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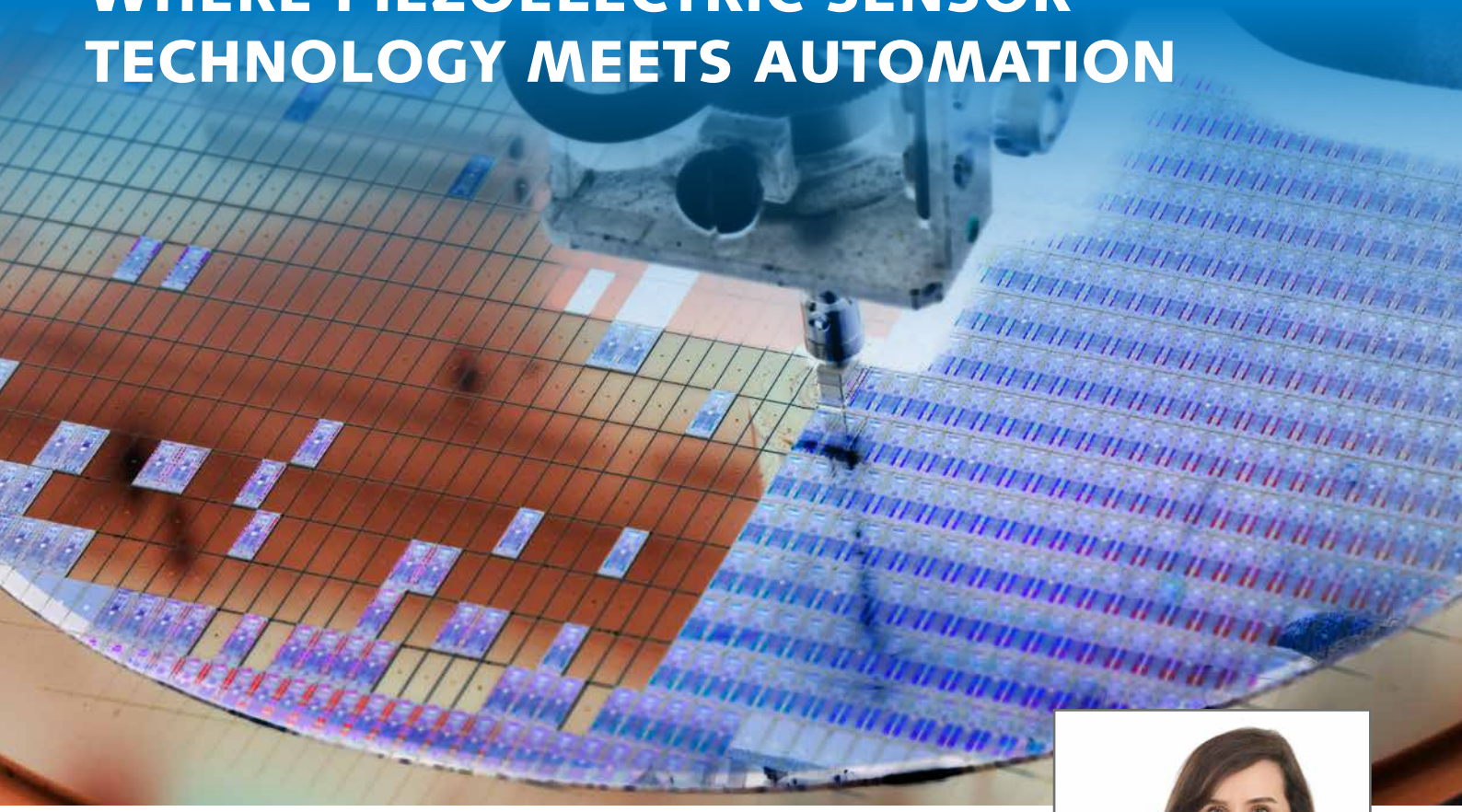
INTERVIEW WITH PRODUCT MANAGER MARYAM BAHRAMI

