

What is hydraulic power pack ?

What are the hydraulic power pack applications?

Mobile hydraulics applications increasing so much with hydraulic power pack recently. Such as, dump trailers, electric sanitation trucks, snow plow, telescopic logistics equipment like the dock leveler, car tailgate, wing trucks, electric push cart, electric pallet lift. Car lift, scissors lift ,electric operating table to a meal of special equipment on the elevator. Compact hydraulic power units (HPU) win at high pressure, low flow hydraulic system with its small size, simple elements and affordable price.

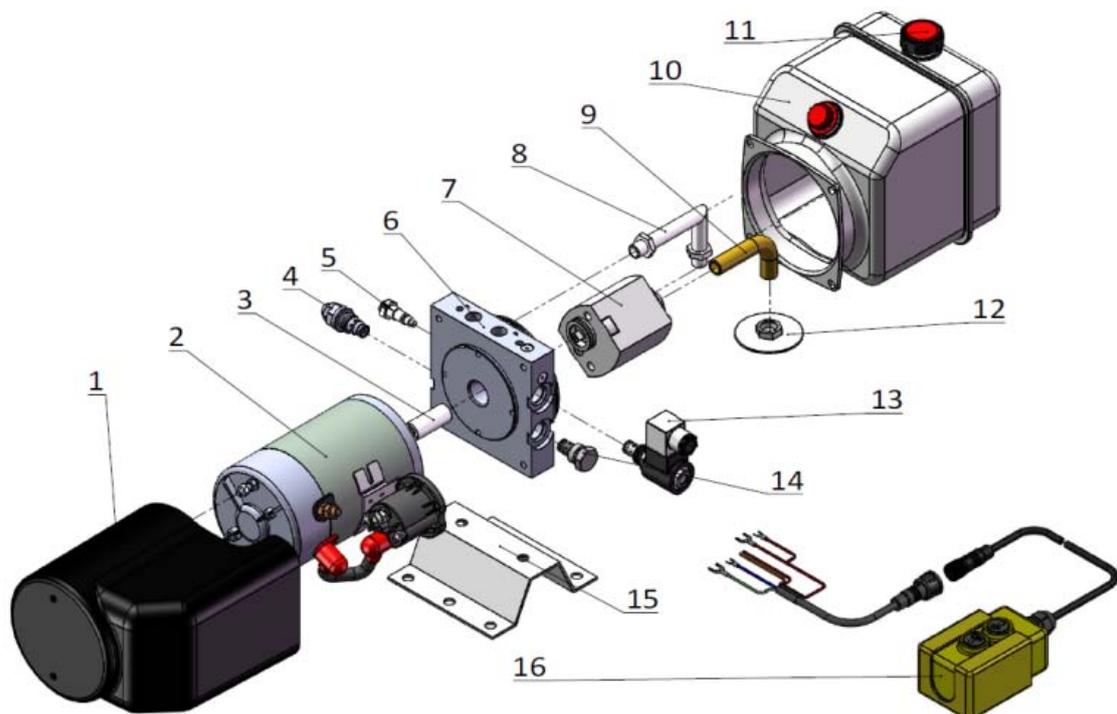
How many different types of hydraulic power unit are?

In how to work are: single-acting hydraulic power unit, double-acting hydraulic power unit, power unit and other complex special effects work.

In the motor voltage are: DC hydraulic power units, AC hydraulic power units. In the tank installation are: vertical or horizontally mounted hydraulic power unit.

How the valves control are: manual operate hydraulic power unit and electric control hydraulic power unit.

Here is a DC Hydraulic Power Unit drawing show you what the main Hydraulic components are.



1-DC motor cover 2-DC motor 3-Shaft joint 4-relief Valve 5-Flow control valve
6-Central Manifold 7-Hydraulic Gear Pump
8-Return oil pipe 9-suction pipe 10-hydraulic oil tank 11-air breather
12-suction filter 13-two position two way normally closed solenoid valve
14-Check Valve 15-Mounting Bracket 16-Remote control pendant

What are hydraulic power unit components including ?

(HPU) Hydraulic power unit is a hydraulic system with hydraulic actuators (hydraulic cylinders, hydraulic motors) connected to the control valve operation to achieve the operation of the equipment for the oil pressure apparatus adopted. Hydraulic power unit complete with a power section (electric motor, hydraulic pump), the control section (pressure valves, directional control valves, flow control valves), auxiliary section (couplings, manifold block, suction pipe, return pipe, tank, air breather ,etc.).

