

Definitions of Technical Terms

ABSOLUTE – A measure having as its zero point of base the complete absence of the entity being measured.

ABSOLUTE PRESSURE – A pressure scale with zero point at a perfect vacuum.

ACCUMULATOR – A container in which fluid is stored under pressure as a source of fluid power.

ACTUATOR – A device for converting hydraulic energy into mechanical energy. A motor or cylinder.

AERATION – Air in the hydraulic fluid. Excessive aeration causes the fluid to appear milky and components to operate erratically because of the compressibility of the air trapped in the fluid.

AMPLIFIER – A device for amplifying the error signal sufficiently to cause actuation of the stroke control. Several types of servo amplifiers are used at the present time: electronic (DC, AC, phase, sensitive, and magnetic) and mechanical.

AMPLITUDE OF SOUND – The loudness of a sound.

ANNULAR AREA – A ring shaped area – often refers to the net effective area of the rod side of a cylinder piston, i.e., the piston area minus the cross-sectional area of the rod.

ATMOSPHERE (ONE) – A pressure measure equal to 14.7 psi.

ATMOSPHERIC PRESSURE – Pressure on all objects in the atmosphere because of the weight of the surrounding of the surrounding air. At sea level, about 14.7 psi absolute.

BACK CONNECTED – A condition where pipe connections are on normally unexposed surfaces of hydraulic equipment. (Gasket mounted units are back connected.)

BACK PRESSURE – A pressure in series. Usually refers to pressure existing on the discharge side of a load. It adds to the pressure required to move the load.

BAFFLE – A device, usually a plate, installed in a reservoir to separate the pump inlet from return lines.

BLEED-OFF – To divert a specific controllable portion of pump delivery directly to reservoir.

BREATHER – A device which permits air to move in and out of a container or component to maintain atmospheric pressure.

BY-PASS – A secondary passage for fluid flow.

CARTRIDGE

1. The replaceable element of fluid filter
2. The pumping unit from a vane pump, composed of the roto, ring, vanes and one or both side plates.

COVITATION – A localized gaseous condition within a liquid stream, which occurs where the pressure is reduced to the vapor pressure.

CHAMBER – A compartment within a hydraulic unit. May contain elements to aid in operation or control of a unit. Examples: spring chamber, drain chamber, etc.

CHANNEL – A fluid passage, the length of which is large with respect to its cross-sectional dimension

CHARGE (supercharge)

1. To replenish a hydraulic system above atmospheric pressure.
2. To fill an accumulator with fluid under pressure (see pre-charge pressure)

CHARGE PRESSURE – The pressure at which replenishing fluid is forced into the hydraulic system (above atmospheric pressure).

CHECK VALVE – A valve, which permits flow of fluid in one direction only.

CHOKE – A restriction, the length of which is large with respect to its cross-sectional dimension.

CIRCUIT – The complete path of flow in a hydraulic system including the flow-generating device.

CLOSED CIRCUIT – A piping arrangement in which pump deliver, after passing through other hydraulic components, bypasses the reservoir and returns directly to pump inlet.

CLOSED LOOP – A system in which the output of one or more elements is compared to some other signal to provide an actuating signal to control the output of the loop.

COMMAND SIGNAL (or input signal) – An external signal to which the servo must respond.

COMPENSATOR CONTROL – A displacement control for variable pumps and motors which alters displacement in response to pressure changes in the system as related to its adjusted pressure setting.

COMPONENT – A single hydraulic unit.

COMPRESSIBILITY – The change in volume of a unit volume of a fluid when it is subjected to a unit change in pressure.

CONTROL – A device used to regulate the function of a unit (see Hydraulic Control, Manual Control, Mechanical Control, and Compensator Control)

COOLER – A heat exchanger used to remove heat from the hydraulic fluid.

COUNTERBLANCE VALVE – A valve, which maintains resistance to flow in one direction but permits free flow in the other. Usually connected to the outlet of a vertical double-acting cylinder to support weight or prevent uncontrolled falling or dropping.

