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EDDL Solution for Field Tasks

Field communicators have existed for as long as intelligent devices. The early problem of plants having to grapple with many different communicators was solved already in the mid nineties by standard protocols like HART and Foundation fieldbus together with the Electronic Device Description Language (EDDL, formerly just known as DDL), an integral part of both technologies. A single universal field communicator supports all instruments, an arsenal of many communicators is no longer required.

Use of Windows software from the central control room has since become possible thanks to multiplexers and digital communication interfaces embedded in control system I/O modules. These systems may access data in devices using HART, FOUNDATION fieldbus, PROFIBUS, WirelessHART, or a combination of two or more of these. Although many maintenance tasks can be done remotely from centrally located device management software part of Asset Management Solution (AMS), there are several other tasks that must still be carried out in the field right next to the device. Because of such field work, a compact field communicator is highly valued by maintenance technicians. A notebook computer is not ideal. EDDL is the only technology suitable for portable communicators because it works on embedded operating system used in such devices. IEC 61804-3 graphical enhancements the EDDL now make field communicators easier to use and powerful enough for complex devices.

Need for field work

When commissioning most field devices you can't just install the device and walk away. There are adjustments that need to be done "in-situ" (in the field), for which the device cannot be prepared in the workshop. These tasks have to be done in the field, and in order to not need a second technician in the control room or disturb the operators to send commands from the control room, a communicator is needed by the technician in the field.

Field Calibration

After installing a pressure transmitter it is often required to do a zero trim for mounting position. If the transmitter is drifting it may have to be done again at some point in time. It is advantageous and most practical to do in-situ calibration trim without removing device and bringing it to the workshop since this is faster and the mounting position is true. An in-situ zero trim first requires the technician to isolate, equalize, and vent the manifold. This cannot be done remotely, only in the field. Performing the zero trim requires a command to be sent to the transmitter. The fastest and most practical way to do this is for the technician in the field to do it himself, without a counterpart in the control room or bothering the operators to help. Therefore, a field communicator is required.

Field Configuration/Setup

After installing a pressure transmitter it is often also required to elevate or suppress the lower range value to cancel a "wet leg" in either impulse line. This can only be done after the transmitter has been mounted in the field, not in the workshop in advance. Setting the range requires a command to be sent to the device. In the field, a communicator is the most convenient solution to this.

After replacing a valve positioner it is necessary to set it up and stroke it to make sure the valve travels unrestricted and to adjust the valve position feedback to correctly indicate position. To know the valve can reach its end positions the setup is done in the field where travel can be verified.

A radar level transmitter needs to have its echo filtered to eliminate false echoes from obstructions inside the tank such as heating element or agitator etc. This is typically done in the field so that

technician can look inside the tank to verify. A field communicator is a convenient solution for this task.

Field Troubleshooting

Intelligent device management software part of asset management solutions is very effective to capture reported device problems and to verify if suspected device problems are real. However, if there indeed is a genuine problem reported by the device diagnostics, the troubleshooting and repair must be done in the field at the device. During field troubleshooting it is common to make mechanical adjustments and parts replacements. In this process the technician typically want to perform diagnostics and a function check before leaving. This requires sending commands to the device. A communicator is the most practical way of doing this in the field.

Early configuration solutions

In the past, two solutions existed; either portable field communicator without graphics, or graphics on a notebook computer which is not very portable.

Traditional DD had no graphics, so communicators had only a few lines of text, without color. Therefore early field communicators could not display information in the form of graphs, charts, bar-charts, and histograms etc. as required for advanced functions in "complex" (sophisticated) devices. That is, traditional DD was best suited for "simple" devices.

There is computer software that display device diagnostics and do calibration, the catch is that you need to lug a notebook computer or tablet PC with interfaces into the field and find a place to rest it while working.

EDDL on the Move

A field communicator is more practical. It is sufficiently light and compact to hold with one hand for a long time while entering data with the other. It is therefore sometimes called "handheld terminal" (HHT) or "handheld communicator" (HHC). In the field, a field communicator is the best solution for maintenance (as per NAMUR NE 74 clause 5.1). The handling of a communicator corresponds to ergonomic principles for hardware and software.

A field communicator is lightweight and can comfortably be carried a whole day, truly portable. Some are intrinsically safe simplifying work in hazardous areas. Low power consumption makes sure the battery lasts a whole workday without recharge so no need to leave the job unfinished due to battery running flat. Rugged designs without moving parts (e.g. fan or hard disk) suitable for field use can even tolerate low drops. Ingress protection without ventilation holes make communicators splash proof also preventing dust from entering. In short, field communicators are designed to roam in a plant or machine room, not just conference rooms and airports.

To make a communicator compact and lightweight, the screen and keypad are not as large as on a computer, but on the other hand the keypad has dedicated function keys for fast menu navigation. The buttons are large enough to be pressed wearing protective gloves.