First, the Power Section

1) Motor - hydraulic power unit power source

Motor hydraulic power unit main role is to convert electrical energy into mechanical energy. Generating a driving torque, hydraulic power unit as power source. Hydraulic power units commonly classified according to the motor by the power supply of the motor in different operating power can be divided into DC motors and AC motors. Wherein the AC motor and the motor is also including 2poles and 4poles.

electric Motor common parameters

- a. rated power. Motor maximum working power recommended operating conditions. POWERRATING is Motor power.
- b. rated voltage or operating voltage. Since the motor can generally operate at different voltages, the voltage is directly related to the speed and other parameters have to change accordingly, so that the voltage of the voltage is only a suggestion.
- c. No-load speed. The unit is RPM. Revolutions per minute here R is not meant RATE speed is REVOLUTION rotation means. That is how many revolutions per minute rpm. Since there is no load speed reverse torque, the output power and the stall situation is different, the effect parameters only provides maximum speed of the motor at a predetermined voltage.
- d. Stalltorque stall torque. This is an important parameter to take a lot of the load of the motor. That is, when the motor is reversed by an external force to stop the rotation torque. If the motor stall phenomenon often occurs, it will

damage the motor, or burned driver chips, so when you choose the motor, which is in addition to speed, but I think it is the first parameter to be considered. The unit mainly N.M, or KG.M. Usually the relationship values and the operating voltage is not very close, and close operating current. Note, however, stalled over time, the motor temperature rises rapidly, the value will decline very powerful.

e. no-load current It is closely related to current and torque. There is certainly no-load current, voltage and energy product formed is divided into potential energy and heat energy consumption. Heat is the heat of the motor coil, better motor, at no load, the smaller the value.

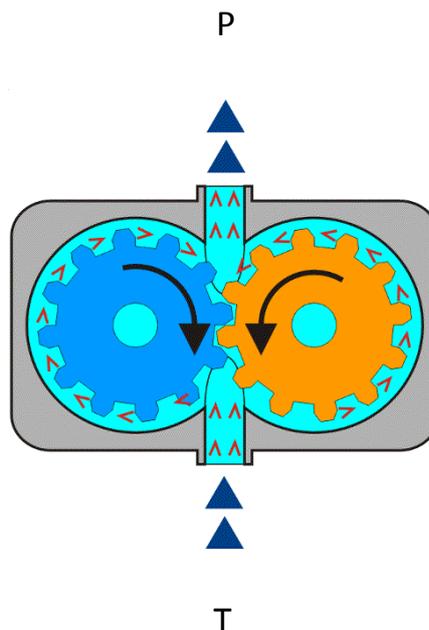
f. starting current. This parameter is also important. Good motor, under the same acceleration, starting current small.

2) hydraulic pump - the heart of the hydraulic power unit

Hydraulic pump means is a hydraulic power unit capable of converting mechanical energy in hydraulic pressure. Driven by the motor, providing flow and pressure of the hydraulic actuator action desired. Thus, it can be said hydraulic pump hydraulic power unit is the "heart." There are several types of hydraulic pumps, gear pumps, vane pumps, piston pumps.

Gear pumps

Compact Hydraulic power unit normally work with hydraulic gear pump. At present the industry's leading manufacturers in Italy MARZOCCHI. Gear pump advantages are: simple structure, easy fabrication, low cost, small size, light weight, self-priming performance, not sensitive to pollution of the oil, reliable, high speed range.



How a Gear pump works

As shown capstan clockwise, then seal the suction chamber at T, because the tooth is disengaged children volume increases, the formation of a vacuum, atmospheric pressure hydraulic oil tank into the suction chamber T, the room filled with alveolar, this is the pump suction process; with the rotation of the gear, with oil constantly being brought into pressure oil chamber P, teeth into engagement on that side, the volume decreases, forcing oil output, this is the process of pumping oil. And syringe injection medicine procedure is very similar.

Gear pumps commonly parameters

- a. rated pressure refers to the maximum under the premise volumetric efficiency of the pump, and the life of the rated speed, continuous operation of the pump allows the use of pressure to ensure that more than this value is overloaded. Rated pressure and maximum working pressure of the pump pressure is not actually at work, do not be confused.
- b. Displacement refers to the pump shaft rotation, excluded volume of oil. Here we must distinguish between displacement and rated flow. Rated flow at rated pressure and speed conditions, the output of a predetermined flow rate. Speed-dependent, but no relationship between displacement and speed.
- c. efficiency into mechanical efficiency and volumetric efficiency, respectively, showed losses in torque and pump flow.

Second, the control section

As with the development of hydraulic power unit Cartridge Valve Cartridge Valve in the increased range, a wide range of hydraulic power units is also increasing. The main production base in the current international Cartridge Valve in the United States Hydraforce, Sun Hydraulics, Eaton-vickers (Eaton), Parker Hannifin (Parker), Fluid control . Sterling hydraulics and Integrated hydraulics from the UK. In Germany there are Bosch-Rexroth , HYDAC, Fluid Team. Wandfluh and Bucher-Frutigen from Switzerland. In Italy there are Comatrol and Oil-Control. In Sweden, Denmark Sauer-Danfoss. Keta hydraulics and Haihong Hydraulics from China.

