

# Configure... Get Set... Go!

## Fast Implementation of PROFIBUS PA Transmitters

Trends in process automation in recent years have been moving away from proprietary and analog communication technology, and towards the use of digital fieldbuses which have many advantages. One of the most important is the widely used PROFIBUS fieldbus with its PROFIBUS Process Automation (PA) application profile. Many manufacturers are thus expanding their portfolios with field devices that provide a PROFIBUS PA interface. Due to the complex underlying technology, a PROFIBUS PA implementation is no small matter, however. It requires in-depth PROFIBUS knowledge and extensive hardware and software development work. As a result, device manufacturers are looking for ways to cut development costs and reduce the time-to-market. A very easy-to-use implementation solution is offered by the PAeasy product from Softing Industrial Automation.

### Comprehensive requirements for PROFIBUS PA devices

To better understand the advantages of PAeasy, it is useful to take a look at the work involved in a standard PROFIBUS PA implementation. The Physical Layer of the OSI Reference Model (Open Systems Interconnection Model) is implemented by the hardware of a PROFIBUS PA field device. Based on the MBP (Manchester Coded Bus Powered) transmission technology, the hardware allows powering the field devices over the bus. The hardware is responsible for connecting the device to the PROFIBUS PA network, for processing the lower levels of PROFIBUS communication, and for executing the PROFIBUS PA firmware.

The PROFIBUS PA firmware comprises the software part (i.e. the less time-critical functionality) of the PROFIBUS PA protocol stack and the function block application. While the PROFIBUS PA protocol stack is responsible for the pure data exchange via the fieldbus, the function block application implements an interface to the specific device functionality and ensures that all device functions and parameters as well as the access to this data is standardized throughout the network. In the function block application, the uniform and systematic access to the different field device parameters within the PROFIBUS PA network is standardized using a block model. The function blocks cyclically access the dynamic process parameters while the physical block provides access to the data containing the physical device properties. Transducer blocks map the device-specific process data to the standardized function blocks. The device data is pre-processed and calibrated during mapping. Within the function block application, the function block shell is responsible for linking the different blocks to the PROFIBUS PA communication and for controlling their execution. This component can thus be seen as a kind of run-time environment for PROFIBUS PA blocks.

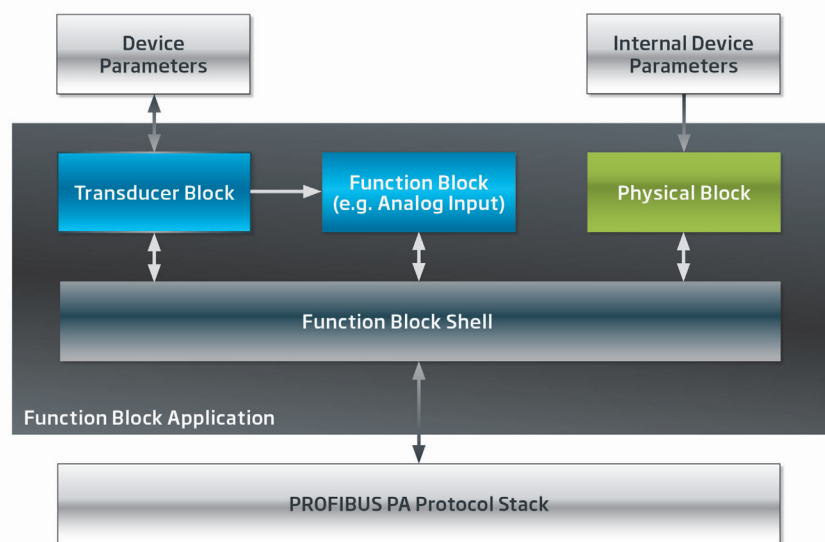


Figure 1: Block diagram of function block application for simple transmitter interfacing the PROFIBUS PA protocol stack

Within a PROFIBUS PA field device, one or more transducer blocks serve to adapt the specific individual device parameters for standardized fieldbus access. To access these internal parameters, they make use of internal device communication (e.g. a serial protocol). This makes them a key component in fieldbus implementation. Special attention needs to be paid to the number of parameters because even a simple PROFIBUS PA transmitter supports at least 80 (fixed and variable) parameters depending on the respective device profile. As a result, the transducer block implementation with the associated pre-processing often involves writing long and complicated programs with a high potential for error. The development and test efforts are correspondingly high.

As outlined above, the implementation of a PROFIBUS PA field device with custom hardware and software development involves a lot of work. Therefore, it often takes more than a year from first conception to final device certification – a fact that

tends to discourage many manufacturers. Approaches based on the use of pre-engineered hardware and software with the aim of reducing development cost and time-to-market for field devices are thus of particular interest.