CRACKING PRESSURE – The pressure at which a pressure actuated valve begins to pass fluid.

CUSHION – A device sometimes built into the ends of a hydraulic cylinder, which restricts the flow of fluid at the outlet port, thereby arresting the motion of the piston rod.

CYLINDER – A device which converts fluid power into linear mechanical force and motion. It usually consists of a movable element such as a piston and piston rod, plunger rod, plunger or ram, operating within a cylindrical bore.

DEADBAND – The region of band of no response where an error signal will not cause a corresponding actuation of the controlled variable.

DECOMPRESSION – The slow release of confined fluid to gradually reduce pressure on the fluid.

DELIVERY – The volume of fluid discharged by a pump in a given time, usually expressed in gallons per minute (GPM).

DE-VENT – To close the vent connection of a pressure control valve permitting the valve to function at its adjusted pressure setting.

DIFFERENTIAL CURRENT – The algebraic summation of the current in the torque motor; measured in MA (milliamperes).

DIFFERENTIAL CYLINDER – Any cylinder in which the two opposed piston areas are not equal.

DIRECTIONAL VALVE – A valve, which selectively directs or prevents fluid flow to desired channels.

DISPLACEMENT – The quantity of fluid which can pass through a pump, motor or cylinder in a single revolution or stroke.

DITHER – An alternating signal imposed upon the stroke control in order to reduce the effects of some small non-linearities.

DOUBLE ACTING CYLINDER – A cylinder in which fluid force can be applied in either directions.

DRAIN – A passage in, or a line from, a hydraulic component, which returns leakage fluid independently to reservoir or to a vented manifold.

EFFICIENCY - The ratio of output to input. Volumetric efficiency of a pump is the actual output in gpm divided by the theoretical or design output. The overall efficiency of a hydraulic system is the output power divided by the input power; Efficiency is usually expressed as a percent.

ELECTRO-HYDRAULIC SERVO VALVE – A directional type valve which receives a variable or controlled electrical signal and which controls or meters hydraulic flow.

ENERGY – The ability or capacity to do work. Measured in units

ENCLOSURE – A rectangle drawn around a component or components to indicate the limits of an assembly. Port connections are shown on the enclosure line.

ERROR (signal) – The signal which is the algebraic summation of an input signal and a feedback signal/

FEEDBACK (or feedback signal) – The output signal from a feedback element.

FEEDBACK LOOP – Any closed circuit consisting of one or more feedback elements.

FILTER – A device whose primary function is the retention by a porous media of insoluble contaminants from a fluid.

FLOODED – A condition where the pump inlet is charged by placing the reservoir oil level above the pump inlet port.

FLOW CONTROL VALVE – A valve, which controls the rate of oil flow.

FLOW RATE – The volume, mass or weight of a fluid passing through any conductor per unit of time.

FLUID –

1. A liquid or gas.
2. A liquid that is specially compounded for use as a power-transmitting medium in a hydraulic system.

FOLLOW VALVE – A control valve which ports oil to an actuator so the resulting output motion is proportional to the input motion to the valve.

FORCE – Any push or pull measured in units of weight. In hydraulics, total force is expressed by the product P (force per unit area) and the area of the surface on which the pressure acts ($F=P \times A$).

POUR-WAY VALVE – A directional valve having four flow paths.

FREQUENCY – The number of times an action occurs in a unit of time. Frequency is the basis of all sound. A pump or motor's basic frequency is equal to its speed in revolutions per second multiplied by the number of pumping chambers.

FRONT CONNECTED – A condition wherein piping connections are on normally exposed surfaces of hydraulic components.

FULL FLOW – In a filter, the condition where all the fluid must pass through the filter element or medium.

GAUGE PRESSURE – A pressure scale, which ignores atmospheric pressure. Its zero point is 14.7 psi absolute.

HEAD – The height of a column or body of fluid above a given point expressed in linear units. Head is often used to indicate gage pressure. Pressure is equal to the height times the density of the fluid.