Some field communicators now have touch screen and features graphics and color. A large stylus for the touch screen makes navigation and data entry easy even while wearing protective gloves.

Figure 1 field communicator with color screen

Using EDDL, one "universal" communicator can support all instrumentation regardless of the manufacturer. EDDL files are small compressed text files. Therefore a field communicator can store EDDL files for a large number of device types, of many different versions, using different protocols. A communicator is easily updated to support new device types and versions. There is no need to send the field communicator to the factory for upgrade. User does the upgrade in their workshop using a computer. There is no license key required to unlock access to functionality in devices.

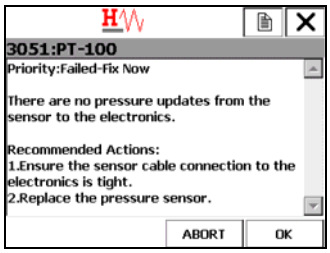

Figure 2 Explanation by the device manufacturer's expert provide user guidance

Communicators are based on EDDL because EDDL works on embedded operating systems like those found in field communicators. Therefore there are no communicators based on other device integration technologies.

Graphics, step-by-step wizards, and help is key to make working with sophisticated devices easy. Help and wizards have been a part of traditional DD since 1992. Wizards are essentially Java-like scripts called methods created by the device manufacturer to guide the technician through more difficult tasks like setup or calibration trim in the proper sequence making their device easy to use. The help function is information provided by the device manufacturer's expert to help technician configure the device, or interpret and act on diagnostics.

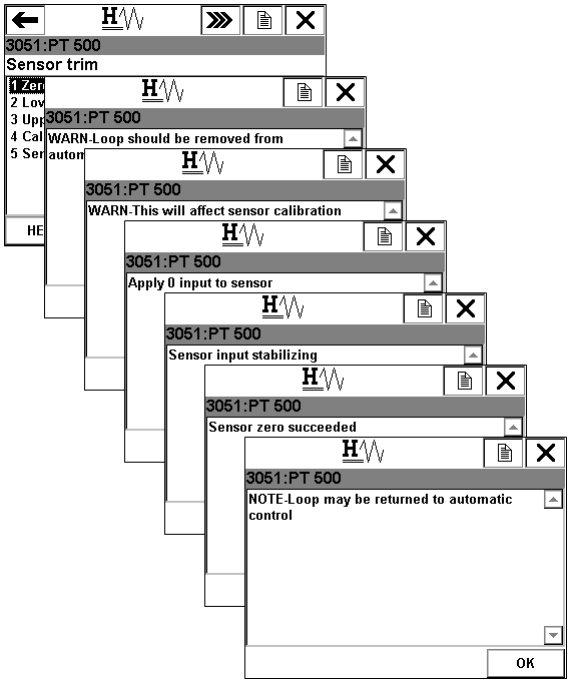

Figure 3 Device manufacturer creates wizard that guides technician through complex procedures step-by-step

Thanks to EDDL enhancements, field communicators also support presentation of data in graphical form. The enhancements to EDDL standardized in 2006 introduced new graphical elements: illustrative images, multi-pen trend chart, dial gauge, bar-graph, histogram, multi-pen waveform graph, and table. These graphics are supported on new communicators with color display and some earlier models with black & white display. These EDDL elements are now used by device manufacturers to present configuration of intelligent devices in a way making them easy to work with from a computer or field communicator.

The content and organization of the device information displayed in the communicator is defined by the device manufacturer to make sure all data is accessible, no functionality is lost. That is, EDDL is the key to interoperability. The look & feel of graphical elements chosen by the device manufacturer is rendered by the communicator identical for any device connected to the communicator ensuring they work the same way for every device in the plant. This consistency makes working with their device very intuitive.

The EDDL enhancements makes it possible to perform more device functions in the field, including advanced diagnostics and setup, tasks previously not possible using a communicator; tasks which previously required a notebook computer. For instance, a communicator is able to display multiple waveforms such as the echo curve and threshold when setting up a radar level transmitter.

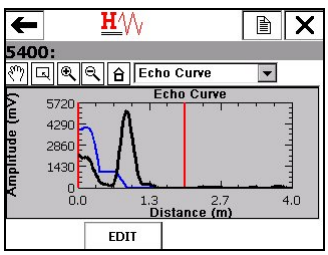

Figure 4 Graph visualizes multiple waveform such as radar level transmitter echo curve

Images, help text, and other user guidance is available in a field communicator just as in a workstation software. Images are provided by the device manufacturer's expert to help understand setup options and in interpretation of diagnostics when troubleshooting in the field.

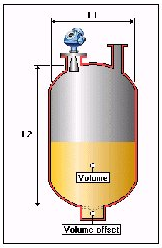

Figure 5 Image help in the interpretation of parameters such as tank geometry

The device manufacturer may display large data set in an Excel-like table format for easy editing.

