile (For arduous applications)

Where measurements are critical request certified drawings.
APPLICATION

Zero differential overcentre valves give static and dynamic control of loads by supplying a restriction to flow related to the opening of the valve created by the pilot pressure. The valve is used in conjunction with a remote pilot source to provide hose failure protection, load control and load holding functions.

If over-pressure or shock pressure protection is required then a separate relief valve should be used.

OPERATION

The check section allows free flow into the actuator then holds and locks the load against movement. By the application of pilot pressure to the pilot port the poppet moves back against the main spring opening the cylinder port to the valve port. The metering characteristic of the valve is controlled by the rate of the spring, the seat angle and the pilot pressure applied.

Due to the balanced poppet design load induced pressure will not open the valve and once open valve port pressure will not increase the pilot pressure required to keep the valve open.

FEATURES

The cartridge fits a simple cavity allowing quick, easy field service reducing down time. Hardened poppet and seat provide for long leak free performance.

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Figure</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Flow</td>
<td>300 litres/min (80 US GPM)</td>
</tr>
<tr>
<td>Max Working Pressure</td>
<td>400 bar (5800 psi)</td>
</tr>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel. External surfaces zinc plated</td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Unrestricted</td>
</tr>
<tr>
<td>Cavity Number</td>
<td>A1309A (See section 17)</td>
</tr>
<tr>
<td>Torque Cartridge into Cavity</td>
<td>150 Nm (110 lbs ft)</td>
</tr>
<tr>
<td>Weight</td>
<td>0.91 kg (2.0 lbs)</td>
</tr>
<tr>
<td>Seal Kit Number</td>
<td>SK971 (Nitrile) SK971V (Viton) SK971P (Polyurethane/Nitrile)</td>
</tr>
<tr>
<td>Recommended Filtration Level</td>
<td>BS5540/4 Class 18/13 (25 micron nominal)</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-20°C to +90°C</td>
</tr>
<tr>
<td>Leakage</td>
<td>4.0 millilitres/min max (60 dpm)</td>
</tr>
<tr>
<td>Nominal Viscosity Range</td>
<td>5 to 500 cSt</td>
</tr>
<tr>
<td>Bar per turn</td>
<td>5 bar</td>
</tr>
</tbody>
</table>

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

PRESSURE DROP

![Graph showing pressure drop vs flow rate]

CARTRIDGE ONLY
BASIC CODE: 1CPBD300

Adjustment Means
F = Screw Adjustment

Seals
S = Nitrile (for use with most industrial hydraulic oils)
SV = Viton (for high temperature and most special fluid applications)
P = Polyurethane/Nitrile (for arduous applications)

Pilot Adjust Range
2 = 5-20 bar. Std setting 10 bar. Std setting made at 4.8 litres/min

ORDERING CODE EXAMPLE

Basic Code
1CPBD300 = Cartridge Only

Where measurements are critical, request certified drawings.

6-266.E
1CE SERIES OVERCentyre VALVE

ALTERNATIVE BODY ARRANGEMENTS for 300 Litres/min Valves

**COMPLETE VALVE**

**1 1/4" PORTS**

**THROUGH PORTED**

**BASIC CODE:** 1CE356

- **Body Only** part numbers:
  - BSP, aluminium: 1 1/4" C13637
  - BSP, steel: 1 1/4" C13638

- **Holes Ø15.0 THRO'**

**ORDERING CODE EXAMPLE**

- **Basic Code**
  - 1CE356 = Cartridge 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

**COMPLETE VALVE**

**1 1/4" PORTS**

**GASKET MOUNTED**

**BASIC CODE:** 1CEG350

- **Sub-assembly part numbers**
  - **BSP, aluminium:** 1 1/4" CXP25647-10W-S
  - **BSP, steel:** 1 1/4" CXP25647-10W-S-377

- **Pilot Ratio**
  - **3** = 3:1
  - **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.

---

6-269.D
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.

