Validation Solutions

Product Spotlight

Wired Thermocouple Systems

November 2018

In this Product Spotlight we will go through some of the advantages of using a wired thermocouple system as well as make a comparison analysis of Ellab's E-Val™ Pro vs. traditional cable systems (validators) available on the market.

Background
The E-Val Pro is a highly intuitive cable based system, designed for validating applications like, lyophilization, steam sterilization, depyrogenation, environmental chambers, cold storage within various industries and retort sterilization. It was originally designed with focus on usability and superior performance. This was made possible with an intuitive operating system, a fully FDA compliant software package and an intuitive design, offering the latest technology for thermocouple measurements.

Some of the main advantages of using E-Val Pro are:
- 512 mb memory capacity able to hold 10 studies
- Up to 40 measuring channels
- 8-hour internal battery
- No built-in fan, making it 100% Clean Room compatible

With a weight of only 3 kg, the E-Val Pro is an extremely compact and portable unit – especially when compared to the heavier, cart-based validators. There is no need for registration or setup as the E-Val Pro works as soon as the sensors are plugged in. In addition, the module can run as a standalone unit or be connected to a PC.

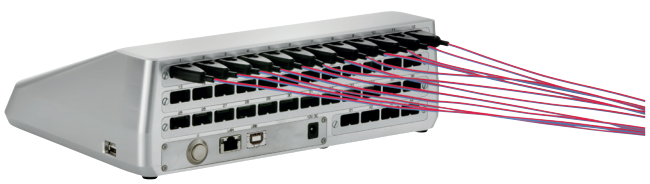
No Loss of Data
The rechargeable built-in 8-hour backup battery ensures that no data is lost in the case of power failures and allows users to relocate the E-Val Pro during or between studies without having to turn it off.

Use any type of sensor input
Usually, traditional wired validation systems incorporate a Sensor Interface Module (SIM) to connect the sensors. These SIMs are typically only able to contain the same type of sensors. Validations however, often require several temperature sensors as well as a pressure sensor, which means that the pressure sensor would occupy an entire SIM. This is highly impractical and would likely add to the overall costs.

The E-Val Pro is equipped with interchangeable sensor arrays, which can handle any type of sensor input. These arrays can easily be changed - or removed for service and calibration, as only the array itself needs to be returned for factory calibration, and not the entire module. The E-Val Pro continues to work once an array has been removed, completely eliminating downtime as extra pre-calibrated arrays can stand by as back-up.

With the combination of 4- and 12-channel arrays with individual ID numbers for traceability, the E-Val Pro can handle all thermocouple types as well as analog and digital inputs. 3 modules can even be connected to the same study, providing a total of 120 channels for a single session.

The E-Val Pro is supplied and ready to handle a measuring range of -200 to +1300 °C depending on the sensor type, and has an ambient operating temperature range of +5 to +50 °C. The sample rate can be set to anything from 1 second to 24 hours and is uniquely independent of the number of channels.



USB Sensor Connection

Connecting sensors is surprisingly easy with the E-Val Pro, especially for those who are used to the outdated method of manually applying each sensor to a screw terminal plug before use. Mounting sensors in the traditional manner required gloves to avoid static electricity, complicated traceability and introduced the risk of human error. Finally, every time a new or extra sensor was required, the whole system had to be powered off.

Ellab thermocouples on the other hand, are equipped with USB connectors. Resulting in a safe, fast and easy plug-and-play setup. The USB sensors can be plugged in and out at any time - and to any channel in the sensor array. And unlike traditional setups, the E-Val Pro can continue to run while moving/removing sensors, further reducing downtime.

Thermocouple Sensors

Ellab offers a wide range of pre-assembled Type-T thermocouple sensors that are ideal for thermal validation processes. The 7-stranded high-performance thermocouples cover a temperature range of -196 to +400 °C and are tightly connected to the fully sealed USB plug. In addition to the excellent strain relief, these sensors offer complete elimination of measuring errors, e.g. from faulty soldering or moisture ingression. For open-end thermocouples we also offer screw terminal plugs.

