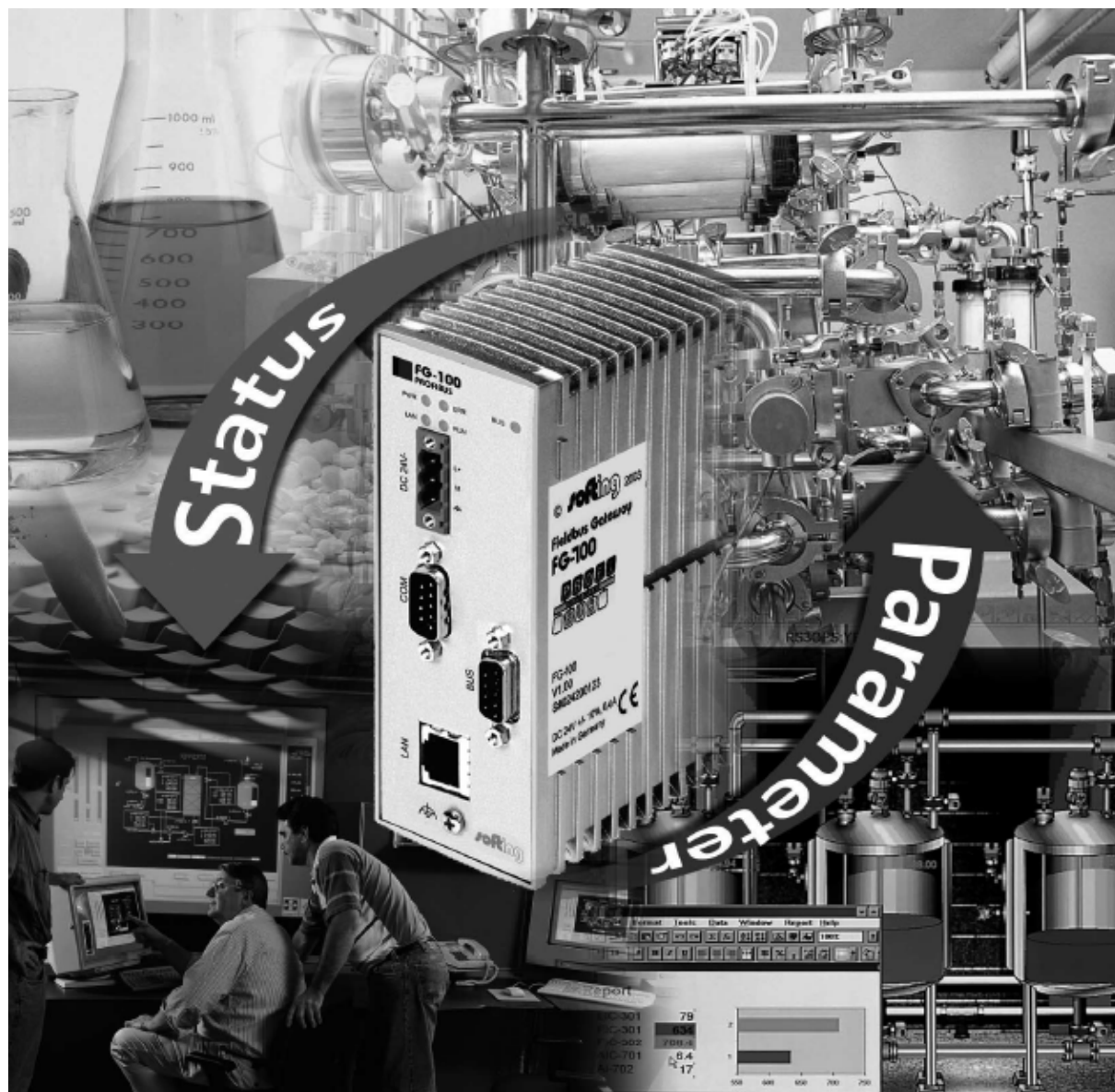


Integrating industrial fieldbuses in Ethernet structures

Fieldbus gateways bridge previously existing gaps

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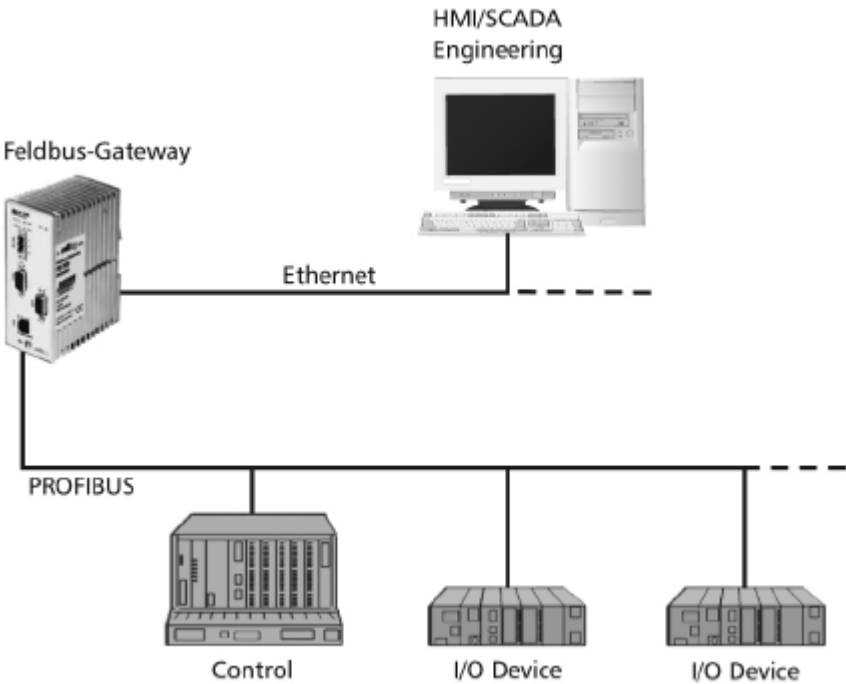
Knowledge of the current status of installations, devices and processes is becoming increasingly important in process automation and many other fields. It is necessary to consider not only the availability of the information itself, but also how this information can be accessed easily and conveniently. And such access must be possible both from within an installation and its automation structures and externally as well.



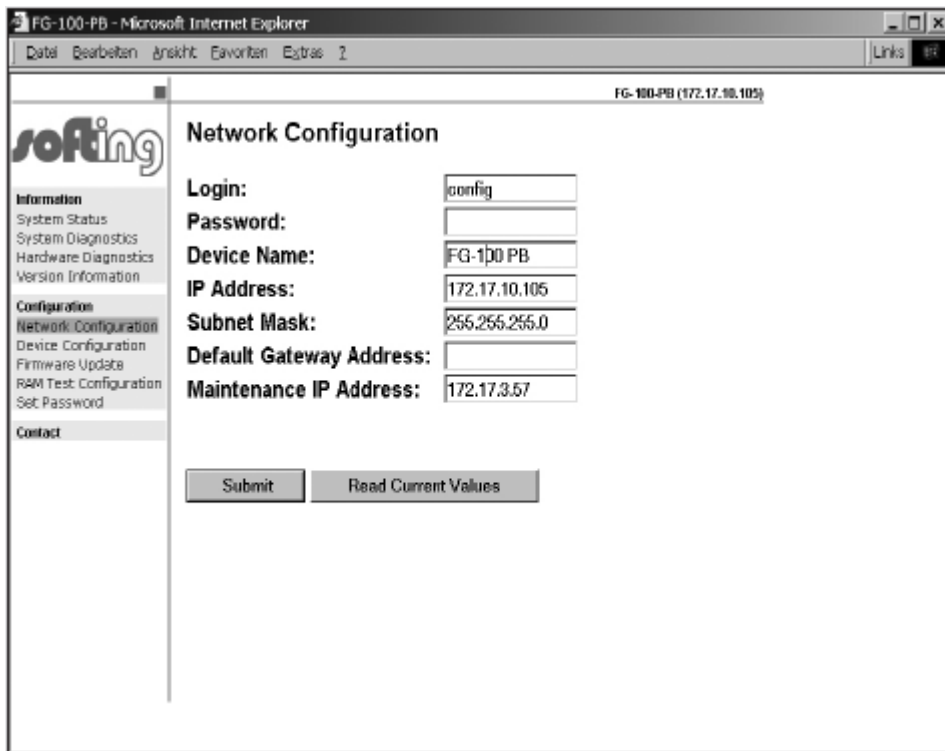
Figur 1: Compact fieldbus gateway in use: ideal for diagnostics and field device parameterization.

The role of functions such as device parameterization, the management of device parameter sets and the integration of bus systems in Internet/intranet structures is

growing. The technologies used in office environments can also be used for operations and monitoring in the field of automation technology, saving both time and money. This is made possible by fieldbus gateways, which can be used in conjunction with other software components to considerably simplify the commissioning and maintenance of an installation. There has been a continual rise in the communication demands between actuators, sensors and control technology systems. The significance of remote access, parameterization and diagnosis is growing, as is the importance of functionalities for installation operation. To meet these demands, it is necessary to fully integrate fieldbus systems in Ethernet structures. Fieldbus gateways (Figur 1) which act between host systems on Ethernet and the local fieldbus can be used for this. The following example demonstrates the use and benefits of a fieldbus gateway which directly connects Profibus structures with Ethernet (Figur 2). This makes it possible to access the devices connected to Profibus from any workstation with access to the Ethernet network, opening up a wide range of uses for the fieldbus gateway.



Figur 2: Profibus is integrated in Ethernet architectures.



Figur 3: The fieldbus gateway can be easily parameterized using a Web browser.