# WHERE PIEZOELECTRIC SENSOR TECHNOLOGY MEETS AUTOMATION



## New charge amplifier and signal conditioner with Ethernet interface for industrial applications

**The new ICAM-B charge amplifier and signal conditioning device (5073B) revolutionizes the use of piezoelectric sensors in industrial environments – and beyond. We spoke with Product Manager Maryam Bahrami from Kistler about the benefits of this new state-of-the-art device for industrial applications, smart factories and digital manufacturing.**

**Maryam Bahrami**
Product manager for Industrial Amplifiers from Kistler

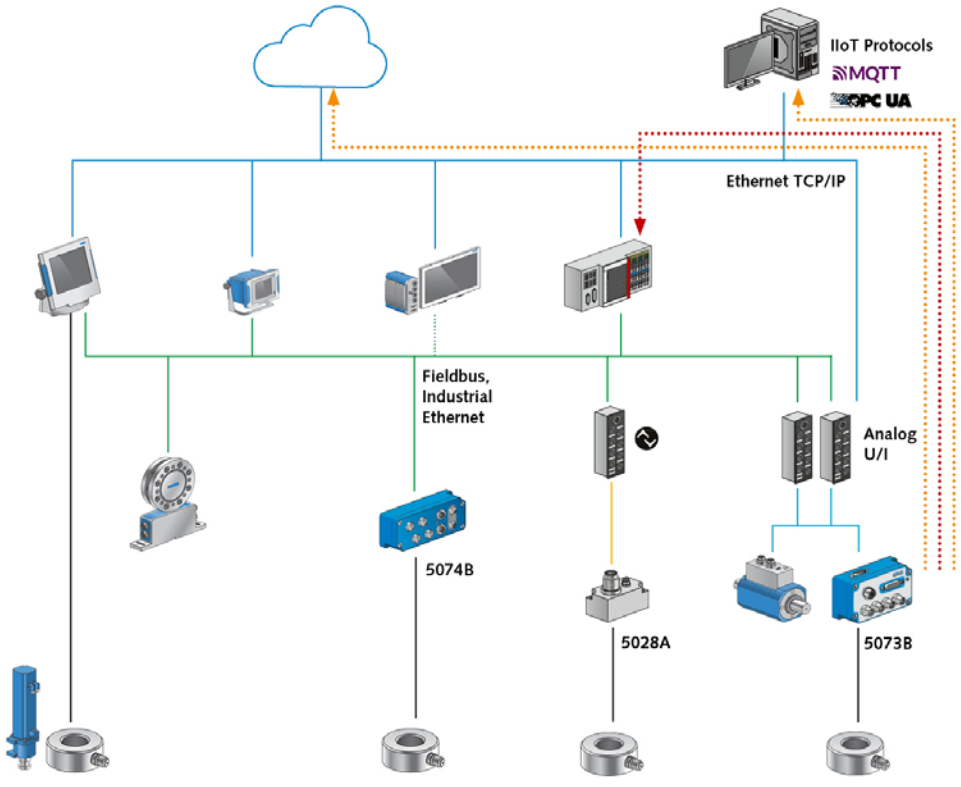
**Hi Maryam! What are the main applications for the new ICAM-B?**

Maryam Bahrami: The ICAM-B charge amplifier and signal conditioner is so versatile that it offers benefits for almost every industrial application where piezoelectric sensors can be used. And with an extended measuring range starting at 20 pC, it's suitable for low-force applications as well – in micromechanics, medical technology or semiconductor manufacturing, to name only a few. The ICAM-B's Ethernet interface is another feature that gives users lots of advantages including the intuitive web user interface: this can be used to configure the device, for firmware updates, factory resets and to activate the license. But that's still not all: the measured signal can be visualized as a function of time in this web interface, and the Ethernet interface offers two IIoT protocols – OPC UA and MQTT – which can be used for remote parametrization and data streaming. And last but not least, the REST API makes it easy to integrate the ICAM-B into automation systems.


The new ICAM-B charge amplifier and signal conditioning device comes with Ethernet and many other features that facilitate the use of piezoelectric sensors in modern digital manufacturing environments.

