

FieldMate FIELD DEVICE MANAGEMENT TOOL FOR THE NEW ERA

HIROOKA Isao *1 SAITOU Youji *1 KAWAHARA Mizuo *1 MURATA Hironori *1

We have developed FieldMate, a field device management tool for the new era, and released it in July 2006. FieldMate is software designed to be used with a notebook PC to efficiently facilitate configuration, adjustment, and replacement of field devices that support communication protocols such as Highway Addressable Remote Transducer (HART), FOUNDATION™ fieldbus H1, or Process Field Bus (PROFIBUS). FieldMate provides an integrated task environment independent of the communication protocol, as well as simple operating procedures to greatly improve the above field device operations. This paper describes the technical features of FieldMate.

INTRODUCTION

FieldMate application software runs mainly on a notebook PC and is a key component epitomizing Yokogawa's asset excellence (AE) concept together with Plant Resource Manager (PRM). FieldMate is available in basic and advanced versions. The basic version enables parameter setting and adjustment as well as status check of a field device by directly connecting a FieldMate-installed PC to a Highway Addressable Remote Transducer (HART) device or FOUNDATION™ fieldbus H1 device. The advanced version, on the other hand, has a field device management function in addition to the basic version's functionality. Moreover, use of communication and gateway DTMs (Device Type Managers), described later, enables the advanced version to cope with communication protocols other than HART and FOUNDATION fieldbus H1 and handle field devices of a type other than direct connection. This paper primarily describes the features of the advanced version. Figure 1 shows an example of connection with a field device.

*1 Product Business Center, Industrial Automation Business Headquarters

FieldMate FUNCTIONS

FieldMate was developed with the three concepts of "installing on My PC," "simple connection and operations," and "one tool for all" as the basic policy. This section describes the FieldMate features that have realized these concepts.

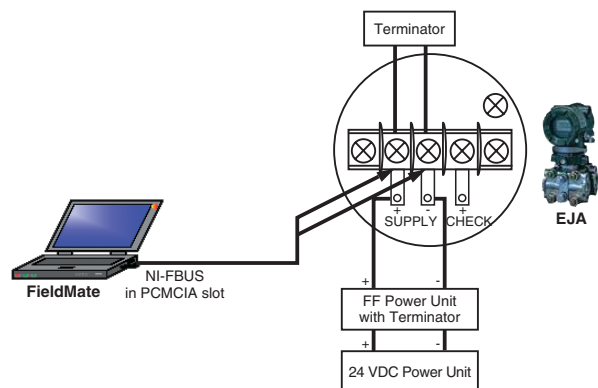


Figure 1 Example of Connection with an FOUNDATION™ fieldbus H1 Device

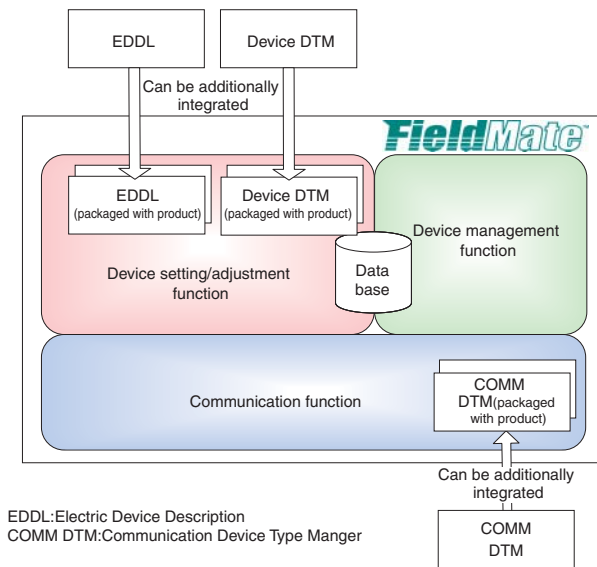


Figure 2 FieldMate Functional Configuration

FieldMate Functional Configuration

FieldMate is designed assuming that it will be installed on a notebook PC (My PC) used daily by maintenance personnel. FieldMate is composed of the three functions described below (Figure 2).

