User's
Manual

FieldMate
FlowNavigator R1.05

FSA120
Flow Configuration Software

IM 01C25R51-01E

vigilantplant®

YOKOGAWA
Yokogawa Electric Corporation

IM 01C25R51-01E
8th Edition

FSA120
Flow Configuration Software

IM 01C25R51-01E 8th Edition

Contents

1. Introduction

This User's Manual gives instructions on FSA120 Flow Configuration Software "FieldMate FlowNavigator".

FlowNavigator User's Manual contains the following two items.

Table 1.1a FlowNavigator User's Manual List

Title	Contents	Media	IM No.
FSA120 Flow Configuration Software	<This manual> Operation manual for FlowNavigator	PDF File	IM 01C25R51-01E
FSA120 Flow Configuration Software Getting Started	Basic procedure to install and precautions	Paper	IM 01C25R51-10E

This software is to be used to setup the EJX Multivariable Transmitter and digitalYEWFLO Vortex Flowmeter; therefore, it is indispensable for users to read, understand and follow the instructions on all the following user's manual before actually starting the operation.

Table 1.1b EJX Multivariable Transmitter User's Manual List

Title	Contents	IM No.
EJX910A and EJX930A Multivariable Transmitters	Installation, wiring, and maintenance	IM 01C25R01-01E
EJX910A and EJX930A Multivariable Transmitter HART Communication Type	Operation manual for HART communication type	IM 01C25R02-01E
EJX910A and EJX930A Fieldbus Communication Type	Operation manual for FOUNDATION fieldbus communication	IM 01C25R03-01E

Table 1.1c digitalYEWFLO Vortex Flowmeter User's Manual List

Title	Contents	IM No.
Model DY Vortex Flowmeter, Model DYA Vortex Flow Converter	Installation, wiring, and maintenance	IM 01F06A00-01E
Model DY Vortex Flowmeter, Model DYA Vortex Flow Converter Fieldbus Communication Type	Operation manual for FOUNDATION fieldbus communication	IM 01F06F00-01E

Refer to FieldMate User's Manual when using FlowNavigator.

Table 1.1d FieldMate User's Manual List

Title	Contents	Media	IM No.
FieldMate Versatile Device Management Wizard	Operation manual for FieldMate	PDF File	IM 01R01A01-01E
FieldMate Operational Precaution	Precautions	Paper	IM 01R01A01-91E
FieldMate Versatile Device Management Wizard Getting Started	Quick start procedure for FieldMate	Paper	IM 01R01A04-01E

In this manual, following abbreviations are often used:

- AR Block stands for Arithmetic Function Block
- HART protocol revision 5 and 7 are described as HART 5 and HART 7 respectively.

1.1 About This Manual

- This manual should be delivered to the end user.
- The information contained in this manual is subject to change without prior notice.
- The information contained in this manual, in whole or part, shall not be transcribed or copied without YOKOGAWA's written permission.
- In no case does this manual guarantee the merchantability of the transmitter or the software or its adaptability to a specific client needs.
- If any question arises or errors are found, or if any information is missing from this manual, please inform the nearest Yokogawa sales office.
- Changes to specifications, structure, and components used may not lead to the revision of this manual unless such changes affect the function and performance of the products.
- The operation of the FlowNavigator described in this manual is the operation for the use with FieldMate Basic. For the detailed installation and operation of FieldMate and additional functions available on FieldMate Advance, please refer to the FieldMate User's manual.
- The following safety symbols are used in this manual:

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

IMPORTANT

Indicates that operating the hardware or software in this manner may damage it or lead to system failure.

NOTE

Draws attention to information essential for understanding the operation and features.

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Operation

Temperature: 0 to 40 °C
Humidity: 20 to 80 % (No dew condensation)

Storage

Temperature: -10 to 50 °C
Humidity: 20 to 80 % (No dew condensation)

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2. General

2.1 Components

The following picture shows the items included in the FSA120 package.

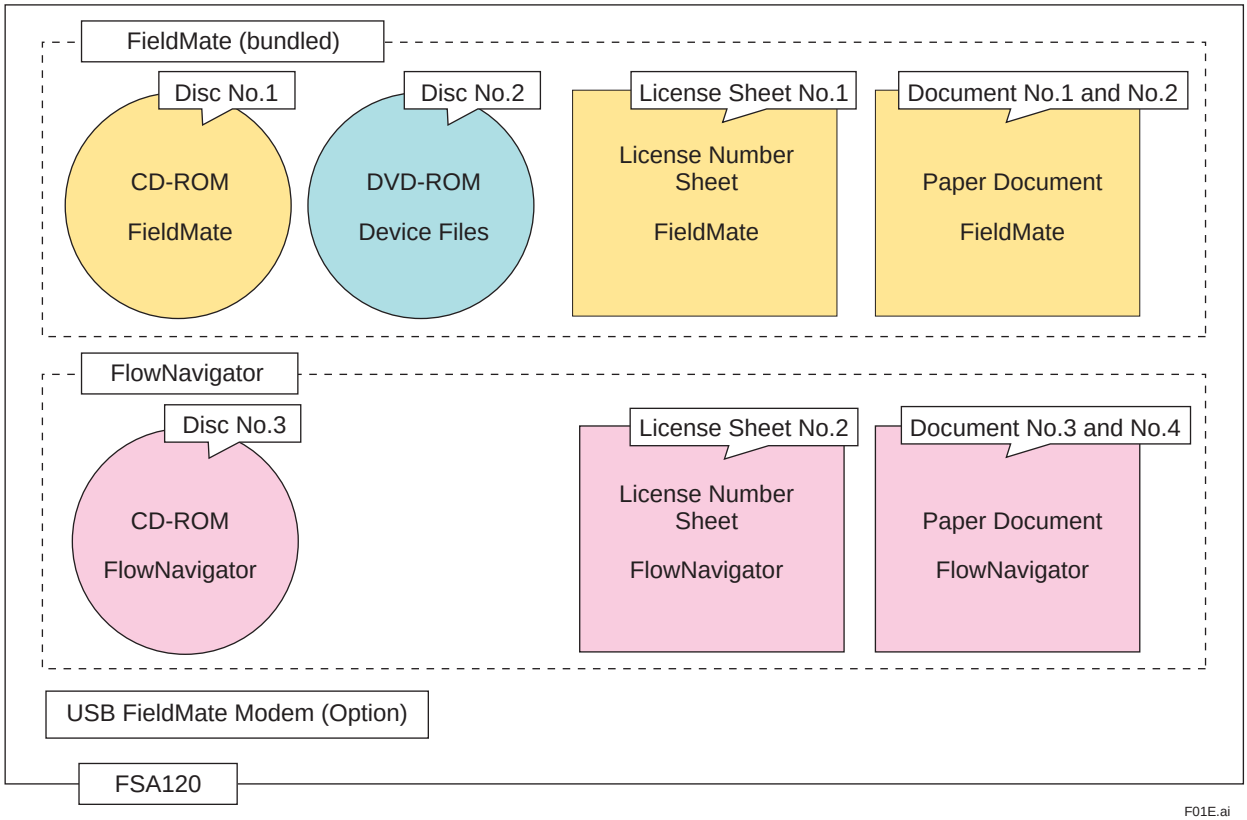


Figure 2.1 Components of FSA120

Each disk contains the following software.

- **CD-ROM/DVD-ROM: 3 discs**

  (1) FieldMate <Disc No.1>

  (2) Device Files (Includes Device DTM*) <Disc No.2>

  *: Device DTM is delivered by Yokogawa DTMLibrary HART/FOUNDATION fieldbus

  (3) FlowNavigator (Includes FlowNavigator Program and Resource) <Disc No.3>

- **License Sheet: 2 sheets**

  (1) FieldMate License Number Sheet (Basic or Advance, as specified in order) <License Sheet No.1>

  (2) FlowNavigator License Number Sheet <License Sheet No.2>

- **Paper Document: 4 sheets**

  (1) FieldMate Getting Started (IM 01R01A04-01E) <Document No.1>

  (2) FieldMate Operational Precaution (IM 01R01A01-91E) <Document No.2>

  (3) FlowNavigator Getting Started (IM 01C25R51-10E) <Document No.3>

  (4) FlowNavigator License Agreement <Document No.4>

- **USB FieldMate Modem (Option)**

NOTE

For FSA120 R1.04 or later, the product name has been changed to “FieldMate FlowNavigator” because the DYFMVTool program for digitalYEWFLO Vortex Flowmeter has been added.

Consequently, the following items have been renamed accordingly:

<Disc No.3>:
EJXMVTool Additional resource disk → FlowNavigator CD-ROM

<License Sheet No.2>:
EJXMVTool License Number Sheet → FlowNavigator License Number Sheet

<Document No.3>:
EJXMVTool Read Me First → FlowNavigator Getting Started

<Document No.4>:
EJXMVTool License Agreement → FlowNavigator License Agreement.

NOTE

The location of following software has been changed for FSA120 R1.04 or later.

- Device Files DVD-ROM <Disc No.2>:
  FlowNavigator program has been moved from Yokogawa DTMLibrary HART/FOUNDATION fieldbus in Device Files DVD-ROM to FlowNavigator CD-ROM
- FlowNavigator CD-ROM <Disc No.3>:
  In addition to Resource, the FlowNavigator program (EJXMVTool and DYFMVTool) has been added.

2.2 To Start with

1) FlowNavigator is the software utilizing FDT/DTM technology. To use this software, a frame application is required. 'Field Mate' is bundled with this software package as Yokogawa standard frame application. The quality and operability of FlowNavigator is certified for use with FieldMate only. Please use 'Field Mate' as frame application.
Also, you can use Field communication server included in FieldMate as a Communication DTM. For the installation and operation of FieldMate, please refer to the printed document.

• "FieldMate Getting Started" (IM 01R01A04-01E) <Document No.1>

• "FieldMate Operational Precaution" (IM 01R01A01-91E) <Document No.2>

For the details of installation and operation, please also refer to the user's manual of FieldMate in pdf format shown by start menu.

2) Before starting any operation, please carefully read the instructions in the user's manual of FlowNavigator and obtain necessary knowledge about installation and operation of the software.
The User's manual "FSA120 Flow Configuration Software" (IM 01C25R51-01E) is provided as a Portable Document Format (pdf) file in the CD-ROM labeled "FlowNavigator", and is located at

<FlowNavigator CD-ROM>: \EJXMVTool_Manual.pdf

<FlowNavigator CD-ROM>: \DYFMVTool_Manual.pdf

Set the FlowNavigator CD-ROM in the CD-ROM drive of your computer and double click the name of the file.
To read the file in PDF format, Adobe Reader is required.
If Adobe Reader is not on your PC, download and install Adobe Reader from the following website.
<http://www.adobe.com/>

2.3 Installation Flow

Followings are the flow of standard installation. As the procedures may differ according to the condition, please find details in each designated manual and follow the instructions.

Step 1 **Confirm incompatible software does not exist, PRM and FSA210 (Refer to <Document No.2>)**

Step 2 **Install communication device software (For FOUNDATION fieldbus communication)**

Step 3 **Install FieldMate (Refer to <Document No.1>)**

1) Install FieldMate <Disc No.1>
2) Enter the license number of FieldMate <License Sheet No.1>
3) Install Device Files <Disc No.2>

Step 4 **Install FlowNavigator <Disc No.3>**

Step 5 **Start FieldMate**

1) Register yourself in FieldMate (Refer to <Document No.1>)
2) Start Device DTM

Step 6 **Start FlowNavigator Program**

1) Enter the license number of FlowNavigator <License Sheet No.2>

2.4 Outline of FlowNavigator

The FSA120 (FieldMate FlowNavigator) is the software package which offers various functions to help users to easily configure the mass flow parameters of device.

The FSA120 includes following two programs:

- EJXMVTool: for EJX Multivariable Transmitter
- DYFMVTool: for digitalYEWFLO Vortex Flowmeter

FSA120 includes FieldMate, Yokogawa's frame application. It employs FDT/DTM technology and works on the FieldMate.

FSA120 has the following features:

- Easy flow parameter configuration by dialog windows
- Configuration of the fluid physical properties*

  *: DIPPR, Steam tables IAPWS-IF97, Natural gas standard AGA8/ISO12213
- Configuration of the primary device**

  **: Orifice, Nozzle, Venturi, FIX
- Various flow calculation modes

  EJXMVTool: Auto Compensation Mode / Basic Mode
  DYFMVTool: Detail Compensation Mode / Steam Mode / Simple Mode
- HART and FOUNDATION fieldbus H1 are supported.

FSA120 provides the following advantages to device:

- Highly-responsive flow measurement and saving cost by built-in flow computer inside device
- Highly-accurate mass flow rate output compensated by process temperature or pressure value by using the fluid physical properties database
- Easy mass flow configuration by FDT/DTM standard conforming software

  FieldMate: Yokogawa's frame application which conforms to FDT standard
  FDT(Field Device Tool): defines the system environment in which the DTM runs.
  DTM(Device Type Manager): the application which defines the graphical user interface(GUI) specific to the device.

NOTE

For FSA120 R1.03 or before, FSA120 was called "EJXMVTool(EJX-MV Configuration DTM)" because it comprised a single EJXMVTool program for the EJX Multivariable Transmitter.

For FSA120 R1.04 or later, the product name has been changed to "FieldMate FlowNavigator (Flow Configuration Software)" because the DYFMVTool program for digitalYEWFLO Vortex Flowmeter has been added.

FlowNavigator consists of two programs (EJXMVTool and DYFMVTool) and Resource (Instruction Manual and Database) for both programs.

To perform the flow configuration of EJX Multivariable Transmitter, use FlowNavigator program, EJXMVTool, which works on Device DTM, EJX910 HART/FOUNDATION fieldbus DTM.

EJXMVTool consists of the Flow Configuration Wizard, a dialog editor for flow configuration, and Obtain Flow Coefficient, a display for confirming the flow configuration.

To perform the flow configuration of digitalYEWFLO Vortex Flowmeter, use FlowNavigator program, DYFMVTool, which works on Device DTM, DYF(SoftDL) FOUNDATION fieldbus DTM.

DYFMVTool consists of the Flow Configuration Wizard, a dialog editor for flow configuration.

The following charts show a configuration consisting of a notebook PC, communication device and EJX Multivariable Transmitters and digitalYEWFLO Vortex Flowmeter.

