

Protecting Pump Motors with Current Monitoring Techniques



HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Follow safe electrical work practices. See NFPA 70E in the USA, or applicable local codes.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Read, understand and follow the instructions before installing this product.
- Turn off all power supplying equipment before working on or inside the equipment.
- Use a properly rated voltage sensing device to confirm power is off.
DO NOT DEPEND ON THIS PRODUCT FOR VOLTAGE INDICATION
- Only install this product on insulated conductors.

Failure to follow these instructions will result in death or serious injury.

The information provided herein is intended to supplement the knowledge required of an electrician trained in high voltage installations. There is no intent to foresee all possible variables in individual situations, nor to provide all training needed to perform these tasks. The installer is ultimately responsible to assure that a particular installation will be and remain safe and operable under the specific conditions encountered.

Introduction

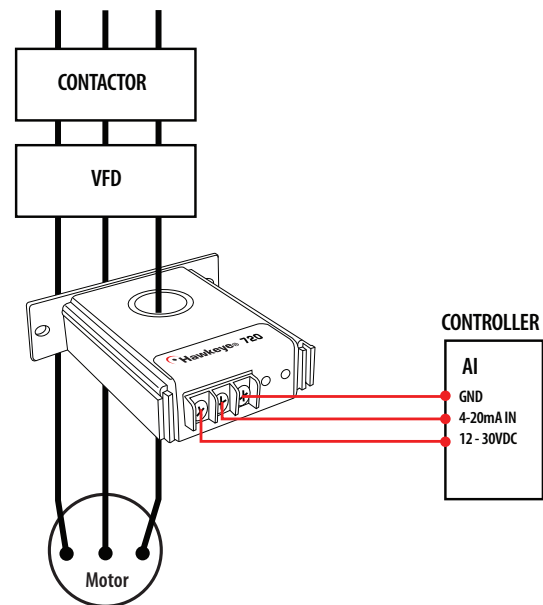
A well-designed pumping system in theory should quietly and efficiently continue to work for years. In reality, any number of operating conditions can dramatically shorten the life of the system. Cavitation, dead head, jammed impellers and over/under voltage conditions can all lead to early motor failure. An easy and often overlooked protection method is to continually monitor the motor current and automatically shut down the system if a problem occurs.

In any pump installation, the heavier the load, the more power the motor is required to deliver. By monitoring the amount of current the motor is using, it is possible to determine if the system is running as expected. If the amount of current used increases dramatically, the pump is probably jammed. A quick drop in current indicates a probable blockage in the suction line, pin shear or cavitation. The easiest way to monitor motor load is to use a current transducer or current switch.

Current Transducers

The simplest example of a current transducer is one that simply outputs a signal that is directly related to the current draw of the motor. This style of transducer is used with a programmable logic controller (PLC), and it functions as an alarm. Upper and lower current limits are programmed in the PLC along with the appropriate motor control functions.

Current Transducer for use with a PLC



Current Switches

A very versatile type of current transducer is the current switch. In many installations, interface to a PLC is not required, so these sensors can be used on stand-alone or remote installations. This type of transducer can be preset during installation for a specific current threshold. A single model may be set for either over- or under-current monitoring. When the preset current limit is reached, the transducer can either send a signal to a controller or trip an internal relay built into the transducer. This relay can be used to interrupt the motor contactor to quickly shut down the system.

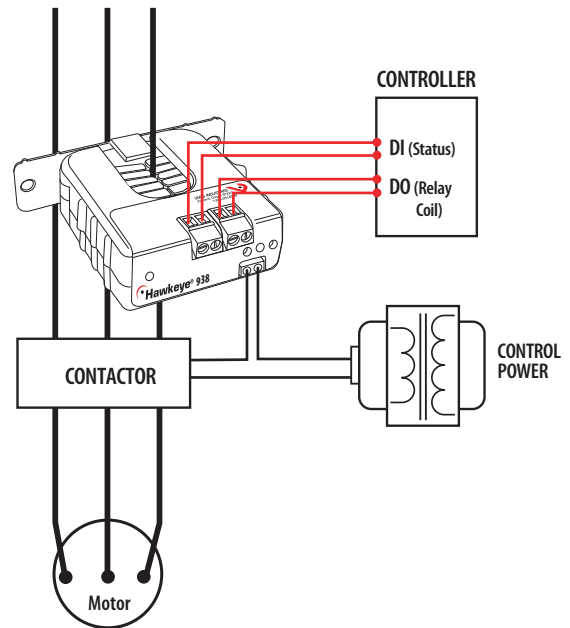
Under-current monitors are especially useful in protection against flow blockage, which can lead to overheating. These problems are quickly detected and the system can be shut down immediately, preventing further damage. Most useful are the split-core models, as retrofitting to existing systems is simple. This type of product is also available with a built-in relay for simple motor control.

Over-current monitors are used to protect the motor from damage due to jams or bearing failure. Although not designed to replace circuit breakers or thermal fuses (fuses can detect a lower load increase over a period of time to prevent overheating), a current switch can detect an increase in load within milliseconds. This fast response can increase motor life as well as reducing product damage from a jam.

Advantages include:

- Reduced installation costs...no calibration fixtures or exposed location
- Fast response increases motor life
- No moving parts means long life
- Easy maintenance...no exposure to washdown...does not have to be installed in open
- Ease of operation...set & forget
- Works with VFD control systems (VN07, "Monitoring Variable Frequency Drive Status")

Current Switch for Low Threshold Protection



High Threshold Transducer Applications