(1) Field device setting/adjustment function

Activating this function requires an EDD file created by the electronic device description (EDD) technology prepared specially for individual field devices or a program called “device DTM” (Device Type Manager). These components are generally supplied by a field device vendor. However, FieldMate is supplied with a complete set of the latest versions provided by the HART Communication Foundation or Fieldbus Foundation, including those of other vendor devices. They can also be additionally integrated later. The features of EDD files and device DTM and their appropriate use are described in Subsection 2.3.

(2) Field device management function

This function stores information relating to field device maintenance as a database and is a function facilitating maintenance/management work of field devices. The database was realized by a set of general Windows folders and files used daily by many users. The function is described in detail in 2.4.

(3) Field communications function

This function is for communicating with field devices. For HART and FOUNDATION fieldbus H1 devices, dedicated hardware can be directly connected to a device to establish communications. Moreover, installation of additional communication device drivers called “communication DTM” and “gateway DTM” enables FieldMate to support communication protocols other than HART and FOUNDATION fieldbus H1 and communication routes of a type other than direct connection. The field communication function is

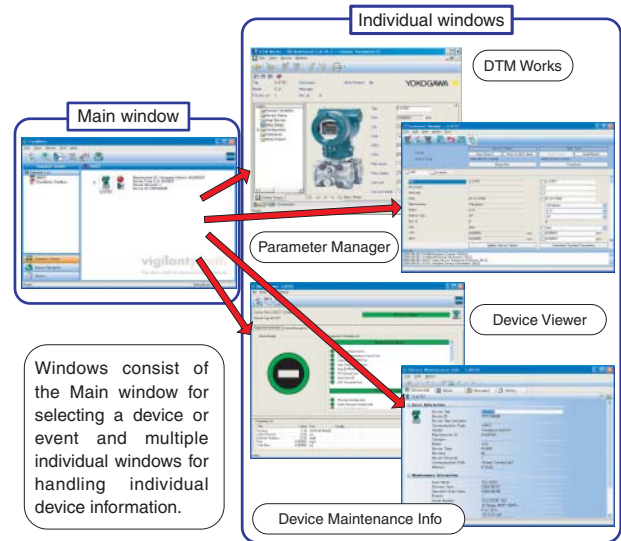


Figure 3 FieldMate Window Configuration

described in detail in 2.5.

Window Configuration of FieldMate

The following describes the features of the FieldMate window configuration:

- (1) Human-machine interface (HMI) is provided, similar to Microsoft Office Outlook currently used by many users daily.
- (2) Windows consist of two types: “Main window” used to select a field device or event and “individual windows” for handling individual details (Figure 3).
- (3) On the assumption that FieldMate is used in the field, input/selection operations are reduced as much as possible, so that it can be operated using a keyboard only. Consideration is given so that on the Main window, a switching button on the navigation window similar to that of Microsoft Outlook is selected to switch over to any of the following three windows. This efficiently brings you to the target device or event according to the usage phase (Figure 4).
 - ① Segment Viewer: Displays a list of devices connected to a segment in an easy-to-follow way using device icons, including the soundness of devices.
 - ② Device Navigator: Displays a list of devices registered in the database and enables a search for a specific one or the assignment of check marks to them.
 - ③ History: Displays a list of events of main operations conducted in FieldMate on a time-series basis and enables narrowing them down using a filter.

An operation flow is designed such that a device or event is selected using these three windows and then an “individual window” is opened to handle the details of individual devices.

As methods to eliminate input/selection operations as much as possible, when using Yokogawa’s HART device for the first time, for example, the user supplies power to the device, connects a FieldMate-installed PC to it via a HART USB modem, and starts FieldMate and then the device DTM (DTM Works) by

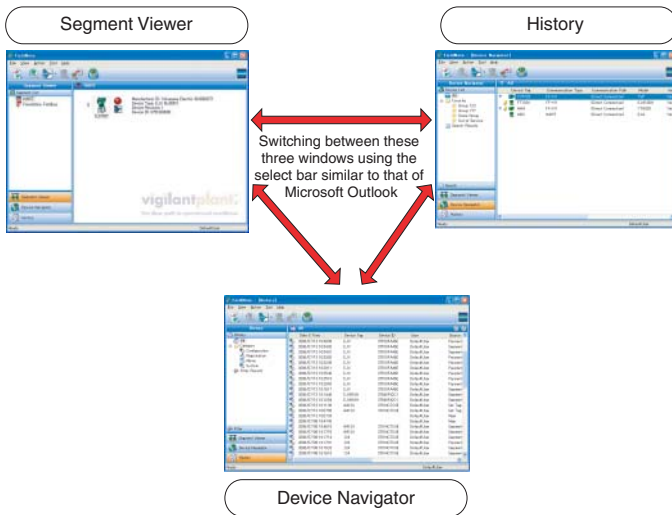


Figure 4 FieldMate Main Window

making only a few clicks. This enables setting/adjustment of the device and conducting its status check.

