System 800xA

800xA Device Management
Frequently Asked Questions
(FAQ)

ABB

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This product meets the requirements specified in EMC Directive 89/336/EEC and in Low Voltage Directive 73/23/EEC.

Abbreviations

Table 1

Abbreviation	Explanation
DTM	Device Type Manager
EDD(L)	Electronic Device Description (Language)
ECT	EDDL Communication Team
FDT	Field Device Tool

Chapter 1 Device Management – General

1.1 What does "Device Management" mean for System 800xA?

"Device Management" is a Core Functional Area of System 800xA. It integrates smart field devices into System 800xA. Device Management is available as Device Management Packages, which are offered for the major field communication protocols or field busses:

• HART
• Foundation Fieldbus
• PROFIBUS

Each Device Management Package contains three components necessary to manage a field device within the 800xA environment:

• Device Library: consisting Device Object Types for device from ABB or other vendors

• Fieldbus Management Tool (Fieldbus Builder): for configuration, parameterization, commissioning and detailed diagnostics

• Fieldbus OPC server: providing field device variables and status information to asset optimization applications and operator workplaces.

1.2 What is a Device Object Type?

In System 800xA field devices are represented by device object types. A device object type keeps all aspects like documentation, parameterization, diagnostics, or configuration together. If applicable, a DTM is also integrated by one or more aspects.

Device Libraries contain ABB and third party device object types enhanced with the essential Aspects for configuration and parameterization, commissioning, diagnosis and calibration, device documentation as well as asset monitoring and maintenance management.

1.3 Do I need a license?

A license is necessary. It depends on the number of devices used (see price list System 800xA). Licenses can be ordered in blocks of 1000 devices.

1.4 How do I get a license?

Order your license using the System 800xA price list. Send the order to your responsible order box.

1.5 Access to Device Libraries

Device Libraries are available from System DVD, ABB SolutionsBank and ABB Library.

1.6 How do I get an update of the Device Library?

Upgrades will be provided by ABB on a regular basis. Upgrades of the Device Library are available from ABB SolutionsBank. All new ABB devices will become part of the library when the new device or new version is available. 3rd party devices will be added according market needs. The upgrade of the library contents is independent of system releases. Device library upgrades for the same system version are free of charge.

1.7 Demo license for Device Management?

A demo license for System 800xA is available. This includes Device Management.

1.8 How do I order Device Management?

Device Management is part of the System 800xA. You have to order System 800xA (Core System and Core Functional Areas) and the needed Device Management package (HART, PROFIBUS, and/or FF) as additional functionality.

1.9 How to add a new device to the Device Library?

Devices included in ABB's Device Library, are proven as interoperable with System 800xA and have been enhanced with additional aspects like device documentation, asset monitors, CMMS connectivity etc. The library will be continuously maintained and enhanced by the Device Integration Center (DIC). If a Device Object Type is not yet available in the Device Library, contact ABB's Device Integration Center in Minden:

ABB Automation GmbH
Device Integration Center
Schillerstr. 72
32425 Minden

E-mail: dic@de.abb.com

Fax.: +49 571 830 1871

The device integration will be done free of charge.

1.10 How much does it cost to add a new device to the Device Library?

The Device Integration Center (DIC) is adding new Device Object Types and all its aspects to the Device Library free of charge.

1.11 Whom to contact in case of problems?

Contact ABB technical support for assistance in problem reporting.

1.12 ABB fieldbus capabilities (Profibus, HART and FF)

ABB supports the three major fieldbus protocols in an equal way with software (Device Management FF, Device Management PROFIBUS, Device Management HART) and hardware like interface modules for controllers or linking devices. All three are fully integrated, including diagnostics and maintenance features as well as access to device parameters. They have advantages and disadvantages depending on the intended application. Furthermore there are preferences which of them is taken depending on regions or industries.

The tools Fieldbus Builder FF and Fieldbus Builder PROFIBUS/HART are different on a detailed level, as they address different requirements, i.e. FF from a DD-based architecture that also needs to take into account configuration of function block applications and an HSE architecture while the PROFIBUS/HART tool is strictly FDT-based from the beginning and just needs to serve a Master/Slave communication protocol architecture.

