

# Future-oriented web server technology for field devices

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## Web technologies are changing the world

The Internet and web technologies have fundamentally changed our modern world. Many new possibilities have emerged in our networked world. Web server technology is one of these steps forward, opening up new paths for data exchange and communication. Today web servers have become ubiquitous as they are, for example, integrated into Wi-Fi routers, ATMs, TV set-top boxes and many other devices. Web servers provide easy access to devices for configuration or, in terms of remote maintenance, for retrieving measurement and diagnostic information.

The automation and process industry is faced with all kinds of challenges. Plant operators – to name just one example – are always looking for the simplest possible means of operating a specific system and its components in the most efficient way. In order to provide this level of time/cost optimization, special operating software along with required drivers (DTM/FDT and DD/EDD technology) are used to operate devices. This software is often manufacturer-specific, resulting in a complex update and version management, for both the manufacturer and the users.

The rapidly increasing number of device types, protocols and tools creates an undesirable complexity for users, as networking and communication technologies have become increasingly more prevalent in the field in recent years. Endress+Hauser has taken this development into account, and has integrated web servers into its Proline flowmeters as a standard technology (Fig. 1, 2).



Fig. 1: Promass P 100 flowmeter by Endress+Hauser, with connected notebook and web browser.

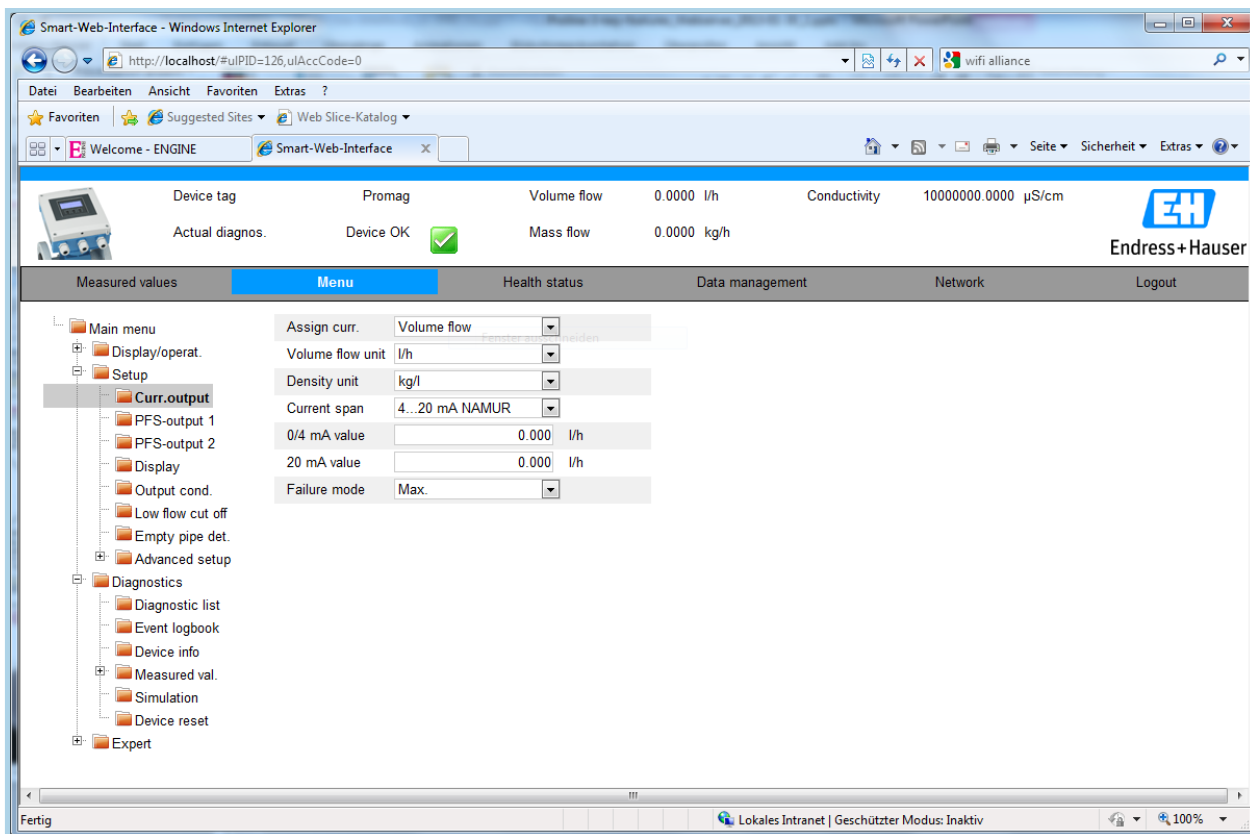


Fig. 2: Web interface of a Promag W 400 flowmeter with integrated web server. The web server enables access to all device parameters, diagnostic information and data management functions, for example to export measuring point documentation or device drivers.

