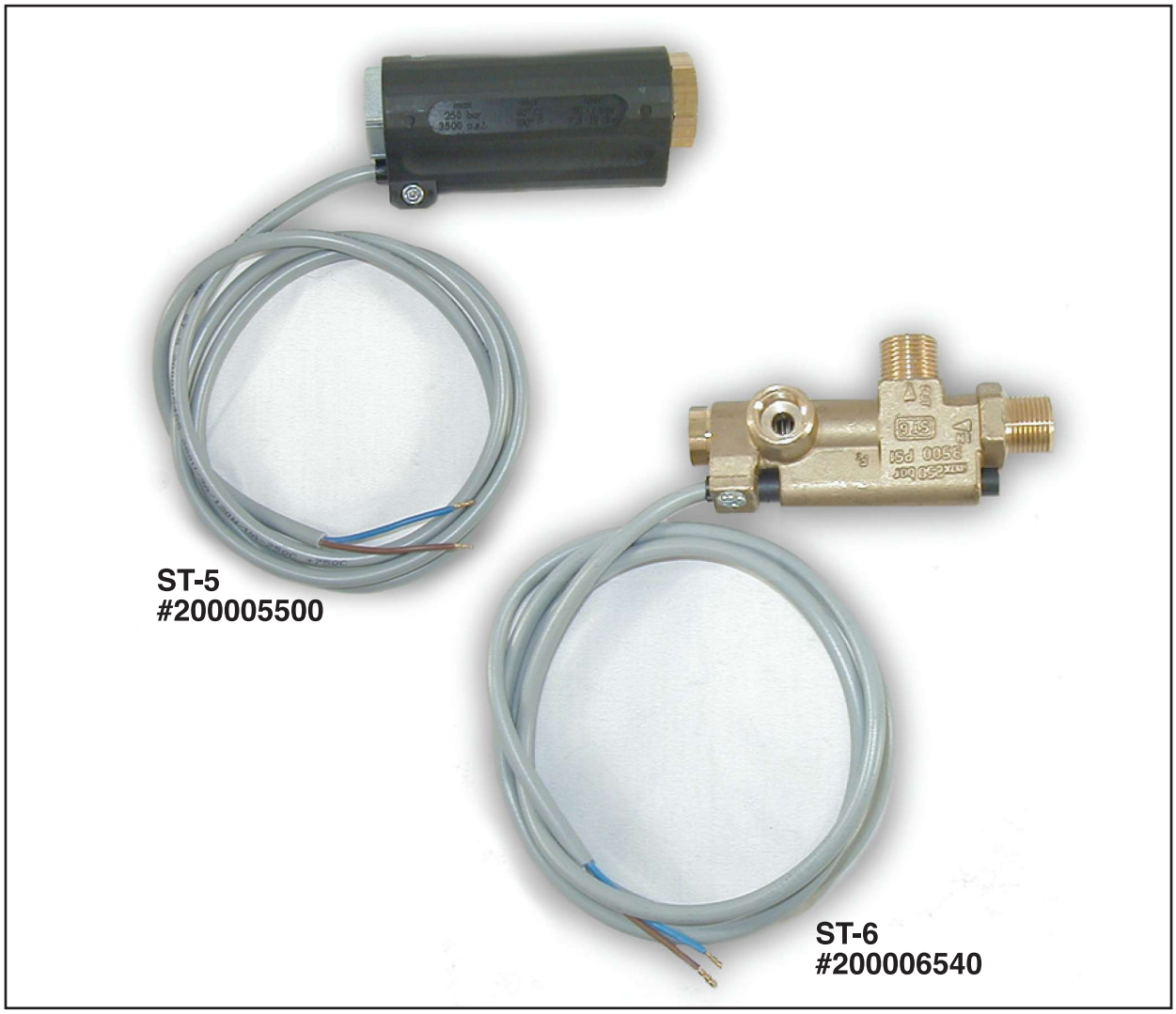
SUTTNER
AMERICA COMPANY

ST-5 & ST-6 Flow Switches

Manual



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HOW IT WORKS:

The ST-5 and ST-6 are "normally open" flow switches designed to be mounted in a high-pressure water line Inside the housing is a floating magnet aligned parallel with a reed switch When water flow is initiated (typically when a spray gun trigger is squeezed) the water velocity forces the magnet to move forward. Once in the correct position, the two thin reeds pull together and make contact, allowing electrical continuity (closing) the switch When water flow ceases (typically when spray gun trigger is released) a gravity (in the case of the ST-5) or a light gauge spring (in the case of the ST-6) the magnet reverts back to the original position, causing the reeds to pull apart This opens the switch stopping electrical continuity

Model ST-5

Model ST-6

APPLICATIONS:

The Suttner ST-5 and St-6 Flow switches can be used to control the following in relation to water flow:

*Solenoids
*Indicating lights
*Timers
*Sequencers

Although the most popular application has been high pressure washing applications, the ST-5 and ST-6 are suitable for other appliances as well, including carpet cleaning equipment, steam boilers and other types of pumping systems.