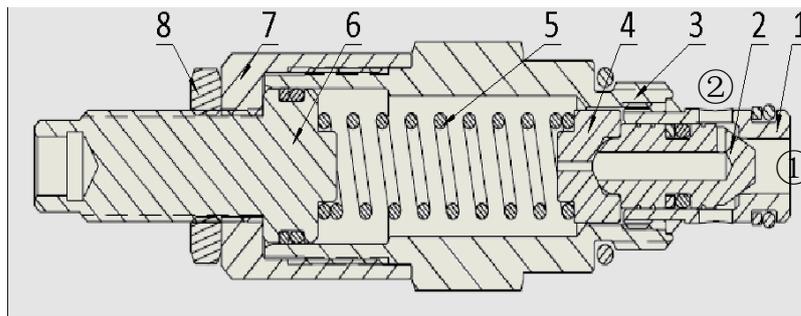
1) pressure control valve

Pressure control valve on the hydraulic power unit with pressure relief valve, sequence valve, relief valve, pressure relay-based .Almost each hydraulic power unit complete with a relief valve. Sequence valve, relief valve and pressure switch on some special hydraulic power unit having a sequence of

actions and the same system have different working pressures used, such as Dock leveler hydraulic power units for logistics equipment and Paper Cutter production line hydraulic power units.

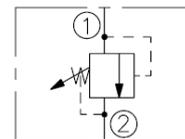
Relief Valve – umbrella of hydraulic power unit

Pressure relief valve on the hydraulic power unit primarily as a security role, limit the maximum pressure to avoid other hydraulic components, pipe damage. As part of a back pressure relief valve in the hydraulic power unit, causing back pressure to increase the stability of motion.



Hydraulic-Symbol

USASI/ISO:



1—Valve body 2—valve spool 3—valve body 4—spring seat 5—spring 6—adjusting lever 7—screw-in body 8—Locking nut

How Relief valve works

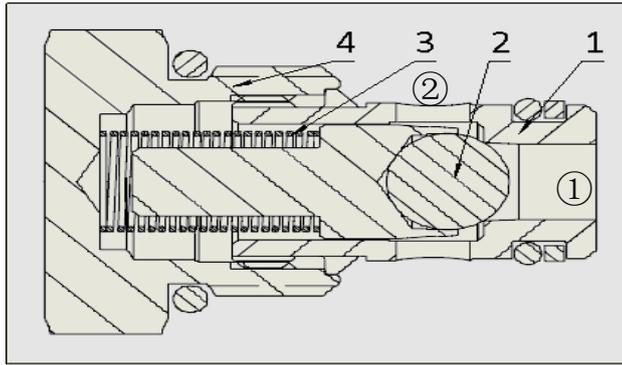
Under normal ①chamber to chamber ② closed until the liquid pressure chamber ① sufficient to overcome the spring force of the valve body from the valve seat, ①chamber communicating with the chamber ②, the flow of oil from the chamber ①cavity②.

2) directional control valve

Hydraulic power units varied different types of directional control valve, check valve, P-O-check valve, shuttle valve, solenoid valve, hydraulic control valve, electric proportional valve and so on.

a Check valve –(one-way valve) oil traffic in one-way.

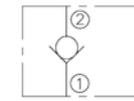
One-way valve, also known as a check valve, which allows fluid only in one direction through the reversing valve closing direction. The main role of the check valve in the hydraulic power unit are: to keep the system pressure constant period of time and other pressure retaining components, installation preventing normal operation of the hydraulic pump hydraulic shocks in pump outlet position, the check valve installed in the back part oil used as a back-pressure valve. According to the role of one-way valve in the hydraulic power unit, his performance was mainly: oil pressure loss circulation of small forward, reverse seal better performance, quick action, low noise.



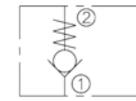
1-Valve seat 2-Check valve spool 3-Spring 4-Screw Plug

Hydraulic-Symbol

USASI:



ISO:



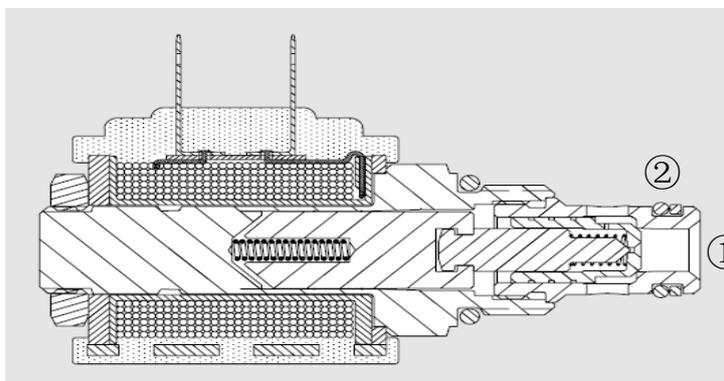
How Check valve works

The pressure port ① is higher than the pressure port ② plus spring force, the spool is pushed, the channel is open, fluid forward through the check valve (① flow to ②).