1.13 ABB Asset Management capabilities

On the Asset Management level ABB offers a whole set of tools that provide unified access to diagnostic information independent of the underlying communication protocol or even the underlying components. These can be field devices but also network components or equipment units. The Asset Optimization offering ranges from the Maintenance Workplace, to continuous condition monitoring over root cause analysis, reporting features to support pro-active maintenance strategies, integration with Computerized Maintenance Management Systems for streamlined maintenance workflows and efficient work order scheduling. By combining these building blocks with further plant- or production optimization packages, the idea of Asset Optimization can be lifted from a pure consideration of field devices to a plant operation philosophy for increased overall equipment efficiency.

1.14 What are FDT key benefits for end users?

End users want to connect any device to their automation system, so that they have the freedom of choice to select the device fitting best the demands of their applications, regardless of supplier or communication protocol. This is achieved by FDT technology and interoperable device DTMs.

Most important benefits:

- Freedom to choose best-in-class instruments

- No need to replace existing installed devices

- Fieldbus independence

- Open for future technologies

- Expanded capabilities compared DDs / EDDs

- Possibility of nested communication

Chapter 2 Profibus and HART

2.1 What is Fieldbus Builder PROFIBUS/HART?

Fieldbus Builder PROFIBUS/HART is the Fieldbus Management tool. The tool is a FDT frame application and enables the communication with installed Device Type Managers (DTM). Fieldbus Builder PH enables the configuration of field devices even in off-line mode and performs all on-line mode functions like upload, download and verification of device data. It provides all communication interfaces depending on the selected fieldbus type or protocol and a standardized graphical user interface for intuitive operation.

2.2 What is a frame application?

A frame application is a software that can access field devices via DTMs. Typically frame applications are part of control systems or asset management applications. For example ABB's Freelance 800F or System 800xA have a frame application as integral part.

2.3 What is a Device Type Manager (DTM)?

- It is a software component, that makes all device information accessible

- Has tailor-made user interfaces for configuration, diagnosticis, maintenance etc.

- Works with all frame applications

- Is built according to the FDT specification

- Supports one or several device types or devices

- Will be supplied with the device by the device manufacturer

2.4 Why are interoperability tests necessary?

Like any other piece of software, DTMs and other addons, that come along with device management packages, need to be tested. To achieve on the one hand high quality and on the other hand freedom of choice, integration of 3rd party devices, which means interoperability tests have to be performed.

2.5 How to update DTMs?

Updates of a DTM will be provided with a new version of a device object type. Due to the fact that new versions of the DTMs are downwards compatible to older DTM versions, only one DTM version per device object type needs to be installed. There are two cases of new versions of device object types possible: new minor versions and new major versions. A new minor version replaces the old version. The possibly new DTM will replace the old one. All instances will get the new DTM automatically. A new

major version coexist to the older one. During the installation the possibly new DTM replaces the older one. The older device object type and of course its instances acts now also with the newer DTM version.

2.6 Do different DTMs run together in the same frame application?

Yes, if their FDT Version is less than or equal to the FDT Version of the frame application. System 800xA supports FDT 1.2.

Those DTMs can run simultaneously. Each user interface opens in an own window.

2.7 Which FDT version does the Fieldbus Builder PROFIBUS/HART support?

FDT 1.2.

FDT 0.98 was used in a few projects. This was a pre-standard version. System 800xA supports FDT 1.2.

FDT 0.98 shall not be used in new projects.

2.8 Are DTM with versions 0.98 compatible to DTM version 1.2?

No.

2.9 What is the difference between FDT 1.2 and FDT 1.2.1?

With FDT 1.2.1 there are minor changes regarding single data access. Important to know: FDT 1.2.1 supports DTMs following FDT 1.2 (this is mandatory) and vice versa DTMs supporting FDT1.2.1 can be opend by a FDT 1.2 frame.

2.10 Can a HART-device with DTM 0.98 operate together with DTM 1.2 for Remote I/O?

No.

2.11 Are different FDT versions compatible?

Yes, future major versions (1.x) will be compatible with FDT 1.2.

