

Effective monitoring helps resolve operational issues - saving water and costs while increasing production

THE SITUATION

CPKelco has been one of our Grundfos iSOLUTIONS MONITOR trial customers for some time, with several Grundfos iSOLUTIONS MONITOR units been installed on CRN pumps supplying water or other liquids to different processes for the extraction of Pectin from citrus peels. One of these was a filtration application where two CRN10-20/CRN10-21SF units have been used to supply process water (80°C, 8m³/h @ 30 bar) for cleaning a filter for citrus peels filtration.

The reason for installing Grundfos iSOLUTIONS MONITOR was because the customer often had leaking shaft seals and the hope was that Grundfos iSOLUTIONS MONITOR could help identify the reason. After some time, several dry-running alarms were detected, indicating that the pumps were operating without liquid or that air/steam bubbles were entering the pumps.

After presenting the findings to the customer, the process water supply line was investigated and it turned out that the used pipe was too small to handle the required flow of 16 m³/h needed for the two filter systems, resulting in negative suction pressure when both filters were in operation. As the process water has a temperature of 80°C, a negative suction pressure resulted in steam bubbles in the pumps, which again resulted in damaged shaft seals. To solve the problem, our customer found out that by replacing the nozzles in the filter, he could achieve the same cleaning effect as for a pump with 4 m³/h @ 50 bar.

The solution for our customer was our new CRNE3-23 Q pump with a 11 kW MGE motor.

THE SOLUTION

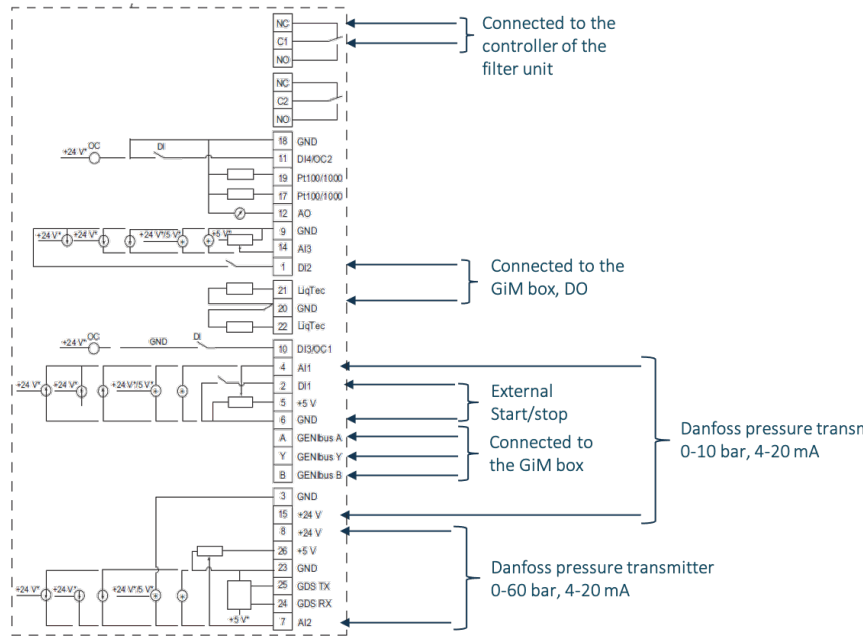


We installed 2 x CRNE3-23 HS 11 kW, equipped with Grundfos iSOLUTIONS Monitor, our solution for monitoring CR pumps and CR pump systems for common operational issues such as dry running. A dedicated output signal can be linked to an external controller enabling fast action to prevent pump damage. Additional functionality has been added for the customer, to avoid operational issues and provide process insights:

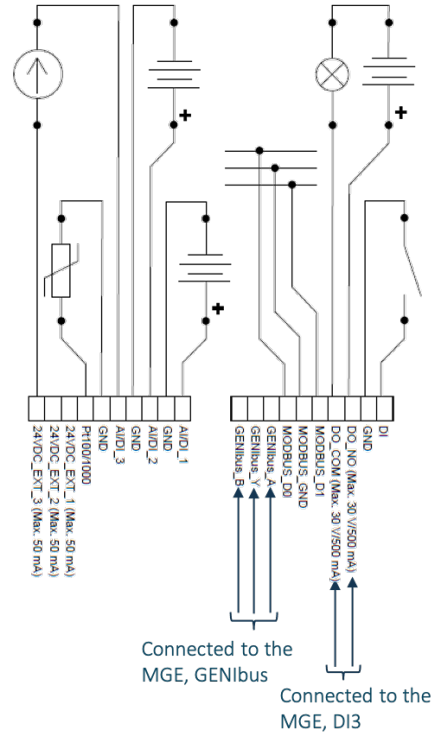
- Grundfos iSOLUTIONS MONITOR and the MGE motor was connected via GENI-bus
- 60 bar sensor was installed on discharge side of the pump as feedback sensor for constant pressure operation
- 10 bar sensor was installed on the inlet side of the pump to monitor the inlet pressure
- The flow estimation in our MGE motor was activated to monitor the flow through the nozzles in the filter. In case of blocking the operator can see that the flow drops
- Limit exceed 1 is setup to monitor the inlet pressure and give warning if exceeded. If this happens, it indicates that either the feed-pump is not performing or the inlet filter on the suction side of the HS pumps are blocked and need cleaning
- Limited exceed 2 is setup to monitor the inlet pressure, stopping the pump and providing an alarm if proper actions are not taken on the Limit exceed 1 warning
- The DO from Grundfos iSOLUTIONS MONITOR is connected to DI2 on the MGE and will stop the pump in case of dry-running and give an alarm
- Signal relay on the MGE is connected to the controller of the filter and will close in case of alarm. This will result in a controlled stop of the filter unit
- Grundfos iSOLUTIONS MONITOR is connected to Grundfos iSOLUTIONS Cloud.