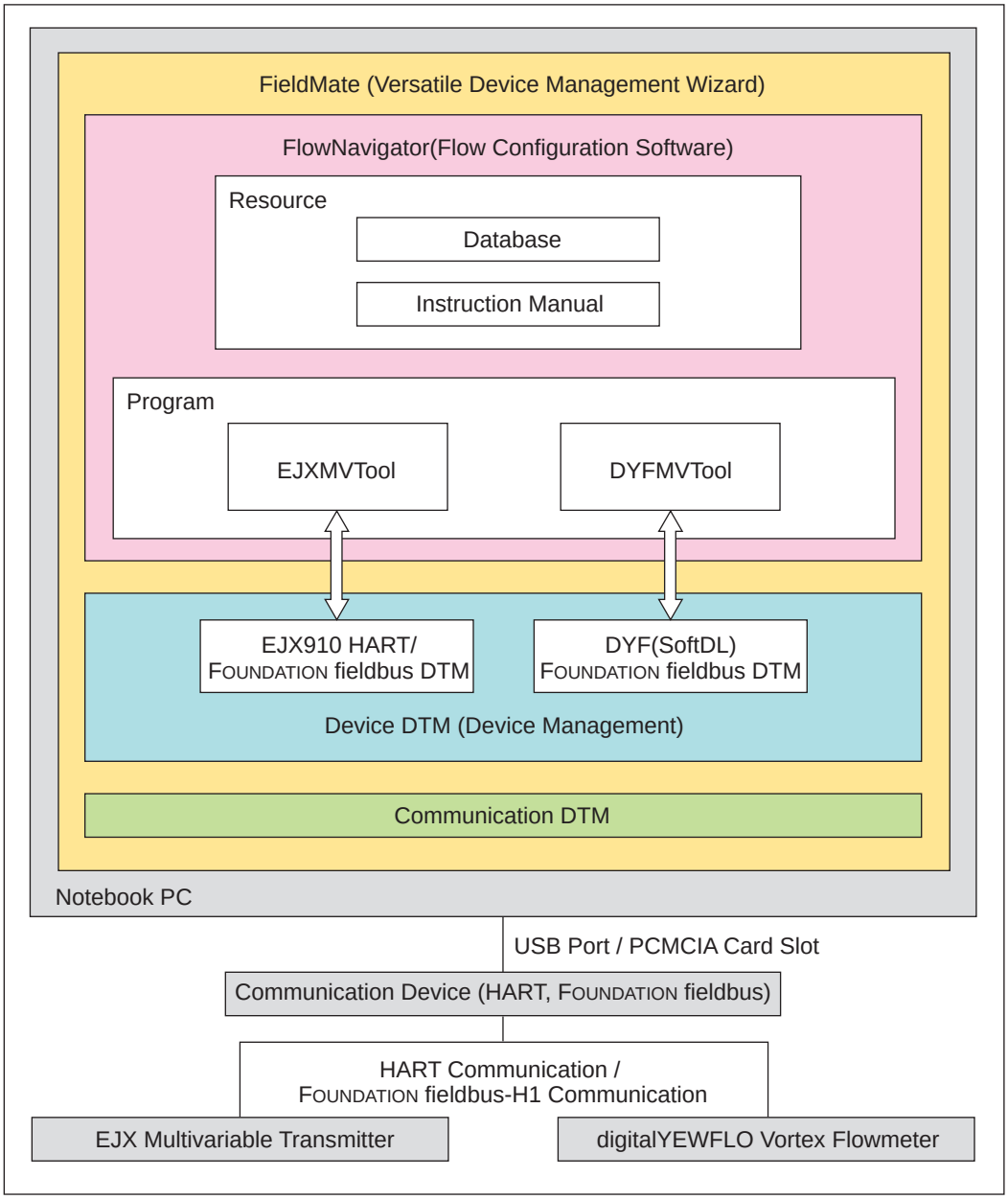


Figure 2.2a Functional diagram

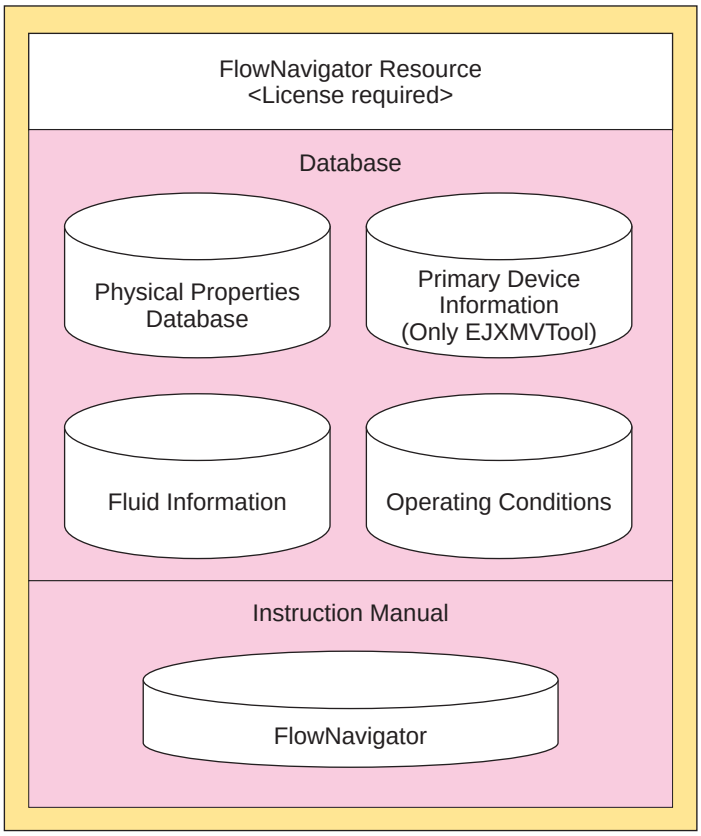


Figure 2.2b FlowNavigator Resource

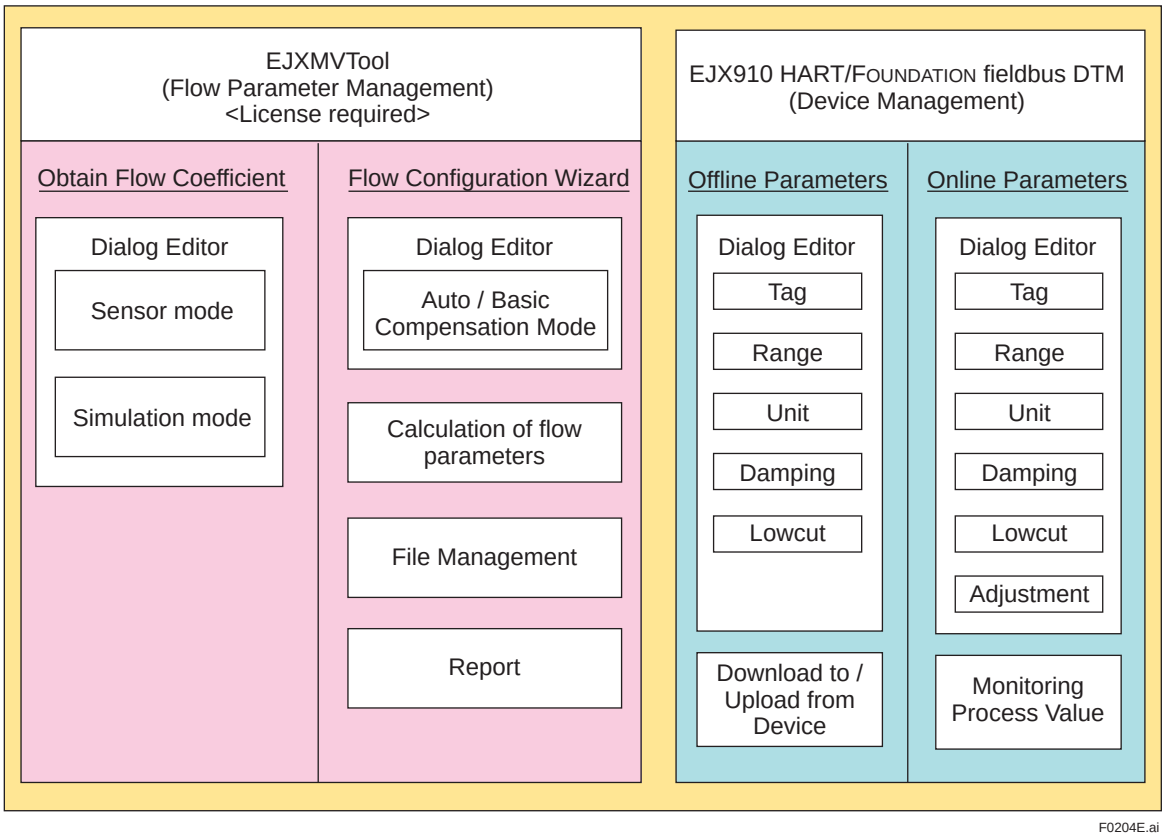


Figure 2.2c FlowNavigator Program and Device DTM (EJX Multivariable Transmitter)

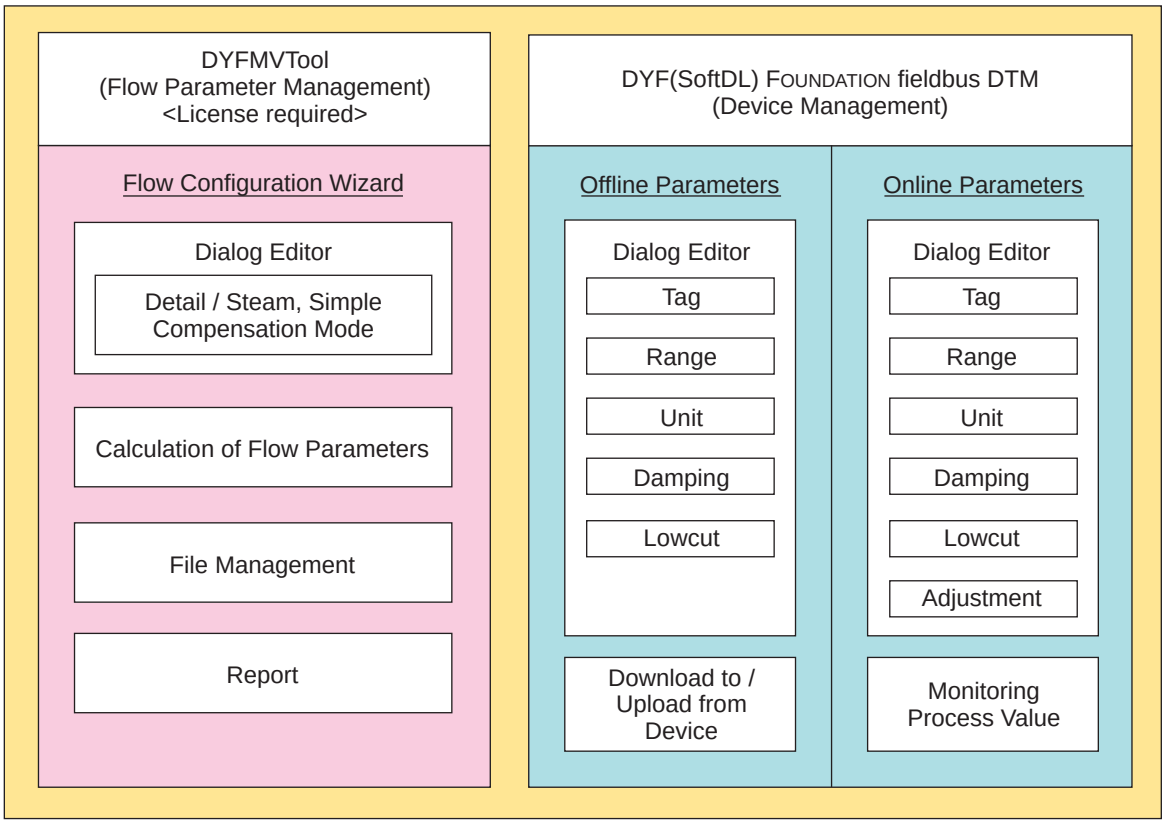


Figure 2.2d FlowNavigator Program and Device DTM (digitalYEWFLO Vortex Flowmeter)

2.5 FlowNavigator Programs

FlowNavigator and Device DTM consist of following programs.

Each program can be started in the following way.

- Execute Device DTM on the FieldMate*.
  (Not necessary to enter a license for FlowNavigator)
- Execute the FlowNavigator Program on Device DTM.
  (Necessary to enter your license for FlowNavigator)

*: Device DTM function is operated by DTMWorks

Table 2.1 Function of FlowNavigator Resource

Program			Function	Contents	Install location	Startup method	License
FlowNavigator	Resource	Database	Database	• Physical property database used for flow parameter calculation	–	–	Required
		Instruction Manual	Instruction Manual	• FlowNavigator Instruction Manual	<DTM InstDrive>: \Program Files \Yokogawa\DTMs \MVToolCommon		

Table 2.2 Function of EJXMVTool (for HART communication) and EJX910 HART DTM

Program			Function	Contents	Install location	Startup method	License
Device DTM	EJX910 HART DTM		Device Management	• Online Parameter • Offline Parameter • Download to or Upload from the device	<DTM InstDrive>: \Program Files \Yokogawa\DTMs	Execute from FieldMate	Not required
Flow Navigator	Program -EJXMVTool-	Flow Configuration Wizard	Flow Parameter Management -Flow Configuration-	• Configuration of flow parameters for EJX Multivariable Transmitter - Auto Compensation Mode - Basic Mode • File management • Report function	<DTM InstDrive>: \Program Files \Yokogawa\DTMs \EJXMVTool	Execute from EJX910 HART DTM	Required
		Obtain Flow Coefficient	Flow Parameter Management -Confirming Flow Configuration-	• Flow coefficient retrieval			Required

Table 2.3 Function of EJXMVTool (for FOUNDATION fieldbus communication) and EJX910 FOUNDATION fieldbus DTM

Program			Function	Contents	Install location	Startup method	License
Device DTM	EJX910 FOUNDATION fieldbus DTM		Device Management	• Online Parameter • Offline Parameter • Download to or Upload from the device	<DTM InstDrive>:\Program Files\Yokogawa\DTMs	Execute from FieldMate	Not required
Flow Navigator	Program -EJXMVTool-	Flow Configuration Wizard	Flow Parameter Management -Flow Configuration-	• Configuration of flow parameters for EJX Multivariable Transmitter - Auto Compensation Mode - Basic Mode • File management • Report function	<DTM InstDrive>:\Program Files\Yokogawa\DTMs\YokFFFramework\EJXMVToolFF	Execute from EJX910 FOUNDATION fieldbus DTM	Required
		Obtain Flow Coefficient	Flow Parameter Management -Confirming Flow Configuration-	• Flow coefficient retrieval			Required

Table 2.4 Function of DYFMVTool (for FOUNDATION fieldbus communication) and DYF(SoftDL) FOUNDATION fieldbus DTM

Program			Function	Contents	Install location	Startup method	License
Device DTM	DYF(SoftDL) FOUNDATION fieldbus DTM		Device Management	• Online Parameter • Offline Parameter • Download to or Upload from the device	<DTM InstDrive>:\Program Files\Yokogawa\DTMs	Execute from FieldMate	Not required
Flow Navigator	Program -DYFMVTool-	Flow Configuration Wizard	Flow Parameter Management -Flow Configuration-	• Configuration of flow parameters for DYF - Detail Compensation Mode - Steam, Simple Compensation Mode • File management • Report function	<DTM InstDrive>:\Program Files\Yokogawa\DTMs\YokFFFramework\DYFMVToolFF	Execute from DYF (SoftDL) FOUNDATION fieldbus DTM	Required

3. Functional Specification

3.1 PC

3.1.1 Hardware Operating Environment

Hardware Operating Environment		
	Windows 7	**Windows Vista**
PC	IBM PC/AT Compatible	
CPU	Intel® Core™2 Duo T7100 or similar specification CPU	
Main Memory	2GB or more	1GB or more (2GB or more recommended)
Hard Disk Drive	8GB or more	
CD-ROM Drive	Windows 7 compatible	Windows Vista compatible
Display	1024×768 or better resolution recommended Windows 7 compatible	1024×768 or better resolution recommended Windows Vista compatible
Network port		
HART	One USB port USB2.0 standard / Bluetooth 2.0	
FOUNDATION fieldbus H1	One PCMCIA card slot / One USB port USB2.0 standard	

3.1.2 Software Operating Environment

- Windows 7 Professional 32bit / 64bit / Home Premium 32bit / 64bit SP1 or later (English)
- Windows Vista business 32bit SP2 or later (English)

IMPORTANT

Login Windows as an Administrator or a user with an administrative authority.

The following software is necessary to be installed in your computer.

Common

Adobe Reader
FDT frame application conforming to FDT Interface Specification Version 1.2
The frame application which is already tested with FSA120 and proper operation is confirmed; FieldMate

For HART Communication

Communication DTM for HART Modem conformed FDT Interface Specification Version 1.2
The following Communication DTM has been tested with FSA120 and compatibility is confirmed; HART Communication DTM included in FieldMate

For FOUNDATION fieldbus Communication

Communication DTM for PCMCIA-FBUS conforming to FDT version 1.2
The following Communication DTM has been tested with FSA120 and compatibility is confirmed; FOUNDATION fieldbus communication DTM included in FieldMate.

NI-FBUS Communications Manager
• Windows Vista, Windows 7: 4.0.1 or later

Function Block Scheduling and Connection Tool (For DYFMVTool)
e.g.NI-FBUS Configurator
• Windows Vista, Windows 7: 4.0.1 or later

NOTE

Install the following software which is contained in FSA120.

1) FieldMate
   • FDT frame application
   • HART communication DTM
   • FOUNDATION fieldbus communication DTM
2) Device Files
   • EJX910 HART DTM (included in Yokogawa DTM Library HART)
   • EJX910 FOUNDATION fieldbus DTM (included in Yokogawa DTM Library FOUNDATION fieldbus)
   • DYF(SoftDL) FOUNDATION fieldbus DTM (included in Yokogawa DTMLibrary FOUNDATION fieldbus)

IMPORTANT

If you already have FSA210 Mass Flow Configuration Software installed in your computer, uninstall FSA210 to avoid the competition of COM PORT.

3.2 Field Communication

1) HART communication

Recommended HART modem:

USB FieldMate Modem: BRAIN/HART (Optional code: /B, Yokogawa Parts Number: F9197UC)

VIATOR® Bluetooth® Interface: Model 010041 (MACTek®) *

2) FOUNDATION fieldbus communication

Recommended:

Softing

FFusb**

National Instruments

PCMCIA-FBUS Series 2

NI USB-8486

* : Microsoft supplied Bluetooth stack is used.
**: The package is provided complete with FieldMate driver from Softing.

3.3 Model to be Connected

- EJX Multivariable Transmitter

  EJX910A/EJX930A

  Protocol: HART, FOUNDATION fieldbus

- digitalYEWFLO Vortex Flowmeter

  DY-F/DYA-F

  Protocol: FOUNDATION fieldbus

  Device Type: 9, Device revision: 3 or later

3.4 Function Detail

3.4.1 Device Management

Device Management function is supported by EJX910 HART/FOUNDATION fieldbus and DYF(SoftDL) FOUNDATION fieldbus DTM.

FOUNDATION fieldbus Device DTM supports following blocks.

EJX910 FOUNDATION fieldbus DTM:
Resource block, Sensor Transducer block, Flow Transducer block, LCD Transducer block, and AI function blocks

DYF(SoftDL) FOUNDATION fieldbus DTM:
Resource block, Transducer block, AI function blocks and AR function block

Parameters of other function blocks should be set and changed by other Fieldbus configurators.

IMPORTANT

Use function block scheduling and connection tool for DYFMVTool. After using these setting tool, finish the program before starting FlowNavigator.

(1) Online Parameter

The Device General Parameters of the device can be edited directly in online status. (Tag, Range, Unit, Damping, Lowcut, Indicator display)

(2) Offline Parameter

The Device General Parameters of the device can be edited and stored in offline database. (Process value monitoring, Tag, Range, Unit, Damping, Lowcut, Indicator display)

(3) Downloads to or uploads from the device

The Device Flow Parameters and Device General Parameters stored in offline database are downloaded to the device.
The parameters of the device is uploaded from the device and stored in offline database.

Device General Parameters:

HART or FOUNDATION fieldbus parameters of the device, which can be modified with using Device DTM. e.g. range, damping, etc.

User Flow Parameters:

The parameters which users input on EJXMVTool and DYFMVTool for flow configuration. These parameters are used to only generate Device Flow Parameters and not downloaded to the device.

Device Flow Parameters:

The parameters which EJXMVTool and DYFMVTool calculate and generate with using the User Flow Parameters and are downloaded to the device.

3.4.2 Flow Parameter Management (Flow Configuration Wizard)

(1) EJXMVTool

(a) Auto Compensation Mode

Configuration of the fluid physical properties and primary device for the EJX Multivariable Transmitter can be performed using a dialog window. Refer to Section 7.1.

(b) Basic Mode

Flow operation and density compensation are performed conventionally, with the flow factors being input manually. Refer to Section 7.2.

(c) File management

Parameters are imported and exported using following files.
xmv file: import / export User Flow Parameters and Device Flow Parameters
prm file: Import HART Device Flow Parameters (only for FSA210 user)

(d) Report function

Export User Flow Parameters and Device General Parameters in CSV file format.

(2) DYFMVTool

(a) Detail (Gas / Liquid) Compensation Mode

Configuration of the fluid physical properties for the digitalYEWFLO Vortex Flowmeter can be performed using a dialog window. Refer to Section 8.1.

(b) Steam Compensation Mode

Flow operation and density compensation are performed, with the flow factors inside digitalYEWFLO Vortex Flowmeter. Refer to Section 8.2.

(c) Simple (Gas / Liquid) Compensation Mode

Flow operation and density compensation are performed conventionally, with the flow factors being input manually. Refer to Section 8.2.

(d) File management

Parameters are imported and exported using following files.
vmv file: import / export User Flow Parameters and Device Flow Parameters

(e) Report function

Export User Flow Parameters and Device General Parameters in CSV file format.

3.4.3 Flow Parameter Management (Obtain Flow Coefficient)

This function is supported by EJXMVTool.

Flow coefficient retrieval

The flow coefficient can be obtained from the device (input selection: sensor data or simulated data).

3.4.4 Primary Device

This function is supported by EJXMVTool Auto Compensation Mode.

Table 3.1 Supported primary devices

Type	Primary Device
Orifice	Orifice Corner Taps [ISO5167-1 1991]
	Orifice Corner Taps [ISO5167-2 2003]
	Orifice Corner Taps [ASME MFC-3M 1989]
	Orifice Flange Taps [ISO5167-1 1991]
	Orifice Flange Taps [ISO5167-2 2003]
	Orifice Flange Taps [ASME MFC-3M 1989]
	Orifice Flange Taps [AGA No.3 1992]
	Orifice D and D/2 Taps [ISO5167-1 1991]
	Orifice D and D/2 Taps [ISO5167-2 2003]
	Orifice D and D/2 Taps [ASME MFC-3M 1989]
Nozzle	ISA1932 nozzle [ISO5167-1 1991/ ISO5167-3 2003]
	Long radius nozzle [ISO5167-1 1991/ ISO5167-3 2003]
	ASME FLOW NOZZLES [ASME MFC-3M 1989]
Venturi	Venturi nozzle [ISO5167-1 1991/ ISO5167-3 2003]
	Classical Venturi tube “as cast” convergent section [ISO5167-1 1991/ ISO5167-4 2003]
	ASME Venturi Tubes With a rough Cast or Fabricated Convergent [ASME MFC-3M 1989]
	Classical Venturi tube with a machined convergent section [ISO5167-1 1991/ ISO5167-4 2003]
	ASME Venturi Tubes With a machined convergent section [ASME MFC-3M 1989]
	Classical Venturi tube with a rough-welded sheet-iron convergent section [ISO5167-1 1991/ ISO5167-4 2003]
FIX	Fixed Mode (Sets the discharge coefficient and gas expansion factor to a fixed value)

3.4.5 Density Compensation

This function is supported by EJXMVTool Auto Compensation Mode and DYFMVTool Detail (Gas/Liquid) Compensation Mode.