2.12 FDT is based on Microsoft COM technology. What will be happen if the technology changes (e.g. to.Net)?

A lot of software is based on COM technology and it runs together with .net. Microsoft will support COM functionality also in future. We have got a statement from Microsoft, that COM is also supported Vista.

2.13 Is it possible to use HART devices without a device specific DTM?

Yes. You can run any HART device using a Basic HART DTM, which support universal and common practice commands. You may miss some of the more powerful features of the device, which are only accessible via a specific DTM.

The Device Integration Center will take care of such cases. It will decide depending on the customer requirements and availability of information on the device (like device descriptions):

- To recommend usage of Generic HART Actuator or Generic HART Transmitter, which in turn involve the Basic HART DTM

- To generate a DTM from a HART device description (DD) through a software tool

- To develop a device specific DTM

2.14 What will happen, if the firmware of a device is changing?

If the DTM stays the same no action is necessary. If the device supplier offers a new DTM to support the new firmware, he has to assure that the new version of the DTM is compatible with the previous one and the previous version of the device.

The new DTM has to be integrated into the corresponding Device Management package.

2.15 What does nested communication mean?

Each DTM is made for a specific device and a specific communication protocol, e.g. a DTM for a HART device can be used only for HART communication and not for PROFIBUS. If a HART device is connected to a PROFIBUS Remote I/O, a DTM for the Remote I/O and also a DTM for the HART device has to be installed. The communication goes via PROFIBUS DTM and HART DTM from the controller to the HART device. The advantage of nested communication is, that the application, which works with the device data, does not need to have any protocol specific knowledge to get the data out of the devices.

Chapter 3   Profibus

3.1   Engineering / Commissioning

3.1.1   Object Types - GSD Files

3.1.1.1   Are there any drawbacks when working with GSD files instead of DTMs?

The normal, recommended and tested procedure is to use devices which are part of the Device Library. While running the wizard it will generate from the Device Type an Object Type that fits to the extensions of System 800xA, you have installed in your system. This means, if for example Asset Optimization is not installed, the object type will not be blown up with unneccessary features.

When no pre-configured Object Type is available you can use the GSD Import Tool of Control Builder M. It imports the gsd file coming with the device and generates the corresponding HW representation for the controller. With this the device is visible in the same way as with an Object Type. But it is in the responsibility of the user to check, that the device is correctly integrated and running.

In this case the integration is based only on the GSD file. This means that only the cyclic data and other gsd-common data are available.

It works pretty straight forward for PROFIBUS PA devices because of their high degree of standardized features.

It is a little more complicated when it comes to other devices like Remote I/Os, Encoders, electrical equipment using none standard data types. If you don't feel experienced enough in handling such devices you may seek for help from Consult IT or the Level 3 support line.

With System Version 5 the GSD import tool will be significantly improved and tighter integrated into Control Builder. With that version also support of none-standard data types will become easier.

Please note that you don't need DTMs for all devices. A lot of them can be configured just by using the GSD-File. DTMs are only required if configuration or diagnostics are done via a-cyclic communication services.

3.1.2   What are the differences between Profibus DP and Profibus PA?

DP stands for "Decentralized Peripheral" and is for high speed data gathering. The distance is limited against the communication speed (e.g. at 1.5 Mbit/s - 200 metres). Up to 32 devices can be placed on a single segment. This can be extended to max 125 devices by usage of repeaters between the segments. A maximum of 244 bytes of data can be gathered. Linking Modules like the LD 800P provides an interface between DP an PA without speed limitations.

PA stands for "Process Automation". It is used for field devices and instrumentation, where update times are less of an issue but grater field runs are needed. The communication rate is fixed at 31.25 Mbit/s with a maximum cable length of 1900m. PA is a Manchester Bus Powered (MBP) Network and can also be used in hazardous areas (this is not so easy with DP, but also possible).

3.2 FDT DTM / EDD

3.2.1 FDT vs. EDDL (including ABB involvement)

Please see attached position paper of FDT as issued by Mark Taft. It was published in part or in whole in several publications, as well as the ISA Daily at the ISA show.