These dual overcentre valves also contain a brake release shuttle valve which ensures that pressure is applied to a brake release circuit regardless of whether pressure is applied to ports V1 or V2. These multifunction valves are normally used for the static and dynamic control of systems using motors or semi-rotary actuators.

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:

\[ \text{Pilot Pressure} = (\text{Relief Setting}) - (\text{Load Pressure}) \times (\text{Pilot Ratio}) \]

**SPECIFICATIONS**

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

**FEATURES**

These valves have the excellent load control and safety features of the dual overcentre valve with the addition of a port for a brake release line. Smooth, safe performance.

**APPLICATION**

-2.5:1 best suited for extremely unstable applications such as long booms or flexible frameworks.

-5:1 best suited for applications where load (Standard) varies and machine structure can induce instability.

-10:1 best suited for applications where load remains relatively constant.
### ORDERING CODE EXAMPLE

**Basic Code**
1CEESH35 = Cartridges and Body Only

**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.

**Port Sizes - Bodied Valves Only**
- **3W** = 3/8" BSP Valve & Cyl Port. 1/4" BSP Brake Port

**Pressure Range @ 4.8 l/min**
- **35** = (2.5:1 and 5:1): 100-350 bar. Std setting 210 bar
- **10:** 120-350 bar. Std setting 210 bar

Std setting made at 4.8 l/min

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

**Body Material**
- **377** = Steel

**Pilot Ratio**
- **2** = 2.5:1
- **5** = 5:1 (Standard)
- **10** = 10:1

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

These dual overcentre valves also contain a brake release shuttle valve which ensures that pressure is applied to a brake release circuit regardless of whether pressure is applied to ports V1 or V2. These multifunction valves are normally used for the static and dynamic control of systems using motors or semi-rotary actuators.

**FEATURES**

These valves have the excellent load control and safety features of the dual overcentre valve with the addition of a port for a brake release line. Smooth, safe performance.

**SPECIFICATIONS**

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Flow</td>
<td>90 litres/min (23 US GPM)</td>
</tr>
<tr>
<td>Max Setting</td>
<td>Max Load Induced Pressure:</td>
</tr>
<tr>
<td></td>
<td>160 bar (2300 psi) (20)</td>
</tr>
<tr>
<td></td>
<td>270 bar (4000 psi) (35)</td>
</tr>
<tr>
<td></td>
<td>Relief Setting:</td>
</tr>
<tr>
<td></td>
<td>350 bar (5000 psi) (35)</td>
</tr>
<tr>
<td></td>
<td>225 bar (3260 psi) (20)</td>
</tr>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel. External surfaces electroless nickel plated</td>
</tr>
<tr>
<td>Body Material</td>
<td>Steel</td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Line mounted</td>
</tr>
<tr>
<td>Weight</td>
<td>3.50 kg (7.70 lbs)</td>
</tr>
<tr>
<td>Seal Kit Number</td>
<td>SK817 (Nitrile)</td>
</tr>
<tr>
<td></td>
<td>SK817V (Viton)</td>
</tr>
<tr>
<td>Recommended Filtration Level</td>
<td>BS5540/4 Class 18/13</td>
</tr>
<tr>
<td></td>
<td>(25 micron nominal)</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-20°C to +90°C</td>
</tr>
<tr>
<td>Leakage</td>
<td>0.3 millilitres/min nominal (5 dpm)</td>
</tr>
<tr>
<td>Nominal Viscosity Range</td>
<td>5 to 500 cSt</td>
</tr>
</tbody>
</table>

**APPLICATION**

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:

\[
Pilot Pressure = (Relief Setting) - (Load Pressure)
\]

**PILOT RATIO**

4:1  Best suited for applications where the load varies and machine structure can induce instability.
8:1  Best suited for applications where the load remains relatively constant.

Other ratios available upon request.
We reserve the right to change specifications without notice.
1CEESH SERIES DUAL OVERCENTRE VALVE
WITH BRAKE SHUTTLE - PILOT ASSISTED

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.

