Application note AN507

Task

Pump supervision for active pump as well as dry running

Description

The supervision consists of two tasks: a) Protection of the pump against dry running
                                            b) Supervision of whether or not the pump is running.

Unipower

For this task the Unipower HPL500 is used

Setup

HPL500 has two independent limits with separate relay outputs.

Limit 1 must be set up as a *max limit* with a *setpoint of 6%*. The setpoint must be so low, that it is exceeded, when the pump is working under normal conditions (And as soon as the pump is startet)

Limit 2 must be set up as a *min limit* with a setpoint appropriate below the power consumption for normal conditions. This is easily achieved by running the pump under normal conditions and read the min peak value (in kW% mode activate the arrow down key). Place the setpoint below the min peak value.

Respons timer 1 (Tr 1) must be short – for instance 0.0 seconds. This causes a limit 1 alarm as soon as the pump is started – on the condition that the pump starts!

Respons timer 2 (Tr 2) should be set in accordance with the data for the pump. (How long is the pump allowed to run without cargo?). Tr 2 should not be set too short (below 1 second), in which case alarms may occur at start up, since the start timer should be set very short.

Start timer (Ts) must be set short – for instance 0.0 seconds. This is a compromise; Not until the start timer (Ts) expires, will the supervision be activated, which speaks of chosing Ts as short as possible. When Ts expires the peak values are set to the actual measuring value. If this happens too soon, the min peak value is useless as guideline for the setpoint for dry running. This can be remedied by putting off setting Ts until the setpoint for the min limit has been correctly set.

Relay polarity for relay 1 must be selected inverted, by which the relay is disconnected (open) under normal conditions (and when HPL500 is turned off) and closed in alarm condition.

Relay polarity for relay 2 must be selected non-inverted, by which the relay is closed under normal conditions and disconnected (open) in alarm condition (and when HPL500 is turned off).

Mode of operation

When turned off both relays in the HPL500 are disconnected (open), by which the self-supervision is established.

When HPL500 is turned on, relay 1 remains disconnected, since the relay polarity is inverted. Relay 2 closes immediately.

As soon as the pump starts, setpoint 1 is exceeded (max limit) and relay 1 closes. Now both relays are closed signaling normal condition.
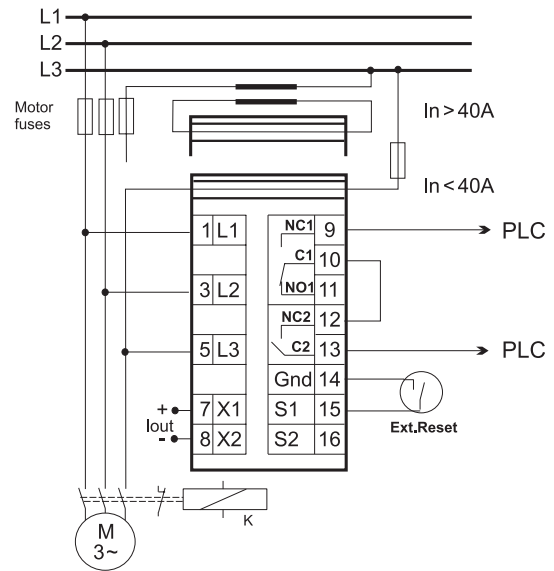
If the cargo in the pump disappears, the power consumption drops and setpoint 2 is exceeded (min limit). This causes relay 2 to disconnect signaling an alarm condition.

Connection

The schematic below shows how the HPL500 may be connected to solve the task. The two relays are connected in series to obtain only *one* signal for alarm condition (optional). If separate alarm signaling is required, the relays must be connected to separate inputs in the PLC.
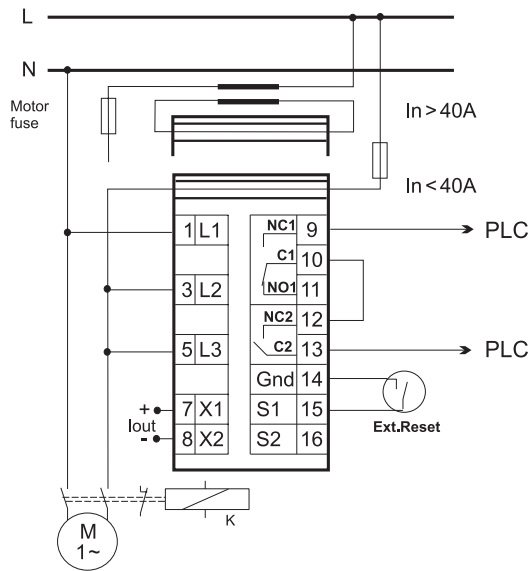
Single phased pump

Three phased pump