(1) Density compensation using physical properties database

Table 3.2 Supported physical properties database

Fluid name
Acetic Acid (*)
Acetone
Acetonitrile
Acetylene
Acrylonitrile
Air
Allyl Alcohol
Ammonia
Argon
Benzaldehyde
Benzene
Benzoic Acid (*)
Benz Alcohol
Biphenyl
Bromine
Carbon Dioxide
Carbon Monoxide
Carbon Tetrachloride
Chlorine
Chlorodifluoromethane
Chloroprene
Chlorotrifluoroethylene
Cycloheptane
Cyclohexane
Cyclopentane
Cyclopentene
Cyclopropane
Dichlorodifluoromethane
Divinyl Ether
Ethane
Ethanol
Ethylamine
Ethylbenzene
Ethylene
Ethylene Glycol
Ethylene Oxide
Fluorene
Furan
Helium-4
Hydrazine
Hydrogen
Hydrogen Chloride
Hydrogen Cyanide
Hydrogen Peroxide
Hydrogen Sulfide

Fluid name
Isobutane
Isobutene
Isobutylbenzene
Isopentane
Isoprene
Isopropanol
m-chloronitrobenzene
m-dichlorobenzene
Methane
Methanol
Methyl Acrylate
Methyl Ethyl Ketone
Methyl Vinyl ether
Monochlorobenzene
n-Butane
n-Butanol
n-Butyraldehyde
n-Butyronitrile
n-Decane
n-Dodecane
n-Heptadecane
n-Heptane
n-Hexane
n-nonane
n-Octane
n-Pentane
Neon
Neopentane
Nitric Acid (*)
Nitric Oxide
Nitrobenzene
Nitroethane
Nitrogen
Nitromethane
Nitrous Oxide
Oxygen
Pentafluoroethane
Phenol
Phosphoric Acid (*)
Propadiene
Propane
Propylene
Pyrene
Styrene
Sulfur Dioxide

Fluid name
Toluene
Trichloroethylene
Trichlorofluoromethane
Vinyl Acetate
Vinyl Chloride
Vinyl Cyclohexene
Water
1-Butene
1-Decene
1-Decanal
1-Decanol
1-Dodecene
1-Dodecanol
1-Heptanol
1-Heptene
1-Hexene
1-Hexadecanol
1-Octanol
1-Octene
1-Nonanal
1-Nonanol
1-Pentadecanol
1-Pentanol
1-Pentene
1-Undecanol
1,1,2,2-Tetrafluoroethane
1,1,2-Trichloroethane
1,2,4-Trichlorobenzene
1,2-Butadiene
1,3-Butadiene
1,3,5-Trichlorobenzene
1,4-Dioxane
1,4-Hexadiene
2-Methyl-1-Pentene
2,2-Dimethylbutane

*: Only for liquid.

Source:

DIPPR® Project No.801 Database 2003 Edition
This Physical Property Database from American Institute of Chemical Engineers (AIChE®)

NOTE

The DIPPR recommends an air temperature no higher than –25°C and cannot guarantee results if this temperature limit is exceeded.

(2) Density compensation using standard steam tables (For EJXMVTool)

IAPWS-IF97 Water and Steam (1997)

IAPWS-IF97: IAPWS Industrial Formulation 1997

IAPWS: The International Association for the Properties of Water and Steam

(3) Density compensation using standard.

Natural gas:

AGA8.

Compressibility Factors of Natural Gas and Other Related Hydrocarbon Gases

American Gas Association (AGA)

Transmission Measurement Committee Report No.8 Second Edition, November 1992

Detail Characterization Method
Gross Characterization Method 1
Gross Characterization Method 2

ISO 12213:1997 First edition 1997-12-01

Part 2: molar-composition analysis
Part 3: physical properties

(4) Custom fluid density and viscosity compensation

Numerical value user input for physical properties (density, viscosity, etc.)

4. Preparation

4.1 PC

To ensure that FlowNavigator functions properly, please make sure your PC meets the requirements stated in the section ‘3.1’.

All application must be finished.

4.1.1 Setting Items after Installing Windows

It is recommended that the following items be set and confirmed before installation of FlowNavigator.

● Power Management

FieldMate may not function properly while the sleep, standby and hibernation settings are enabled. The settings above can be disabled in Windows. The setting procedure is as follows.

<Windows 7>

Log on as a user with administrator privileges, click the Start menu, select Control Panel, Hardware and Sound, double-click Power Options to display the Power Options Properties dialog box, and then make sure the following items are set as described below. Note that some of the items described below may not be displayed depending on the configuration of the PC.
If an item is not displayed, the function is disabled.

- Choose what the power button does.
  When I press the power button: Do nothing
  When I close the lid: Do nothing

- Choose what to turn off the display
  Turn off the display: Never

<Windows Vista>

Log on as a user with administrator privileges, click the Start menu, select Control Panel, double-click Power Options to display the Power Options Properties dialog box, and then make sure the following items are set as described below. Note that some of the items described below may not be displayed depending on the configuration of the PC. If an item is not displayed, the function is disabled.

- System Settings window
  When I press the power button: Do nothing
  When I press the sleep button: Do nothing
  When I close the lid: Do nothing

- Edit Plan Settings window
  Put the computer to sleep: Never

4.2 Installation Procedure

4.2.1 Online Manual

The pdf format Manual for FlowNavigator is located at

<FlowNavigator CD-ROM>: \EJXMVTool_Manual.pdf

<FlowNavigator CD-ROM>: \DYFMVTool_Manual.pdf

If Adobe Reader is not on your PC, download and install it from the following website.

<http://www.adobe.com/>

4.2.2 Uninstall FSA210

This procedures are only applicable for the users of FSA210 Mass Flow Configuration Software.

If FSA210 is existing on your PC, uninstall it to avoid the competition with FieldMate.

To uninstall all the program of FSA210, take the following three steps.

(1) Uninstall a field communication server

Execute <FieldInstDrive>: \PRM\Program\PRMUninstall.exe

Double-click the filename in Windows Explorer.

<FieldInstDrive> is the drive on which field communication server is installed.

<FieldInstDrive> is the drive where the PRM directory is located.

The default drive is the same drive on which Windows is installed.

(2) Uninstall the EJXMVTool program with the Add or Remove Programs function of the Windows Control Panel. Select EJXMVTool and click [Change/Remove].

(3) Uninstall Exaopc

Use the Add or Remove Programs function of the Windows Control Panel to uninstall Exaopc. Select Exaopc and click [Change/Remove].
Follow the instruction to reboot the computer.

NOTE

Refer to Appendix A for the detailed procedures of uninstalling FSA210.

4.2.3 For FieldMate Users

If you already have FieldMate installed in your computer, which satisfies the operating requirement of FlowNavigator, you may need to skip the installation of FieldMate. Please see the followings.

NOTE

If FieldMate installed in your PC is older version and does not satisfy the working condition of FlowNavigator, it is necessary to install FieldMate which satisfies the requirement.

NOTE

FlowNavigator requires “Device Files R3.03.00 or later”. Device Files R3.03.00 includes “DTMLibrary FOUNDATION fieldbus 2011-4” and “DTMLibrary HART 2011-3”.

If Device Files installed in your PC does not satisfy the above condition, it is necessary to install the FieldMate and Device Files which are bundled in FSA120.

1) If you have FieldMate Basic installed on your PC, and...

- if you have purchased FSA120 with FieldMate Basic;

  check the version of FieldMate which is installed on your PC.

  On the other hand, the version of the bundled FieldMate is shown on the disk.

  If the version is lower than that of the bundled FieldMate, install the bundled FIeldMate.

  If the version is equivalent or higher, install FlowNavigator CD-ROM alone.
- if you have purchased FSA120 with FieldMate Advance;

  install the bundled FieldMate Advance and FlowNavigator CD-ROM.

2) If you have FieldMate Advance installed on your PC, and...

- if you have purchased FSA120 with FieldMate Basic;

  check the version of FieldMate which is installed on your PC.

  On the other hand, the version of the bundled Fieldmate is shown on the disk.

  If the version is lower than that oh the bundled FieldMate, install the bundled FieldMate Basic after uninstalling the previous version of FieldMate Advance.

  If the version is equivalent or higher, install FlowNavigator CD-ROM alone.
- if you have purchased FSA120 with FieldMate Advance;

  check the version of FieldMate which is installed on your PC.

  On the other hand, the version of the bundled FieldMate is shown on the disk.

  If the version is lower than that of the bundled FieldMate, install the bundled FIeldMate.

  if the version is equivalent or higher, install FlowNavigator CD-ROM alone.

4.2.4 FieldMate and Device Files Installation

Install following software before installing FlowNavigator.

Step 1 **Install software for communication device (For FOUNDATION fieldbus communication)**

Refer to Appendix D-1 for detail.

Step 2 **Install FieldMate**

NOTE

Device Files which includes Yokogawa DTMLibrary HART/FOUNDATION fieldbus and software for HART communication device are automatically installed during the installation of FieldMate. Regarding installation of software for HART communication device, refer to Appendix C-1.

NOTE

For the installation procedures of FieldMate, refer to the User's Manual IM01R01A04-01E "FieldMate Versatile Device Management Wizard Getting Started".

When installing FieldMate, log-in the Windows as an Administrator or an user with an administrative authority.

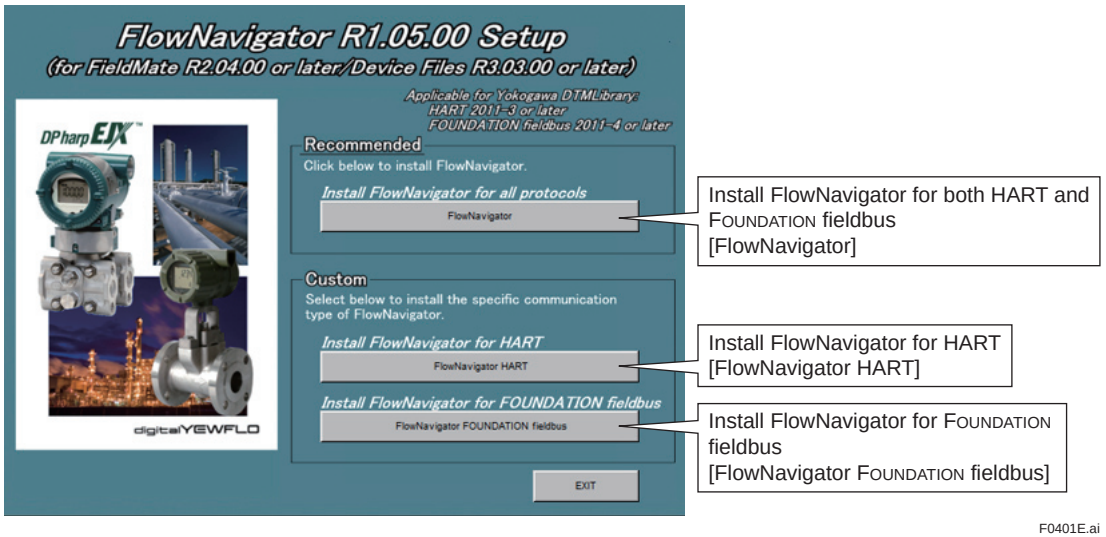
4.2.5 FlowNavigator Installation

Following gives the overview of FlowNavigator Setup and recommended installation procedures.

Overview of FlowNavigator Setup

The FlowNavigator setup is used for installing FlowNavigator (FOUNDATION fieldbus Program, HART Program and Resource) and located in "FlowNavigator CD-ROM".

Following shows "FlowNavigator Setup window".



F0401E.ai

Figure 4.1 FlowNavigator Setup window

Following gives FlowNavigator Software Component assigned to FlowNavigator setup window button.

Table 4.1 Assignment of FlowNavigator setup window button

FlowNavigator Software Component	FlowNavigator setup window button		
	Recommended	Custom	
	[FlowNavigator]	[FlowNavigator HART]	[FlowNavigator FOUNDATION fieldbus]
FOUNDATION fieldbus Program *1 (EJXMVTool FOUNDATION fieldbus and DYFMVTool FOUNDATION fieldbus)	**Installed**	Not installed	**Installed**
HART Program *2 (EJXMVTool HART)	**Installed**	**Installed**	Not installed
Resource *3 (Database and Instruction manual)	**Installed**	**Installed**	**Installed**

*1: Installed by "FlowNavigator FOUNDATION fieldbus program" Upgrade Setup. For detail, refer to "Installation Procedure <Step 3>".
*2: Installed by "FlowNavigator HART program" Upgrade Setup. For detail, refer to "Installation Procedure <Step 4>".
*3: Installed by "FlowNavigator Resource" Setup. For detail, refer to "Installation Procedure <Step 5>".

Installation Procedure

Following gives the FlowNavigator recommended installation procedures.

IMPORTANT

The quality, operability of FlowNavigator is certified for use with FieldMate only.

Step 1 Login Windows

Login Windows as an Administrator or a user with an administrative authority.

Step 2 Insert the "FlowNavigator CD-ROM"

Insert the "FlowNavigator CD-ROM" into the CD-ROM drive. Auto run starts and a FlowNavigator setup window appears. And click [FlowNavigator].

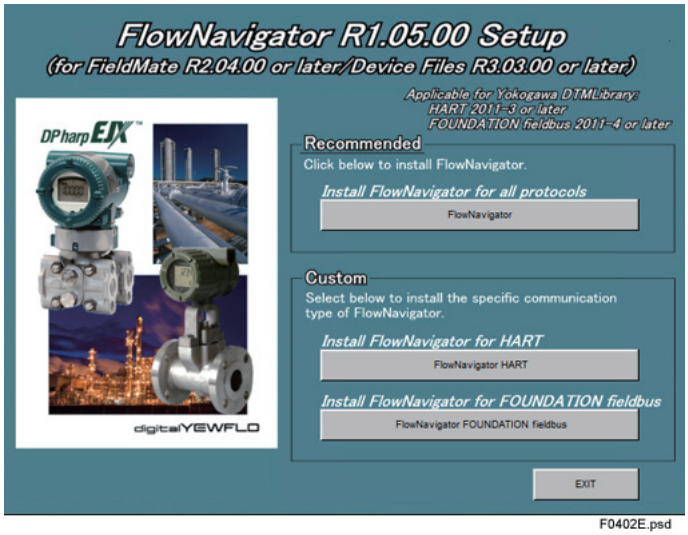


Figure 4.2 FlowNavigator Setup window

IMPORTANT

If auto run does not start after inserting the CD-ROM, double-click the following file.
<FlowNavigator CD-ROM>:\FlowNavigator.exe

NOTE

On Windows Vista/Windows 7, due to user account control, the “Auto Play” or “User Account Control” window may be displayed. And confirmation operation is required.

Step 3 “FlowNavigator FOUNDATION fieldbus program” Upgrade Setup window appears

NOTE

“FlowNavigator FOUNDATION fieldbus program” Upgrade Setup installs EJXMVTool FOUNDATION fieldbus and DYFMVTool FOUNDATION fieldbus.
The setup requires “DTMLibrary FOUNDATION fieldbus 2011-4 or later”. Device Files R3.03.00 includes “DTMLibrary FOUNDATION fieldbus 2011-4” and “DTMLibrary HART 2011-3”.

(1) Click [Next].

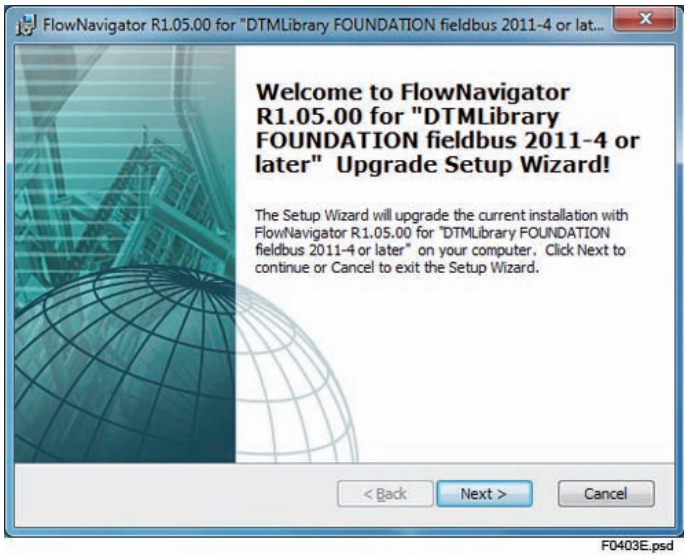


Figure 4.3 Welcome screen

NOTE

In case of an error occurrence or cancellation during the installation of “FlowNavigator FOUNDATION fieldbus program” Upgrade Setup, the following setup window appears.
• “FlowNavigator HART program” Upgrade Setup (“Installation Procedure <Step 4>”)
Then cancel the setup (If not canceled, the setup is installed).
After that, the following setup window appears sequentially.
• “FlowNavigator Resource” Setup (“Installation Procedure <Step 5>”)
Then cancel the setup (If not canceled, the setup is installed).

NOTE

If following error message is shown, cancel the HART program setup and Resource setup. Then install the FieldMate and Device Files which are bundled in FSA120 (refer to section 4.2.4), and install FlowNavigator again.

Error message:
"Please check that the following files are installed in your PC. Yokogawa DTMLibrary FOUNDATION fieldbus 2011-4 or later"

Figure 4.4 "DTMLibrary FOUNDATION fieldbus 2011-4 or later" nonexistence error message

The cause of error:
- Device Files is not installed
- The Device Files installed in your PC is R3.02.10 or before

(2) Select [I accept...] and click [Next].