**Which improvements would you highlight in the ICAM-B, as compared to its predecessor?**

The new charge amplifier doesn't only include improvements – it also comes with a whole series of new features. There's individual configuration and control for each one of up to four channels, for example. Then, users can choose the output signal type from various available options (RMS, min, max, peak to peak, integral, and so on) according to their individual preferences. Each input signal can be routed flexibly to one of the six available analog outputs.
What's more, the ICAM-B offers a vast range of signal conditioning options such as filters, offset definition, and signal scaling. On the connectivity side, as I've already mentioned, we have an Ethernet interface that enables two IIoT protocols – MQTT and OPC UA – as well as a REST API for direct machine integration. The ICAM-B shows its network and channel status via LEDs on the device. Unlike the old version, the new device is galvanically isolated – so noise levels are lower, and device functionality for industrial applications in harsh environments is better.




Ideal for industrial applications and smart factories: the ICAM-B charge amplifier from Kistler combines proven analog signal routing from piezoelectric sensors with Ethernet connectivity including OPC UA and MQTT.

I'll mention one final improvement: users can configure the device so it sends digital output signals to control systems. When the measured signal in the process goes below or above the user-defined threshold, the amplifier sends a digital output signal. This is a very helpful feature for process monitoring.

**Why is it important to have analog and digital signal transmission in one device?**

Because this combination makes the advantages of piezoelectric sensors fully available to modern industrial manufacturing environments – I'm referring to smart factories, for instance. On the one hand, tried-and-tested analog signal routing enables filtering, variable outputs, and real-time calculations. And on the other, digital transmission delivers high interference resistance, continuous communication and data streaming from field device (sensor) level to higher levels in the automation pyramid. So as you can see, the ICAM-B is one single robust and compact device that really gives users the best of both worlds – a cutting-edge charge amplifier for piezoelectric sensors that combines both analog and digital interfaces for high-level signal conditioning and data transfer.

**The new ICAM-B offers Ethernet connectivity and a variety of IIoT options as well. Please can you take us through these new features?**

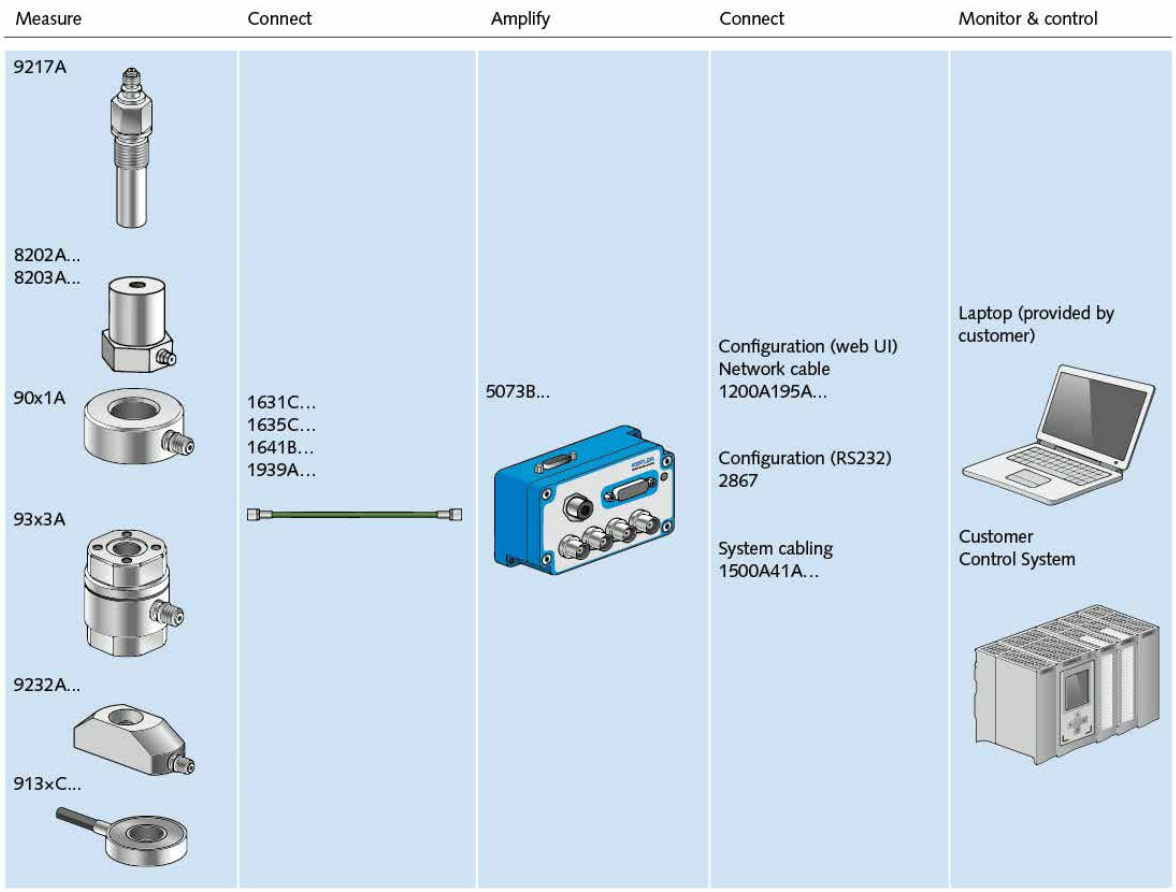
Sure! ICAM-B offers OPC UA and MQTT as licensed options. OPC UA is a standard protocol that facilitates device integration and communication with other devices. Sensor and amplifier configuration and parametrization can be performed remotely with a high level of security. And OPC UA's real-time capabilities make device and configuration updates very efficient. The ICAM-B charge amplifier and signal conditioner also features MQTT, a standard for remote data streaming that focuses on low latency, enhanced security, and highly reliable message delivery.

