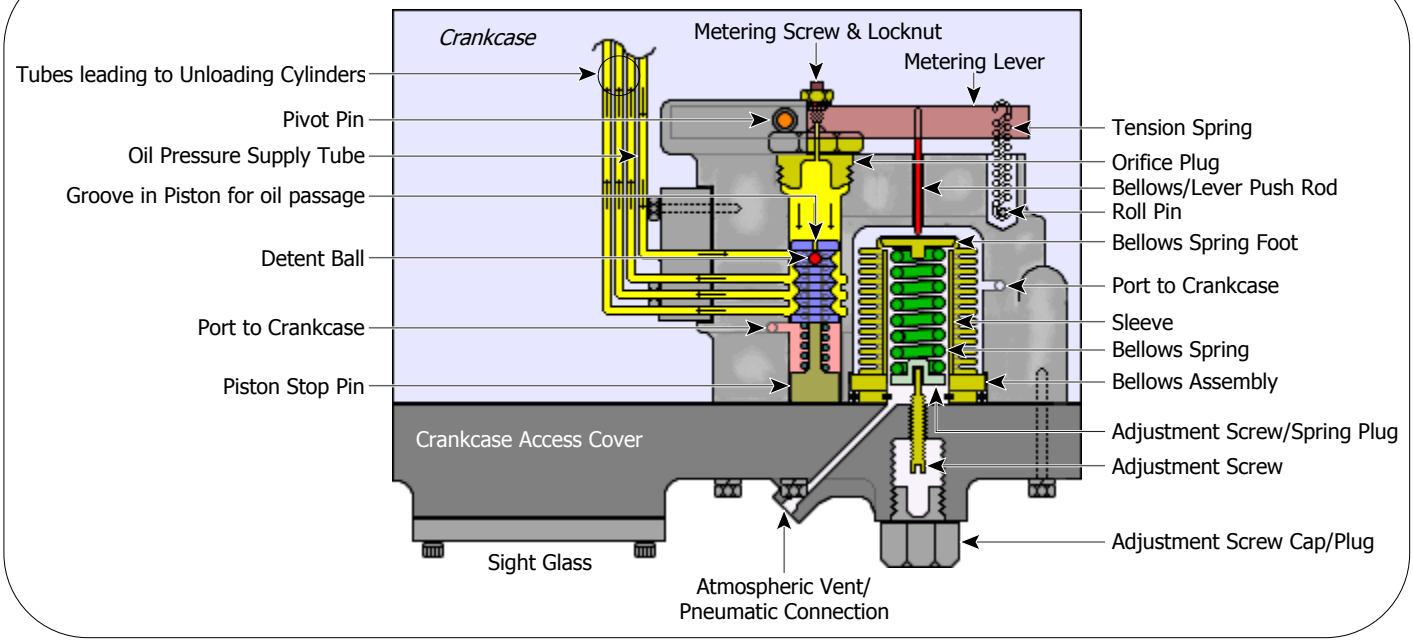
Worthington/Climatrol
2V,3V/CHC,CVC Compressors
Unloading Characteristics

Internal Capacity Control



The internal capacity control device consists of a combination adjustable bellows assembly and hydraulic relay. The bellows contains an internal spring which can be adjusted externally using an adjustment screw. Suction pressure acts upon the internal surface of the bellows which tends to force the bellows against its spring pressure towards the control access cover. A push rod contacts the internal end of the bellows and a lever assembly. When the bellows moves forwards or backwards the push rod moves the lever assembly back and forth. A metering screw is attached to the lever which contacts an orifice plug to control the flow of oil from it. Oil pressure is ported to the hydraulic relay cylinder from an internal tube. The oil flows around the hydraulic relay piston. When the relay is in the fully unloaded position the piston is pushed all the way towards the orifice plug by a spring beneath it. Oil pressure around the piston is blocked from flowing to the unloaders. When the lever metering screw contacts the orifice plug port oil pressure is allowed to build up on top of the piston forcing it down, in steps (due to the detent ball and springs). With each step a port in the cylinder is opened to oil pressure. Oil pressure is communicated to the unloaders via an internal tube. This loads the cylinders. When the bellows is forced away from the control plate by its spring due to lowering of the suction pressure the lever metering screw moves off of the orifice plug allowing oil pressure to bleed from off the top of the hydraulic relay piston. The piston begins to move towards the orifice plug, in steps, due to the spring pressure beneath it. With each step a port to the unloaders is closed off to oil pressure. The oil pressure built up in the unloaders is allowed to drain to the crankcase in the hydraulic relay cylinder via a port drilled in the cylinder beneath the piston. This unloads the cylinders. This operation of controlling suction pressure by loading and unloading cylinders is automatic and can be maintained in a narrow range.