FDT has enjoyed increasing membership in the last year. This not only shows that the overwhelming majority of the automation vendors support FDT (Emerson and Siemens are the notable exceptions), it also shows that major automation vendors are indicating their support in the recent past. This indicates further activities to promote and enhance the technology in upcoming times. The new founded FDT End User Council has also attracted important users from the Oil and Gas industry namely Shell and Saudi Aramco.

3.2.2 For which devices are DTMs available?

Send a blank e-mail to the following address: dic@de.abb.com

You will get an autoreply with the actual data.

Chapter 4 HART

4.1 General

4.1.1 Are there any drawbacks when working without DTMs?

The normal, recommended and tested procedure is to use devices which are part of the Device Library. While running the wizzard it will generate from the Device Type an Object Type that fits to the extensions of System 800xA, you have installed in your system. This means, if for example Asset Optimization is not installed, the object type will not be blown up with unneccessary features.

When no pre-configured Object Type is available you can use the measured value as 0 .. 20 mA signal of the HART device, for example an temperature transmitter. But you do not have access to other data.

4.1.2 What is HART Multiplexer Connect

HART Multiplexer Connect enables communication between HART devices, connected between control systems or PLCs other than System 800xA on the one hand and System 800xA on the other. This offers the possibility to integrate those devices and make system features like asset monitoring, device configuration and diagnostics applicable to those devices.

Chapter 5 FOUNDATION Fieldbus

5.1 General

5.1.1 Is "Control in the Field" possible with Profibus?

Control in the field, which is also known as "Control on the Wire" is possible with FF only.

5.1.2 Is the speed of signal transfer different to Profibus?

FOUNDATION Fieldbus H1 and PROFIBUS PA are based on the same physical layer according to IEC 61158-2 (MBP, Manchester Bus Powered). The comunication speed for both is therefore 31.25 Mbits/s. FOUNDATION Fieldbus HSE (High Speed Ethernet) supports transfer rates 10 and 100 Mbit/s. Up to now there are no HSE devices available on the market than linking devices like ABB's LD 800HSE, which acts as gateway between the slower H1 links and the HSE subnet.

5.1.3 Can the Connectivity Server FF be installed on the same PC where the Fieldbus Builder FF resides?

Yes.

5.1.4 Can we test the FF application in Soft Controller before downloading to a temporary controller, which is at the site for test purposes?

You can test the controller application with the soft controller without the FF I/O. For testing the FF applications/connectivity you need a CI860 module which is not available for the soft controller.

5.1.5 Will the OPC Server FF give access to all Resource Block, Function Block(s), Transducer Block information?

Yes. In the block library of the Fieldbus Builder the block parameter of each block can be configured to be (default) or not to be transferred to the OPC Server FF.

5.1.6 Connectivity Server FF for each HSE segment

Detailed Question:

It seems one needs one Connectivity Server FF (two for redundancy) for each HSE segment. Can I connect CSFF in one place and have a fiber connection/switch in all controllers, which are routed to this one server?

Yes, there is one Connectivity Server FF needed for each HSE subnet, but note that IP routing is not possible within HSE subnets, since basic traffic is using broadcast addressing which does not go across routers. Switches and fiber connections are OK.

5.1.7 FAT Testing

Detailed Question:

We have no device connected to the bus physically before FAT testing of the system. How can we then build applications?

It is not necessary to have a device connected at the beginning of the configuration, e.g. creating function block applications. All you need is to install the needed device object type from the Device Library. Afterwards the required device description (DD files) and the capabilities file (CFF), that describe the device needed for the off-line configuration, is then available.

5.1.8 Function Blocks

Detailed Question:

Are the FF function blocks so standard that we can build the FF function blocks irrelevant to the device?

The DD and CFF files describe in detail the properties of the device specific function blocks. Actually, the originally FF defined standard blocks are not that commonly used in current field devices. So, the creation of function block application should be done with the function blocks specified in the device dependent DD and CFF.

5.1.9 Commisioning: Upload to instruments

Detailed Question:

We will not connect the instruments before we are at site. Will we be able to perform up load of the instrument and verify the process tag in the FBB structure / PPA Control Structure, against the instrument if the supplier inserts the tag name?