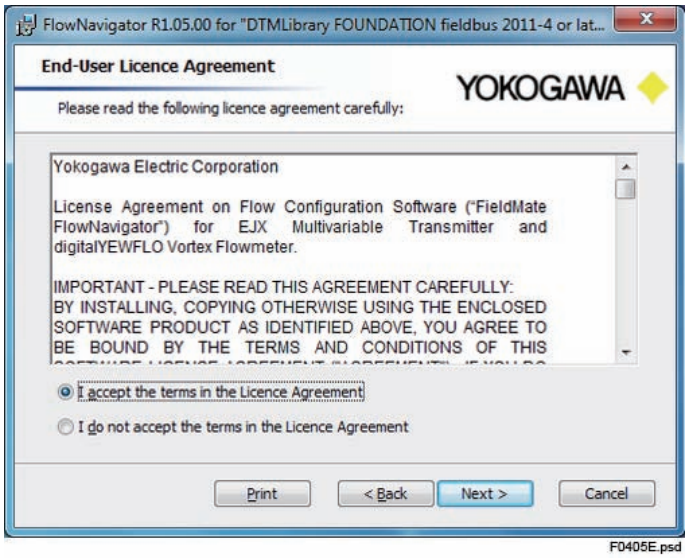


Figure 4.5 License Agreement screen

NOTE

Print function is not supported.
The "License Agreement" paper is included in FSA120 package.

(3) Input “User Name”, “Organization” and click [Next].

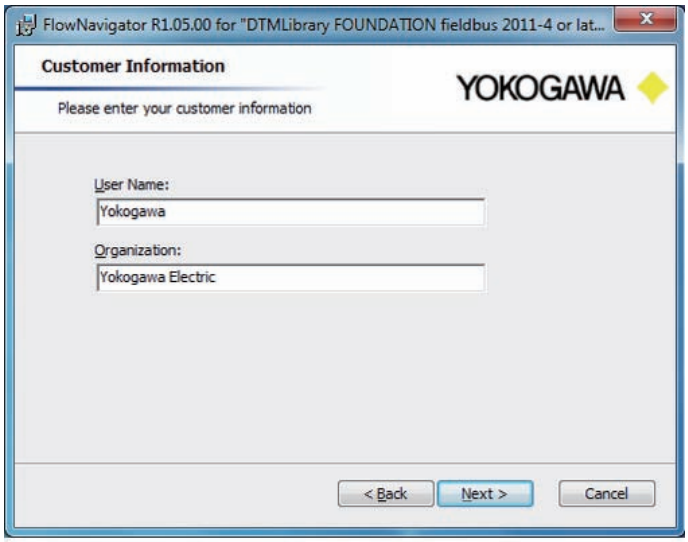


Figure 4.6 Customer Information screen

(4) Select [Automatic Upgrade].

[Custom Upgrade] setup is not supported.

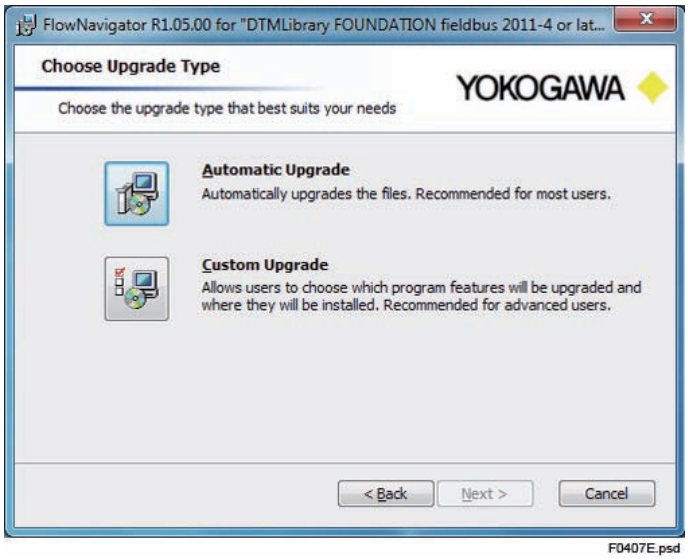
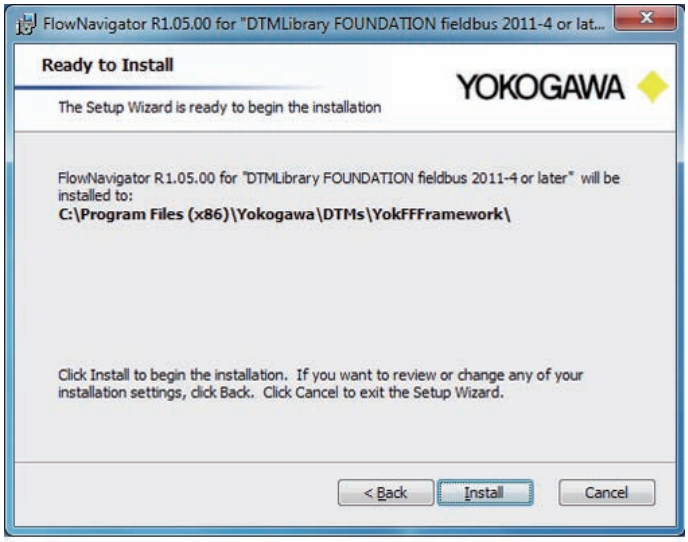


Figure 4.7 Choose Upgrade Type screen

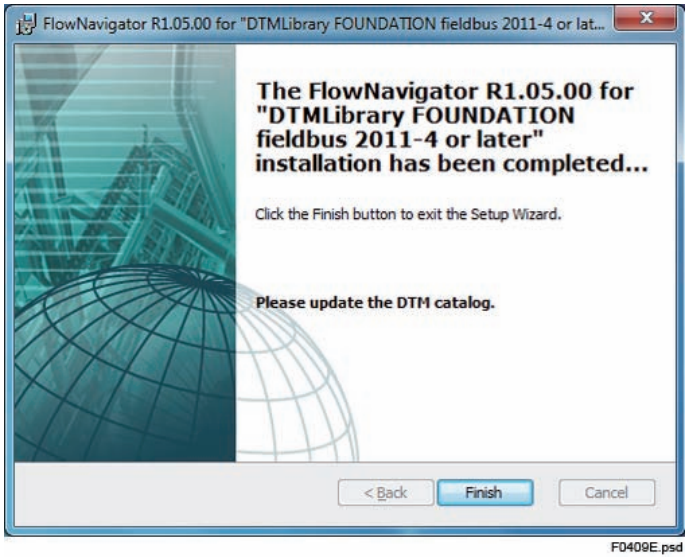
(5) Click [Install].



F0408E.psd

Figure 4.8 Ready to Install screen

(6) Click [Finish]



F0409E.psd

Figure 4.9 Finish Setup screen

NOTE

Even though “Please update the DTM catalog” message is shown, FlowNavigator installation does not require “Update DTM catalog” operation.

Step 4 FlowNavigator HART program Upgrade Setup window appears

NOTE

"FlowNavigator HART program" Upgrade Setup installs EJXMVTool HART. The setup requires "DTMLibrary HART 2011-3 or later".

(1) Click [Next].

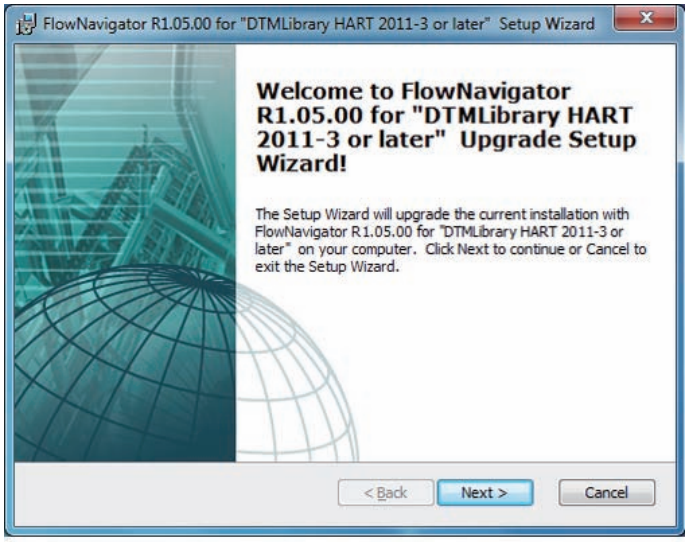


Figure 4.10a Welcome screen

NOTE

In case of error occurrence or cancellation during the installation of "FlowNavigator HART program" Upgrade Setup, the following setup window appears.
• "FlowNavigator Resource" Setup ("Installation Procedure <Step 5>")
Then cancel the setup (If not canceled, the setup is installed.).

NOTE

If following error message is shown, cancel Resource setup.
Then install the FieldMate and Device Files which are bundled in FSA120 (refer to section4.2.4), and install FlowNavigator again.

Error message:
"Please check that the following files are installed in your PC. Yokogawa DTMLibrary HART 2011-3/ HART 2011-3J or later"

Figure 4.10b "DTMLibrary HART 2011-3/ HART 2011-3J or later" nonexistence error message

The cause of error:
- Device Files is not installed
- The Device Files installed in your PC is R3.02.10 or before

(2) Select [I accept...] and click [Next].

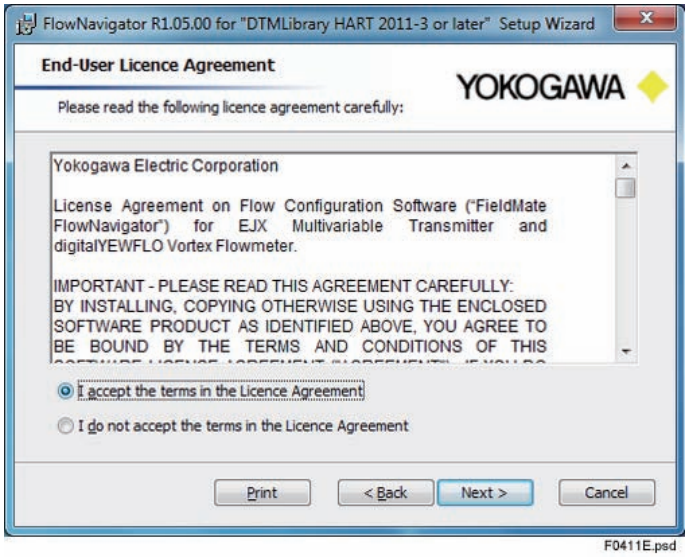


Figure 4.11 End-User License Agreement screen

NOTE

Print function is not supported.
The "License Agreement" paper is included in FSA120 package.

(3) Input “User Name”, “Organization” and click [Next].

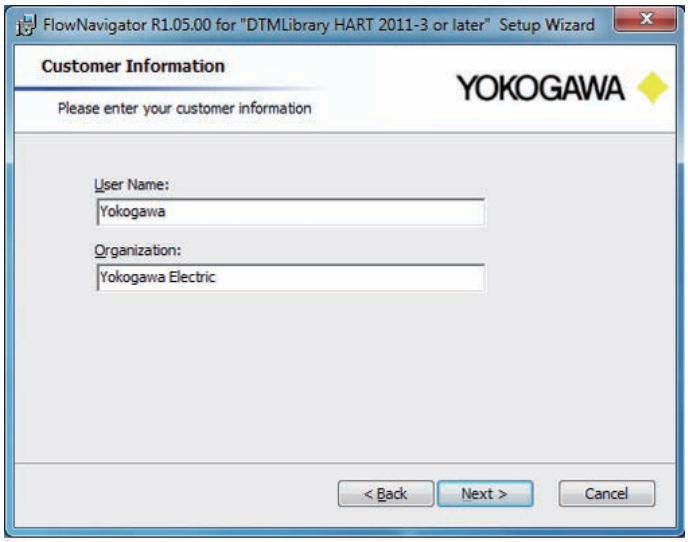


Figure 4.12 Customer Information screen

(4) Select [Automatic Upgrade].

[Custom Upgrade] setup is not supported.

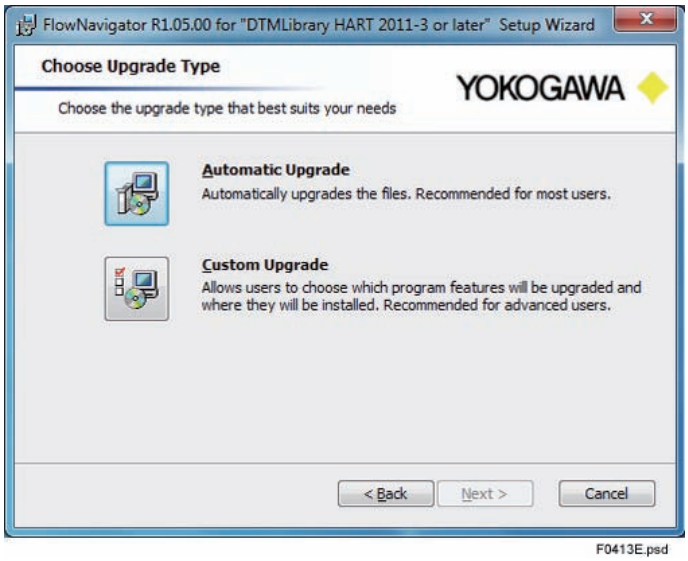


Figure 4.13 Choose Upgrade Type screen

(5) Click [Install].

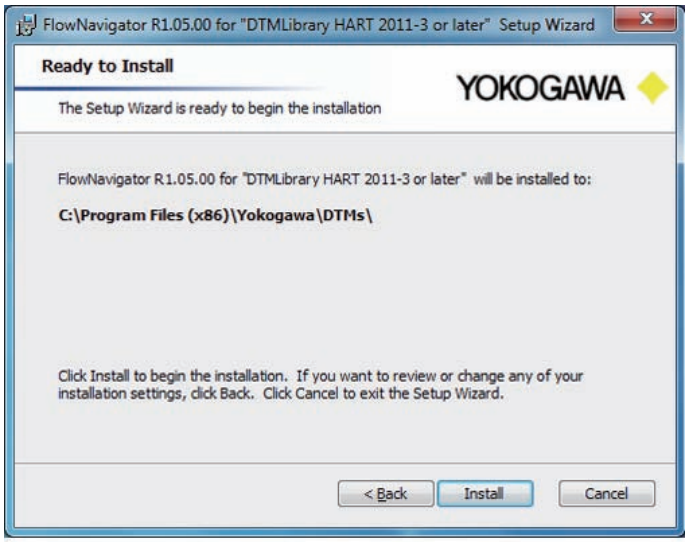


Figure 4.14 Ready to Install screen

(6) Click [Finish].

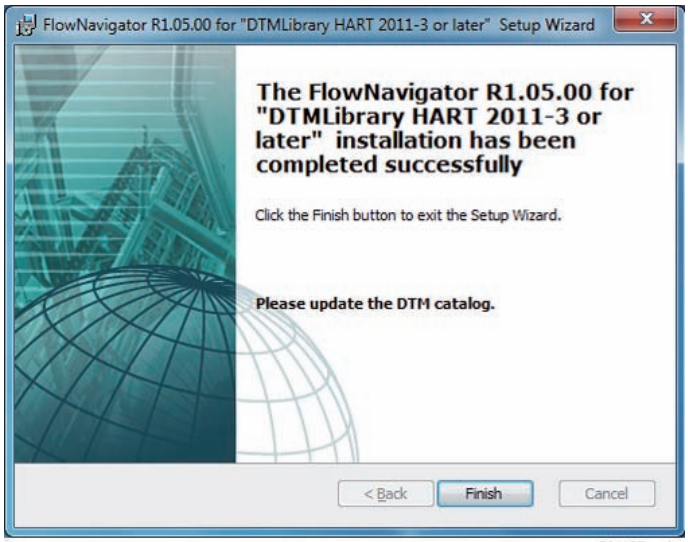


Figure 4.15 Finish Setup screen

NOTE

Even though “Please update the DTM catalog” message is shown, FlowNavigator installation does not require “Update DTM catalog” operation.

Step 5 “FlowNavigator Resource” Setup window appears

NOTE

“FlowNavigator Resource” Setup installs Database and Instruction Manual.

(1) Click [Next].

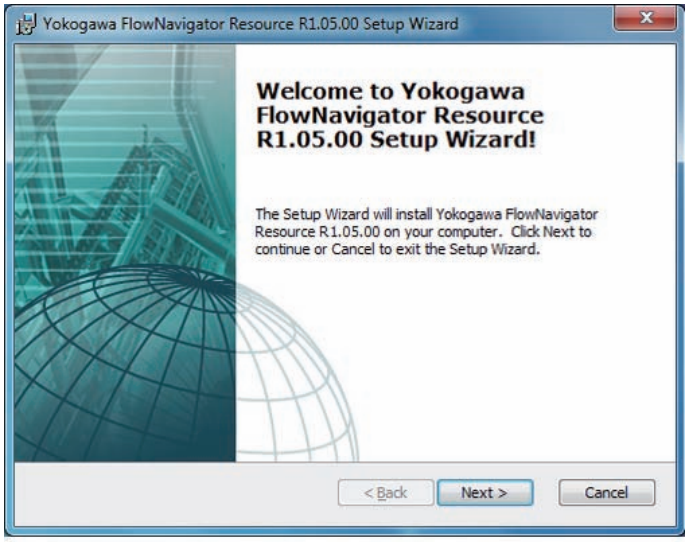


Figure 4.16a Welcome screen

NOTE

In case that “FlowNavigator Resource” is already installed, following window appears.
Click [Next].

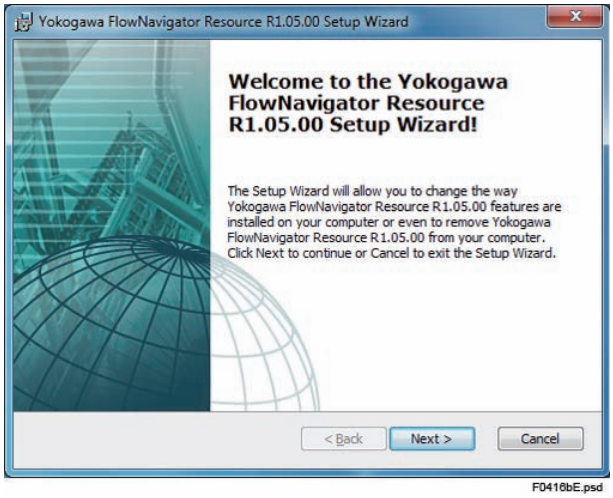


Figure 4.16b Welcome screen

This case is no problem and installation can be continued.
Because this can occur in following procedure:
1) FlowNavigator installation is partly canceled
   - “FlowNavigator HART/FOUNDATION fieldbus program” is canceled
   - “FlowNavigator Resource” is not canceled and installed correctly
2) FlowNavigator is installed again

(2) Select [I accept...] and click [Next].

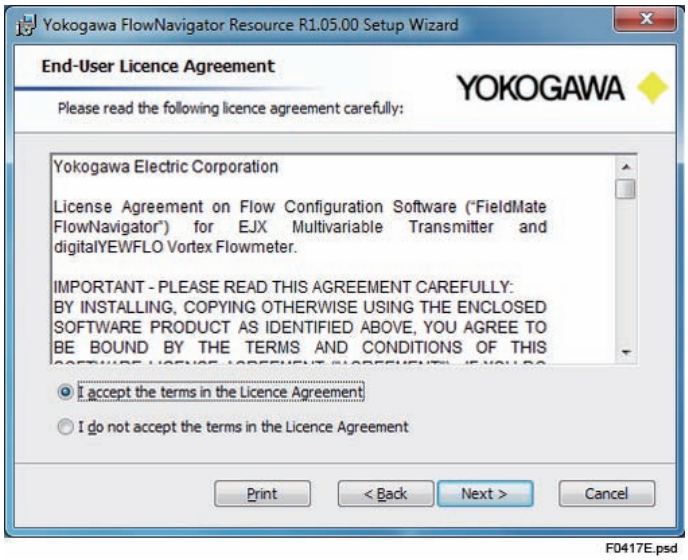


Figure 4.17 End-User License Agreement screen

NOTE

In case that “FlowNavigator Resource” is already installed, above window does not appear.

