

**Alternator:** Device designed for alternating the run cycle or duplexing of two motors automatically, which equalizes pump wear.

**Brake Horsepower (BHP):** The BHP is the actual amount of horsepower being consumed by the pump as measured on a pony brake or dynamometer.

**Best Efficiency Point (BEP):** The BEP is the point where the power coming out of the pump is the closest to the power coming into the pump. In other words, the BEP is the point at which the head (pressure) and flow converge to produce the greatest amount of output for the least amount of energy.

**CAD:** Computer Aided Design

**Circuit Breaker:** A switch that protects an electrical circuit from overload by opening the circuit when the current flow exceeds a predetermined level. It serves the same purpose as a fuse and can be reset either manually or electrically after the overload is removed.

**Closed Circuit:** A circuit in which there is a complete current path from the voltage source, through the circuit, and back to the voltage source.

**Conduit:** Plastic or metal piping used to protect electrical conductors (wires) or cables.

**Contact:** An electrical relay used to control the flow of power in a circuit

**Cavitation:** Process in which cavities or bubbles form in the fluid low-pressure area and collapse in a higher pressure area of the pump - causing noise, damage to the pump, and loss of efficiency because it distorts the flow pattern. Occurs in centrifugal pumps when  $NPSH_a < NPSH_r$ .

**Cycle:** (Pump Term) The normal on-off operation of the pump to keep the liquid level at a set point.

**Direct Wire:** Wiring a float switch directly to a pump or a control panel (without piggy-back plug).

**Discharge Pipe:** The pipe that passes the liquid out of the pit or sump. The outlet pipe opposite the suction side of the pump.

**Double Pole, Double Throw:** A six-terminal switch or relay contact arrangement that simultaneously connects one independent pair of terminals to either of two other independent pairs of terminals.

**Duplex System:** A double pump system where pumping time is alternated between two pumps. When one pump is running the second acts as a stand-by to handle overload or pump failure.

**Efficiency:** A ratio of total power output to the total power input, expressed as a percent.

**Electrical Contact:** A physical contact that permits current flow between conducting parts.

**External Weight:** The weight secured to a float switch cable which serves as a pivot point.

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**Flasher:** The device utilized in alarm systems that flashes the light on and off at regular intervals.

**Float Switch:** A commonly used term to describe a switch that is buoyant in liquid and tilted on an axis (pivot point).

**Fuse:** A circuit protective device. When the voltage or current becomes excessive, the fuse burns out and opens the circuit path.

**Friction head:** The pressure expressed in pounds per square inch or feet of liquid needed to overcome the resistance to the flow in the pipe and fittings.

**FLA:** Full-Load-Amperage (FLA) refers to the motor's rated-current at rated-load and rated-voltage. This is the amount of current (amps) the motor will draw from the electrical system when producing its rated output horsepower. This value can also sometimes be referred to as: Running Amps, Rated Amps, or just AMPS.

**Flow:** A measure of the liquid volume capacity of a pump. Given in gallons per hour (GPH), gallons per minute (GPM), liters per minute (L/min), or milliliters per minute (mL/min).

**Flooded Suction:** In a flooded suction system, the liquid flows to the pump inlet from an elevated source by means of gravity. This is generally recommended for centrifugal pumps.

**Ground:** A return path to the generator through the earth, or through a common connection.

**Head:** A measure of pressure, expressed in feet of head for [centrifugal pumps](#). Water is used as the default where 10 meters (33.9 ft.) of water equals one atmosphere (14.7 psi. or 1 bar).

**Insulator:** A material that will not readily conduct electricity.

**Lag Float:** In a duplex system, the float switch that activates a secondary pump or alarm (lag pump) if the lead pump cannot handle the flow.

**Lead Float:** Float switch that starts the lead pump in a duplex pump system.

**Liquid Level Controls:** Pump and valve controls used for maintaining pre-set liquid levels.

**Mechanical Float Switch:** A mechanically activated switch that is buoyant in liquid and tilted on an axis (pivot point).

**Motor Contactor:** An electro-mechanical power relay used to switch pump load.

**Motor Starting Current:** Amount of current needed to start a motor (starting amps or in rush).

**MODBUS:** Modbus is a communication protocol; In simple terms, it is a method used for transmitting information over serial lines between electronic devices. The device requesting the information is called the Modbus Master and the devices supplying information are Modbus Slaves. In a standard Modbus network, there is one Master and up to 247 Slaves, each with a unique Slave Address from 1 to 247.

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**Normally Closed (NC):** Reverse action switch, when the float is hanging down, the circuit is closed (continuity made).