ADVANTAGES OF FLOW SWITCHES:

* Mounts further downstream in pumping system than traditional vacuum switches, thereby minimizing potential leak points that can cause vacuum switches to close.

* The reed switch is encased in a protective vacuum sealed glass tube eliminating exposure to corrosive cleaning chemicals.

* Flow switches eliminates need to restrict water flow *to* pump, thereby prolonging pump seal life.

* Vacuum switches use rubber diaphragms that often rupture and cause vacuum leaks to the pump.

FEATURES AND SPECIFICATIONS:

SPECIFICATION	MODEL ST-5	MODEL ST-6
MOUNTING POSITION	VERTICAL	ANY
MAGNET CONFIGURATION	FREE FLOATING	SPRING ASSISTED
PRESSURE, MIN	75 PSI	75 PSI
PRESSURE, MAX	4380 PSI	4500 PSI
FLOW RATE, MIN	1.0 GPM	1.0 GPM
FLOW RATE, MAX	8.0 GPM	8.0 GPM
WEIGHT	.98 lbs	.80 lbs
CORD LENGTH	47 INCHES	47 INCHES
HOUSING	BRASS	BRASS
INLET	3/8" FNPT	3/8" MNPT
OUTLET	3/8" FNPT	3/8" MNPT
GAUGE PORT	N/A	1/4" FNPT

DEFINITION OF TERMS

ELECTRICAL RATINGS

CAPACITANCE - The capacitance between overlapping reeds in the contact area.

CONTACT RATING - The maximum recommended wattage the contacts can switch with reasonable life expectancy. Certain load types will shorten the switching life even when the value is within the maximum switching power.

CURRENT, CARRY - The maximum recommended current after contacts are closed and bounce has stopped. Excessive current may cause contact chatter.

CURRENT, SWITCHING - The maximum recommended current at contact closure. Type and thickness of the contact material are the determining factors.

RESISTANCE, CONTACT - INITIAL. - The maximum resistance of new contacts is measured by the four-wire method. All switches are measured for CR at 10 A.T. overdrive, regardless of pull-in.

RESISTANCE, INSULATION - The minimum open circuit resistance across the glass path at 40% relative humidity.

VOLTAGE, *ARC* QUENCH - The value at which arcing extinguishes in an ionized gas atmosphere.

VOLTAGE, BREAKDOWN - The maximum voltage the switch can withstand without leakage between open contacts. This does not include leakage across the glass. Breakdown may cause the ionization of inert gas within the switch leading to a lower breakdown value until ionization subsides with time.

VOLTAGE, SWITCHING - The maximum voltage on which the contacts should close.

OPERATING CHARACTERISTICS

OPERATE TIME - The time interval from coil energization to the last contact bounce. Variance may be expected due to coil configuration and amount of overdrive.

RELEASE TIME - The time interval from coil de-energization to contact opening

RESONANT FREQUENCY - The natural frequency at which the switch is most susceptible to false operation.

SHOCK - The recommended maximum level without false operation or damage to switch characteristics. Test Method 213B, MIL-STD202.

TEMPERATURE, OPERATING - The safe range for switch operation in which the characteristics are stable. You can expect shortened contact life from continued operation at extreme temperatures. Sufficient stabilization time is required between storage and operating temperature. Contact factory for specific application information.

TEMPERATURE, STORAGE - The safe storage range. Exceeding this range may cause permanent damage to switch seals.

VIBRATION - The recommended maximum level for use without false operation. Test Method 214. MIL-STD-202.

MAGNETIC CHARACTERISTICS

PULL-INDROP-OUT- Ampere turn values have been generated with a coil energization rate of 100 ampere turns per second Other energization rates may produce different characteristics

RATING SENSITIVITY- The controlling element in switch sensitivity is the gap between the open contacts Distance decreases as sensitivity increases, and the ampere turn value, therefore, is lower. Mid-range sensitivity switches are normally used to determine switch characteristics

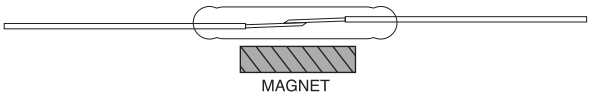
TEST COIL - Reed switch sensitivity is specified in ampere turns (AT), which is the product of current and the number of turns in a designated test coil Magnetic characteristics are measured with the contacts centered in the test coil