## Opportunities and benefits for the user

There are a variety of reasons why a web server integrated right into the measuring device makes life easier for users. In many devices – such as notebooks, tablets and even smartphones – web browsers come pre-installed as part of a default software package, offering free access to web servers. This means there is no need to install any software or tools, which not only saves time, but also reduces the potential of installation problems.

Time and cost pressure are currently generating demand for simple and time-saving operating concepts. Here again, well-established web technologies require neither expert knowledge nor information technology specialists, making it possible for every user to operate field devices conveniently.

Furthermore, web browsers are easy to maintain, since generally no software or hardware compatibility issues are to be expected. This is because web browsers are generally independent from operating system versions and hardware requirements such as storage space and the like. Another decisive advantage is that web servers usually work relatively easily with all web browsers, as long as certain

rules are followed and the correct architecture is selected. This makes it easy to integrate them into various communication structures and into Ethernet-based networks. It is precisely these integration features that play a central role in plant design, thus ensuring maximum efficiency and availability of process facilities. In conclusion, web servers create a variety of advantages and possibilities for the user without limiting the range of functions and features of existing operating software.

### Architecture of embedded web servers

As mentioned previously, web servers enable simple integration of field devices and a connection to the embedded applications. This makes it possible to guarantee a link between the local application and a network (generally speaking the Internet). Moreover, HTTP-based applications also enable integration into the distributed applications available on the network. Figure 3 shows an example of such a system in which, first, measured values and device data are processed within a web server and then displayed on a web browser in a physically separate location.