NOTE

Print function is not supported.
The “License Agreement” paper is included in FSA120 package.

(3) Input “User Name”, “Organization” and click [Next].

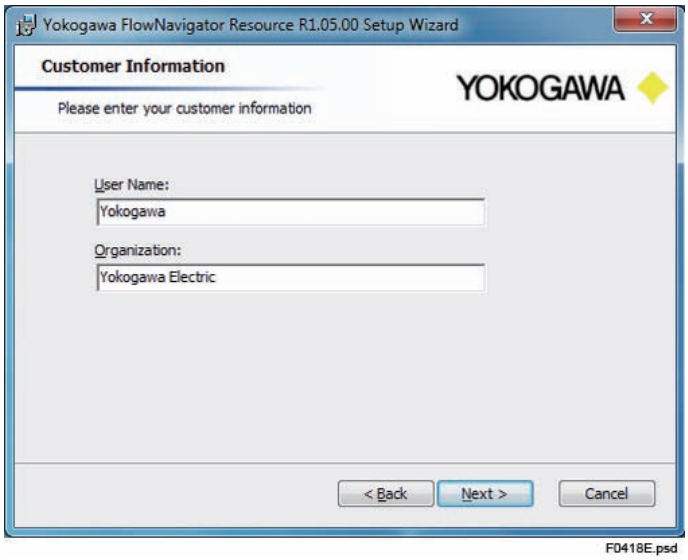


Figure 4.18 Customer Information screen

NOTE

In case that “FlowNavigator Resource” is already installed, above window does not appear.

(4) Select [Complete] or [Custom].

Complete setup is recommended.

Figure 4.19a Choose Setup Type screen

NOTE

In case that “FlowNavigator Resource” is already installed, following window appears.
Select [Repair].

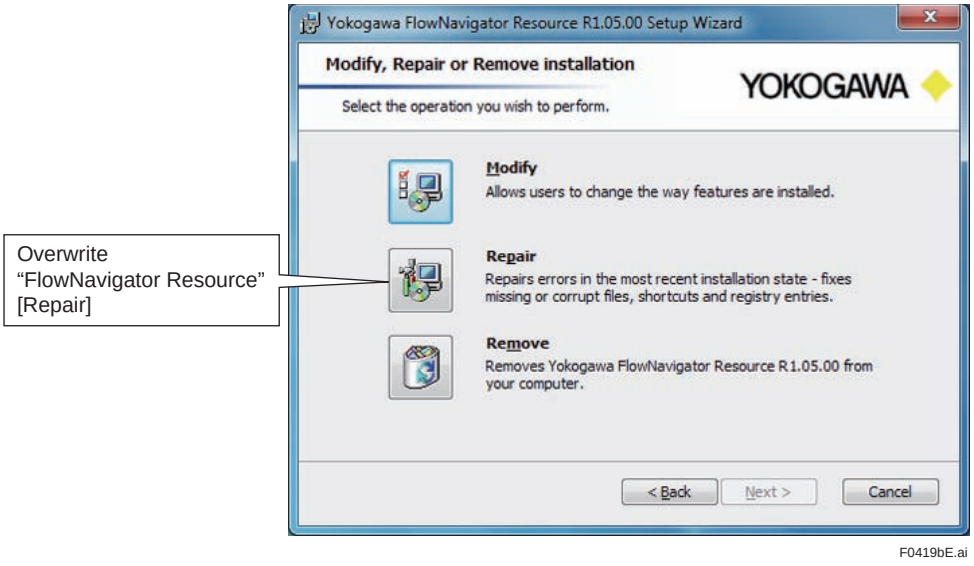


Figure 4.19b Modify, Repair or Remove installation screen

(5) Click [Install].

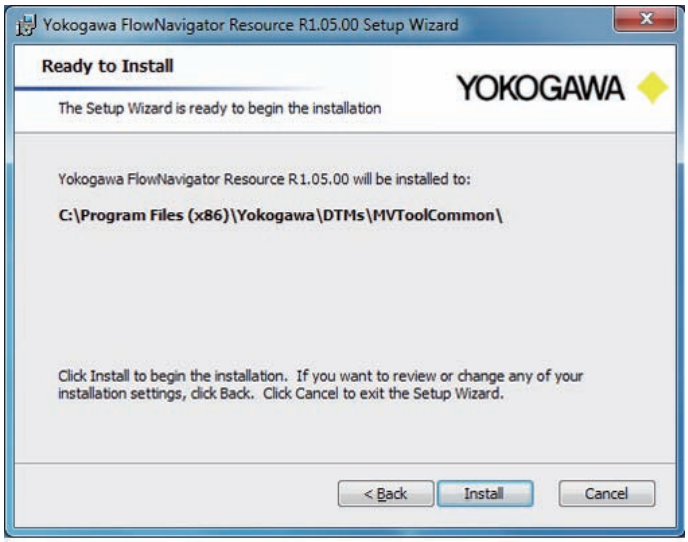


Figure 4.20 Ready to Install screen

(6) Click [Finish].

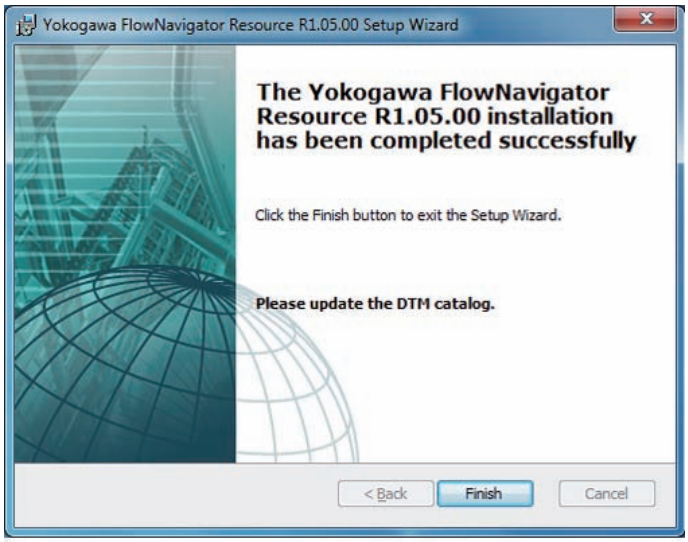


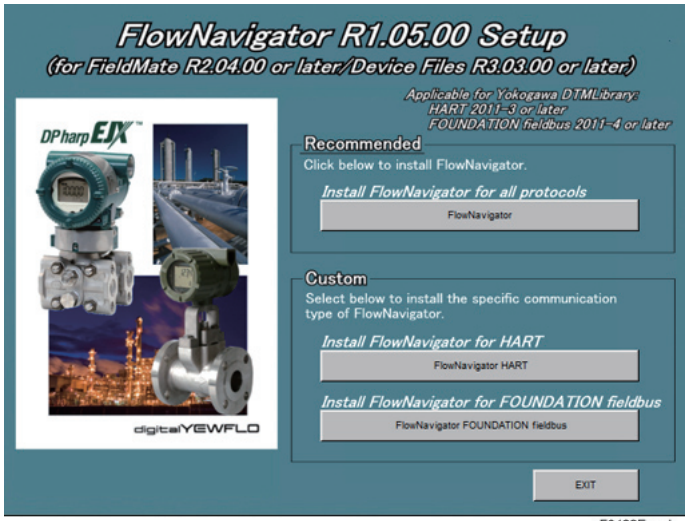
Figure 4.21 Finish Setup screen

NOTE

Even though “Please update the DTM catalog” message is shown, FlowNavigator installation does not require “Update DTM catalog” operation.

Step 6 **FlowNavigator setup window appears**

Click [EXIT].



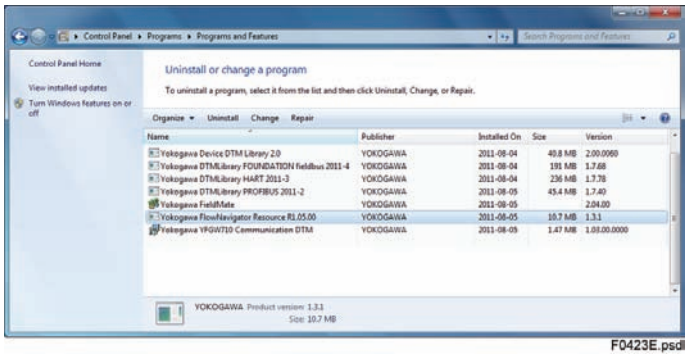
F0422E.psd

Figure 4.22 **FlowNavigator Setup window**

4.2.6 How to confirm Version Number

1) FlowNavigator Resource

The version number is displayed on the “Programs and Features” screen of Windows Control Panel. Select Yokogawa FlowNavigator Resource.



F0423E.psdl

Figure 4.23 **Version Number of Yokogawa FlowNavigator Resource**

NOTE

For FSA120 R1.03 or before, the Windows Control Panel displays “Yokogawa MVTool additional resource,” not “Yokogawa FlowNavigator Resource,” on the “Programs and Features” screen.

2) FlowNavigator Program: EJXMVTool, DYFMVTool

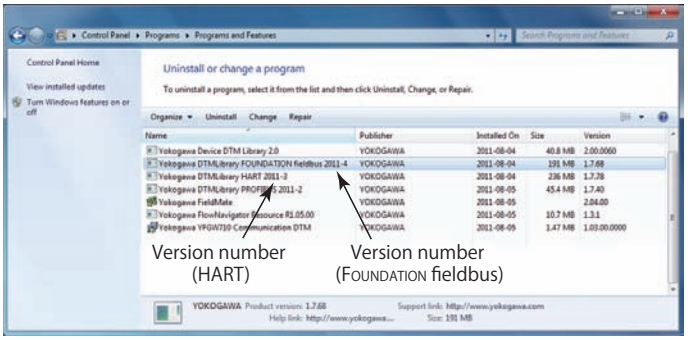
The version number is displayed on the HELP screen.

Flow Configuration Wizard (EJXMVTool, DYFMVTool): Refer to 6.3.5

Obtain Flow Coefficient (EJXMVTool): Refer to 7.3

3) Yokogawa DTMLibrary HART/FOUNDATION fieldbus

The version number is displayed on the “Programs and Features” screen of Windows Control Panel.



F0424E.ai

Figure 4.24 Version Number of DTM Library

4) Device DTM: EJX910 HART/FOUNDATION fieldbus DTM, DYF(SoftDL) FOUNDATION fieldbus DTM

Refer to 4.6.2 or 6.2.5.

4.3 Uninstallation

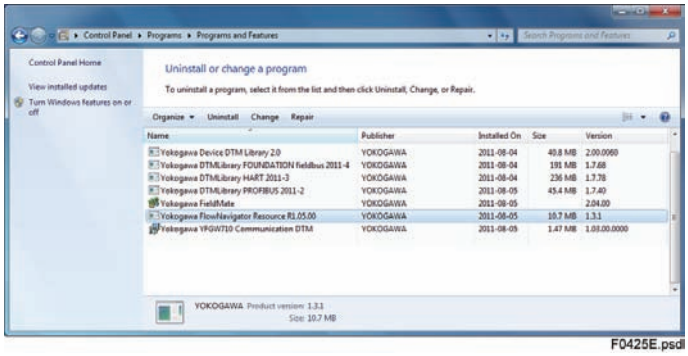
(1) FieldMate

Refer to User's manual IM01R01A01-00E.

(2) FlowNavigator

Use the “Programs and Features” screen of the Windows Control Panel.

Select Yokogawa FlowNavigator Resource and click [Uninstall].



F0425E.psdl

Figure 4.25 Remove Yokogawa FlowNavigator Resource

NOTE

For FSA120 R1.03 or before, the Windows Control Panel displays “Yokogawa MVTool additional resource,” not “Yokogawa FlowNavigator Resource,” on the “Programs and Features” screen.

4.4 Initial Setting (HART Communication)

NOTE

Regarding start up procedure of the device, refer to following:
EJX Multivariable Transmitter: User's Manual IM01C25R01-01E "EJX910A and EJX930A Multivariable Transmitters"

4.4.1 Install Communication Device

Connect the HART communication modem to the PC's COM port.

4.4.2 COM Port

Refer to Appendix C-2 for how to confirm COM Port.

4.4.3 Wiring

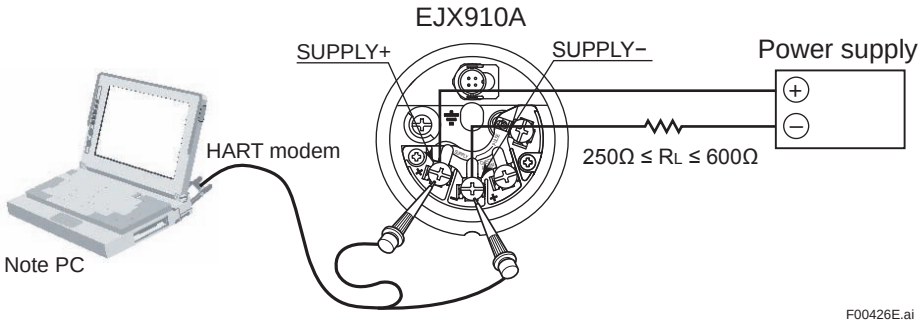


Figure 4.26 Connection of HART instruments

NOTE

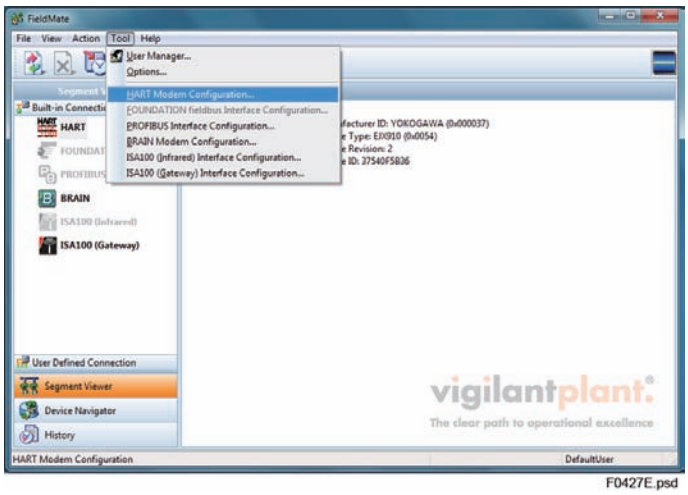
When RTD is not connected to EJX Multivariable Transmitter, the setting is possible though alarm 03 is displayed on the indicator.

4.4.4 Communication Setting

This subsection describes the procedures to change the communication related setting of FieldMate. Please try these procedures after you start FieldMate and if you experience that communication is not correctly established. Please refer to 4.6.2.

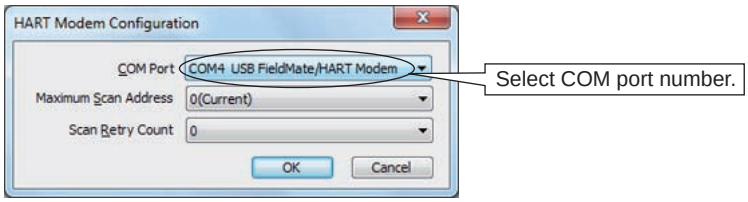
(1) Communication port setting on FieldMate

1. Click the [Tool] → [HART Modem Configuration..] at FieldMate window.
2. Select com port number.
3. Click the [OK] button.



F0427E.psd

Figure 4.27 HART Modem configuration



F0428E.ai

Figure 4.28 COM port

Please refer to FieldMate User's manual for details.

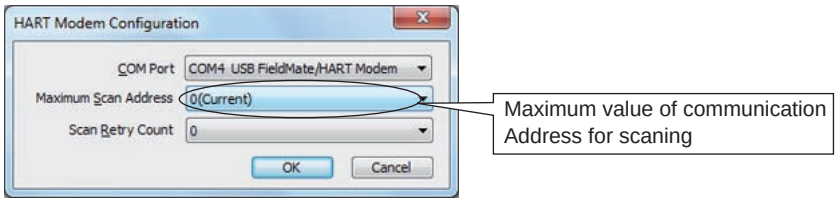
(2) Communication address setting on FieldMate

In FieldMate, the default setting of maximum scan value of communication address is “0”.

If the transmitter’s address is other than “0”, FieldMate cannot distinguish the transmitter.

Therefore, the setting should be changed to the correct value.

1. Click the [Tool] → [HART Modem Configuration..] at FieldMate window.
2. Select address number.
3. Click the [OK] button.



F0429E.ai

Figure 4.29 Address Setting

Please refer to FieldMate for detail.

4.5 Initial Setting (FOUNDATION fieldbus Communication)

NOTE

Regarding start up procedure of the device, refer to following:
EJX Multivariable Transmitter: User's Manual IM01C25R01-01E "EJX910A and EJX930A Multivariable Transmitters"
digitalYEWFLO Vortex Flowmeter: Appendix B-1

4.5.1 Device

Address and Tags (PD Tag and VFD Tag) must be set in the device.

IMPORTANT

Use function block scheduling and connection tool for DYFMVTool. After using these setting tool, finish the program before starting FlowNavigator.

4.5.2 Install Communication Device

Install the Communication Device on PC.

4.5.3 Communication Setting

Refer to Appendix D-2 for Communication Device Setting.

4.5.4 Connect the Device to the power supply

(1) For EJX Multivariable Transmitter

Refer to User's manual IM 01C25 R03-01E "EJX910A and EJX930A Fieldbus Communication Type."

(2) For digitalYEWFLO Vortex Flowmeter

Refer to User's manual IM 01F06F00-01E "Model DY Vortex Flowmeter, Model DYA Vortex Flow Converter, Fieldbus Communication Type"

4.5.5 Connect the Device to the Segment

CAUTION

FSA120 is the software tool which is purposed for the setup and maintenance. Do not try connecting it to the device which is under actual operation in the process. Before connecting communication device to the segment, make sure that the process which is controlled by the segment is off-lined.