These dual overcentre valves also contain a brake release shuttle valve which ensures that pressure is applied to a brake release circuit regardless of whether pressure is applied to ports V1 or V2. These multifunction valves are normally used for the static and dynamic control of systems using motors or semi-rotary actuators.

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:

\[
P_{\text{Pilot Pressure}} = (\text{Relief Setting}) - (\text{Load Pressure})
\]

PILOT RATIOS
3:1 Best suited for applications where load varies
3.5:1 and machine structure can induce instability.
8:1 Best suited for applications where the load remains relatively constant.

FEATURES
These valves have the excellent load control and safety features of the dual overcentre valve with the addition of a port for a brake release line. Smooth, safe performance.

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

<table>
<thead>
<tr>
<th>1CEESH150/1CEESH350</th>
<th>1CEESH150: 150 l/min (40 US GPM)</th>
<th>1CEESH350: 300 l/min (80 US GPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Setting</td>
<td>Max Load Induced Pressure: 270 bar (4000 psi)</td>
<td>relief Setting: 350 bar (5000 psi)</td>
</tr>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel. External surfaces electroless nickel plated</td>
<td></td>
</tr>
<tr>
<td>Body Material</td>
<td>Steel</td>
<td></td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Line mounted</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>1CEESH150: 3.50 kg (7.70 lbs)</td>
<td>1CEESH350: 5.42 kg (11.94 lbs)</td>
</tr>
<tr>
<td>Seal Kit Number</td>
<td>SK818 (Nitrile)</td>
<td>SK818V (Viton)</td>
</tr>
<tr>
<td>SK688 (Nitrile)</td>
<td>SK688V (Viton)</td>
<td></td>
</tr>
<tr>
<td>Recommended Filtration Level</td>
<td>BS5540/4 Class 18/13 (25 micron nominal)</td>
<td></td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-20°C to +90°C</td>
<td></td>
</tr>
<tr>
<td>Leakage</td>
<td>1CEESH150: 0.3 millilitres/min nominal (5 dpm)</td>
<td>1CEESH350: 4 millilitres/min nominal (60 dpm)</td>
</tr>
<tr>
<td>Nominal Viscosity Range</td>
<td>5 to 500 cSt</td>
<td></td>
</tr>
</tbody>
</table>
**ORDERING CODE EXAMPLE**

<table>
<thead>
<tr>
<th>Basic Code</th>
<th>1CEESH150</th>
<th>1CEESH350</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cartridges and Body</td>
<td>1CEESH150</td>
<td>1CEESH350</td>
</tr>
</tbody>
</table>

**Adjustment Means**

| F | Screw Adjustment |

**Port Sizes - Bodied Valves Only**

- 8W = 1” BSP Valve & Cyl Port, 1/4” BSP Brake Port
- 10W = 1 1/4” BSP Valve & Cyl Port, 1/4” BSP Brake Port

**COMPLETE VALVE**

**1" PORTS**

BASIC CODE: 1CEESH150 (INTERNALLY CROSS PILOTED)

Sub-assembly part numbers

- BSP valve
- 1" - CSP1003 8W-6-377

**COMPLETE VALVE**

**1 1/4" PORTS**

BASIC CODE: 1CEESH350 (INTERNALLY CROSS PILOTED)

Sub-assembly part numbers

- BSP valve
- 1 1/4" - CSP2007-10W-S-377

**PRESSURE DROP**

1CEESH150

**PRESSURE DROP**

1CEESH350

**Body Material**

- 377 = Steel

**Pilot Ratio**

- 3 = 3:1 - 1CEESH350 (Standard)
- 8 = 8:1 - 1CEESH350

**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**

- 35 = 70-350 bar, Std setting 210 bar
- Std setting made at 4.8 litres/min

We reserve the right to change specifications without notice

6-292.E
1CEEC SERIES MOTION CONTROL & LOCK VALVE

PILOT ASSISTED

1CEEC35/1CEEC95

APPLICATION

Motion control and lock valves give static and dynamic control by regulating the flow into and out of hydraulic actuators. When installed close to an actuator, the valve can stop runaway in the event of hose burst. The valves also give dual thermal and overload relief protection.