**Normally Open (NO):** Contacts are open (no continuity between the poles) when the float is hanging down.

**Net Positive Suction Head Available (NPSHa):** The NPSHa available to prevent cavitation of the pump. To calculate the NPSHa, you take the [Static Suction Head] plus [Suction Vessel Surface Pressure Head] minus [vapor pressure of your product] minus [friction losses in the suction piping, valves and fittings].

**Net Positive Suction Head Required (NPSHr):** The NPSHr to stop a pump from cavitating. The NPSHr is generally supplied to you by the pump manufacturer.

**OHMS:** A value-measure of electrical resistance in a conductor, element, resistor, etc.

**Piggy-Back Plug:** A molded plug configuration used on pump switches which when plugged into an AC power outlet, allows the molded plug of the pump to be plugged into it. This allows the switch to control the pump.

**Pump Cycle:** One complete normal on-off function of the pump.

**Pump Chatter:** Very rapidly starting and stopping a pump, relay, motor contacts, etc. which may cause overheating and damage. This is caused by the contact being opened and closed rapidly perhaps due to turbulence. A common problem with float switches.

**Pumping Range:** Difference between pump "on" level and pump "off" level.

**Pump performance curve:** A diagram provided by the [pump manufacturer](#) to explain the relationship between the head and the flow rate of a pump using various size impellers. The curve also includes efficiency, NPSH required, and horse power consumption as a function of flow.

**Pipe friction loss:** The positive head loss from the friction resistance between the pipe walls and the moving liquid.

**Pressure:** The force exerted on the walls of a pipe by a liquid. Normally measured in pounds per square inch (psi).

**Pump impeller:** The moving element in a centrifugal pump that drives the fluid.

**Pressure drop:** Referring to the loss of pressure between two points in a pipeline system. Generally occurs because of pipe friction loss of differences in elevation between the two points.

**Relay:** An electrical-mechanical activated set of contacts used to make or break a circuit when it is electrically activated or deactivated.

**Relay Contacts:** The mechanical poles that make or break a circuit. These are housed in a relay, and activated by relay solenoid.

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**Resistor:** An electrical component used for introducing resistance into a circuit to reduce the voltage.

**Secondary Voltage:** Generally the lowered (transformed) voltage on a control system.

**Specific Gravity (Liquid):** The ratio of the weight of a given volume of liquid to pure water. Pumping heavy liquids (specific gravity greater than 1.0) will require more horsepower.

**Shock Hazards:** Open conductors or terminals that could allow electrical current to pass through flesh to ground.

**Simplex:** A single pump control system.

**Single Phase:** Refers to a circuit energized by a single alternating electric force. Common voltage levels are 120V, 208V, or 240V

**Solenoids (Electro-Magnet):** An inductor that serves as a magnetic force to close contacts on a relay, and also to shift a solenoid control valve.

**Single Pole Double Throw (SPDT):** Mechanically activated float switch that can be wired for normally open or normally closed operation.

**Single Pole Single Throw (SPST):** Contact configuration which makes or breaks a single circuit only. Opens and closes a single conductor only.

**Starting Current:** The high initial inrush current (amps) required to accelerate motors to operating speed.

**Suction head:** Condition that occurs when the liquid source is above the centerline of the pump.

**Suction lift:** Condition that occurs when the liquid source is below the centerline of the pump.

**Specific speed:** A formula that describes the shape of a pump impeller. The higher the specific speed the less N.P.S.H. required.

**Switch:** A component that opens or closes a circuit path.

**Terminal Block:** A grouping of screw terminals used to join AC power circuits, pump circuits, and float switch circuits into a system.

**Three Phase:** Energy consisting of three alternating electrical forces that differ in phase by one-third of a cycle or 120 degrees.

**Transformer:** Changes AC voltage to a higher or lower level.

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**Turbulence:** Movement (splashing or inrush impact) of liquid which might affect float switch performance and cause pump chatter. A common problem with float switches.

**Total Head / Total Dynamic Head:** The amount of head produced by the pump. Calculated by summing the static head, friction head, pressure head, and velocity head.

**TCP** is Transmission Control Protocol and **IP** is Internet Protocol. These protocols are used together and are the transport protocol for the internet. When Modbus information is sent using these protocols, the data is passed to TCP where additional information is attached and given to IP. IP then places the data in a packet (or datagram) and transmits it.

**U.L. Listing:** (Underwriters Laboratories) offers formal recognition that the device or product meets specified standards.

**Viscosity:** A measure of a liquid's resistance to flow. Essentially, it's how thick the liquid is. The viscosity determines the type of pump used, the speed it can run at, and with gear pumps, the internal clearances required.

**Wire Nuts:** Screw connectors used to join conductors together.

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