

Fieldbus 501

Commissioning

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Overview

How is the commissioning process different with fieldbus?

Compared to traditional analog technology, FOUNDATION fieldbus reduces commissioning time and cost. Reduced commissioning time can mean an earlier startup, and therefore more revenue.

In the analog world, commissioning is done one device at a time by two technicians with walkie-talkies and multimeters. With FOUNDATION fieldbus, an instrument technician can attach several devices to a segment in the field, while an operator watches the devices appear on the control-room display — completely functional and ready to go.

This course provides tips on commissioning FOUNDATION fieldbus devices.

Hint: As you go through the topics in this course, watch for answers to these questions:

- *What are the steps associated with the commissioning of fieldbus devices?*

- *What is an unconfigured device?*
- *How can you shorten commissioning time?*

The PlantWeb advantage

When you work with Emerson Process Management on a PlantWeb project, you get the benefits of an architecture designed specifically for FOUNDATION fieldbus — and all we've learned in over 1000 fieldbus projects.



This can make a real difference in commissioning. Although FOUNDATION fieldbus offers the potential to reduce commissioning time and cost by up to 90%, the FOUNDATION fieldbus specifications don't cover how devices are to be commissioned. Actual commissioning practices and host-system capabilities differ from vendor to vendor. As a result, time required to commission fieldbus devices may vary.

The commissioning practices described in this section are based on our experience with PlantWeb. Commissioning cost and time savings of 75% to 90% are typical.

Although PlantWeb can use these commissioning practices, solutions based on other host systems may not. Ask your vendor about commissioning practices, references, and examples.

Staging

As automation architectures become easier to integrate and install, staging is becoming less common. If this is your plant's first fieldbus project, however, staging a small fieldbus system (or part of a larger one) in a lab or office gives everyone a chance to gain familiarity with the technology.

For example, **instrument technicians** can practice connecting devices and verifying device operation and configuration. You could even simulate potential error conditions such as missing or extra terminators so the technicians can get used to viewing and correcting these problems.

Operators also benefit from early hands-on experience. At many plants, they're part of the team that develops displays and control strategies. At a minimum, give them time during staging to become familiar with the system and verify both the operator interface and control action.

If possible, use a host system to **simulate control and operation** so operators can start, stop, and step through the control strategy and displays before startup, even without the field devices connected to the host. This is especially valuable for sequencing operations.

Taking advantage of the opportunity to train operators and technicians during staging can help save time — and avoid problems — during actual plant installation and startup. It will also speed acceptance of the new equipment and software.

The PlantWeb advantage

The simulation capability of PlantWeb's DeltaV and Ovation automation systems lets you run control configurations in PCs without I/O or devices.



You can use this capability to configure and debug control strategies, and operators can generate and train on operating displays before the actual controllers and devices are installed.

Pre-configured or not?

For a first-time fieldbus project, or a project with a tight timeline, buying devices that are pre-configured with specific plant parameters can **save you valuable time**. That's because the physical and software capabilities are already set up. All you have to do is install and verify the devices.

You'll spend a little more time specifying these pre-configured devices because **configuration parameters must be communicated at the time of purchase**. This means device tags and operating ranges must be known prior to delivery, which isn't the case with unconfigured devices.

You may also want to **order the devices earlier** so each pre-configured device is available when it's needed. And you'll have to be careful managing device inventory — even for identical devices — since each may have a different configuration.

Despite the few disadvantages of pre-configured devices, many people choose to go this way because of the time savings.

Using pre-configured devices

Each pre-configured device must be installed in the specific plant location it has been configured for.

You'll also need to set up the control strategy to access the field device at a specific tag and/or address.

The easiest way to do this is with a host system that allows configuration of a placeholder with the correct device type and tag in the host database — without the actual device being connected.

Commissioning the device should then be as simple as

- Attaching it electrically to the segment, which causes fieldbus to recognize it as an uncommissioned device with a tag.
- Using the configuration software to "drag and drop" the newly connected device onto the appropriate placeholder. This creates the link between the physical device in the plant and the configuration in the database.
- Uploading the device internal data from the device to the host, and downloading the control strategy from the host to the device.

The PlantWeb advantage

This is the process for using pre-configured devices in PlantWeb. It really is that easy!



Using un-configured devices

Unconfigured devices are configured during commissioning. To do this,

- Connect the appropriate devices to a fieldbus segment. The system will recognize them as uncommissioned devices.
- In the configuration software, drag and drop each device onto the appropriate segment.
- Assign the tag for a specific process location to the appropriate device.
- Load the configuration into the device.

The PlantWeb advantage

This is the process used for commissioning unconfigured devices in PlantWeb architecture.



And because the PlantWeb configuration tool **AMS Suite: Intelligent Device Manager** supports offline configuration, you don't have to wait for the device to arrive at the plant to prepare its configuration. You can do it as soon as the configuration tool is available.

Tagging devices

A typical segment may have several unconfigured devices of the same type. For example, you may want to attach three similar valves to the same segment before returning to the control room to commission them. It's vital that each physical device be given the correct tag and configuration, and linked to the correct control strategy.

One way to manage this is to use a **two-part** instrument tag attached to the field device at the factory.

The two-part tear-away tag has the **device serial number printed on each part**. When an instrument technician attaches a device to a segment, he writes the plant tag on the removable portion of the physical tag. Then he separates the tear-away portion to take back to the control room.

When he gets there, he looks at the list of uncommissioned devices on the host operator interface. The individual device serial numbers printed on the tear-away instrument tags he's holding will be shown on the display. The technician now knows which devices are in specific plant tag locations, and thus can correctly commission the devices.

Other methods may also work. This method has proven successful in a large number of installations.

Attaching devices

When you attach a fieldbus device to a segment, it's recognized by the system but identified as uncommissioned. Fieldbus allocates four addresses for uncommissioned devices, which means you can attach and then commission four devices at a time. Some hosts don't support this, requiring you to commission every device as it's attached.

For one person working alone, attaching and commissioning 16 devices therefore requires 4 to 16 trips to the field. Two people working together — one in the field and one in the control room — still do the job four devices at a time, but without all the back-and-forth trips.

The PlantWeb advantage

AMS Suite: Intelligent Device Manager software in DeltaV and Ovation allows you to commission more devices at one time by reserving some of a segment's 32 operating addresses for uncommissioned devices.



Sixteen addresses are reserved for uncommissioned devices, and 16 addresses are used for commissioned devices. This approach allows all the devices on a segment, up to 16, to be attached at one time.

As a result, a technician can connect a large number of devices to many segments without requiring that someone always be available in the control room to commission the devices as they are attached.

Calibration and scaling

Calibration is often associated with analog devices. It's therefore sometimes assumed that digital fieldbus devices don't need to be calibrated. Many do.

With **analog devices**, calibration compensates for inaccuracies in three parts of the device:

- Sensor or actuator
- Device electronics
- Analog communications signal.

Fieldbus devices have no analog communications signal, eliminating that source of error. However, on many devices the sensor or actuator, and the device electronics, can have errors. So calibration is still sometimes required.

With an analog device, such as a transmitter, the **output is scaled** so that the expected operating range uses the entire 16 mA of a 4-20 mA signal. This minimizes the effect of error in both the transmitter analog output and the host analog input. However, it's common to see errors resulting from a mismatch between the scaling of the field device and the host.

With digital fieldbus devices, **output scaling isn't required** — so there's no such mismatch. Fieldbus does require that the unit of measure be the same in both the device transducer block and the function blocks.