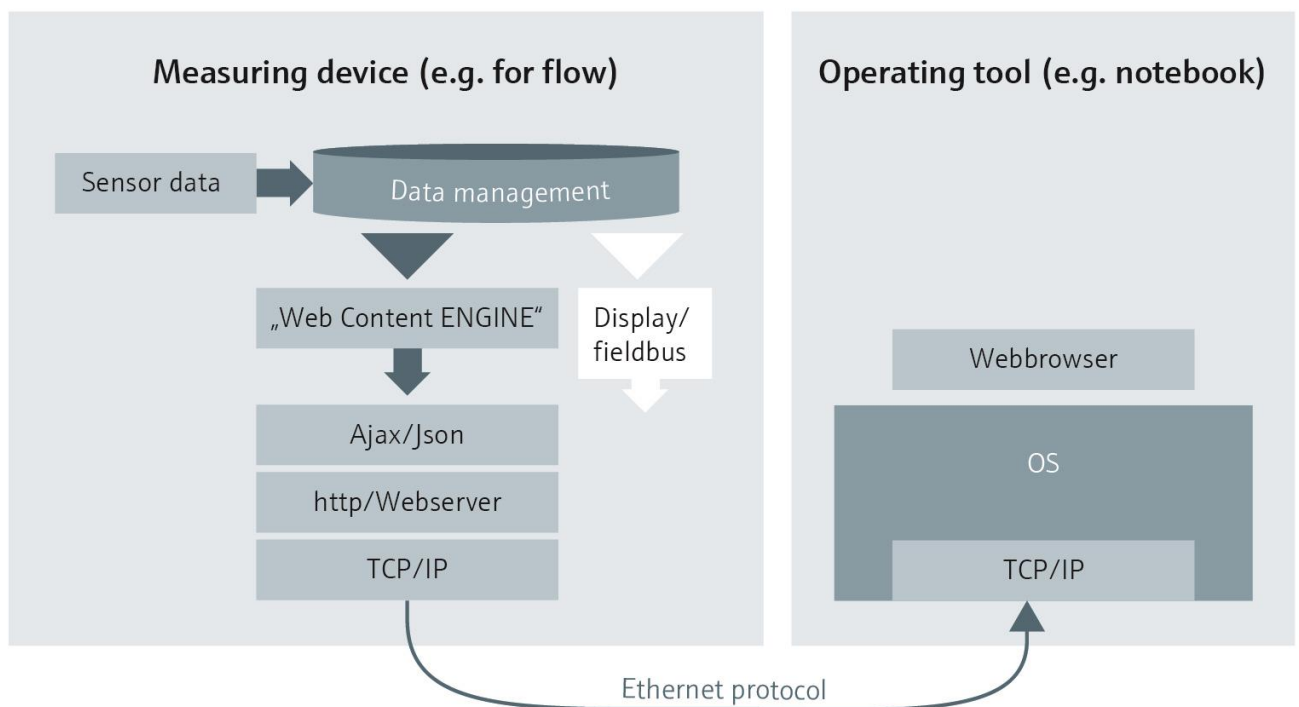


Fig. 3: Scheme of a communication system between a measuring device with an integrated web server and an operating tool.

In order to implement this approach, new components such as the “Web Content Engine” have been integrated alongside the traditional measuring chain where sensor data is processed for communication using analog or fieldbus signals. These new components prepare and communicate the

data for the web browser application in parallel to existing data channels via the internet protocol and a communication layer.

## High security requirement for industrial applications

If devices are connected to networks and particularly to the public Internet, the risk of attacks and tampering consequently increases. Therefore, devices in industry, which are critical for use or necessary for operations, must above all be secured in an effective manner. In particular, functional safety and data security have to be guaranteed.

Functional safety – known as Safety Integrity Level (SIL) in technology standards – guarantees that a device functions correctly without errors, and reliably under any ambient conditions. Such requirements are taken into account by Endress+Hauser from the start when developing flowmeters. Thus, devices with integrated web server and a SIL option also fulfill the necessary safety requirements. Furthermore, Endress+Hauser products with Ethernet communication can be delivered with Ex approval.

Additionally, data security is an indispensable prerequisite for functional safety (“no safety without security”), but also a security objective in and of itself, to achieve the confidentiality, integrity and authenticity of data transmission. Data security in the web server can be guaranteed in the current implementation with various measures, for example using switchable web server features, mechanical write-protect switches or software mechanisms in the firmware that ensure secure access such as for regulating read/write rights.

## An eye on the future

In conclusion, using automation components such as flowmeters with web server technology provides numerous user benefits based on the technologies available today. This improves system integration and operating options of automation components significantly, despite demanding industry requirements and operating conditions within process automation.

Even if a web server itself provides no additional function or no benefit from the perspective of the measuring technology, users can still derive crucial benefits, such as time savings, cost reduction and simpler workflows for commissioning and maintenance. At the same time, these technologies ensure transparency for foreseeable or future trends and requirements in the world of automation. That is because the Internet is now being enhanced by the “Internet of Things,” or the fourth industrial revolution.

In addition to service and asset management, extensive networking down to the production level is currently a main goal aimed at developing and implementing Industry 4.0 devices and systems. This involves secure and protected networking via the Internet. In this world of the “Internet of Things,” distributed Cloud services can significantly reduce plant costs and increase reliability. This way, new services, web services and service models provide real added value for completely networked devices and systems. For this reason Endress+Hauser is making an effort today to take into account the requirements of tomorrow – fully in line with the motto: “Nothing is as constant as change.”