A low pressure tank or charge line may be connected to the T port to provide a make-up flow to either actuator port.

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:

\[
P_{\text{Pilot}} = (\text{Relief Setting}) - (\text{Load Pressure})
\]

A system of check valves allows crossline relief for dynamic applications with the optional make up facility to compensate for any change in system volume.

PILOT RATIOS

<table>
<thead>
<tr>
<th>Pilot Ratio</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5:1 (1CEEC35)</td>
<td>Best suited for extremely unstable applications such as long booms or flexible framework.</td>
</tr>
<tr>
<td>5:1 (1CEEC35)</td>
<td>Best suited for applications where load varies and machine structure can induce instability.</td>
</tr>
<tr>
<td>10:1 (1CEEC35)</td>
<td>Best suited for applications where the load remains relatively constant.</td>
</tr>
<tr>
<td>8:1 (1CEEC95)</td>
<td></td>
</tr>
</tbody>
</table>

FEATURES

These valves provide complete circuit control and protection in a single valve body, reducing installation time and cost. Smooth, safe performance of dual direction actuators.

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Feature</th>
<th>1CEEC35</th>
<th>1CEEC95</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Flow</td>
<td>30 litres/min (8 US GPM)</td>
<td>95 litres/min (25 US GPM)</td>
</tr>
<tr>
<td>Max Setting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load Induced Pressure</td>
<td>160 bar (2300 psi)</td>
<td>270 bar (4000 psi)</td>
</tr>
<tr>
<td>Relief Setting</td>
<td>250 bar (3600 psi)</td>
<td>225 bar (3260 psi)</td>
</tr>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel. External surfaces electroless nickel plated.</td>
<td></td>
</tr>
<tr>
<td>Body Material</td>
<td>Steel</td>
<td></td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Line mounted</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>2.03 kg (4.50 lbs)</td>
<td>3.70 kg (8.20 lbs)</td>
</tr>
<tr>
<td>Seal Kit Number</td>
<td>SK815 (Nitrile) SK815V (Viton)</td>
<td>SK814 (Nitrile) SK814V (Viton)</td>
</tr>
<tr>
<td>Recommended Filtration Level</td>
<td>BS5540/4 Class 18/13 (25 micron nominal)</td>
<td></td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-20°C to +90°C</td>
<td></td>
</tr>
<tr>
<td>Leakage</td>
<td>0.3 millilitres/min nominal (5 dpm)</td>
<td></td>
</tr>
<tr>
<td>Nominal Viscosity Range</td>
<td>5 to 500 cSt</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1. 1CEEC Series Pilot Assisted Motion Control & Lock Valve

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Website: www.integratedhydraulics.com
ORDERING CODE EXAMPLE

Basic Code
1CEECC** = Cartridge and Body
1CEECC35 = Cartridge and Body
1CEECC95 = Cartridge and Body

Adjustment Means
F = Screw Adjustment
N = Fixed - Static pressure setting required
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
6W = 3/4" BSP

Pressure Range @ 4.8 l/min
20 = (2.5:1 and 5:1): 75-210 bar. Std setting 100 bar. (1CEECC35)
200-210 bar. Std setting 100 bar. (1CEECC35)
100-350 bar. Std setting 210 bar. (1CEECC35)
(10:1):
120-350 bar. Std setting 210 bar. (1CEECC35)
8 (4:1 and 8:1): 200-350 bar. Std setting 210 bar. (1CEECC35)
Std setting made at 4.8 litres/min

COMPLETE VALVE

3/8" PORTS

BASIC CODE: 1CEECC35 (INTERNALLY CROSS PILOTED)
Sub-assembly part numbers
BSP steel
2W: BIP1024-3W-G-377

COMPLETE VALVE

3/4" PORTS

BASIC CODE: 1CEECC95 (INTERNALLY CROSS PILOTED)
Sub-assembly part numbers
BSP, steel
3/8"BXP16247-3W-S-377
3/4"BXP16248-6W-S-377

Body Material
377 = Steel

Pilot Ratio
2 = 2.5:1 (1CEECC35)
4 = 4:1 (1CEECC35)
5 = 5:1 (1CEECC35 standard)
8 = 8:1 (1CEECC95)
10 = 10:1 (1CEECC95)
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)

We reserve the right to change specifications without notice.