High Accuracy

Traditional wired thermocouple systems struggle to provide measuring accuracies of ± 0.25 to 0.4°C. Whereas the E-Val Pro easily provides an accuracy of ± 0.05 ºC.

The high accuracy is ensured by the state-of-the-art sensor array design and the implementation of ID chips that enable factory certification and calibration offsets to be stored in each individual thermocouple.

Using the E-Val Pro system means:

- Improved performance
- Considerable time saving
- Secure calibration offsets
- Traceability when changing sensors

To reach this level of performances in addition to storing individual calibration constants and ID numbers, all Ellab thermocouples have a built-in cold junction compensation in the molded and sealed USB connector. A Pt1000 element ensures a high accuracy, leading to a more stable and accurate validation process. In comparison, the common practice for traditional systems is almost completely opposite, in which the cold junction is measured as an average value of the whole SIM, resulting in ambient temperature variations around the SIM, undoubtedly causing measurement errors. As the offset values are stored in the same electronic chip, the wire configuration cannot be changed once connected.

Graphical Display

Due to its 8'' display and user-friendly touch interface, the E-Val Pro is intuitive and easy to operate. The graphical display increases efficiency, as the measured results are easy to read and analyze on the spot. The module provides clear visuals of the setup, programming, data and graphs, making it a perfect interface for running in a standalone mode. The display automatically shows all active channels and presents the time, temperature, pressure and lethality values for each channel. Real-time statistics are also available through the several display options.

Feed-Through System

With our impeccable feed-trough system, up to 80 thermocouple sensors and a pressure sensor can be installed to measure within autoclaves, dry heaters, lyophilizers and other thermal processing equipment all at the same time.

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Numerous other Measuring Parameters
Unlike any other traditional thermocouple system, the E-Val Pro offers the option to measure several different parameters, such as:

- Temperature
- Pressure
- Vacuum
- Relative humidity
- Conductivity
- CO_2

The module offers a fully integrated digital pressure sensor and a sensor interface that allows for interchangeable sensors to be connected.

Intuitive and Comprehensive Validation Software
The E-Val Pro also utilizes the FDA 21 CFR Part 11 compliant ValSuite® Pro validation software, which keeps a complete database of all validation requirements. In addition, it tracks thermocouples, generates calibration reports and allows for test setups, data analysis, specific user access and final compliance reports.

To obtain an extremely strong data integrity and to comply with FDA, ValSuite offers software password protection and Windows authentication. To secure data even further, audit trails and electronic signatures are available for the E-Val Pro module and ValSuite software.

Two highly important functionalities are the predefined names that provide huge time savings by pre-programming all standard procedures, methods, users, sensor positions etc. and the Merging of Sessions, which allows for the comparison of results and to easily identify variations, as is required by e.g. EN15883 (WD).

Calibration made Easy
Even though the E-Val Pro validation systems offers cutting edge technology and a high measuring accuracy, it makes little sense if the performance is not evaluated and documented – in other words, E-Val Pro, like any other system, requires calibration.

ValSuite is not only a validation software, but also a calibration software, offering calibration of all parameters by using the intuitive setup with a savable template. Up to 6 calibration points are freely selectable and can be flexibly adjusted in order. There are 3 modes to choose from: semiautomatic or fully automatic for temperature, and manual calibrations for all other parameters. Automated calibrations or pre- and post-verifications are the greatest time saving features. Once the calibration template is set-up, the software can automatically ramp the dry block or bath and then stream data directly from the reference standard to ValSuite.

With Ellab's Calibration Service you don't have to worry about calibrating your equipment - we can do it on-site or at our certified laboratory.

Custom Fittings
that Ensure Accurate and Repeatable Measurements
The correct positioning of sensors according to the critical measurement point is of paramount importance – more or less as important as ensuring that the sensor itself measures accurately. We therefore strive towards accurate measurements regardless of the application or difficulty of reaching the critical measuring point by providing custom fittings as a part of our services.

For more information
on E-Val Pro or
to find the right solution please contact:

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