



Leffek
Efficient cooling circuit
monitoring



Monitoring cooling circuits with precision.

Sensors in cooling systems for power electronics.


Powerful cooling systems protect energy converters in industrial environments from overheating. In the cooling system, sensors monitor the process and ensure energy-efficient and optimum dissipation of lost heat.

Semiconductors heat up during operation. In the field of small electronics, heat sinks are often sufficient to dissipate the heat. Powerful PCs already use water cooling to protect processors from overheating. The container-sized XXL cooling systems for industrial applications from the Duisburg-based company Leffek Industrie GmbH are in a different league, even though they are based on the same in principle.

Cengiz Danaci heads production there and explains: *"We design and build cooling systems for power electronics. They permanently dissipate the heat losses that occur during energy conversion so that the large energy converters can operate continuously. The cooling capacity of our systems ranges from 500 W to 5 megawatts. Thereby, cooling liquids move in a flow range from 3 to up to 800 cubic metres per hour."*

Various sensors monitor the process.





The electronic contact manometers combine the advantages of pressure sensors with those of analogue manometers.

Sensors monitor the cooling circuit

Different sensors from the automation specialist ifm are positioned in the pipes of the cooling circuit. They support the controller regulating the ideal cooling power.

Cengiz Danaci: "The most important parameters in the cooling system are flow, pressure and temperature. These process values must be continuously monitored and processed in the controller. They are also interdependent. If, for example, there is no pressure or no pressure difference, then no coolant will flow. And if no coolant flows, no heat will be dissipated from the power semiconductors. In this case, the systems may overheat and suffer damage. Therefore, the control and monitoring of the cooling system is of particular importance with regard to safe and reliable operation. Many sensors are also double, in some cases triple. This prevents that a failure of a measuring point will lead to a shutdown of the cooling system and thus to a shutdown of the important energy converter that is tempered via this cooling system. The installations are used in very diverse areas, for example in power plants, in mining or in the steel industry. Therefore, the installed sensors must be suitable for the corresponding environmental conditions of these industries in terms of their ambient temperature and robust construction. We rely on sensors from ifm for this."

” We use the IO-Link parameter setting functions of the ifm sensors intensively during the setup, configuration and documentation stages.

More than just a monometer display: the LED ring here indicates the set switching points.

Electronic contact manometers with analogue display

The electronic pressure sensor of the PG series with analogue display combines the good readability of a manometer display with the advantages of an electronic pressure sensor.

Cengiz Danaci: *“The pressure gauges are used both in the system pressure range upstream of the pumps and in the conveying pressure range downstream of the pumps. We use the ifm pressure sensors of the PG series because they offer digital measurement, transmit the pressure values to the process control system via a current signal and also offer the advantages of an analogue manometer display on site.”*

The ifm sensor has both programmable switching outputs and a scalable analogue output. The current system pressure is indicated by a pointer. It is simultaneously shown on the LED display as an alphanumeric value. The LED ring also indicates the set and reset points, trends and, if there are any, limits of dynamic pressure fluctuations. This offers maximum transparency and overview when reading on site.

Thanks to its robust stainless steel housing, the sensor can withstand even harsh industrial environments. The rotatable analogue display can be adapted quickly and conveniently to any given installation situation.



” We use temperature sensors from ifm because they directly provide us with the process variable by means of a current signal in the process control system.

TN series temperature sensors with fast response time and on-site display.



Sensor with temperature probe and display

The temperature sensors of the TN series used on the cooling system serve to reliably detect process temperatures.

“We use temperature sensors from ifm because they directly provide us with the process variable by means of a current signal in the process control system. In addition, they show the operator the current temperature via an on-site display,” says **Cengiz Danaci**.

Furthermore, the units are characterised by an excellent response time, high pressure resistance and a large measuring range. Critical process states, e.g. reaching of minimum or maximum limit temperatures, can be directly monitored by means of the switching output

Set-up, maintenance and operation are facilitated by a 4-digit LED display that is visible from all sides even at greater distances and two switching status LEDs on the sensor head. Parameter setting is performed via the buttons on the sensor. In addition, the sensor can also be configured via IO-Link using a PC, e.g. by means of a USB interface.

Compact flow sensors with stainless steel housing

With their calorimetric measuring principle, the flow sensors of the SI5 series ensure reliable monitoring of the coolant in piping systems. Thanks to a great variety of available process adapters, the sensors can be used in almost all industrial applications. Their robust stainless steel housing provides high reliability even in harsh operating conditions.

The flow range and the switch points are adjusted using a pushbutton on the unit. A multicolour LED display indicates the nominal flow range and the switch point. Electronic locking of the settings prevents unintentional maladjustment.

IO-Link for sensor parameter setting

All modern sensors have an IO-Link communication interface. This allows digital access to the sensor. Measured values can, for example, be transmitted digitally, which ensures greatest accuracy without any conversion losses. For even greater reliability, the sensor also provides diagnostic data. Leffek uses another advantage of IO-Link.

Cengiz Danaci: *“We use the IO-Link parameter setting functions of the ifm sensors intensively during the setup, configuration and documentation stages.”*

Instead of setting switch points, hysteresis or the scaling of the analogue output via the buttons on the sensor, this can be done conveniently via PC using the corresponding adapter and software. A mouse click is all it takes to transfer stored parameter sets to the sensor. This reduces setup complexity significantly. At the same time, the parameter sets stored there serve to document the installation. This is why using IO-Link saves time and costs.

Bottom line

A wide range of reliable sensors guarantees that the temperatures in Leffek's cooling systems are right. The cooperation with the automation supplier ifm also has the right climate .

Cengiz Danaci says, "We are very satisfied with the performance of the ifm sensors, also with regard to the documentation of the devices, the accuracy and the MTBF analyses. ifm's support is also very satisfactory. We are continuously informed about new developments, equipment replacements and new areas of application for the equipment."

This underlines the claim of customer proximity that ifm's slogan has been expressing for years: ifm – close to you!

Flow sensor type SI5 monitors the flow of the cooling liquid in the pipes and displays it on the LED bar graph.