Using a universal measurement module for condition monitoring

White Paper

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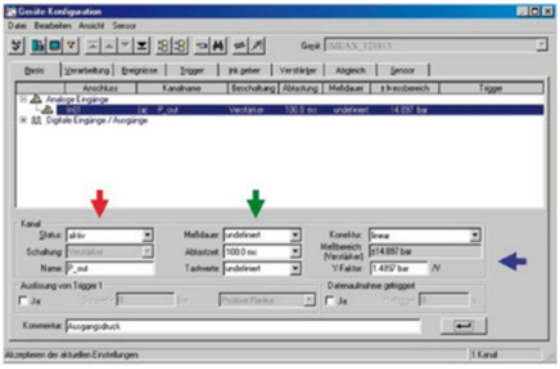
Limit monitoring of calculated (virtual) measurement channels in real time

Universal measuring modules provide fast and individual adjustments for various measurement applications. The capability to monitor limits in real time, including the settings for individual measurement amplifiers, triggers and memory options is indispensable. In addition, intelligent measurement connectors also allow mathematical and statistical analysis of measurement data in real time. As a result, in addition to simple data collection (data logger operations), complex monitoring of conditions and analysis functions is possible.

The most important requirement for the operator or technician is to be able to make fast and secure system configurations without programming.

The following example shows the continuous measurement and processing of a tension-voltage signal from a pressure transducer. When the pressure reaches a limit of 9 bar, a digital output is enabled (1), and when the pressure falls below 9 bar, the output is reset (0).



Configuration of an analog input channel

The pressure signal is very "restless". The digital output which has a relay coil connected to it, must rapidly switch several times when approaching a fixed limit. In order to prevent this, a mean value is formed from the pressure signal. This allows for the signal to be smoothed. When the average value is used for limit comparison, the output / relay is less stressed. The original signal, whose average is calculated online in real time (sliding), and the reaction of the digital output will be documented.

The implemented functions:

Configuration of an input signal's **conditioning**.

Create mathematical instructions for a **sliding mean average** and the **monitoring of limit values**.

The iMEAX operating and configuration software automatically detects the hardware configuration of the measurement modules and allows for individual channel setups.

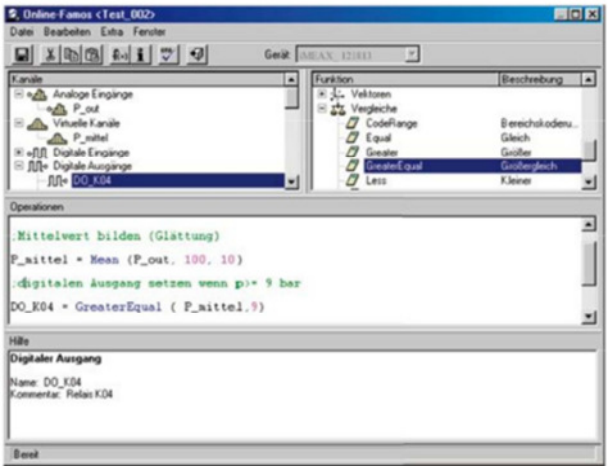
The voltage signal is connected at the analog input In01 of the iMEAX measurement module.

This channel is activated (Status) and named (Name) P_out.

The signal is set to be measured continuously (measuring time: undefined), the sampling time is set to 100 ms.

The transmitter signal at 1V corresponds to the physical size p = 1.4897 bar (Y-factor).

After making these basic configuration settings, the calculation instructions for averaging, threshold values and limits must be defined, as well as the algorithm to switch the digital output. This occurs by means of functions written in imc Online FAMOS.

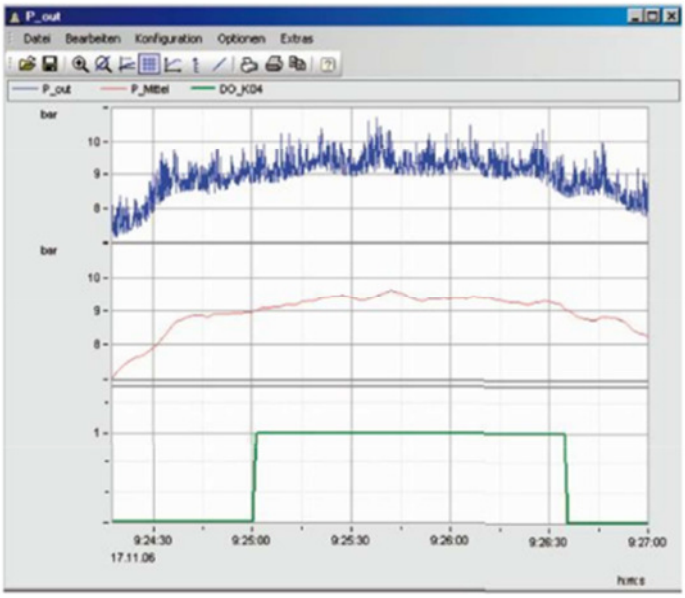


Definitions of arithmetic instructions and algorithms are carried out clearly in writing and without programming.

