CHEMPUMP
A DIVISION OF TEIKOKU USA INC.

ENGINEERING DATA SHEET

Temperature Sensors		
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Monitoring the temperature of canned motor pumps is a valuable diagnostic tool to prevent the pumped liquid from reaching critically high or low temperatures. Temperature sensors can be installed in the stator cavity and throughout the internal flow path of the recirculation fluid.

The three most common types of temperature monitoring used in Chempumps are:

1. **THERMAL CUT OUT (TCO)** - A standard feature of all Chempumps, the TCO is a thermal-sensing device which is wired (by the customer) into the holding coil of the magnetic starter to protect the motor windings against excessive heat build-up. When the temperature limit of the TCO is exceeded the circuit opens causing the pump to shut down (if the TCO lead wires are connected to the holding coil by the User). For complete description of the TCO, please refer to data book page 11E.

2. **THERMOCOUPLE** - Normally placed in the outboard bearing housing to sense the temperature of fluid in the rotor cavity. Thermocouples can also be embedded in the motor windings to measure the temperature of the stator windings and the stator cavity. Thermocouples are used to detect a number of process upset conditions such as dry running, dead heading and a disruption of the recirculation flow which could be caused by a clogged filter or a blockage in the circulation line or internal clearances of the pump.

    The thermocouple consists of a pair of wires of dissimilar metals connected at both ends. When the two junctions are subjected to different temperatures, an electrical potential is set up between them. This voltage is directly proportional to the temperature difference. A voltage-measuring instrument placed in the circuit measures the temperature. Thermocouples may be used with any temperature indicating device such as a thermometer, controller or chart recorder.

    When used in conjunction with a controller, thermocouples can also be used to shut off the pump, sound an alarm, or activate a signal light when maximum and/or minimum temperature limit is reached. The most common thermocouple specific is a type "J".

3. **BI-METALLIC SWITCH** - Normally placed in the rear bearing housing this bi-metallic switch, which contains a relay to open or close at a preset temperature, can be used to sound an alarm our shut off the pump when the preset temperature limit is exceeded. This switch can also be used to prevent start-up of the pump until a fluid reaches its proper temperature or to

prevent the pump from operating if the fluid temperature is too high. A typical application would be pumping a fluid with a high melt point such as phthalic or makeic anhydride. The thermo switch would be set at a temperature above the melting point to prevent the pump from operating if the pthallic anhydride is in a solid state.

The bi-metallic switch can use the same holding circuits as those used with the TCO. (Refer to data book 11E).

A bi-metallic switch is preset at the factory and can sense only one temperature point. If both high and low settings are required, two bi-metallic switches are installed on the pump.

Thermowells

Thermowells are recommended when using a thermocouple or thermal switch. Thermowells are hollow tubes with an NPT connection that becomes a pressure boundary part of the pump. The thermowell or thermal switch is inserted into the tube and threaded into the NPT connection. The use of a thermowells allows a thermocouple or thermoswitch to be removed from the pump without violating the pressure boundary areas of the pump.

Chempump's standard practice is to use a 1/4" diameter thermocouple (or thermoswitch) with a 1/4" NPT connection with a mating thermowell. The material of the thermowell will be the same as the wetted parts of the pump.

Enclosures

Thermocouples and bi-metallic switchs can be supplied for all electrical classifications including explosion proof environments. Refer to the data book modification sheets for pricing.