HEAT – The form of energy that has the capacity to create warmth or to increase the temperature of a substance. Any energy that is wasted or used to overcome friction is converted to heat. Heat is measured in calories or British Thermal

Units (BTU's). One BTU is the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit.

HEAT EXCHANGER – A device which transfers heat through a conducting wall from one fluid to another.

HORSEPOWER – (HP) – The power required to lift 550 pounds one foot in one second or 33,000 pounds one foot in one minute. Horsepower is equal to 746 watts or to 42.4 British Thermal Units per minute.

HYDRAULIC BALANCE – A condition of equal opposed hydraulic forces acting on an art in a hydraulic component.

HYDRAULIC CONTROL – A control which is actuated by hydraulically induced forces.

HYDRAULICS – Engineering science pertaining to liquid pressure and flow.

HYDRODYNAMICS – The science dealing with liquids in motion and particularly their kinetics energies.

HYDROSTATICS – The science of liquid pressure.

KINETIC ENGERGY – Energy that a substance or body has by virtue of its mass (weight) and velocity.

LAMINAR (FLOW) – A condition where the fluid particles move in continuous parallel paths. Streamline flow.

LEVERAGE – A gain in output force over input force by sacrificing the distance moved Mechanical advantage of force multiplication.

LIFT – The height a body or column of fluid is raised; for instance, from the reservoir to the pump inlet. Lift is sometimes used to express a negative pressure or vacuum. The opposite of head.

LINE – A tube, pipe or hose which acts as a conductor of hydraulic fluid.

LINEAR ACTUATOR – A device for converting hydraulic energy into linear motion—a cylinder or ram.

MANIFOLD – A fluid conductor which provides multiple connection ports.

MANUAL CONTROL – A control actuated by the operator, regardless of the means of actuation. Example: Lever or foot pedal control for directional valves.

MANUAL OVERRIDE – A means of manually actuating an automatically controlled device.

MAXIUM PRESSURE VALVE – See relief valve.

MECHANICAL CONTROL – Any control actuated by linkages, gears screws, cams or other mechanical elements.

METER – To regulate the amount or rate of fluid flow into an actuator or system.

METER-IN – To regulate the amount of fluid flow into an actuator or system.

METER-OUT – To regulate the flow of the discharge fluid from an actuator or system.

MICRON – One-millionth of a meter or about .0004 inch.

MICRON RATING – The size of the particles a filter will remove.

MOTOR – A rotary motion device, which charges hydraulic energy into mechanical energy, a rotary actuator.

OPEN CENTER – A condition where pump delivery re-circulates freely to sump in the center or neutral position.

ORIFICE – A restriction, the length of which is small in respect to its cross-sectional dimensions.

PASSAGE – A machined or cored fluid conducting path, which lies within or passes through a component.

PILOT PRESSURE – Auxiliary pressure used to actuate or control hydraulic components.

PILOT VALVE – An auxiliary pressure used to actuate or control hydraulic components.

PILOT VALVE – An auxiliary valve used to control the operation of another valve. The controlling stage of a 2-stage valve.

PISTON – A cylindrically shaped part which fits within a cylinder and transmits or receives motion by means of a connecting rod.

PLUNGER – A cylindrically shaped part, which has only one diameter and is used to transmit thrust. A ram.

POPPET – That part of certain valves which prevents flow when it closes against a seat.

PORT – An internal or external terminus of a passage in a component.

POSITIVE DISPLACEMENT – A characteristic of a pump or motor which has the inlet positively sealed from the outlet so that fluid cannot re-circulate in the component.

POTENTIOMETER – A control element in the servo system which measures and controls electrical potential.

POWER – Work per unit of time. Measured in horsepower (HP) or watts.

POWER PACK – An integral power supply unit usually containing a pump, reservoir, relief valve and directional control.

PRECHARGE PRESSURE – The pressure of compressed gas in an accumulator prior to the admission of liquid.