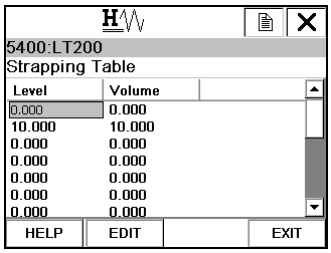

Figure 6 Edit large amounts of information in table format such as strapping table

Value over time is displayed as a trend-chart, typically including multiple values.

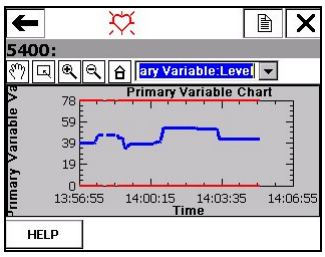

Figure 7 Multi-pen trend-chart visualizes variables over time

Instantaneous value may be displayed as a dial gage to easily grasp how near or far from the upper or lower limits the value is, and how fast it is moving.

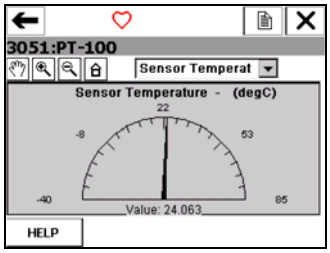

Figure 8 Dial gage graphically represents "where" the variables is

Computer in workshop

Of course, if somebody wants to use a notebook computer to get a larger screen, this is also possible. There are several EDDL-based programs for different protocols suitable for notebook computers that can do device setup and diagnostics. A notebook or desktop computer is ideal for device maintenance in an instrument workshop.

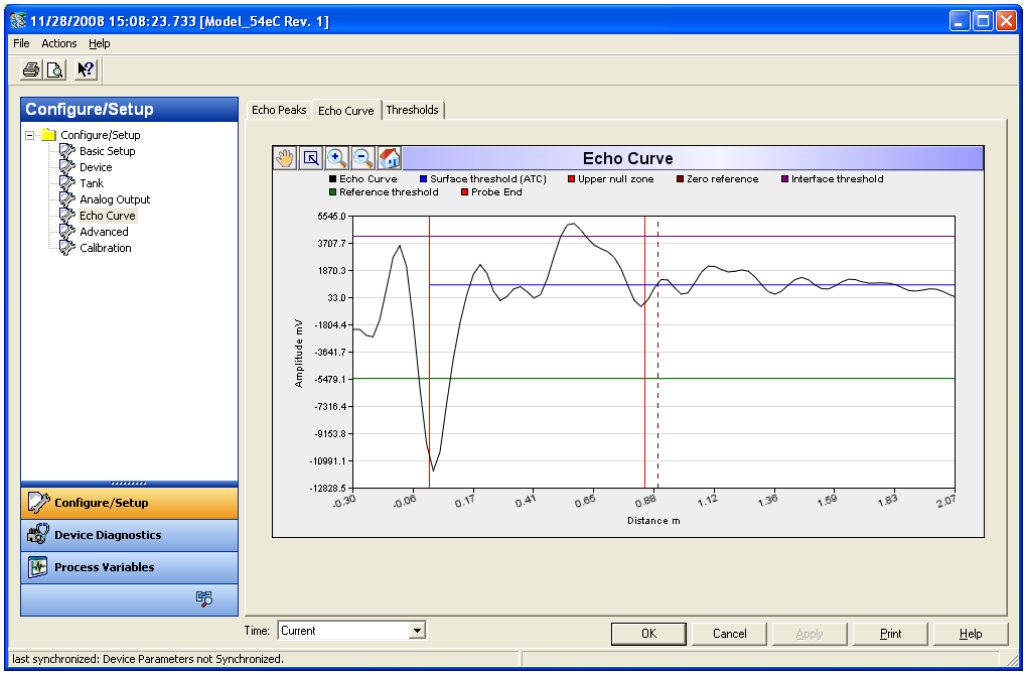

Figure 9 The main use of EDDL is in computer software

The price of a field communicator is lower than a notebook computer once the whole package is taken into account. Apart from the configuration and setup software you need the computer, operating system, and HART and FOUNDATION fieldbus interfaces. A dedicated computer is recommended such that it is available when urgently needed. It may not be used every day, but when needed they are indispensible and there is no time to go searching.

Another device integration technology offers free software. However, driver software license key for each device must instead be purchased to unlock functionality of some devices.

More Efficient Maintenance

Using HART, FOUNDATION fieldbus, PROFIBUS, and WirelessHART, field work is reduced but not eliminated. Some tasks have to be carried out in the field. Instrument technicians equipped with a communicator are more self-reliant, and do not take valuable time from production operators to work the device. Using enhanced EDDL, also sophisticated devices can be setup and advanced diagnostics performed.

It may be a good idea to replace existing DD field communicators with communicators supporting EDDL with enhancements to enjoy the greater ease of use afforded by the standard graphical display. But don't replace your field communicator with a notebook computer.

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