THE SOLUTION

Wiring: MGE motor



Wiring: Grundfos iSOLUTIONS MONITOR box



Settings: MGE motor

Operating mode: Normal

Control mode: Constant pressure

Setpoint: 13 bar

Other settings: Ramp-up time; 10 sec.

As the water to supply are 80°C when need a slow start up. This is to avoid that the feedwater column collapsing, resulting in steam bubbles and water hammer.

Max speed in case of failure on feedback:

sensor: Set to 93% speed. This will ensure that the pump max can give 50 bar of pressure.

AI 1: Function: Feedback sensor

Measured: Discharge pressure

Signal, 4-20 mA. Unit, bar. Range, 0-60 bar

AI 2: Function: other function

Measured: Inlet pressure

Signal, 4-20 mA. Unit, bar. Range, 0-10 bar

DI 1: Ext. start/stop

DI 2: Function: Dry-running

Signal relay 1: Running

Limit 1 exceeded:

Measured: Inlet pressure

Limit: 2 bar

Limit exceeded when: Below limit

Action: Alarm/Warning

Detection delay: 15 sec.

Reset delay: 0 sec.

Hysteresis band: 0 sec

Limit 2 exceeded:

Measured: Inlet pressure

Limit: 1.5 bar

Limit exceeded when: Below limit

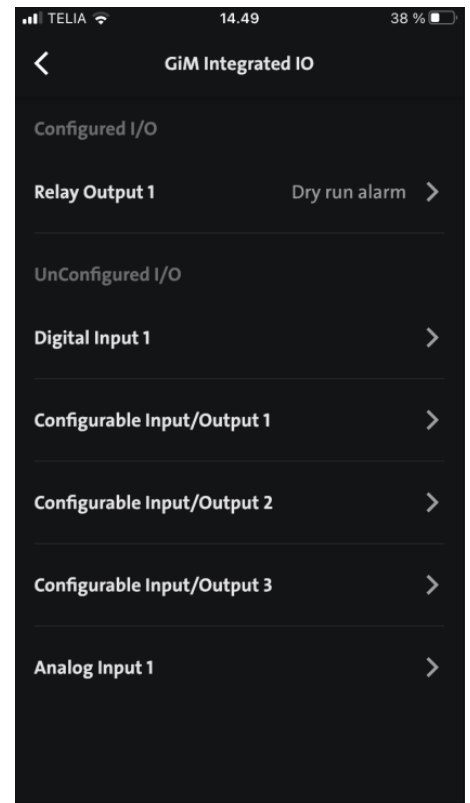
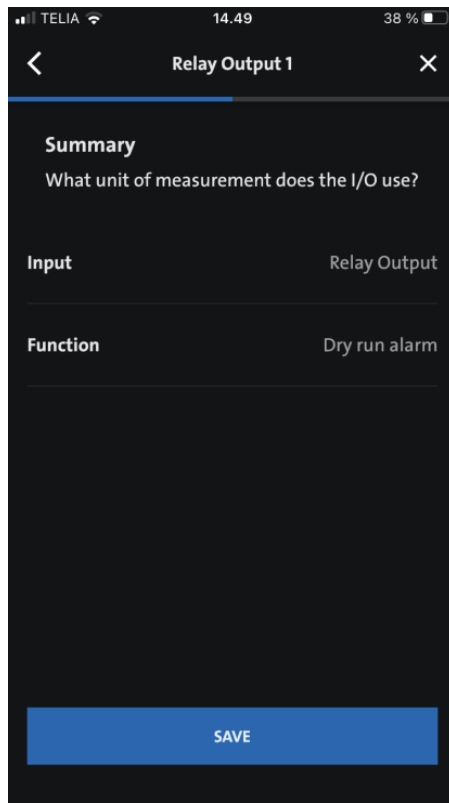
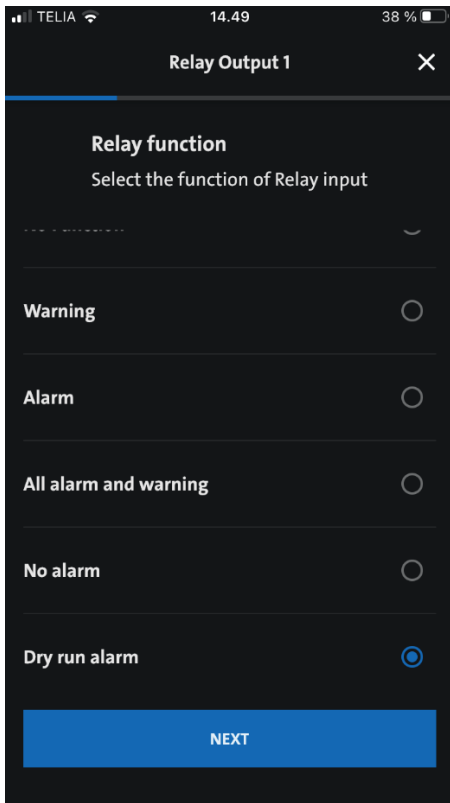
Action: Stop

