



Figure 1:
The FIM-110 FF interface module for FOUNDATION fieldbus integration can also be used in potentially explosive environments.

Softing Gateway Allows Integration of FOUNDATION™ fieldbus into Legacy Plants

Designed for mapping the Modbus communication protocol to FOUNDATION fieldbus, Softing's FG-110 FF gateway offers the possibility to renew and expand legacy plants in the process industry by modern and highly functional segments without requiring substantial changes to the main installation. In this way, plant operators can use state-of-the-art technology to increase production capacity while saving costs, protecting their investments, and making optimum use of the achievable lifetime of their installations.

Plants in the process industry frequently control complex processes comprising several thousand measurement points. Accordingly the controllers and field devices used as well as the expenses for installation and commissioning often add up to a large investment amount. Therefore, it is small wonder that these plants usually run for a long time, and are not replaced by new plants at short intervals. Many processing plants are now past their prime and still use communication protocols that provide process data on an analog basis. These legacy plants of course age along with their components, and thus need a certain amount of maintenance. But the renewal of existing automation technology or the expansion of a processing plant is often no easy feat. The devices used as well as other components have frequently become obsolete: It may happen, for example, that individual components currently installed in a plant have meanwhile been discontinued and are no

longer available. And even if the required devices can still be obtained, the procurement costs may be very high because the underlying technology does not serve a mass market any longer. At the same time, the implementation of a completely new plant is usually not an option either, as this involves a prolonged production stoppage. In the process industry, the cost of downtime can be substantial and may quickly run into the millions for a large plant. Considering the fact that in this case the controllers also need to be replaced along with the associated field devices and the necessary cabling, the high investment costs involved do not justify this approach either.

Fieldbus Integration via Gateway

A way out of this dilemma is to use the FOUNDATION fieldbus (FF) for renewing individual plant sections or for expanding a plant by new components. In this way,

the advantages of this fieldbus are also available to the newly implemented sections of outdated plants. These advantages include, for example, increased data accuracy and enhanced system reliability through digital technology, as well as improved plant availability due to preventive maintenance based on the available diagnostic information. Further benefits are easy expandability, reduced costs over the entire product life cycle, improved reproducibility of individual processes, and reduced installation and cabling by field-mounting close to the individual process points.

This solution requires the integration of fieldbus technology into the legacy plant, including consistent data exchange. This is accomplished by using a gateway that is connected to the plant and at the same time provides a FF H1 interface for connection to the newly integrated subprocess. To unlock the special benefits of the fieldbus in the newly implemented plant

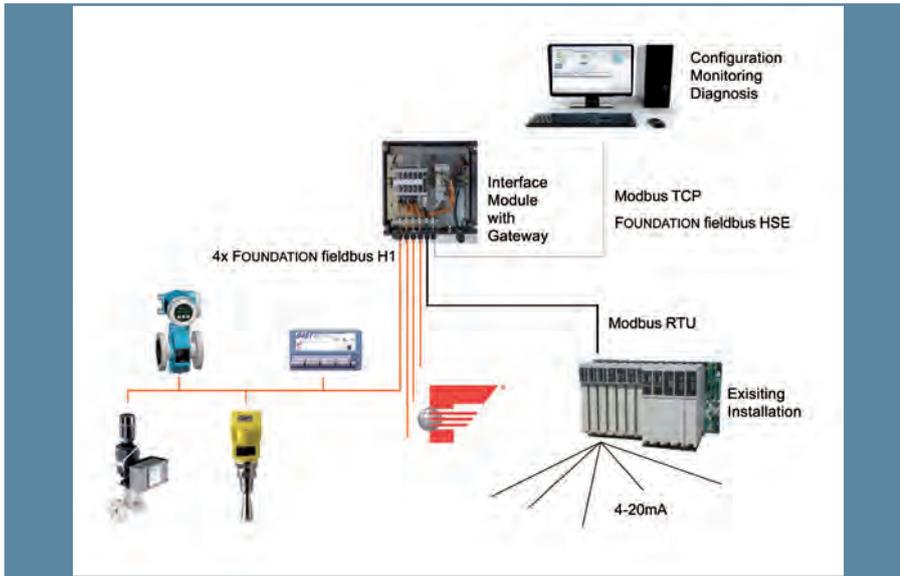


Figure 2: A gateway allows the renewal and expansion of legacy plants by FF components

sections, the gateway has to support not only pure data exchange, but also FF-specific communication capabilities.