Field Device Setting/Adjustment Function

This function enables setting/adjustment of a field device or conducting its status check. Activating this function requires an EDD file provided specially for individual field devices or the device DTM program, both of which are supplied by a field device vendor. As field device setting/adjustment windows, FieldMate is equipped with Parameter Manager using an EDD file and DTM Works using device DTM. The following sections describe these windows.

Parameter Manager

An example of a Parameter Manager window is shown in Figure 5. An EDD file is a data dictionary that defines field device parameters and the method for accessing parameters. There is a long history for EDD files, and they are available for almost all FOUNDATION fieldbus H1 and HART devices. In addition, there is an advantage for the host vendor in that all field devices can be

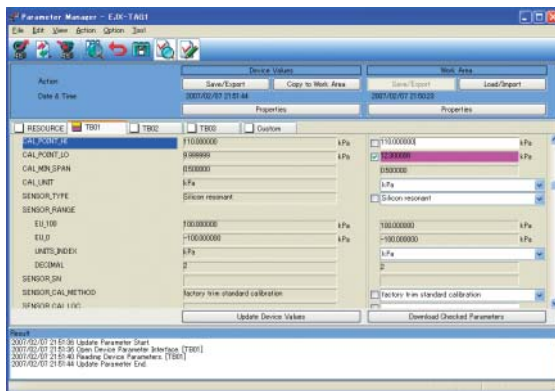


Figure 5 Example of Parameter Manager Window

handled in a similar way using the same HMI.

The Parameter Manager offers functions such as management of field device parameter values, export to, editing on, and import from a CSV file, comparison of parameters between the actual device and database-/file-stored values, and differential download using the standardized HMI independent of the model.

DTM Works

An example of a DTM Works window is shown in Figure 6. Device DTM is an application program (Active X Control) with a display screen specially developed for field devices. It has an advantage in that complex setting/adjustment procedures or special MMI can be created and run using the same HMI on all host systems. DTM Works enables its device DTM to run as is and allows field device setting/adjustment using HMI independent of the host system.

Field Device Management Function

This function enables information relating to field device maintenance to be managed on the database and facilitates field device maintenance/management work.

FieldMate defines a set of the following five pieces of information as a concept known as “Device Maintenance Info” and describes the requirements such that one “Device Maintenance Info” corresponds to one field device.

- (1) Device information
Individual information on device tags, serial numbers, etc. and information for managing devices, such as installation locations and delivery date.
- (2) Maintenance memo
Memo that the user can freely set to devices when conducting device inspection, etc. (multiple memos can be set)
In addition to character information input by the user, files can be attached.
- (3) Document link
Enables defining of device manuals and linking of information to related URLs.