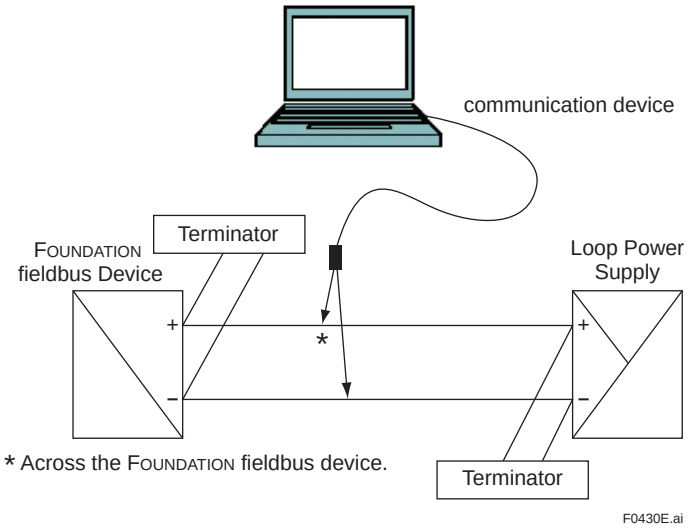


Figure 4.30 Connection example for FOUNDATION fieldbus

4.6 Start FDT Frame Application

This section describes the operation of DTM with using FieldMate.

For the detailed operation of FieldMate, refer to User's manual of FieldMate.

The procedure is described with EJX910 HART DTM as an example.

4.6.1 Update DTM Setup

After new DTM is installed, click “DTM Setup”, so as to confirm that the designated DTM is correctly installed.

Click [Start] → [All Programs] → [YOKOGAWA FieldMate] → [Tools] → [DTM Setup]

4.6.2 Start FieldMate

Starting FieldMate by following operation.

Step 1 **Click [Start] → [All Programs] → [YOKOGAWA FieldMate] → [FieldMate]**

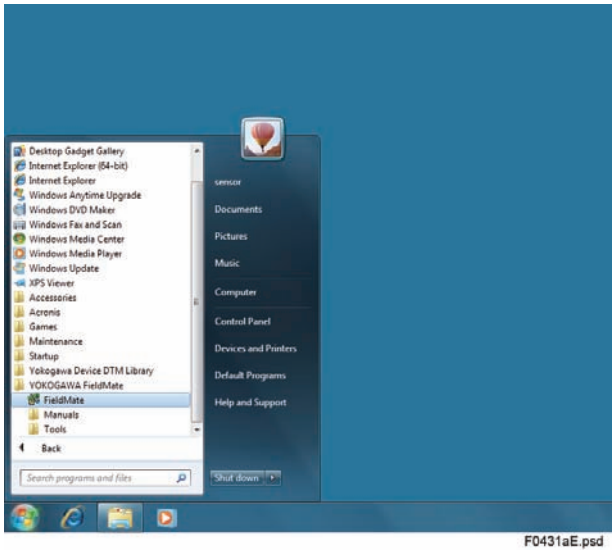


Figure 4.31a Start FieldMate

Step 2 Select Default Scan Segment

Specify whether to automatically scan HART devices/Foundation Fieldbus H1 devices after startup. Select [HART] or [FOUNDATION fieldbus] and click [OK].

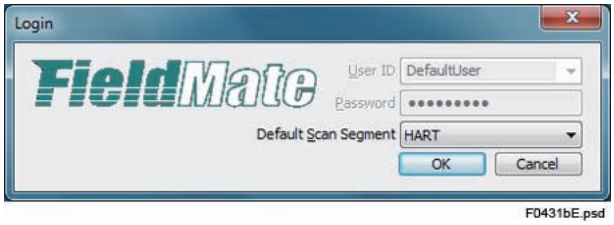


Figure 4.31b Select HART/FOUNDATION fieldbus

NOTE

The software for the communication device starts automatically when [FOUNDATION fieldbus] is selected at [FieldMate]. Refer to Appendix D-3 for how to start the software.

Step 3 FieldMate Segment Viewer window

Open Segment Viewer on FieldMate.

A device icon appears on the window if it is successful to connect to FieldMate. If not, “No device found” message is shown on the window.

If a connected device icon does not appear, check that initial setting for communication is correctly done. Refer to section 4.4 for HART and 4.5 for FOUNDATION fieldbus.

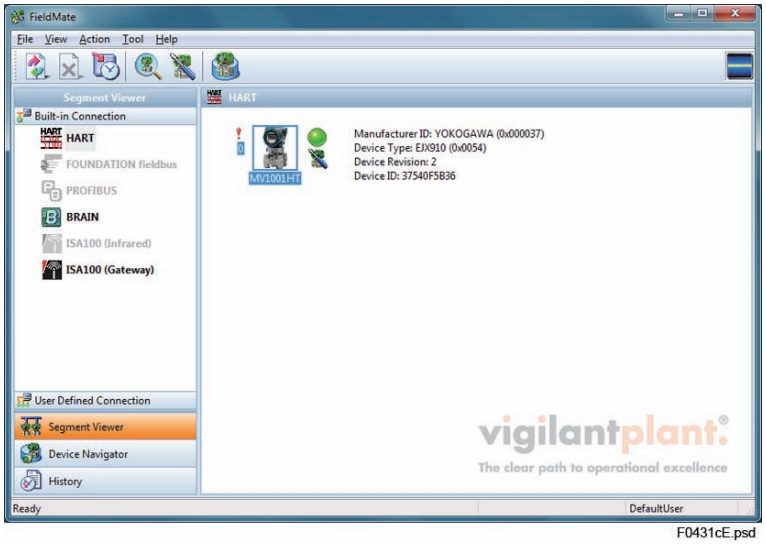


Figure 4.31c Segment Viewer

NOTE

FlowNavigator works on following Device DTM.

Table 4.2 Device DTM Name (EJX910 HART DTM)

Device DTM	EJX Multivariable Transmitter			
Name	Model Name	HART Protocol Revision	Device Type	Device Revision
EJX910 V1.1	EJX910A EJX930A	5	EJX910 (0x0054)	1
EJX910 V2.1			EJX910 (0x0054)	2
EJX910 V2.1*		7	EJX910 (0x3754)	10

*: For EJX910A/EJX930A HART 7 model, “EJX910 V2.1” DTM is used for FlowNavigator. For detail, refer to Section 4.6.4.

Table 4.3 Device DTM Name (EJX910 FOUNDATION fieldbus DTM)

Device DTM	EJX Multivariable Transmitter		
Name	Model Name	Device Type	Device Revision
EJX910 V1.2	EJX910A	EJX910 (0x000E)	1
EJX910 V2.1	EJX910A EJX930A	EJX910 (0x000E)	2

Table 4.4 Device DTM Name (DYF(SoftDL) FOUNDATION fieldbus DTM)

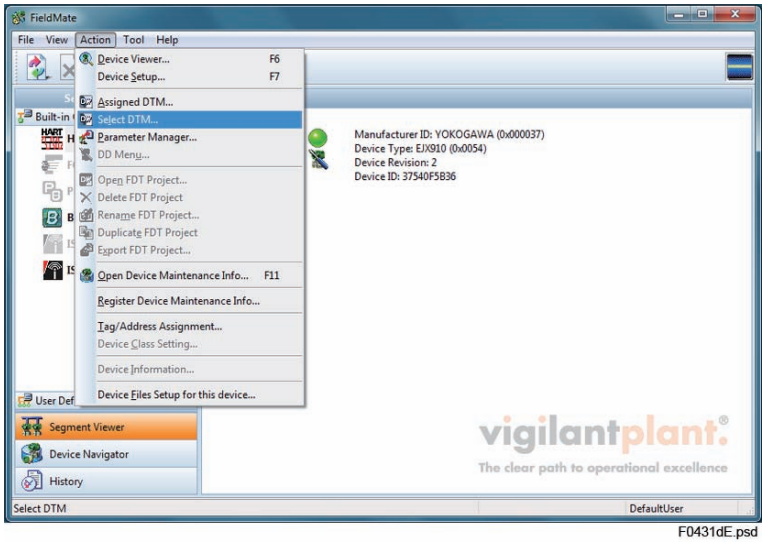
Device DTM	digitalYEWFLO Vortex Flowmeter		
Name	Model Name	Device Type	Device Revision
DYF (SoftDL) V3.1	DY-F DYA-F	DYF (Software Download) (0x0009)	3

NOTE

How to confirm Device DTM version number.

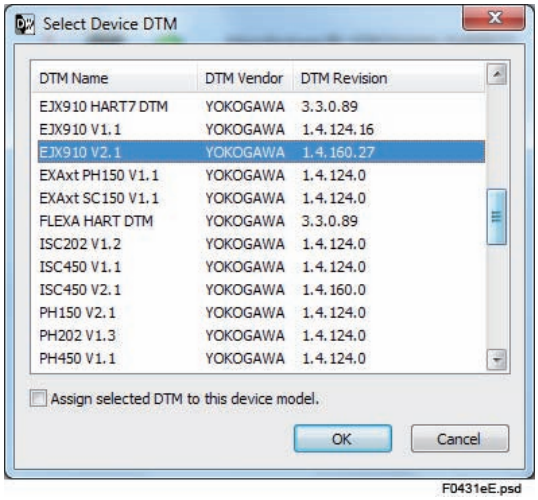
Click [Action] → [Select DTM] to select the target device.

Confirm version number.



F0431dE.psd

Figure 4.31d Confirm Version of Device DTM



F0431eE.psd

Figure 4.31e Version Number of Device DTM

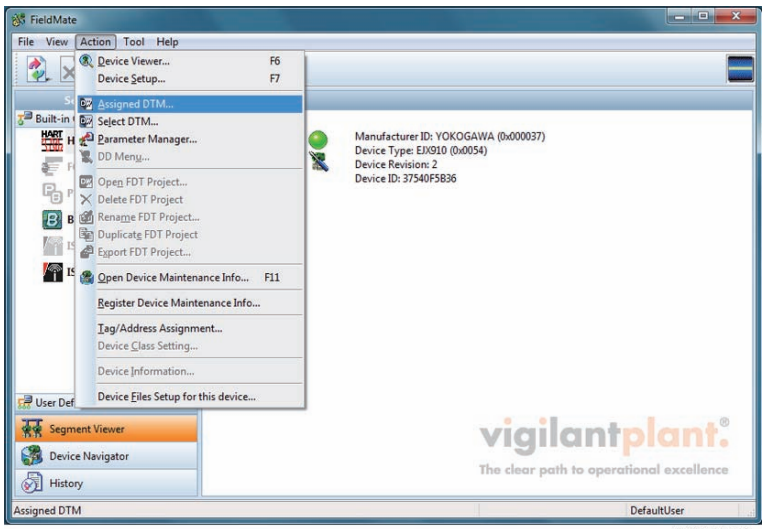
4.6.3 Start Device DTM

(1) Start DTM Works

(a) Case 1 (Except for EJX910A/EJX930A HART 7 model)

Select the icon of the target device. Regarding the device DTM on which FlowNavigator works, refer to Table 4.2, Table 4.3 and Table 4.4.

Click the [Action] → [Assigned DTM]



F0432E.psd

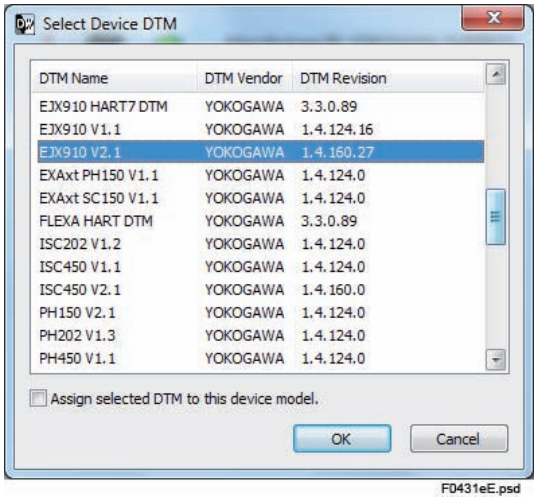
Figure 4.32a Start DTM Works

(b) Case 2 (For EJX910A/EJX930A HART 7 model)

Select the icon of the target device.

Click the [Action] → [Select DTM]

Select “EJX910 V2.1” DTM and click OK.



F0431eE.psd

Fig 4.32b Select “EJX910 V2.1” DTM

NOTE

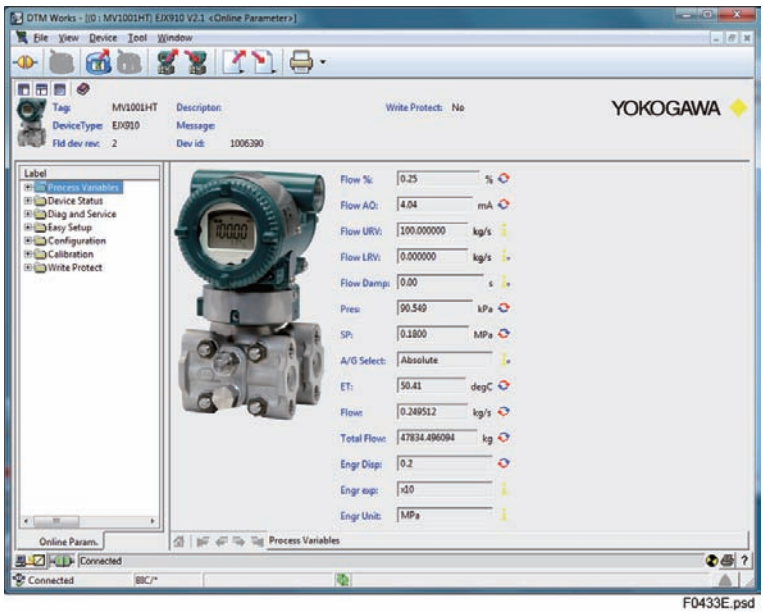
Use the device DTM “EJX910 V2.1” for EJX910A/EJX930A HART 7 model. “EJX910 V2.1” is a DTM which corresponds to EJX910A/EJX930A HART 5 model (Device revision 2). Flow parameter configuration by FlowNavigator can be done by this DTM.

NOTE

General parameter configuration for EJX910A/EJX930A HART 7 model (Device revision 10) can be done by “EJX910 HART 7 DTM”. When starting FieldMate for EJX910A/EJX930A HART 7 model, “EJX910 HART 7 DTM” is automatically assigned by default. So when using FlowNavigator, select “EJX910 V2.1” DTM manually.

(2) Online Parameter window appears.

It may takes about one minute to open Online Parameter window.



F0433E.psd

Figure 4.33 Online Parameter Window

4.6.4 Save DTM Infomation

If “Save to file” is performed, a device parameter snapshot is saved to an external file-.dns, which includes the following parameters.

- User Flow Parameters
- Device Flow Parameters
- Device General Parameters

For detail of .dns, refer to section 3.4.1, 6.1.2 and 9.1.

1. Click the [File] → [Save to file] at DTM Works window.
2. The message below appears when [Save to file] is clicked without [Upload from Device]. Click the [OK] button.

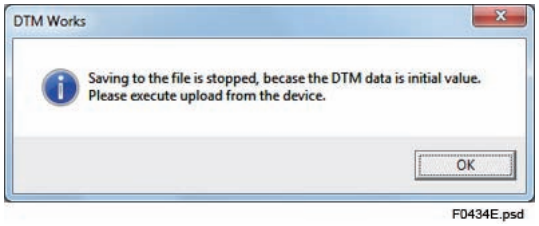


Figure 4.34 Confirmation Message in Saving .dns file

3. Save .dns file in the computer.

NOTE

.dns file is not compatible among different communication.

4.6.5 Exit FieldMate and DTM Works

DTM Works and FieldMate are ended by closing each window.

1. Click the [File] → [Exit] at DTM Works window.
2. Click the [File] → [Exit] at FieldMate window.0

4.7 FlowNavigator Activation

4.7.1 How to Activate

Start EJX910 HART/FOUNDATION fieldbus or DYF(SoftDL) FOUNDATION fieldbus DTM. (see 4.6.3)

> Start DTM Works.

> Select [Device] → [Additional Functions] → [Flow Configuration Wizard]

- The following screen appears only when this program is run for the first time.

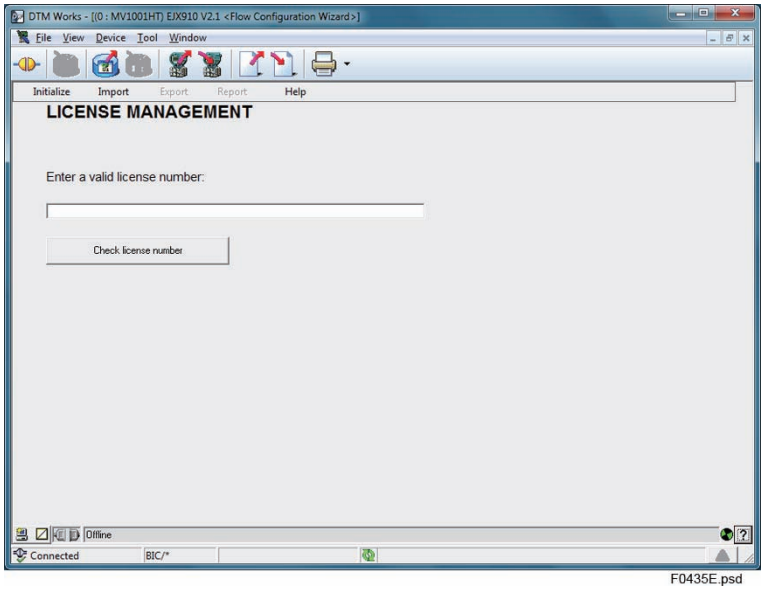


Figure 4.35 EJXMVTool / DYFMVTool Activation Screen

Enter the FlowNavigator license number, and Click [Check and Save].

NOTE

You must enter whole license number including '-' .

F9197EK Rev.5

FlowNavigator: Flow Configuration Software

Software License Number

Model and Suffix Codes: **FSA120-□□□□□□**
Serial Number: □□□□□□□□□
Software License Number: □□□□□□-□□□□□□-□□□□□□-□□□□□

IMPORTANT **Please keep this sheet with the FlowNavigator Media.**

Thank you for purchasing ***FieldMate FlowNavigator***. The software license number for the included Media is printed above. This number is used to **ACTIVATE FlowNavigator programs after the installation is completed** and to identify your software package by Yokogawa Electric Corporation. Please keep this sheet with the Media.

To use this software, you must first enter the software license number. For the information on how to enter the license number, please see the instruction manual [IM01C25R51-01E].