### Experience ensures easier implementation

Softing decided launch a very easy-to-use solution for a PROFIBUS PA implementation designed specifically for the needs of manufacturers without fieldbus experience who are looking to offer PROFIBUS PA access for their devices without having to meet special requirements. For this purpose, Softing analyzed a number of successful PROFIBUS PA implementation projects and compared the properties of the implemented field devices. The aim was to find the greatest possible common set of functionality that supports implementation using a ready-to-use pre-engineered product. The result was the development of PAeasy for the implementation of transmitters.

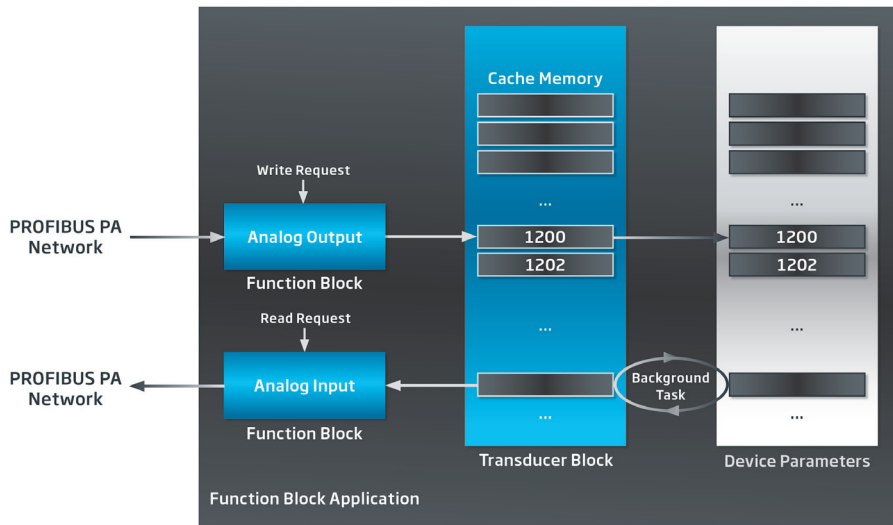


Figure 2: Example of implementing a function block application

PAeasy comprises a communication module for PROFIBUS PA interfacing, a PROFIBUS PA protocol stack designed for execution in the module, and a function block application. The function block application allows the use of up to four Analog Input function blocks for read access to up to four process values. A transducer block is used for reading and writing up to 25 dynamic device parameters. The serial HART or the Modbus RTU protocol can be used for internal interfacing to the device parameters. For this purpose, an appropriate HART or Modbus master was developed that, acting as the only master, initiates and controls data exchange with the device. As the bandwidth achieved here is usually smaller than that in the PROFIBUS PA network, the implementation uses a suitable strategy to ensure that the data available in the fieldbus is up to date and of good quality. This is only possible, however, if a secure and deterministic data exchange can be guaranteed.

### Support for customization

To allow use of PAeasy with any field devices, it is important that access to the internal dynamic device parameters, which is implemented in the transducer block, is not based on fixed settings, but allows customization of the individual parameters to suit the respective device properties. This is achieved using a configuration from an MS Excel spreadsheet in which the device-specific information is defined, such as the PROFIBUS identification number and the vendor ID. It also provides the communication commands and the device addresses with which the process values and device parameters are read. The data for creating the status information is stored here, as well. The specifications made in this spreadsheet are then integrated in the function block application with a generator tool and, subsequently, transmitted to the communication module.

much easier. This solution exactly meets the needs and demands of our customers." Another key advantage of PAeasy is its communication module. With a size of only 40mm x 40mm, it is small enough to fit into the housing of many field devices available in the market. It has a low power consumption and is also available with ATEX certification for use in hazardous environments.

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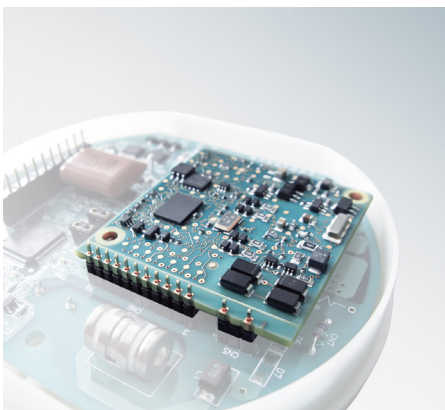


Figure 3: PAeasy uses a ready-to-use communication module for integration into a PROFIBUS PA network.

In this way, PAeasy provides a quick and easy possibility to implement PROFIBUS PA transmitters. Lars Mickan, the product manager responsible for PAeasy at Softing, outlines PAeasy's many advantages: "PAeasy is a simple-to-use solution designed to meet the needs of many device manufacturers. It enables them to implement PROFIBUS PA without performing any programming work and without the need for in-depth PROFIBUS PA know-how. All that needs to be done is configure the specific device properties. So PAeasy goes much further than other implementation approaches. As a result, the complete development of a PROFIBUS PA device usually takes just a few days. Even the certification of hardware and software has been prepared already, so that the registration process for the field device is