Comprehensive Functionality of the FG-110 FF

With the FG-110 FF product, Softing offers plant operators in the process industry a solution to facilitate fieldbus integration and make full use of FF advantages. The gateway functionality of the FG-110 FF allows the exchange of process data between the existing plant and the renewed or expanded plant sections. Any legacy plant supporting the Modbus protocol can be connected either serially or via Ethernet. On the fieldbus side, four FF H1 segments with up to 64 field devices are available. To allow universal use, a flexible mapping is needed between the Modbus world and the FOUNDATION fieldbus world. For this, the FG-110 FF provides a special user interface, in which the mapping of FF functions to Modbus registers can be defined to suit the specific requirements of the plant. The FG-110 FF thus makes it possible to integrate the FF world into a wide variety of traditional control systems available in the market.

The FG-110 FF gateway also supports a Linking Device interface, which provides access to the FF H1 network via the FF High Speed Ethernet (HSE) protocol and thus allows the implementation of additional FF functionality. FF HSE can be used in parallel with other Ethernet communication protocols. Using the Linking Device interface, solutions for the configuration,

monitoring and diagnostics of FF H1 segments can be integrated into the overall system. The FG-110 FF comes with a FF configuration software package for the definition of connections and the execution of FF Function Blocks (function blocks in the individual field devices that can be executed on the basis of input values in a decentralized and independent manner, and that provide results for further processing). The software also supports the definition of additional communication capabilities and the parameterization of field devices. Therefore this configuration tool provides the complete FF configuration functionality and eliminates the need to purchase additional software or interfaces in order to perform this task.

The FF HSE interface of the FG-110 FF gateway also supports the integration of modern asset management systems and other software packages into the FF part of the overall solution. Software solutions like Emerson's AMS Suite can be included directly and without adaptations. Other software packages supporting Field Device Tool (FDT) technology (such as SMART VISION, FieldMate, Field Device Manager or PACTware) use the included communication and gateway Device Type Manager (DTM) of the FG-110 FF to access FDT compliant FF H1 field devices for parameterization and other tasks.

In addition, the gateway features an integrated web server which provides additional functionality, such as the monitoring of process values and Function Block inputs and outputs. It also displays information on the quality of the individual values.

Another key advantage of expanding legacy plants with FOUNDATION fieldbus is the possibility to implement "Control in the Field", a specialty of FF. Using this functionality, the control tasks are not performed by a centralized controller, but distributed to individual field devices. The control loops are described by defining the communication relationships (i.e. data exchange) between the respective outputs and inputs of the individual Function Blocks as well as their scheduling. This is done by synchronizing the communication between the Function Blocks based on common timing. In this way, a remote control functionality is available without interfering with the control program of the legacy plant, thus minimizing the risk and effort involved in renewing and expanding an existing plant.

Future Proof Technology

In addition to the FG-110 FF gateway, Softing offers an interface module for FF integration – the FIM-110 FF. This product includes the gateway, but also features additional components required for an interface module, such as power conditioners or an RS232-RS485 converter for Modbus communication. The preassembled module is delivered ready-to-use in an IP65 rated housing. As the FIM-110 FF comes with the appropriate certificates for use in explosive environments, the module can be used in potentially explosive atmospheres and field-mounted close to the process. As a result, only minimal cabling is required.

The presented approach to renew and expand legacy plants by implementing FF segments has already been applied and proved effective in a number of use cases. As both the FG-110 FF gateway and the FIM-110 FF interface module are based on state-of-the-art technology, this solution ensures that legacy plants expanded with these components are future proof, and that the investments made are protected.

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