6-302.G
1CEEC SERIES MOTION CONTROL VALVE

MOTOR APPLICATIONS - PILOT ASSISTED POPPET

1CEEC150/1CEEC350

APPLICATION

Motion control and lock valves give static and dynamic control by regulating the flow into and out of hydraulic actuators. When installed close to an actuator, the valve can stop runaway in the event of hose burst. The valves also give dual thermal and overload relief protection.

A low pressure tank or charge line may be connected to the T port to provide a make-up flow to either actuator port.

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:

\[ \text{Pilot Pressure} = \frac{\text{(Relief Setting)}}{\text{(Load Pressure)}} \times \text{Pilot Ratio} \]

A system of check valves allows crossline relief for dynamic applications with the optional make up facility to compensate for any change in system volume.

PILOT RATIOS

3:1 Best suited applications where load varies and machine structure can induce instability

8:1 Best suited for applications where the load remains relatively constant.

FEATURES

These valves provide complete circuit control and protection in a single valve body, reducing installation time and cost. Smooth, safe performance of dual direction actuators.

SPECIFICATIONS

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>1CEEC150</th>
<th>1CEEC350</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Flow</td>
<td>150 litres/min (40 US GPM)</td>
<td>300 litres/min (80 US GPM)</td>
</tr>
<tr>
<td>Max Setting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure</td>
<td>270 bar (4000 psi)</td>
<td>350 bar (5000 psi)</td>
</tr>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel. External surfaces zinc plated</td>
<td></td>
</tr>
<tr>
<td>Body Material</td>
<td>Steel</td>
<td></td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Line mounted</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1CEEC150</td>
<td>3.7 kg (8.20 lbs)</td>
<td></td>
</tr>
<tr>
<td>1CEEC350</td>
<td>8.2 kg (18.0 lbs)</td>
<td></td>
</tr>
<tr>
<td>Seal Kit Number</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1CEEC150</td>
<td>SK813 (Nitrile)</td>
<td></td>
</tr>
<tr>
<td>1CEEC350</td>
<td>SK813V (Viton)</td>
<td></td>
</tr>
<tr>
<td>Recommended Filtration Level</td>
<td>BS5544/4 Class 18/13 (25 micron nominal)</td>
<td></td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-20°C to +90°C</td>
<td></td>
</tr>
<tr>
<td>Leakage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1CEEC150</td>
<td>0.3 millilitres/min nominal (5 dpm)</td>
<td></td>
</tr>
<tr>
<td>1CEEC350</td>
<td>4 millilitres/min nominal (60 dpm)</td>
<td></td>
</tr>
<tr>
<td>Nominal Viscosity Range</td>
<td>5 to 500 cSt</td>
<td></td>
</tr>
</tbody>
</table>
### Complete Valve

**1" Ports**

**Basic Code:** 1CEEC150 (Internally Cross Piloted)

- Sub-assembly part numbers
  - BSP steel: 1" BIP15007-8W-S-377

**2 Overcentre Valves**

**1CE120-F-35-S**

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

- 3 Mounting Holes Ø12.5 Thru

**Pressure Drop**

- 1CEEC150

- 1CEEC350

**Ordering Code Example**

- **Basic Code**
  - 1CEEC150 = Cartridges and Body
  - 1CEEC350 = Cartridges and Body

- **Adjustment Means**
  - F = Screw Adjustment

- **Port Sizes - Bodied Valves Only**
  - 8W = 1" BSP Valve & Cyl Port, 1/4" BSP Brake Port
  - 10W = 1 1/4" BSP Valve & Cylt Port, 1/4" BSP Brake Port