When the port ② pressure plus the spring force is higher than the port ① pressure spool is pressed against the spring force and fluid pressure on the valve seat, the flow is turned off.

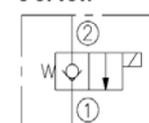
b directional valve - oil traffic red and green lights

Directional valve is the largest amount components of Hydraulic power unit request. Directional valve use of different relative positions in hydraulic power pack. Hydraulic power unit requirements: the oil through a less pressure loss, less amounts of the oil leakage gap between the mouth commutation reliable, sensitive, reversing smoothly without impact. According manipulation way valve used in the hydraulic power unit valve can be divided into: manual valve, solenoid valve, motorized valve. For example, in the automotive lift hydraulic power unit, electric pallet truck hydraulic power unit, electric car pushing hydraulic power unit, hydraulic power units and other Tipper trailers on two two-way solenoid valve with the most.

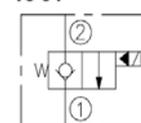


Hydraulic-Symbol

USASI:



ISO:



Hydraforce SV type two two-way solenoid valve works

When the solenoid valve coil power, the two two-way solenoid valve can do a one-way valve to allow flow from ① to ② chamber cavity, and the cavity

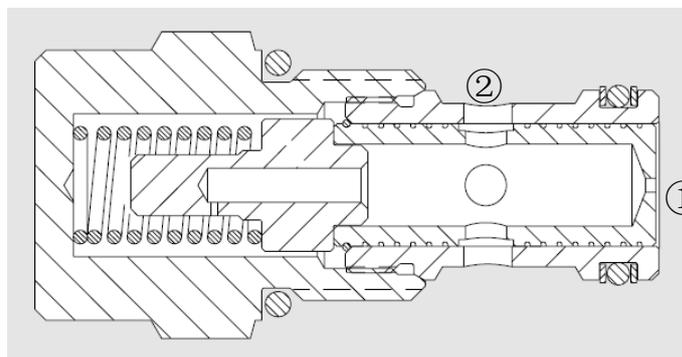
reverse blocking oil from ② to ①.

Solenoid valve coil is energized, the lifting force generated by the coil, valve open, fluid chamber from ② to ①, ② and ① chamber to the fluid chamber due to structural reasons strong resistance.

3) flow control valve

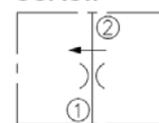
Flow control valve referred to the flow valve, is by changing the orifice flow area to achieve flow control. It is a control valve components to control the speed of movement of the element. Flow valve can be opened as a small mark of "taps."

Flow valve can generally be divided into: a throttle valve, 2-way flow control valve (also known as pressure-compensated flow valve), the three-way flow control valve. Currently on the hydraulic power unit is mainly used Hydraforce company NV Throttle and Comatrol's SC13 type 2-way flow valve.

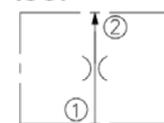


Hydraulic symbol

USASI:



ISO:



Hydraforce FR-type pressure compensated flow control valve works

FR-type pressure compensated flow control valve ② from holding chamber effluent flow rate constant and is not affected by the load pressure changes in the circuit downstream of the chamber ②, when the flow through the valve in the control orifice pressure differential created more than 5.5bar, valve begins response to load changes within a pressure range of 7.6 ~ 240bar can maintain accurate flow, reverse flow (chamber ②to chamber①) through the control orifice, no pressure compensation, and orifice same.

Third, the auxiliary section

Hydraulic auxiliary components of the hydraulic power unit is a "supporting role", but it is also an important part of the hydraulic power unit, Types of hydraulic auxiliary element is varied, including: tank, filter, suction pipe, return pipe, an intermediate manifold, control switches, pressure gauge, accumulator, and so on. The right choice and ensure the rational use of the hydraulic power unit is reliable, stable and has a very important auxiliary hydraulic components.

a tank - the hydraulic medium required for storage of the hydraulic system, as a heat sink, the role of the liquid medium in air separation and precipitation of impurities.

b Filter - filtration of impurities mixed in with the oil, foreign particles in a controlled hydraulic power unit normal operating range, the protection of hydraulic components.

. C Central manifold - Installation Connecting the motor and gear pump, simplifying the piping, integrated control valve of the hydraulic power unit compact and convenient. Replace with a different intermediate manifold control valve can be achieved on different principles of hydraulic power unit, which makes the intermediate manifold high versatility.