Introduction

New developments in analog signal conditioners have resulted in transducers that measure just 6.2 mm wide, greatly simplifying installation and maintenance. Features such as visible, easily accessible connection points, convenient connection via screw or push-in technology, as well as the measurement of current loops without interrupting operation all contribute to the narrow transducers’ ease of use.

Design widths of six millimeters have become standard in the analog transducer market. The choice and functional range of devices have been steadily increasing since 2004, so these compact transducers work in most of today’s applications. However, miniaturization also creates certain disadvantages, such as connection...
points with impaired access or limited labeling options. These drawbacks make the 6-mm transducers less convenient to use than devices that are 12.5 millimeters and above in width.

In this context, the newest slim-line devices on the market allow particularly user-friendly installation, operation, and maintenance – all this while maintaining the established low-cost, space-saving design. While some manufacturers choose to go with a larger housing size, today’s narrow analog transducers can still ensure a wide range of functions and ease of use at a width of only 6 millimeters and a similarly compact height.

**Designed for installation in the tightest spaces**

When control cabinet space is at a premium, device width plays a key role. However, many forget that the device’s height can be equally important. Many transducers need to be installed between cable ducts separated by 115 millimeters. With most narrow transducers, you cannot see the termination hole, and they have to be wired from the bottom up, or the wire above will block the below-termination screw. To solve this dilemma, choose a transducer that can be wired from above, with all connection points visible and accessible. This saves time and eliminates frustration for those doing the wiring.

In addition, pluggable connection technology can offer further advantages. Pluggable modules can be removed from the DIN rail without inverting the connected cables, as every plug is coded and only fits in one position inside the device. With such a compact design, the plug can be disconnected and reconnected tool-free thanks to the patented self-rotating screw release mechanism. And if there should ever be an issue with the module or circuit, pluggable housings greatly reduce time and mistakes in troubleshooting or replacing of the module (Figure 1).

**Clear identification for easier maintenance**

The labeling of six-millimeter-wide devices is a challenge for any user, because analog signal circuits in the field are almost always marked with more than three characters. Today, some 6-mm transducers have a 30-mm labeling surface, so they can accommodate easy-to-place label tags that have space for around 21 characters. Alternatively, existing adhesive labels of the same length can be used.

A status indicator with green (power), red (error), and yellow (switching status) LEDs is another helpful feature. The LEDs are located on the outside of the cover and are labeled according to function. The labeling eliminates the risk of covering the LEDs with additional labels. The user can immediately recognize which type of message it is, so he or she no longer needs to consult the documentation.

**Measure current loops without system shutdown**

Most service technicians know that measuring current loops while the system is in operation risks shutting down the entire system. Built-in measuring points (on both input and output side) solve this problem. The current loop no longer needs to be disconnected to connect the multimeter in series. The technician can measure the entire loop without disconnecting the circuit. Thus, no error occurs and no component is disconnected – even briefly – from the signal circuit (Figure 2).

These test points also eliminate the need for a knife terminal block that technicians sometimes use to get the multimeter’s...
leads in series for current loop testing purposes. This makes it convenient to troubleshoot an issue with a 4-20 mA signal coming into a transducer, with current loop measuring points on both input and output side. The technician can easily determine the source of the issue, field device, transducer, or control device.

In addition to the current measuring feature of the pluggable connector, the user can also disconnect the input, output, and supply circuit’s connectors. This may be important during start-up, when the application is being tested in the field, and the signal is not to be transmitted to the controller. For this, the quick screw-release mechanism on the plug is rotated 180 degrees, so that the plug reaches the electrically isolated position. This way, the cables remain in the correct position and do not dangle loosely inside the control cabinet. Subsequently, they can be reconnected by simply pressing the plug with your finger.

**Intuitive configuration using DIP switches or software**

Easy configuration via a DIP switch is another helpful feature in the newest transducers. All of the configurable measurement ranges are calibrated when the transducers are manufactured. This eliminates the need for subsequent adjustment or tweaking. An electrically isolated USB programming adapter permits module configuration without the modules needing to be connected to a power supply.

Ease of use remains the top priority in this area as well, and some transducers offer three different solutions. The first approach is based on the manufacturer-independent FDT/DTM technology, which allows the parameterization of devices from many different suppliers using a single program. With this, the FDT (Field Device Tool) acts as the framework application and the DTM (Device Type Manager) as the driver for the device in question. A second DTM-only solution is available for users who want to continue using their FDT framework application already in use. Finally, traditional stand-alone software with configuration screens is still an option.

**Simple configuration using a smartphone**

To optimize a device for a specific application, many types of devices in the MINI Analog Pro isolation amplifier family can be individually configured. Phoenix Contact offers a free Android app as an alternative to configuring the devices via DIP switches or a PC. To this end, the mobile phone is simply placed on the isolation amplifier to create a wireless connection via Near Field Communication (NFC).

Depending on device type, the free app for Mini Analog Pro offers a variety of functions. The app with some transducers can offer more than configuration, however. The user can also consult connection schematics, descriptions, and other device documentation. All data can be saved and sent by e-mail, simplifying communication during service deployments. (Figure 3).

The DIP switch adjustment tool supports setting or checking DIP configurations with the help of animated DIP switches. In addition to these functions, the configuration allows complete device configurations to be imported and exported. The app is currently available for Android devices.
Near Field Communication (NFC)

Some devices have also integrated a Near Field Communication (NFC) interface. NFC establishes a wireless connection between the smart device and the module for yet another configuration option. This way the user only needs a mobile phone or tablet and associated app to carry out the required functions. This is particularly useful when deploying service at remote sites. The technician no longer needs to carry a special cable or an adapter. He or she merely places the smart device on the transducer to activate the connection. Unlike Bluetooth technology, NFC does not have complicated coupling procedures. Communication via NFC is limited to a few centimeters, which prevents unauthorized access. Also, it is not necessary to connect to the power supply.

Conclusion: high quality from a single source

The MINI Analog Pro product family from Phoenix Contact has all of the features highlighted in this paper. Phoenix Contact has focused not only on the usability of the transducers, but has also developed a new switching technology. It allows for use in temperatures ranging from -40 up to 70 °C, something that no other company offers. In the six-millimeter category, MINI Analog Pro offers the best isolation available on the market. It allows 3 kV test voltage and a rated insulation voltage up to 300 Veff. The power supply unit now also offers new functions. Voltages between 9.6 and 30 V DC can now be connected, meaning power fluctuations are no longer an issue and transducers can even be used in 12 V power applications.

During installation and start-up, the technician focuses on transducers and isolation amplifiers. They must reliably perform their task for decades to come – just like terminal blocks. For this reason, ease of use is particularly important when selecting a device. Phoenix Contact meets this requirement with its MINI Analog Pro product family, developed in-house and produced in its own plastic, metal parts, and SMD manufacturing facility according to the highest standards.

www.phoenixcontact.com/minipro