The averaging function **Mean,** with the selected parameters calculates the average for the last **100** values from P_out and creates a result value every **10** values. These result values are displayed in a virtual channel P_Middle. In the virtual channel P_Middle, the value comparison is now made:

The digital output DO_K04 is "1" if P_Middle is greater than or equal to 9 (bar).

After starting the measurement, the measurement data can be represented with the help of a PC. The display of the measurement data and results can be made either while the measurement is running or after the measurement in "Black Box Mode". All data can be displayed with one click. The Curve window automatically opens in the correct scale. Scaling and display preferences can be changed during the running measurement.



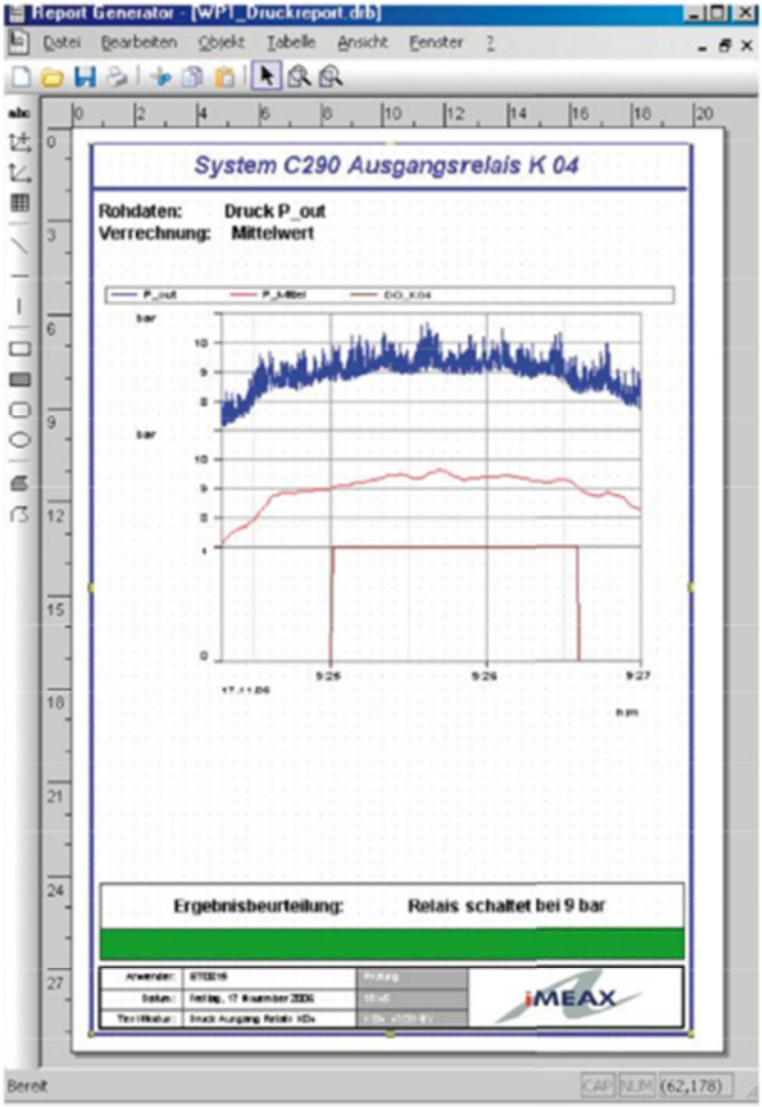
Representation of the original data **P_out** …

and then the mean value calculated in real time, **P_Middle…**

then the reaction of the digital output **DO_K04** to the value comparison

(Output = 1 if P_Middle greater than or equal to 9 bar)

Per Drag & Drop, the above representation of the measurement signals can easily be inserted into a prepared document:



Manual, semi- or fully-automatic generation of measurement reports

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