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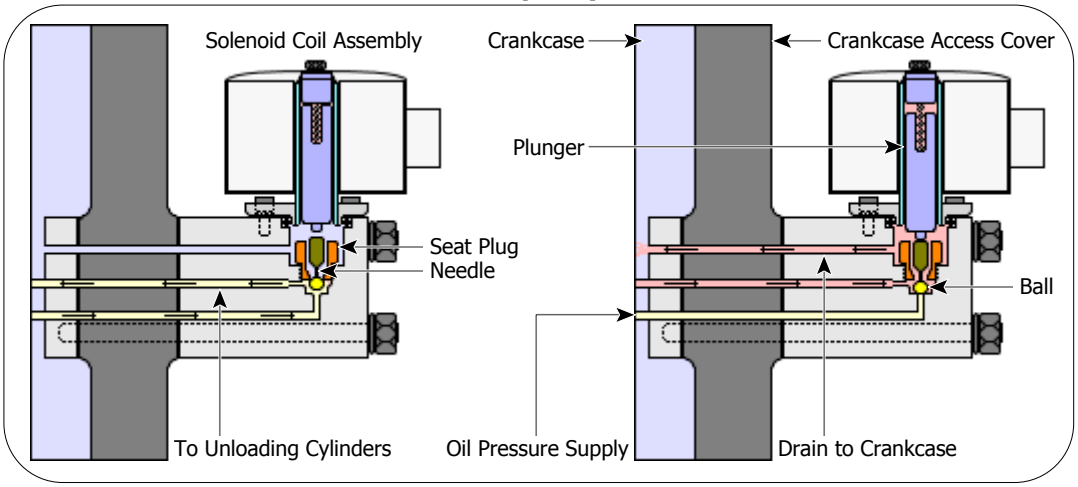
External Capacity Control



Loaded - Energized **Unloaded - De-energized**

When the solenoid valve is energized the plunger is forced upwards compressing its spring. This takes pressure off of the valve needle and allows oil pressure to force the ball beneath it against the seat plug closing the port to the crankcase. Oil pressure now flows to the unloaders through the control side plate and internal tubing. This causes the cylinders to load up and pump. When the solenoid valve is de-energized the plunger spring forces it down against the valve needle. The valve needle forces the valve ball against the oil pressure port closing it off. The unloader port is now opened to the crankcase through the seat plug. Oil pressure in the unloaders flows to the crankcase and the cylinders unload.

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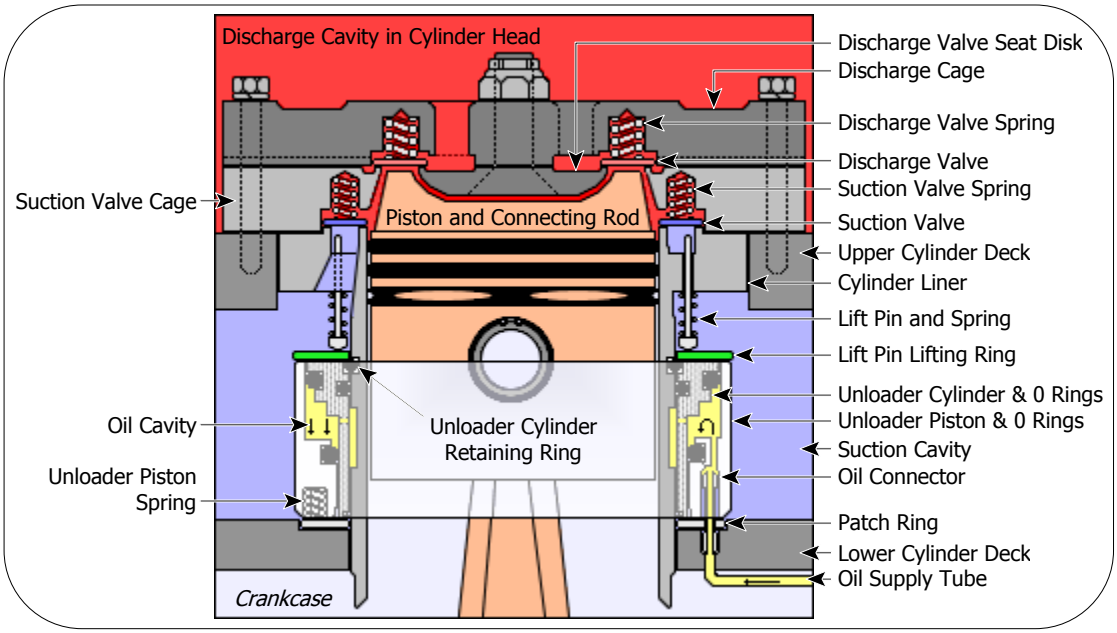
Cylinder Unloading Mechanism