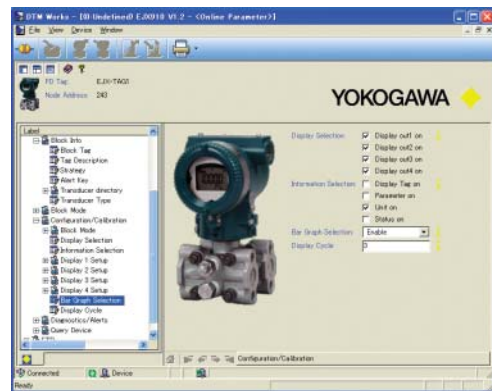


Figure 6 Example of DTM Works Window

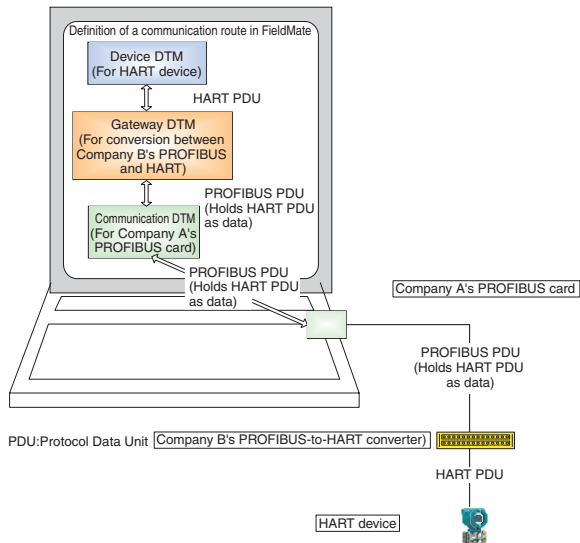


Figure 7 Example of COMM DTM Connection

(4) History

Operation logs relating to the device concerned

(5) Device parameters

This is device parameter information for setting and adjusting a device.

“Device Maintenance Info” can be created in three ways: (A) by acquiring information from a device, (B) by the user entering the necessary items, and (C) by importing the information required. Device maintenance info can be created using Method (B) or (C) without using a device and then linking the device to the created maintenance info after obtaining it.

Field Communication Function

This function is for communicating with a field device. Additionally installing communication device drivers known as “communication DTM” and “gateway DTM” to FieldMate enables it to support communication protocols other than HART and FOUNDATION fieldbus H1 and communication routes of a type other than direct connection. Examples of communication DTMs include a PC COM port driver for HART communications and a driver for a PROFIBUS communication card inserted into a PC slot. Examples of gateway DTMs include a remote I/O driver that performs protocol conversion between PROFIBUS and HART.

The communication and gateway DTMs are provided by a communication device vendor in the same way as device DTMs. The interface (I/F) is specified by the filed device tool (FDT) specifications in the same way as device DTMs, and if it is combined with an FDT frame application complying with the FDT specifications, the user can freely integrate and use the application. In other words, one of the benefits of the field communication function is that different vendor communication and gateway DTMs can be combined to define various network

Table 1 FieldMate Operating Environment

Item	Specifications
Processor	Pentium III of 1 GHz or more (Pentium M or Pentium 4 recommended)
Main storage	256 MB or more (512 MB or more recommended)
Hard disk space	8 GB or more for whole machine (free space of 1 GB or more required)
CD-ROM drive	Double-speed or higher, Windows XP-compatible drive
CRT	1024×768 (256 colors) or more is essential
Others	USB or RS-232C port (for HART modem), PCMCIA card or PCI card slot (for NI-FBUS cards*)
Option	HART USB (Universal Serial Bus) modem
OS	Windows XP Professional (English version) SP1 or later

* Use of an FOUNDATION™ fieldbus H1 device requires National Instruments' NI-FBUS card separately.

configurations of multi-stage stacking. Figure 7 shows an example of this.

FieldMate Operating Environment

Table 1 shows the FieldMate operating environment.

CONCLUSION

This paper describes the technological features of FieldMate. Although not introduced here, FieldMate provides a users' Web site, open to the public, where users can download the latest version of EDD files and device DTMs, an updated version of FieldMate, etc.

In recent years, compact PCs such as UMPC (ultra-mobile PC) have been introduced on the market, and FieldMate can conceivably be installed and used on such PCs.

At this point, we wish to pursue the provision of support for BRAIN devices equipped with Yokogawa-dedicated communications protocol, further improvements in operating ease and interoperability with rivals' field devices, compatibility with languages other than English, enhancement of data linkage with PRM, etc. ◆

REFERENCES

- (1) R. Simon, et al., FDT Field Device Tool, Oldenbourg Industrieverlag, April 2005
- (2) MORI Hiroshi, et al., “PRM Field Device Management Package,” Yokogawa Technical Report, No. 32, 2001, pp. 20–23
- (3) MOTOYOSHI Shinichi, “Standardization of Device Management Interface,” Instrumentation and Control, Vol. 44, No. 6, pp. 390–395(in Japanese)

* ‘FieldMate,’ ‘PRM,’ and ‘CENTUM’ are registered trademarks of Yokogawa Electric Corporation. All other brand names, product names and titles and copyrights used in this paper are either trademarks or registered trademarks of their respective holders.