**One key issue for industrial applications is signal conditioning. Which options does ICAM-B offer here?**

ICAM-B has a lot to offer. First: users may select programmable offsets and low-pass filters as desired. Second: switchable high-pass filters can be used without interrupting the measurements – even in continuous operation. The signal output can be configured as desired, via six analog output channels. Operators can choose from many options here, such as instant value, peak RMS, integral, and many more. And finally, the virtual channel function enables real-time calculations of different input signals from piezoelectric sensors.

**What are virtual channels, and what benefits do they offer?**

In the context of a charge amplifier, particularly in applications involving piezoelectric sensors, the concept of a 'virtual channel' refers to a software-defined channel that allows the user




Powerful signal conditioning plus enhanced connectivity and protocols: the new ICAM-B from Kistler is much more than just a charge amplifier for piezoelectric sensors in industrial applications.

to introduce some calculation from the input channels. Then, the calculated value from these input channels can be measured as an output signal of the virtual channel. The virtual channels can be used to process the sum signal from all or some of the connected sensors. In a conventional setup, the user would need to connect the amplifier to a summing box and measure the output of that box. Virtual channels eliminate the need for additional hardware.
The other use case could be acceleration compensation. In some industrial applications – in the medtech sector, for example – product assembly is performed at very high speed. This introduces an unwanted signal into the force signal that is measured during the assembly process in order to ensure product quality. By including a piezoelectric acceleration sensor, the unwanted signal can be subtracted from the force signal – resulting in a very repeatable and clean force signal.

**In a nutshell, why should users switch to the new ICAM-B? Could you give us an example?**

Basically, because our new charge amplifier offers them so many advanced features that make process monitoring easier and more efficient. Suppose you have a set of machines equipped with a variety of piezoelectric sensors. You can connect multiple sensors to each amplifier and monitor any events that occur in the production line – even from a remote location. Thanks to the ICAM-B's advanced features, users can attain high levels of automation – including efficient machine monitoring and control in industrial applications, based on user-defined thresholds.

**Which options and variants of the new ICAM-B can customers choose from?**

The range of choices is really vast: first, the ICAM-B comes with one to four sensor input channels, according to each customer's requirements. The output type may vary between voltage output (±10 V) and current output (4 … 20 mA). Depending on the harshness of the application environment, protection classes IP50, IP65 or IP67 can be selected. And finally, an optional RS232 interface on the side of the housing ensures that the new charge amplifier and signal conditioner is fully backwards-compatible with its predecessor, the 5073A. ■

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