PRESSURE – Force per unit area; usually expressed in pounds per square inch (psi).

PRESSURE DROP – The reduction in pressure between two points in a line or passage due to the energy required to maintain flow; may be deliberate.

PRESSURE LINE – The line carrying the fluid from the pump outlet to the pressurized port of the actuator.

PRESSURE OVERRIDE – The difference between the cracking pressure of a valve and the pressure reached when the valve is passing full flow.

PRESSURE PLATE – A side plate in a vane pump or motor cartridge on the pressure port side.

PRESSURE REDUCING VALVE – A valve which limits the maximum pressure at its outlet regardless of the inlet pressure.

PRESSURE SWITCH – A switch operated by rise or drop in fluid pressure.

PROPORTIONAL FLOW – In a filter, the condition where part of the flow passes through the filter element in proportion to pressure drop.

PUMP – A device which converts mechanical force and motion into hydraulic fluid power.

RAM – A single-acting cylinder with a single diameter plunger rather than a piston and rod. The plunger in a ram-type cylinder.

RECIPROCATION – Back-and-forth straight line motion or oscillation.

REGENERATIVE CIRCUIT – A piping arrangement for a differential type cylinder in which discharge fluid from the rod end combines with pump delivery to be directed into the head end.

RELIEF VALVE – A pressure operated valve which by-passes pump delivery to the reservoir, limiting system pressure to a predetermined maximum value.

REPLENISH – To add fluid to maintain a full hydraulic system.

RESERVOIR – A container for storage of liquid in a fluid power system.

RESTRICTION – A reduced cross-sectional area in line or passage which produces a pressure stop.

RETURN LINE – A line used to carry exhaust fluid from the actuator back to sump.

REVERSING VALVE – A four-way directional valve used to reverse a double-acting cylinder or reversible motor.

ROTARY ACTUATOR – A device for converting hydraulic energy into rotary motion – a hydraulic motor.

SEQUENCE

1. The order of a series of operations or movements.
2. To divert flow to accomplish a subsequent operation or movement.

SEQUENCE VALVE – A pressure operated valve which diverts flow to a secondary actuator while holding pressure on the primary actuator at a predetermined minimum value after the primary actuator completes its travel.

SERVO MECHANISM (servo) – A mechanism subjected to the action of a controlling device which will operate as if it were directly actuated by the controlling device, but capable of supplying power output many times that of the controlling device, this power being derived from an external and independent source.

SERVO VALVE

1. A valve which controls the direction and quantity of fluid flow in proportion to an input signal.
2. A follow valve.

SIGNAL – A command or indication of a desired position or velocity.

SINGLE ACTING CYLINDER – A cylinder in which hydraulic energy can produce thrust or motion in only one direction. (Can be spring or gravity returned.)

SLIP – Internal leakage of hydraulic fluid.

SPOOL – A term loosely applied to almost any moving cylindrically shaped part of a hydraulic component which moves to direct flow through the component.

STRAINER – A coarse filter.

STREAMLINE FLOW – (See Laminar Flow)

STROKE

1. The length of travel of a piston or plunger.
2. To change the displacement of a variable displacement pump or motor.

SUB-PLATE – An auxiliary mounting for a hydraulic component providing a means of connecting piping to the component.

SUCTION LINE – The hydraulic line connected the pump inlet port to the reservoir or sump.

SUMP – A reservoir.

SUPERCHARGE – (See Charge.)

SURGE – A momentary rise of pressure in a circuit.

SWASH PLATE – A stationary canted plate in an axial type piston pump which causes the pistons to reciprocate as the cylinder barrel rotates.

SYNCHRO – A rotary electromagnetic device generally used as an AC feedback signal generator which indicates position. It can also be used as a reference signal generator.

TACHOMETER – (AC) (DC) – A Device which generates an AC or DC signal proportional to the speed at which it is rotated and the polarity of which is dependent on the direction of rotation of the rotor.