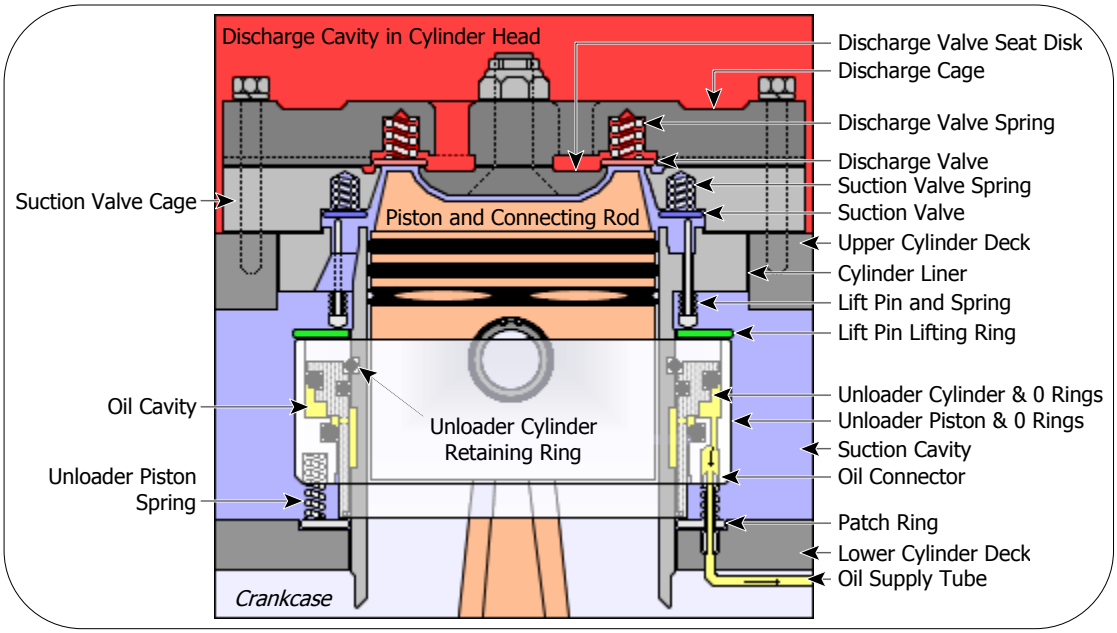
Loaded



When oil pressure is allowed to flow to the unloader device around the cylinder the unloader piston moves down against springs beneath it. The unloader piston contacts a lifting ring which contacts the lift pins and springs. When the unloader piston moves down so do the lifting ring and lift pins. The lift pins allow the suction valve to seat against its seats ground in the cylinder. When the piston travels downward in the cylinder the pressure in the cylinder becomes lower than suction pressure. Suction gas pressure forces the suction valve open against its springs and fills the cylinder. When pressure in the cylinder becomes equal to suction pressure the suction valve springs close the suction valve against its seats. As the piston travels upwards in the cylinder the pressure is increased to above the discharge pressure in the cylinder head. When this happens the discharge valve is forced open against its springs and the pressure in the cylinder is forced into the discharge cavity in the cylinder head. When the pressure in the cylinder becomes equal to discharge pressure the discharge valve springs close the discharge valve against its seats. When the piston begins to travel downwards in the cylinder the process starts over.

Worthington/Climatrol
2V,3V/CHC,CVC Compressors
Unloading Characteristics
Cylinder Unloading Mechanism

Unloaded



When oil pressure is allowed to drain from the unloader the unloader piston springs force the piston upwards. The lifting ring and lift pins are also forced upwards. The lift pins contact the suction valve and move it off of its seats into the fully open positon against its springs. As the piston travels up and down in the cylinder suction gas flows in and out of the cylinder through the suction ports in the cylinder. Since the suction valve remains fully open, in this state, no compression takes place and the discharge valve never opens. This effectively unloads the cylinder.