- **Pressure Range @ 4.8 l/min**
  - 35 = 70-350 bar, Std setting 210 Bar
  - Std setting made at 4.8 l/min

**Body Material**

- 377 = Steel

**Pilot Ratio**

- 3 = 3.1 - 1CEEC350 (Standard)
- 3 = 3.51 - 1CEEC150
- 8 = 8.1 - 1CEEC350

**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.

6-312.H
1CEECSH SERIES MOTION CONTROL VALVE
WITH BRAKE SHUTTLE - PILOT ASSISTED

APPLICATION
Motion control and lock valves give static and dynamic control by regulating the flow into and out of hydraulic actuators. When installed close to an actuator, the valve can stop runaway in the event of hose burst. The valves also give dual thermal and overload relief protection.

A low pressure tank or charge line may be connected to the T port to provide a make-up flow to either actuator port.

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:

\[ \text{Pilot Pressure} = (\text{Relief Setting}) - (\text{Load Pressure}) \]

A system of check valves allows crossline relief for dynamic applications with the optional make up facility to compensate for any change in system volume.

PILOT RATIOS

2.5:1 Best suited for extremely unstable applications such as long booms or flexible frameworks.

5:1 (Standard) Best suited for applications where the load and machine structure can induce instability.

10:1 Best suited for applications where the load remains relatively constant.

FEATURES
This valve provides complete circuit control and protection as with the standard motion control valve but has the addition of a brake release shuttle and brake port contained in a single body.

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Flow</td>
<td>30 litres/min (8 US GPM)</td>
</tr>
<tr>
<td>Max Setting Pressure</td>
<td>270 bar (4000 psi)</td>
</tr>
<tr>
<td>Relief Setting</td>
<td>350 bar (5000 psi)</td>
</tr>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel, External surfaces electroless nickel plated</td>
</tr>
<tr>
<td>Body Material</td>
<td>Steel</td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Line mounted</td>
</tr>
<tr>
<td>Weight</td>
<td>2.03 kg (4.50 lbs)</td>
</tr>
<tr>
<td>Seal Kit Number</td>
<td>SK815 (Nitrile) SK815V (Viton)</td>
</tr>
<tr>
<td>Recommended Filtration Level</td>
<td>BS5540/4 Class 18/13 (25 micron nominal)</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-20°C to +90°C</td>
</tr>
<tr>
<td>Leakage</td>
<td>0.3 millilitres/min nominal (5 dpm)</td>
</tr>
<tr>
<td>Nominal Viscosity Range</td>
<td>5 to 500 cSt</td>
</tr>
</tbody>
</table>

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Integrated Hydraulics

**PRESSURE DROP**

2.5:1 & 5:1 versions

![Graph of pressure drop](image)

**COMPLETE VALVE**

3/8” PORTS

BASIC CODE: 1CEECSH35 (INTERNALLY CROSS PILOTED)

<table>
<thead>
<tr>
<th>Sub-assembled part numbers</th>
<th>3/8”</th>
<th>CAPISNYT-3W-S-377</th>
</tr>
</thead>
</table>

**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.

**Port Sizes - Bodied Valves Only**

3W = 3/8” BSP Valve & Cyl. Port, 1/4” BSP Brake Port

**Pressure Range @ 4.8 l/min**

35 = (2.5:1 and 5:1): 100-350 bar, Std setting 210 bar

10:1: 120-350 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)

**Body Material**

377 = Steel

**Pilot Ratio**

2 = 2.5:1

5 = 5:1 (standard)

10 = 10:1

**Ordering Code Example**

Basic Code: 1CEECSH35

Adjustment Means: F

Port Sizes: 3W

Pressure Range: 35

Body Material: 377

Seals: S

We reserve the right to change specifications without notice.

6-322.E
6

**APPLICATION**

Motion control and lock valves give static and dynamic control by regulating the flow into and out of hydraulic actuators. When installed close to an actuator, the valve can stop runaway in the event of hose burst. The valves also give dual thermal and overload relief protection.