Yes, absolutely. The procedure is the following:

- Configure the usage of the device in the Fieldbus Builder FF (E.g. Specify PD tag and use function blocks to build your application).

- Connect the physical device to the bus at some later point in time.

- The live list of the corresponding H1 link will now show both your configured devices and connected devices including node address and tag.

- Map the configured device to the pre-configured connected device with the corresponding tag using drag and drop. The tool will now do some pre-commissioning activity with the device, e.g. set the new tag if the configured tag or node address was different from the pre-configured values.

- Open the parameter mask of the function block and start the upload. This is required for every block that has been pre-configured with parameters that need to

be saved. Note that this step must be performed before doing the first configuration download (commissioning) to the devices; otherwise the pre-configured values will be overwritten.

- Perform configuration download. This is required, since the device vendor cannot pre-configure the device with all information that belongs to your specific application.

5.1.10 FF without controller

Detailed Question:

Can you indicate if we are promoting the solution in FF that uses FBB-FF directly with LD 800HSE -- no AC 800M?

Yes, it is possible. In that case pure "Control in the Field" is processing - this is the basic control strategy for FF - no process variables are needed from and to an AC 800M controller. For the data communication to PPA or AO an OPC Server FF is necessary which can be run on the same PC where Fieldbus Builder FF is installed. Later system extensions are possible (e.g. adding a AC 800M with CI860, moving the OPC Server onto a separate PC, etc.). For later system extensions be aware of restrictions concerning distribution of software (Tools, PPA, Connectivity Server, domain server, Aspect server, etc.) on separate servers.

5.1.11 Why is the Connectivity Server FF connected to the HSE subnet, not to the controller?

Viewing from FF the controller with the CI860 is just another participant at the HSE subnet with publish/subscriber communications. There are no routing functionalities available at the controller for client/server communications necessary for acyclic configurations (FF configuration, operation, asset management).

5.1.12 Is it possible to set the Connectivity Server FF redundant?

Yes.

5.1.13 How many Connectivity Server at HSE subnet?

Exactly one Connectivity Server FF (two in case of redundancy) is allowed per HSE subnet. It is NOT possible to use one CSFF for more than one HSE subnet.

5.1.14 Do I need separate PC/HW for each Connectivity Server FF?

Each Connectivity Server FF has to be installed on an own PC. So, e.g. for a redundant CSFF you need two PCs but you can combine them with the OPC Server PROFIBUS/HART and/or AC 800M OPC Server. Please refer on the System Guide.

5.1.15 How many instruments/devices at HSE subnet?

In principle it is possible to connect up to 16 devices at one H1 Link. The recommendation is not to use more than 10 -12 devices. It depends on the total power consumption at the H1 Link and of the configured FF application with the resulting cycle time.

It is possible to transfer up to 20 signals per second per H1 Link to and from HSE. With the usage of the H1 Links as pure remote I/Os lots of signals are transferred to the HSE subnet. So if there are 10 devices from which two signals per second has to be transferred the limit is reached with ten devices. If a faster cycle time is required the limit is reaching proportional earlier.

Are there "control in the field" - application configured fewer signals have to be typically transferred between H1 and HSE, but faster cycle times than one per second are often required.

5.1.16 Restrictions concerning support for backup LAS in devices?

The Linking Device supports four sub cycles. This means in principle it is possible to configure function block applications with four different cycle times. Not all field devices support as well four sub cycles. The Fieldbus Builder tries to reduce the LAS complexity for the backup LAS devices. The Fieldbus Builder checks if it fits to the desired field device.

Recommendation: Reduction of the number of different sub cycles helps to be applicable for a wider range of backup LAS devices.

5.1.17 Bus diagnostics?

The main instrument for bus diagnostics is the live list. With the Fieldbus Builder it is possible to have a look on the life list at every FF structure element. Next to this a red triangle in the detailed view and red colored structure tree entries of the Fieldbus Builder indicate a bad status of FF network and field devices.

5.1.18 Does the Fieldbus Builder support bulk data management?

Fieldbus Builder supports import/export of engineering data. Typicals can be used in case of repeated applications.