Detection delay: 5 sec.

Reset delay: 0 sec.

Hysteresis band: 0 sec

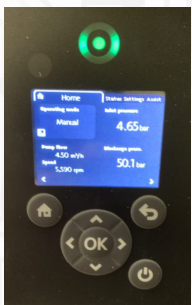
Settings: Grundfos iSOLUTIONS MONITOR (DO1)



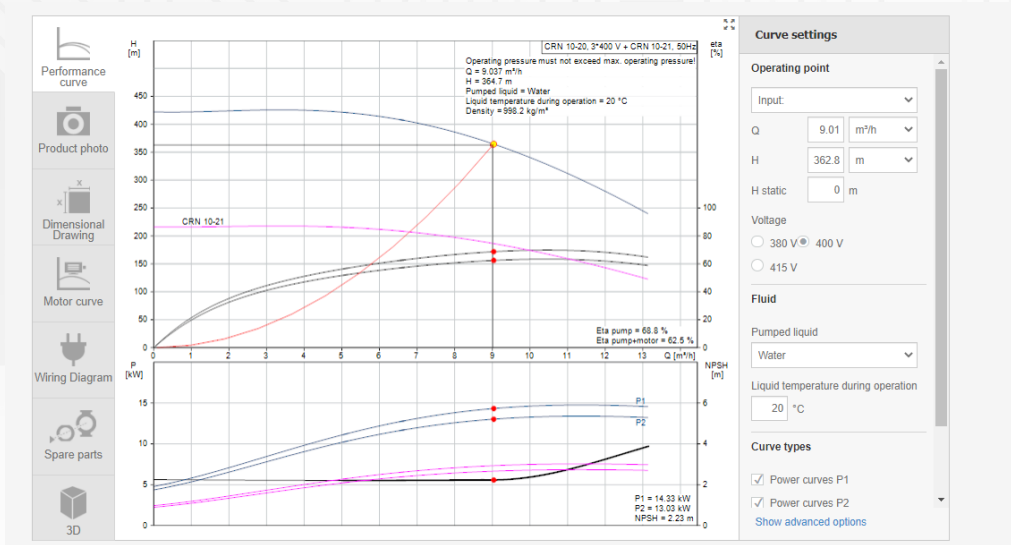
THE OUTCOME

This solution has not only helped solving our customer's problems; it also has a positive long-term effect on CAPAX and OPEX. CAPEX, because the offered solution has a lower cost than the old system; and OPEX, because of energy savings and a 50% reduction in water consumption, as well as savings on service and a higher production.

This is a fantastic example of how we with can help our customers not only monitor their pumps, but also the system in which they are installed.

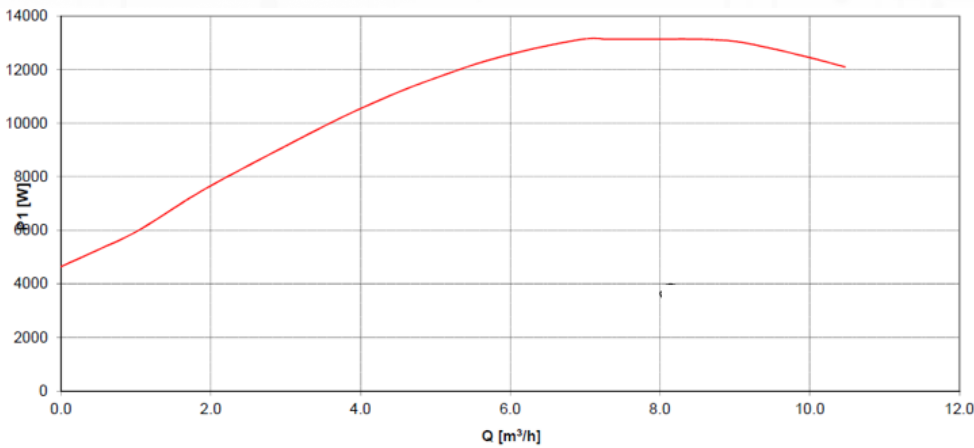


Old pump system



New pump CRNE3-23Q, 11 kW

Power Chart



Grundfos pump performance test

QH Chart