A low pressure tank or charge line may be connected to the T port to provide a make-up flow to either actuator port.

**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:

\[
Pilot\; Pressure = (Relief\; Setting) - (Load\; Pressure)\]

A system of check valves allows crossline relief for dynamic applications with the optional make up facility to compensate for any change in system volume.

**PILOT RATIO**

<table>
<thead>
<tr>
<th>Pilot Ratio</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4:1</td>
<td>Best suited for applications where the load varies and machine structure can induce instability.</td>
</tr>
<tr>
<td>8:1</td>
<td>Best suited for applications where the load remains relatively constant. Other ratios available upon request.</td>
</tr>
</tbody>
</table>

**FEATURES**

This valve provides complete circuit control and protection as with the standard motion control valve but has the addition of a brake release shuttle and brake port contained in a single body.

**SPECIFICATIONS**

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Flow</td>
<td>95 litres/min (25 US GPM)</td>
</tr>
<tr>
<td>Max Setting</td>
<td>Max Load Induced Pressure: 160 bar (2300 psi) (20)</td>
</tr>
<tr>
<td></td>
<td>270 bar (4000 psi) (35)</td>
</tr>
<tr>
<td></td>
<td>Relief Setting: 350 bar (5000 psi) (35)</td>
</tr>
<tr>
<td></td>
<td>225 bar (3260 psi) (20)</td>
</tr>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel. External surfaces electroless nickel plated</td>
</tr>
<tr>
<td>Body Material</td>
<td>Steel</td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Line mounted</td>
</tr>
<tr>
<td>Weight</td>
<td>3.79 kg (8.20 lbs)</td>
</tr>
<tr>
<td>Seal Kit Number</td>
<td>SK814 (Nitrile) SK814V (Viton)</td>
</tr>
<tr>
<td>Recommended Filtration Level</td>
<td>BS5540/4 Class 16/13 (25 micron nominal)</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-20°C to +90°C</td>
</tr>
<tr>
<td>Leakage</td>
<td>0.3 millilitres/min nominal (5 dpm)</td>
</tr>
<tr>
<td>Nominal Viscosity Range</td>
<td>5 to 500 cSt</td>
</tr>
</tbody>
</table>

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**COMPLETE VALVE**  
3/4" PORTS

**BASIC CODE: 1CEECSH95** (INTERNALLY CROSS PILOTED)

- **Sub-assembly part numbers**
  - BSP steel
  - 3/4" - EBP100X95W S 377

Where measurements are critical request certified drawings

**ORDERING CODE EXAMPLE**

<table>
<thead>
<tr>
<th>Basic Code</th>
<th>Adjustment Means</th>
<th>Pilot Material</th>
<th>Pilot Ratio</th>
<th>Seals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1CEECSH95</td>
<td>F = Screw Adjustment</td>
<td>377 = Steel</td>
<td>4 = 4:1 (Standard)</td>
<td>S = Nitrile (For use with most industrial hydraulic oils)</td>
</tr>
<tr>
<td></td>
<td>N = Fixed - State pressure setting required</td>
<td></td>
<td>8 = 8:1</td>
<td>SV = Viton (For high temperature and most special fluid applications)</td>
</tr>
</tbody>
</table>

For fixed versions add setting in 10 bar increments to end of part number. Subject to a +10% tolerance.

- **Port Sizes - Bodied Valves Only**
  - 6W = 3/4" BSP Valve & Cyl Port. 1/4" BSP Brake Port

- **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

We reserve the right to change specifications without notice.