5.1.19 What about CI860 redundancy?

The HSE interface module CI860 can be used redundantly.

5.1.20 FDT for FF?

The FDT Group (see also www.fdt-group.org) already issued (initially in 2003) an annex to the FDT Specification Version 1.2 and 1.2.1 concerning Field Device Tool (FDT) for FOUNDATION Fieldbus.

5.2 Usage of Emerson 375 Handheld configurator with ABB FF system

375 Handheld Communicator acts as a second configuration tool at the bus. It is intrusive to the link configuration in a way that it changes communication setting within the device. As configurations may be changed in an undesired way some experienced customers even think about prohibiting the usage of 375 in their plant. To ensure that no corrupted configurations remain in links that have been touched with 375, System 800xA requires a full download to such links instead of an optimized partial download.

5.3 Engineering / Commissioning

5.3.1 Which design tools for FF are avalable?

FF Layout tool from BU Instrumentation and Fieldbus Builder FF in System 800xA

5.3.2 How many instances of the FF builder tool can be opened simultaneously?

In other words, how many processes (device commissioning, downloads, troubleshooting, etc.) can be performed on different field devices without having to shut down another process?

800xA Device Management up to SV 4.1 allows one instance of Fieldbus Builder FF per HSE Subnet. This means that the number of simultaneously accessible field devices depends on the structure of the FF network, especially on the number of HSE Subnets.

Starting with SV 5.0 additional non-interactive instances of Fieldbus Builder FF per HSE Subnet are supported which are restricted to read-only access to configuration data. This will enable backup and export of configuration data while another instance of Fieldbus Builder FF is running in interactive mode at the same HSE Subnet.

5.4 Applications

5.4.1 Is Foundation Fieldbus suitable for a green-field refinery project

Yes. New plant can take full advantage of capital expenditure savings on equipment and cable

A high value product plant availability is maximised with Asset Management and condition monitoring.

5.5 Performance

5.5.1 How can complex control be managed where so many blocks are

associated?

In general a good approach is to have basic PID loops on the devices and more complex interloc logic on the controllers.

5.5.2 What is VCR?

VCR stands for Virtual Communication Relationship and are configured application layer channels that provide for the transfer of data between applications.

FOUNDATION fieldbus describes three types of VCRs:

• Client/Server - used for acyclic communication, i. e. download and OPC server

• Publish/Subscribe - scheduled communication, i. e. process signals

• Source/Sink - Alarms

5.5.3 What is the fastest loop execution time in ABB system with ABB field instrument as well as with 3rd party field instruments?

Fieldbus Builder FF supports freely configurable loop execution times thus loop execution time only depends on:

• number of blocks executed in the loop

• block execution time (depending on block type and device computing power)

• link settings as supported by the field devices (Yokogawa fastest, Smar slowest, ABB in between)

5.5.4 What about different certifications by the Fieldbus Foundation?

• ITK is a test for H1 field devices. Our system supports devices certified according to Version 4.51 or higher.

• LD 800HSE is an HSE to H1 gateway. This is certified according to the HSE test procedures for Linking Devices supporting Class 42aI (means we don't execute function blocks on the LD)

• The HIST test (that is what your link below points to) is a test of the overall Host System functionality. System 800xA is the first one (and I think still the only one) that has been certified according to the latest HIST Test Spec. also including HSE features. Other system that were certified according to older HIST version show only the subset of functions which were part of the test at the point in time the tests were executed.

5.5.5 Hist test: What is the latest test specification including HSE features?

HIST test procedures including HSE features are described in the Fieldbus Guide FF-569 FS1.2.

5.5.6 How to find the Hists test for HSE-H1systems?

The HIST test results can be found at
http://www.fieldbus.org/ProductsAndServices/hist/

Two different type of listings are displayed: systems which have HSE capabilities like the two ABB Industrial IT based solutions, and such systems without like the rest of the listed systems. Be attentive when analysing the lists: The HSE test procedures are quite new and the results are now displayed with "yes" and "no". Former test results without HSE only displaying the "yes", leaving out the "no". To get a clear overview a comparison of supported features between the systems is required.