BASIC THEORY AND CONSTRUCTION

The basic Single Pole, Single Throw-Normally Open (SPST-NO) has two ferromagnetic reeds which are hermetically sealed into a glass capsule This capsule contains a vacuum The flattened reeds overlap and are separated by a small gap in the contact area The contact surfaces are plated with the precious metal Rhodium

In the presence of a magnetic field the reeds become **flux** carriers and attractive polarities are set up between the contacts Closure occurs when the magnetic force exceeds the reed's spring rate Contacts open when the magnetic force is reduced to less than the reed's restoring force

"open"



"closed"

LOAD AND LIFE CHARACTERISTICS

LIFE EXPECTANCY - Depending on the specific load characteristics, duty cycle and environmental conditions, life expectancy can vary from one million to more than 10 billion operations. Ratings are based upon D.C. resistive loads, however A.C. loads are commonly switched.

INDUCTIVE LOAD SWITCHING - Unless appropriate contact protection is provided with a diode or R.C. network, inductive load switching will cause the contacts to stick. Blackened glass around the contact area indicates inadequate protection.

CAPACITIVE LOAD SWITCHING - The static capacitance in cables may cause permanent or intermittent contact sticking. Contacts may be protected by a series surge protector of 0.5 to 5 mH, depending upon the load. In some instances, a 10-500 ohm resistor can replace the surge suppressor.

TUNGSTEN LAMP LOADS - These may have an initial in-rush current which is 12 times the steady state current. The Model ST-5 and ST-6 are not recommended for such loads

REED SWITCH SPECIFICATIONS

CONTACT FORM	Single Pole, Single Throw, Normally Open
CONTACT RATING	100 watts
VOLTAGE, SWITCHING	400 Vdc- Max
VOLTAGE, BREAKDOWN	600 Vdc- Mm
VOLTAGE, ARC-QUENCH	600 Vdc- Min
CURRENT, SWITCHING	3 0 Amperes- Max
CURRENT, CARRY	6 0 Amperes- Max
RESISTANCE, CONTACT, INITIAL	0 100 Ohms-Max
RESISTANCE, INSULATION	10_{10} Ohms-Min
CAPACITANCE	0 6 Picofarads-Typ
OPERATE TIME	4.5 ms-Max.
RELEASE TIME	2.5 ms-Max.
SHOCK	100 G's Max. 1lms 1/2 sine wave
VIBRATION	30 G's Max., 50-2000 Hertz
RESONANT FREQUENCY	850 Hertz, Typ.
TEMPERATURE, OPERATING	-40 to + 125 Degrees, Celsius
TEMPERATURE, STORAGE	-65 to +200 Degrees, Celsius
RATING SENSITIVITY	60 Ampere Tums
TEST COIL	L4988
STANDARD TOLERANCE, PULL-IN	52-63 Ampere Tums
STANDARD TOLERANCE, DROP-OUT	28-39 Ampere Tums

INSTALLATION:

WARNING! All electrical connections should be accomplished by a certified electrician in accordance with the information above and all applicable codes.

WARNING! All hot water pressure washers and steam cleaners should have at least two methods of safety pressure relief to guard against improper installation or failure.

NOTE: The ST-5 flow switch MUST be installed in a VERTICAL position. Although the ST-6 model may be installed horizontally, the preferred position is vertical.

1. Apply **liquid** thread sealant and tighten water connections on both ends of switch housing. Make sure that arrow on switch housing is pointing in proper direction relative to water flow.

2. Cut wire leads to desired length, attach terminal ends, connects wires as follows:

   A. Lead #1 to "Line/Power"
   B. Lead #2 to "Load"
   C. Yellow with green tracer to "Ground"

3 Dependent upon system flow rate, it is normal for the magnet position to vary This variance may require adjustment of reed switch accordingly upon initial installation, especially at lower flow rates Should the switch fail to close upon initial flow, simply loosen the adjustment screw and position the switch so that it opens and closes properly in relation to flow conditions.

TROUBLESHOOTING: If Switch fails to open or close properly:

* Refer to adjustment procedures outlined in previous paragraph.
* Check leads and assure power to switch and proper connection
* Flow rate is less than 1 GPM. Verify water flow rate.
* Magnet is stuck. Clean inside switch housing
* Reed switch is damaged.

MAINTENANCE:

On systems where mineral content is high or chemicals are used, it will be necessary to disassemble the housing and clean debris on occasion. This will keep magnet moving in a smooth and free fashion and eliminate possibility of nuisance failures due to a build up of scale Frequency of such service will vary, but it is suggested that the switch be inspected and cleaned as necessary each time the machine receives routine maintenance or service.