

**Author:**

Jens Rollmann  
Product Manager  
Calibration Technology & Services

**All-rounder for hazardous areas**

Multi-function process calibrators with explosion protection

*Anyone who has to calibrate intrinsically safe pressure transmitters on site in a plant needs test equipment that is approved for use in hazardous areas. However, it is harder to guarantee explosion protection with the new hand-held generation of portable multi-function calibrators than it was with other conventional devices.*

In processes in the chemical industry, safety and efficiency go hand-in-hand. This is why the process control functions are usually based on electronic measuring instruments such as pressure transmitters. In order to determine whether the monitoring instrument is doing its job properly and with the necessary precision, it must be calibrated regularly. However, even if the instrument check is not required to be DAkkS compliant, calibration processes can often be a time-consuming affair. Inspections in an external laboratory result in significantly more downtime because apart from anything else, the instruments have to be shipped there and back again.

A growing number of firms today choose on-site calibration for this reason. For example, a German chemical company adopted this approach for a multi-purpose plant in its agricultural segment. The plant, whose various sections can be flexibly interconnected depending on the process, is equipped with more than 200 pressure transmitters. Since the operator frequently switches between different media, the pressure measuring instruments require regular calibration. Such checks are carried out before and after every process. By comparing key parameters, it is possible to verify the measurement quality throughout the process. If a production process lasts for a very long time, the transmitters are also calibrated in-between as a functional check.

A considerable amount of equipment is generally necessary for conventional on-site calibration. Apart from the actual calibrator, this entails a means for producing the pressure as well as – in the case of transmitters – a power source. Handling such a wide range of devices is not only complicated, but also takes time and holds many unknowns due to the numerous manual activities.

To simplify their calibration process, the above-mentioned company decided to check the pressure transmitters using WIKAI's CPH7000 portable multi-function calibrator, which unites all the equipment needed for on-site calibration in one instrument. In addition to a highly precise reference (0.025% FS), it also features a mechanical pressure pump and an electrical voltage and current supply module, so that the values can be read out automatically.

The intrinsically safe calibrator version required for this application is ATEX approved (Ex ib IIC T4 Gb classification). This rules out any risk of explosion, regardless of whether the ignition temperature is reached because a surface overheats, an ignition spark is produced owing to static charge on the case, or a fault occurs during electrical operation.

A more complex design compared to other hand-helds was necessary to obtain this approval, especially where the battery is concerned. The capacity of the CPH7000's "powerhouse" must match the instrument's multi-functionality and enable eight hours of operation as a minimum. The lithium-ion cell is cast in a protective sheath, which prevents overheating in the event of a short circuit or other fault. This eliminates the danger of battery cells leaking or being destroyed.

An emergency interrupt function limits the power if it rises excessively. The battery never supplies more than the maximum 24 mA of current and 30 V of voltage, which are output via the integrated electronic module. An additional safety cutout feature was installed as a condition of the ATEX approval.

The test pressure needed for calibration can only be produced using a hand pump because electrical alternatives would not meet the ATEX requirements for explosion protection. By using mechanical components, the battery power is protected and the final value is approached faster owing to the larger stroke. Also, the hand pump has ATEX compliant conductivity: all metal parts are permanently connected to one another, so that they cannot become charged. This simultaneously prevents matchstick effects caused by friction from trapped particles such as chips. Additionally, the pump's piston-cylinder system is fine-tuned so there is virtually no self-heating during pumping.

The CPH7000 and the calibration processes are parameterised and controlled on an intuitive touch screen similar to a smartphone. The screen is made of shatterproof glass that prevents the device from breaking if dropped, resulting in exposed electrical cables in a hazardous area. Even if more severe impacts than a simple fall cause the screen to splinter, it still maintains a closed surface.

The pressure transmitters in the multi-purpose plant are calibrated on site with the CPH7000: the measuring instruments are integrated in the process by means of monoflanges with an Ermeto coupling as the test connection. An external CPT7000 reference sensor is mounted to the coupling for the duration of the test. It is supplied with the same pressure as the transmitter and transfers the value to the calibrator as a digital signal. The result of the calibration is instantly recognizable: the result appears in a green frame if the test item meets the class accuracy, or in a red frame if it does not.

Although calibrating pressure measuring instruments is the most important of the CPH7000's functions, this portable device can also carry out other testing tasks in a single step, like those linked to voltage and current with the electrical module. Switch tests and sensor simulations are just two possibilities of the CPH7000. Temperature measuring points can be checked as well with the help of an ATEX-approved Pt100 sensor. An external atmospheric module and an integrated barometer also provide information on atmospheric pressure, relative humidity and ambient temperature. Because of its small surface, this module in miniature format does not require an intrinsically safe design.

With a data logger that stores all measured values and parameters for documentation purposes, the CPH is equally suited for leak testing. The logger also shows pressure and temperature cycles on a live graph in real time, so any deviations are detected immediately.

The data recorded by the calibrator can be transmitted wirelessly to a host computer or a notebook for further processing. In the opposite direction, calibration routines can be uploaded this way, so that testing processes in sensitive areas are even safer. If the CPH7000's "partner" device is within range for Bluetooth, operators can transmit all relevant information without even leaving the hazardous area.

**WIKAI picture:**  
CPH7000 with explosion protection



**WIKAI picture:**  
CPH7000 with explosion protection



**Application picture:**



Source: Caption: ©werbefoto-burger.ch-Fotolia

**Contact:**

WIKAI Alexander Wiegand SE & Co. KG  
Andrea Suhrcke  
Marketing Services  
Alexander-Wiegand-Straße 30  
63911 Klingenberg/Germany  
Phone +49 9372 132-8031  
Fax +49 9372 132-8008031  
andrea.suhrcke@wika.com  
[www.wika.de](http://www.wika.de)