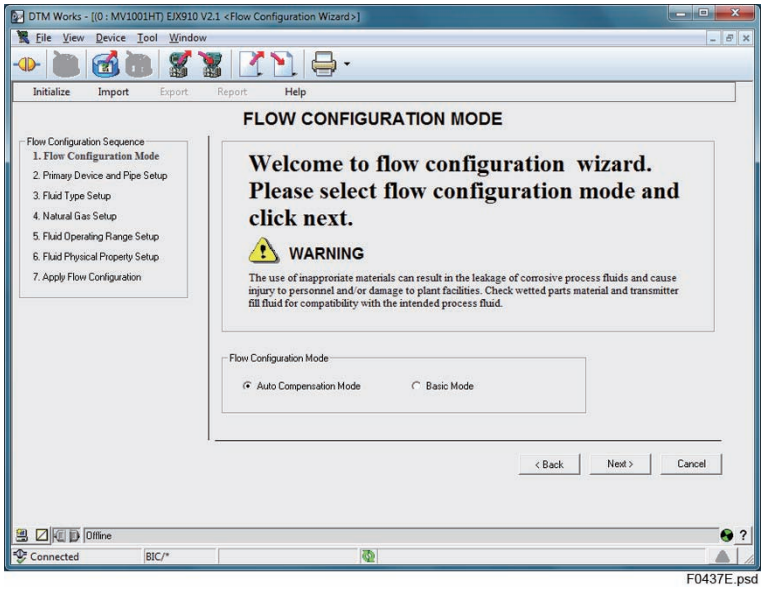
重要　本紙は同梱の FlowNavigator Media と一緒に大切に保管してください。
この度は ***FieldMate FlowNavigator*** をお買い上げいただき、ありがとうございます。同梱の Media のライセンス番号は上記にプリントしております。この番号は **FlowNavigator のインストール完了後の認証確認**を行う際に必要となります。また弊社がお客様のソフトウェアを特定する際に用います。
Media と一緒に保管してください。

ライセンス番号の入力方法につきましては取扱説明書[IM01C25R51-01JP]をご参照ください。

F0439E.psd

Figure 4.36 Software License Form

Once the license number is confirmed, Flow Configuration Wizard screen below appears.



F0437E.psd

Figure 4.37 Top Menu Screen of Flow Configuration Wizard (EJXMVTool)

5. Operational Flowchart

5.1 Configuration Procedure (EJXMVTool)

Following is an example of configuration procedures using Auto Compensation Mode.

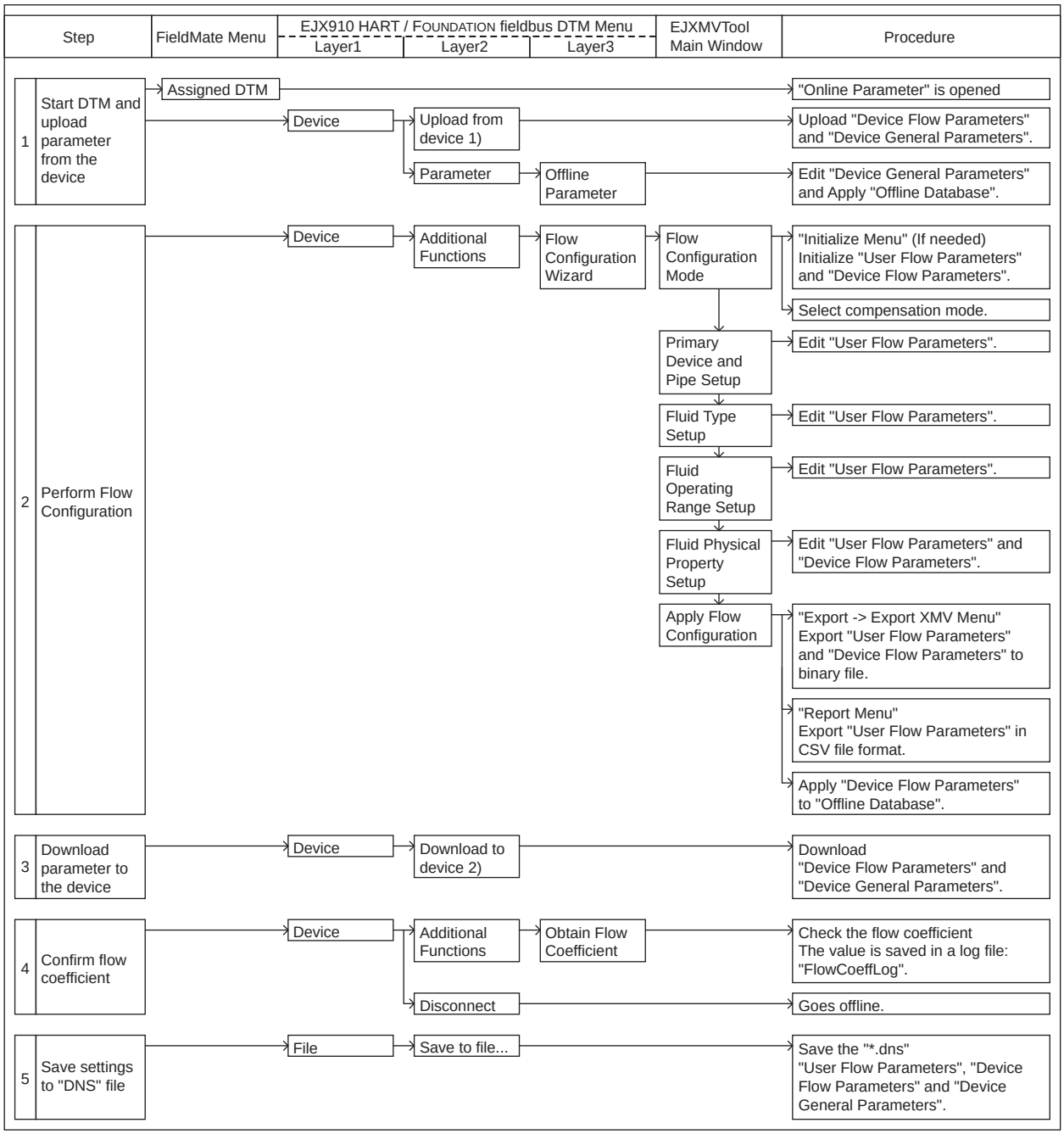
(A) New Configuration (example for using FieldMate project file)

(B) Configure with existing Configuration File (dns/dfs file)

(C) Configure with existing Configuration File (example for using XMV file)

(D) Configure with existing Configuration File (import:XMV file, PRM file,export:dns file)

(A) New Configuration (Example of using Auto Compensation Mode)

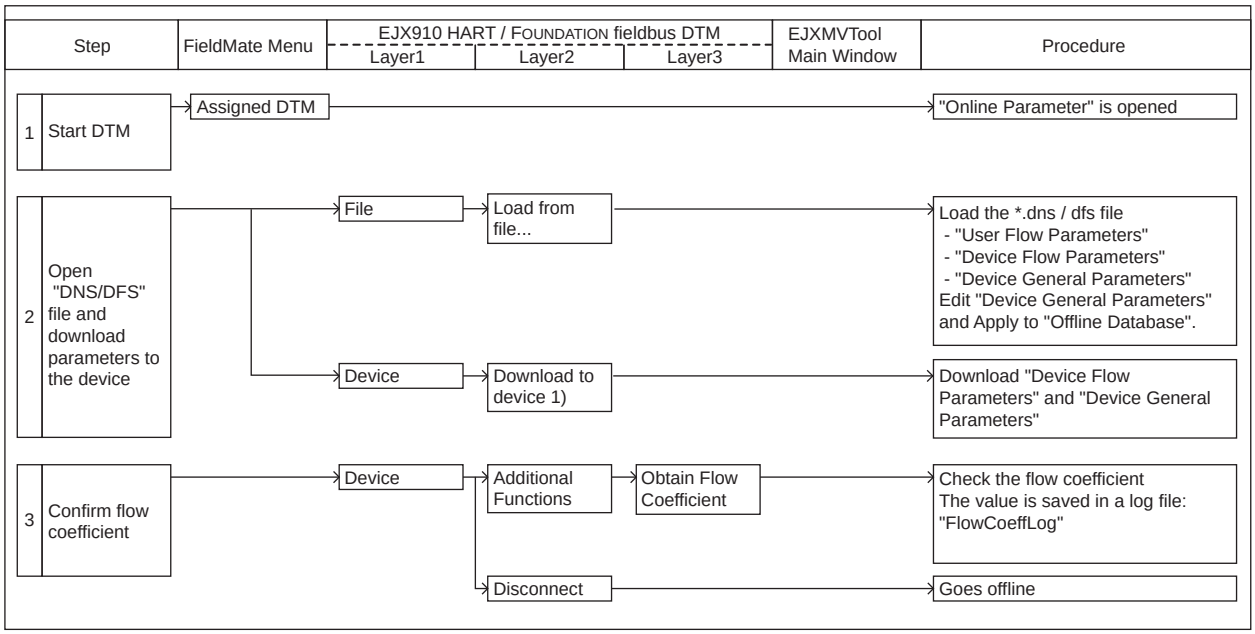


F0501E.ai

1) Before starting operation, execute ‘Upload from device’, so that the “Device General Parameters” in the offline database are synchronized with the device. Upload data from the device does not include “User Flow Parameters”.
*: “User Flow Parameters” consist of primary device information, fluid information and operating condition.

2) Executing ‘Download to device’ will write both “Device Flow Parameters” and “Device General Parameters” into the device. Before executing ‘Download to device’, execute ‘Upload from device’, so as to make “Device General Parameters” in the offline database synchronized with the device.
Download data to the device does not include “User Flow Parameters”.

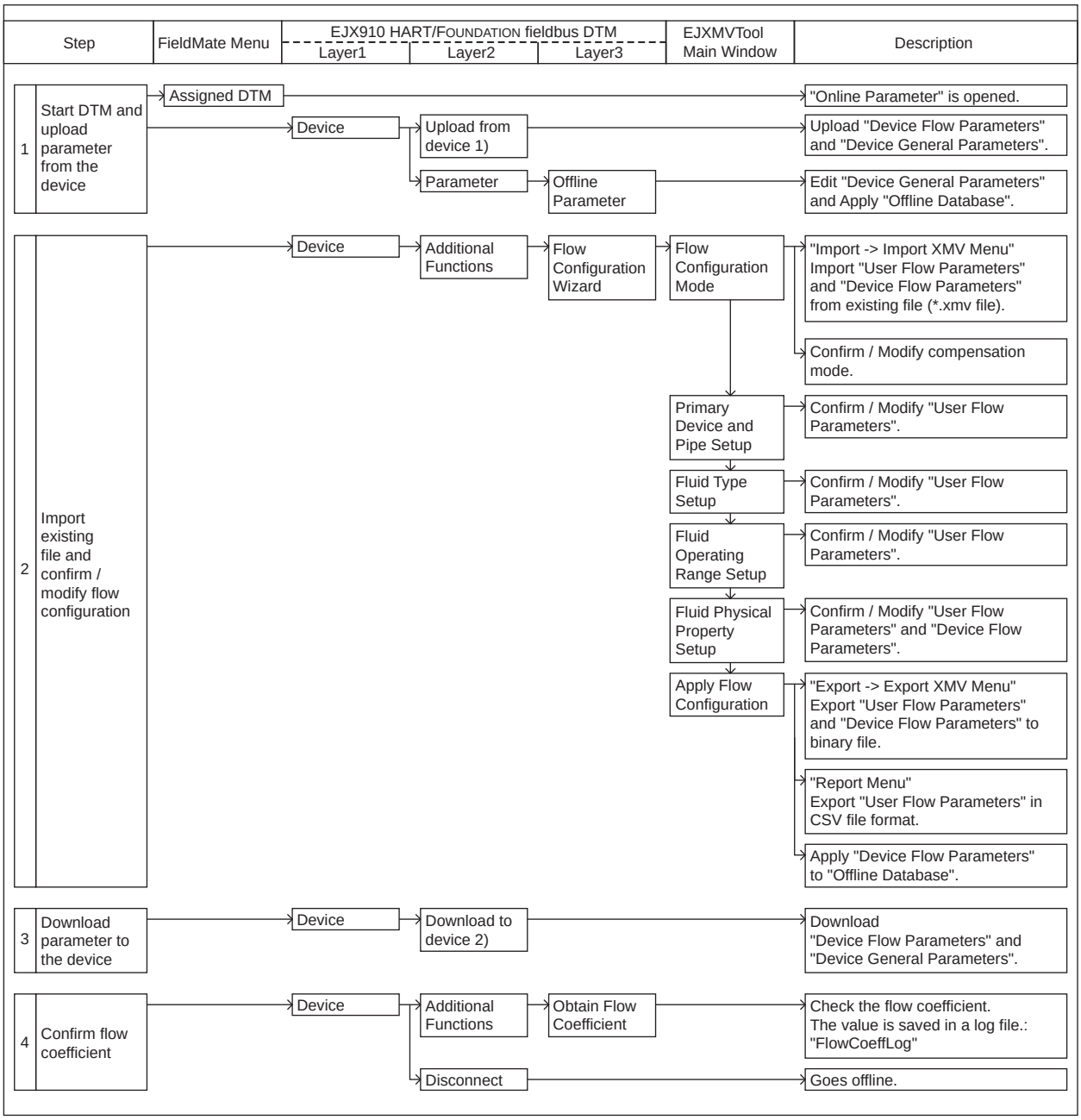
(B) Configure with existing configuration file (dns/dfs file)



F0502E.ai

1) Executing 'Download to device' will write both "Device Flow Parameters" and "Device General Parameters" into the device. Before executing 'Download to device', execute 'Upload from device', so as to make "Device General Parameters" in the offline database synchronized with the device.
Download data to the device does not include "User Flow Parameters".

(C) Configure with existing Configuration File (XMV file)

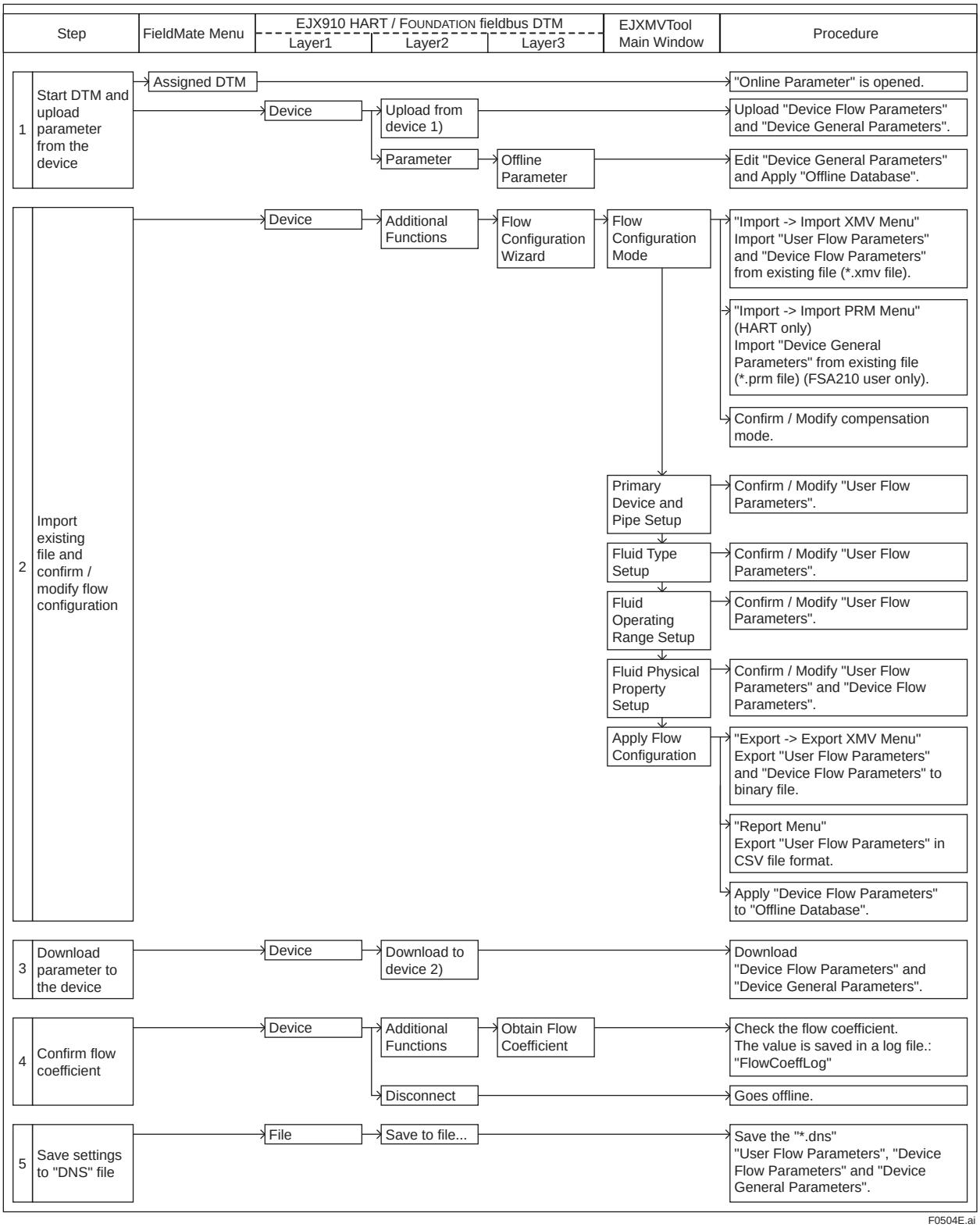


F0503E.ai

1) Before starting operation, execute 'Upload from device', so that the "Device General Parameters" in the offline database are synchronized with the device.
Upload data from the device does not include "User Flow Parameters".*
*: "User Flow Parameters" consist of primary device information, fluid information and operating condition.

2) Executing 'Download to device' will write both "Device Flow Parameters" and "Device General Parameters" into the device. Before executing 'Download to device', execute 'Upload from device', so as to make "Device General Parameters" in the offline database synchronized with the device.
Download data to device does not include "User Flow Parameters".

(D) Configure with existing Configuration File (import:XMV and PRM file,export:dns file) Applicable only for FSA210 user.



F0504E.ai

1) Before starting operation, execute 'Upload from device', so that the "Device General Parameters" in the offline database are synchronized with the device.
Upload data from the device does not include "User Flow Parameters".*
*: "User Flow Parameters" consist of primary device information, fluid information and operating condition.

2) Executing 'Download to device' will write both "Device Flow Parameters" and "Device General Parameters" into the device. Before executing 'Download to device', execute 'Upload from device', so as to make "Device General Parameters" in the offline database synchronized with the device.
Download data to device does not include "User Flow Parameters".