Access to all parameter sets

Simple, convenient device parameterization is critical when field devices from different manufacturers are used, especially as the functionality and intelligence of these devices grows. This applies to commissioning, as well as to maintenance and repair, when it may be necessary to exchange devices and supply a new device with the parameter set of the one which was previously installed. It is therefore necessary for parameter sets to be stored not only on the device itself, but centrally as well, so that they can be uploaded and downloaded. Fieldbus gateways can assist with this by establishing a connection between one or more engineering stations on Ethernet and the field devices on Profibus. The parameterization tools and control systems typical to the field of process automation are installed on these engineering stations. When used like this, the fieldbus gateway takes on the role of a Class 2 master in a Profibus network and can communicate with up to 126 devices as slaves. There are additional benefits for users if the parameterization tool (which may be integrated in the control system) and the devices support the FDT/DTM concept. This brings users much closer to the goal of parameterizing various devices using an application with a single interface. And this concept is not restricted to parameterization; it also applies to accessing diagnostic information.

Convenient field device parameterization

This concept can be conveniently realized for users by combining the fieldbus gateway with a Profibus communication DTM which complies with FDT specification Version 1.2 and is installed on the engineering station. By actively scanning the entire Profibus address space, the communication DTM can detect all of the devices connected in an installation. The detected devices are added to a "live list" and displayed in the engineering tool with their name, address and Profibus identification number. The DTMs which correspond to the Profibus ID can be automatically uploaded to the engineering tool. Devices can therefore be parameterized and diagnosed immediately with practically no manual intervention. Another helpful

feature of the Profibus communication DTM is that device addresses can be set from the engineering tool. This is particularly useful for devices which are supplied with a default address that is not suitable for a project. This eliminates the need to comb through the devices in the installation and change the device address on-site using a hand-held terminal. Support for PACTware, FieldCare and FieldbusBuilder results in a solution that is integrated with all commercially available tools for process automation.

Remote monitoring and diagnosis

The fieldbus gateway can be used not only for parameterization, but also for remote monitoring and diagnosis. The gateway function provides direct access from Ethernet structures to the device and process data on Profibus. This enables simple remote access as well. "Remote" in this context means either from the user's intranet or from the Internet. This makes it possible not only to parameterize devices, but also to access device and process data from an office workstation, for example. Even more communication possibilities are opened up if the fieldbus gateway has a serial interface along with the Ethernet and Profibus interfaces. For example, a modem or message system for transmitting data can be connected so that communication is possible even without an Ethernet infrastructure. To this end, the device itself can be used as a slave in the Profibus network.

Operation and monitoring

In larger process installations, there are usually several operator stations in use at different locations which are networked via Ethernet. In this case, fieldbus gateways can be used to access process data. Process visualization and control systems frequently use OPC as a standard interface for this on the software side. The prerequisite here is that the fieldbus gateway has a corresponding OPC server. With an additional Profibus OPC server installed on the operator stations, it is very easy to integrate Profibus process data in applications implemented on the operator stations. Operating data can also be recorded, archived and evaluated in this way. When it comes to data from PLC controllers in the Siemens S7 family, an S7 OPC server can be used together with the fieldbus gateway to access input/output data, data blocks, flags, timers and counters from several S7 controllers at once, even with a high data throughput rate.

Extensive additional functions and features

Internet technologies can be used for configuration. Both the network configuration and device parameters can be set using a dedicated Web page. Users can only make changes after successfully logging in. Displays showing the results of self-diagnostic functions (for hardware and firmware) and the current status of the fieldbus gateway are also integrated in the Web page. All settings and information can also be retrieved and modified remotely from a PC on Ethernet. This is also possible using the serial interface directly on the fieldbus gateway, which facilitates commissioning and on-site service at the installation. Of course, these extensive functions require a level of performance that satisfies the requirements of the industry. The FG-100 Profibus from Softing AG, for example, uses a powerful PowerPC architecture with the Linux operating system. Up to 32 MB RAM, 4 MB flash memory and the modular firmware also allow for customer- and application-specific adjustments. For instance, a customer's own Web pages or local applications can be installed under Linux. Despite its compact dimensions (47 x 131 x 111 mm), the fanless device can be used in ambient temperatures of up to 55°C. It is ready to

be mounted on a top-hat rail. It features a 24 V power supply, which is typical in the industry. The corresponding Windows drivers can be used for easy integration in PC networks. On the Profibus side, transfer rates of up to 12 Mbps are supported, along with the Profibus DP, DP-V1, DP-V2, FMS, FDL and MPI protocol variants. Maximum flexibility is achieved by using the device as a master or slave. The 100 BASETX Ethernet connection, with transfer rates of 100 Mbps and 10 Mbps, features automatic detection.

Summary

Fieldbus gateways boast all of the integrative functions which make it possible to take advantage of the features of industrial bus systems and Ethernet in a single application at the same time. The great advantage of this is that the two different partial infrastructures meld into a single logical, seamless and continuous communication network from the user's point of view. And this advantage is not just available for Profibus: Solutions are also available for the Foundation Fieldbus, CAN, CANopen and DeviceNet bus systems.