**PRESSURE DROP**

*Graph showing flow rates and pressure drops.*

**Body Material**

<table>
<thead>
<tr>
<th>Port Size</th>
<th>3/4&quot;</th>
<th>5/8&quot;</th>
<th>1/2&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port Number</td>
<td>6W</td>
<td>1CEECSH95</td>
<td>377</td>
</tr>
<tr>
<td>Body Material</td>
<td>Steel</td>
<td>377</td>
<td>Steel</td>
</tr>
<tr>
<td>Tightening torque of “F” adjuster locknut</td>
<td>20 to 25 Nm</td>
<td>20 to 25 Nm</td>
<td>20 to 25 Nm</td>
</tr>
</tbody>
</table>

We reserve the right to change specifications without notice.
1CEECSH SERIES MOTION CONTROL VALVE
WITH BRAKE SHUTTLE - PILOT ASSISTED

1CEECSH150 / 1CEECSH350

APPLICATION
Motion control and lock valves give static and dynamic control by regulating the flow into and out of hydraulic actuators. When installed close to an actuator, the valve can stop runaway in the event of hose burst. The valves also give dual thermal and overload relief protection.

A low pressure tank or charge line may be connected to the T port to provide a make-up flow to either actuator port.

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.

\[ \text{Pilot Pressure} = (\text{Relief Setting}) - (\text{Load Pressure}) \]

Pilot Pressure = (Relief Setting) - (Load Pressure)

A system of check valves allows crossline relief for dynamic applications with the optional make up facility to compensate for any change in system volume.

PILOT RATIOS

3:1 Best suited for applications where load varies and machine structure can induce instability.

8:1 Best suited for applications where the load remains relatively constant.

FEATURES
This valve provides complete circuit control and protection as with the standard motion control valve, but has the addition of a brake release shuttle and brake port contained in a single body.

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

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Flow</td>
<td>1CEECSH150: 150 l/min (40 US GPM) 1CEECSH350: 350 l/min (80 US GPM)</td>
</tr>
<tr>
<td>Max Setting</td>
<td>Max Load Induced Pressure: 270 bar (4000 psi) Relief Setting: 350 bar (5000 psi)</td>
</tr>
<tr>
<td>Cartridge Material</td>
<td>Working parts hardened and ground steel. External surfaces electroless nickel plated</td>
</tr>
<tr>
<td>Body Material</td>
<td>Steel</td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Line mounted</td>
</tr>
<tr>
<td>Weight</td>
<td>1CEECSH150: 3.7 kg (8.2 lbs) 1CEECSH350: 8.2 kg (18.0 lbs)</td>
</tr>
<tr>
<td>Seal Kit Number</td>
<td>1CEECSH150: SK813 (Nitrile) SK813V (Viton) 1CEECSH350: SK635 (Nitrile) SK635V (Viton)</td>
</tr>
<tr>
<td>Recommended Filtration Level</td>
<td>BS5540/4 Class 18/13 (25 micron nominal)</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-20°C to +90°C</td>
</tr>
<tr>
<td>Leakage</td>
<td>1CEECSH150: 0.3 millilitres/min nominal (5 dpm) 1CEECSH350: 4 millilitres/min nominal (60 dpm)</td>
</tr>
<tr>
<td>Nominal Viscosity Range</td>
<td>5 to 500 cSt</td>
</tr>
</tbody>
</table>
**Ordering Code Example**

<table>
<thead>
<tr>
<th>Basic Code</th>
<th>F</th>
<th>10W</th>
<th>S</th>
<th>3</th>
<th>377</th>
</tr>
</thead>
<tbody>
<tr>
<td>1CEECSH***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Basic Code**
- **1CEECSH150**: Cartridges and Body
- **1CEECSH350**: Cartridges and Body

**Adjustment Means**
- **F**: Screw Adjustment

**Port Sizes - Bodied Valves Only**
- **8W**: 1” BSP Valve & Cyl Port, 1/4” BSP Brake Port
- **10W**: 1-1/4” BSP Valve & Cyl Port, 1/4” BSP Brake Port

**Pressure Range @ 4.8 l/min**
- 35 = 70-355 bar, Std setting made at 4.8 litres/min

**Body Material**
- **377**: Steel

**Pilot Ratio**
- **3**: 3:1
- **3.5**: 3.5:1
- **8**: 8:1

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

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*We reserve the right to change specifications without notice.*