5.2 Configuration Procedure (DYFMVTool)

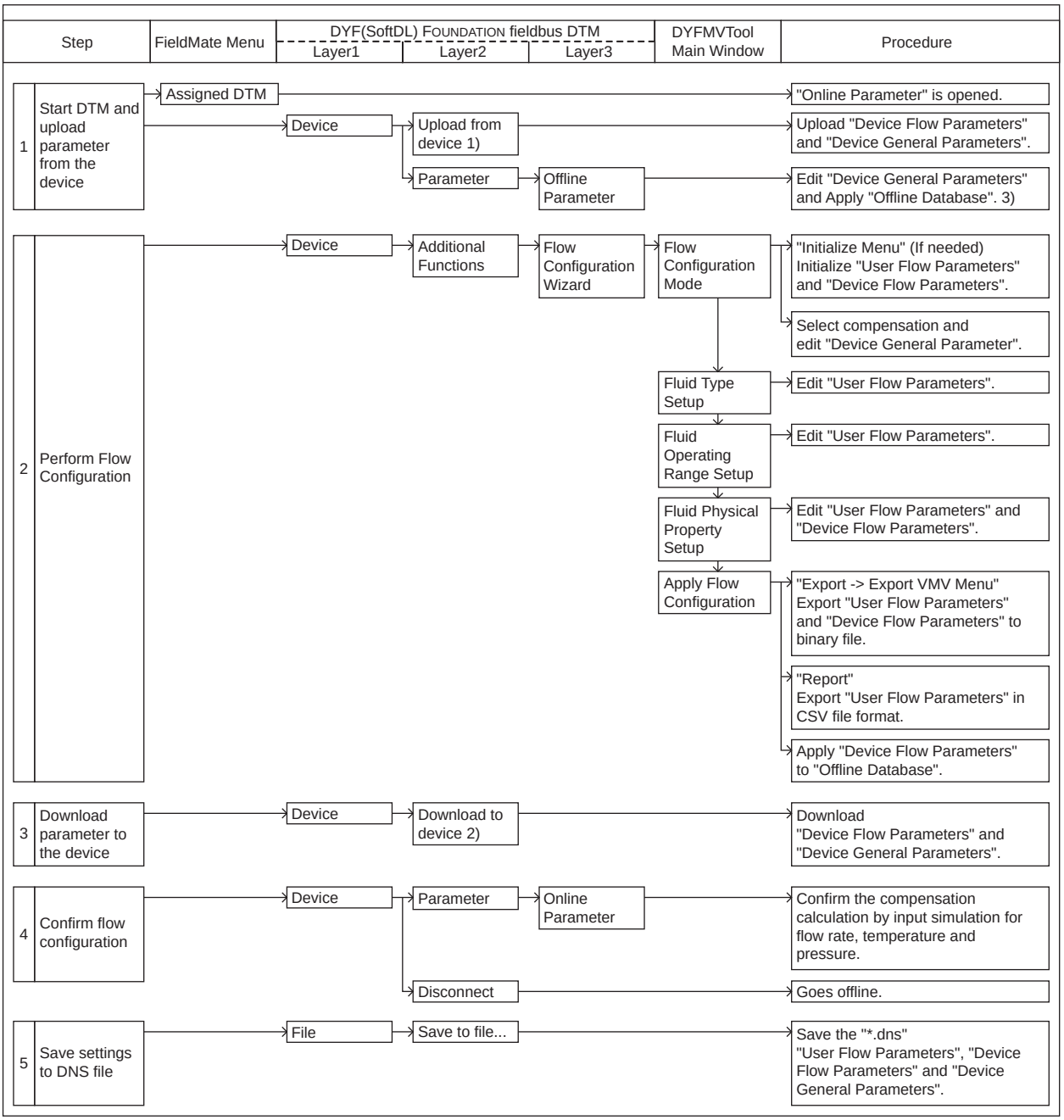
Following is an example of configuration procedures using Flow Configuration Wizard.

(A) New Configuration (example for using FieldMate project file)

(B) Configure with existing Configuration File (dns file)

(C) Configure with existing Configuration File (VMV file)

(A) New Configuration



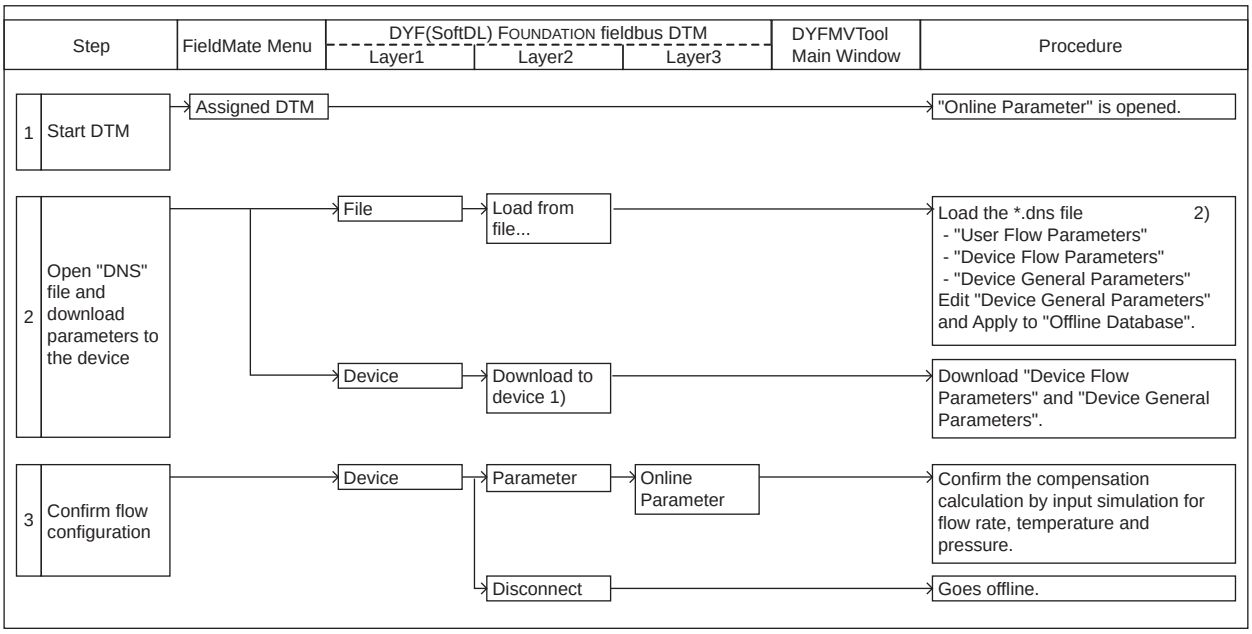
F0505E.ai

1) Before starting operation, execute 'Upload from device', so that "Device General Parameters" of the flowmeter in the offline database are synchronized with the device. Upload data from the device does not include "User Flow Parameters".
*: User Flow Parameters consist of fluid information and operating condition.

2) Executing 'Download to device' will write both "Device Flow Parameters" and "Device General Parameters" into the device. Before executing 'Download to device', execute 'Upload from device', so as to make "Device General Parameters" of the flowmeter in the offline database synchronized with the device.
Download data to the device does not include "User Flow Parameters".

3) Temperature unit and pressure unit in AR Block are not configured in Flow Configurtion Wizard Detail Compensation Mode.
These parameters must be set manually in AR Block offline parameter.

(B) Configuration with existing configuration file (dns file)

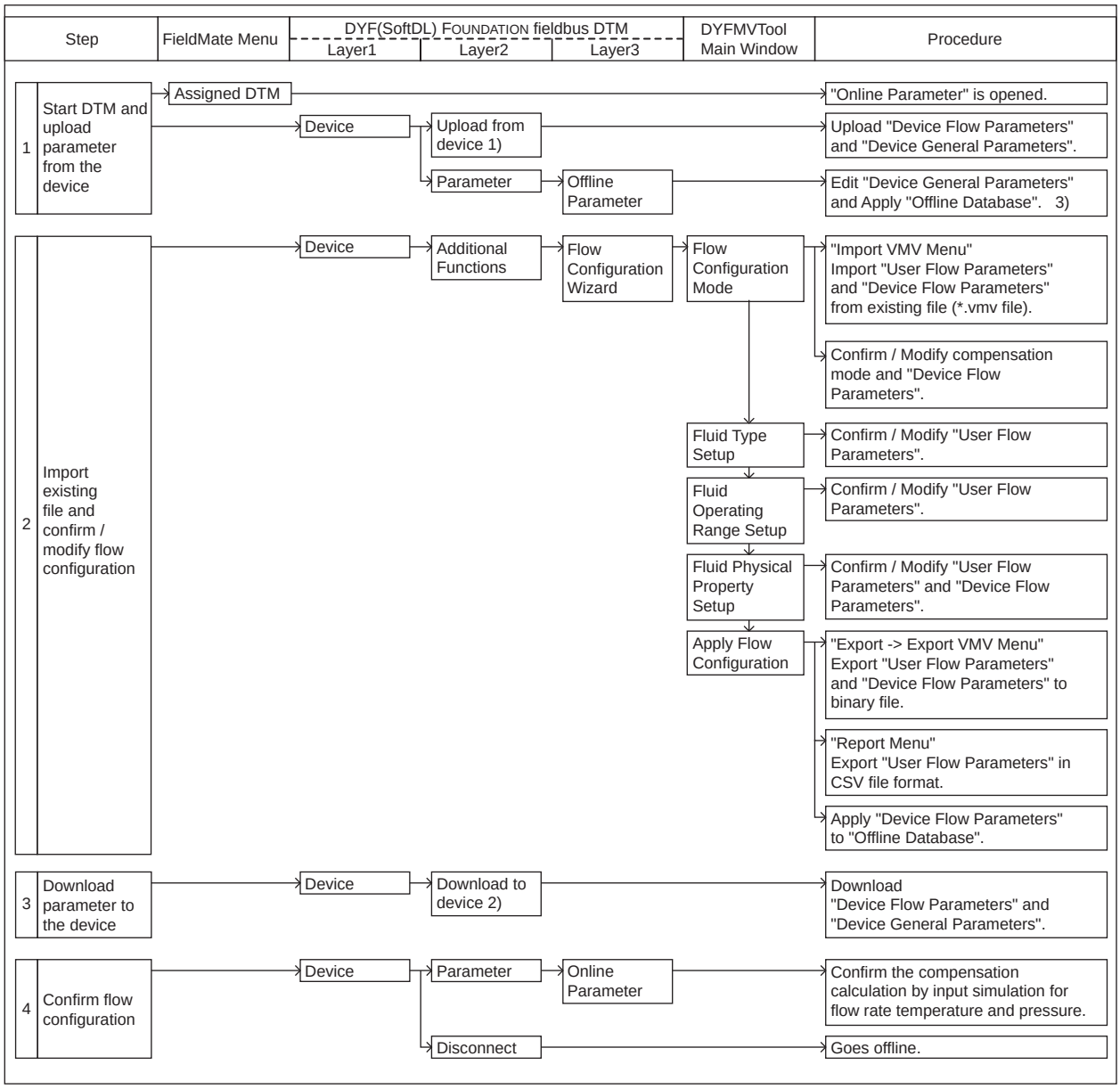


F0506E.ai

1) Executing 'Download to device' will write both "Device Flow Parameters" and "Device General Parameters" into the device. Before executing 'Download to device', execute 'Upload from device', so as to make General Parameters of the device in the offline database synchronized with the device.
*: User Flow Parameters consist of fluid information and operating condition.

2) Temperature unit and pressure unit in AR Block are not configured in Flow Configuration Wizard Detail Compensation Mode.
These parameters must be set manually in AR Block offline parameter.

(C) Configuration with existing configuration File (VMV file)



F0507E.ai

1) Before starting operation, execute 'Upload from device', so that "Device General Parameters" of the flowmeter in the offline database are synchronized with the device. Upload data from the device does not include "User Flow Parameters".
*: "User Flow Parameters" consist of fluid information and operating condition.

2) Executing 'Download to device' will write both "Device Flow Parameters" and "Device General Parameters" into the device. Before executing 'Download to device', execute 'Upload from device', so as to make "Device General Parameters" of the device in the offline database synchronized with the device.
Download data to the device does not include "User Flow Parameters".

3) Temperature unit and pressure unit in AR Block are not configured in Flow Configuration Wizard Detail Compensation Mode.
These parameters must be set manually in AR Block offline parameter.

5.3 Flow Parameters Download Procedure

The basic procedure for downloading the flow parameters to a device is as follows. Refer to Figure 5.2.

Step 1 Upload from Device

Perform “Upload from Device” so that the setting parameters (“Device Flow Parameters” and “Device General Parameters”) in the device are saved to the offline database on your PC.

The parameters will then be displayed in the Offline Parameter screen.

Step 2 Flow Configuration

Perform Flow configuration in accordance with the guidance in the Flow Configuration Wizard. “Device Flow Parameters” are output by Flow Configuration Wizard.

Save “Device Flow Parameters” as XMV file (EJXMVTool) or VMV file (DYFMVTool) in the last menu, and click the “Apply” button.

“Device Flow Parameters” are then stored to the offline database on your PC.

NOTE

Clicking on Apply does not download the flow parameters to the device.

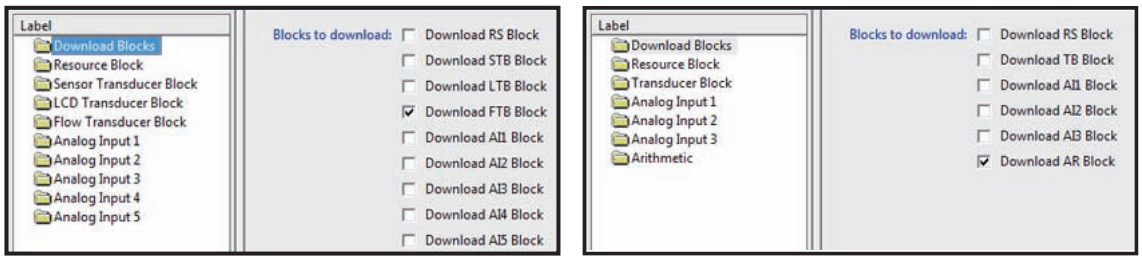
Step 3 Download to Device

Perform “Download to Device”. “Device Flow Parameters” will then be downloaded together with the “Device General Parameters” to the device.

IMPORTANT

For FOUNDATION Fieldbus, following block must be checked on the “Download blocks” menu in the Offline Parameter screen to download “Device Flow Parameters” set by Flow Configuration Wizard.

EJX910 FOUNDATION fieldbus DTM: FTB block
DYF(SoftDL) FOUNDATION fieldbus DTM: AR block

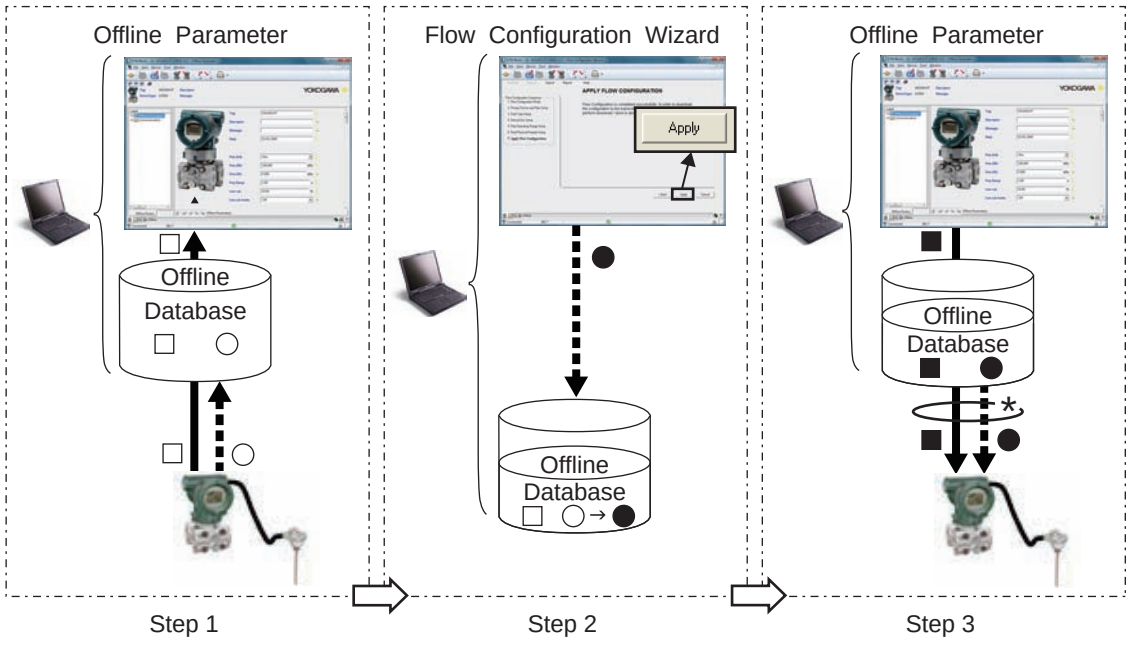


“Download blocks” menu
(EJX910 FOUNDATION fieldbus DTM)

“Download blocks” menu
(DYF(SoftDL) FOUNDATION fieldbus DTM)

F0508E.ai

Figure 5.1 “Download blocks” menu in the Offline Parameter



*: Confirm the checkbox on the “Download blocks” menu in the Offline Parameter (refer to Figure 5.1)

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Figure 5.2 Procedure to Download the Parameters to the Device

6. Operation of FlowNavigator Program

6.1 Outline of FlowNavigator Program

6.1.1 Menu

The following shows the menu items in FlowNavigator except for those specific to Device DTM.

The items for Device DTM are listed in the DTMWorks "Device" menu.

FlowNavigator Program is operated using the Device DTM “Additional functions” menu.

(1) Menu Structure (Example of EJXMVTool HART)

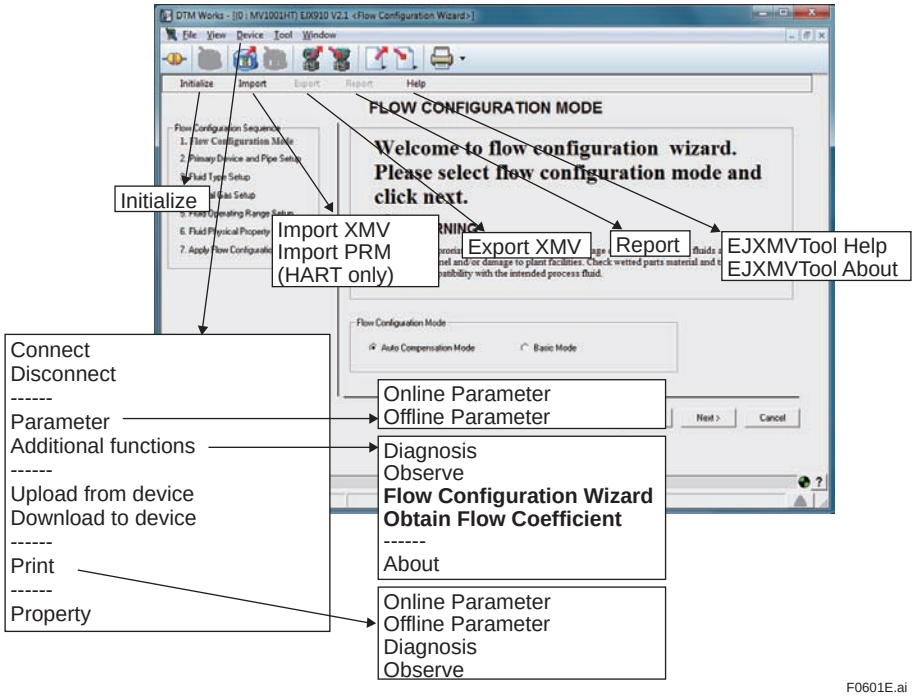


Figure 6.1 Menu structure of EJXMVTool HART

NOTE

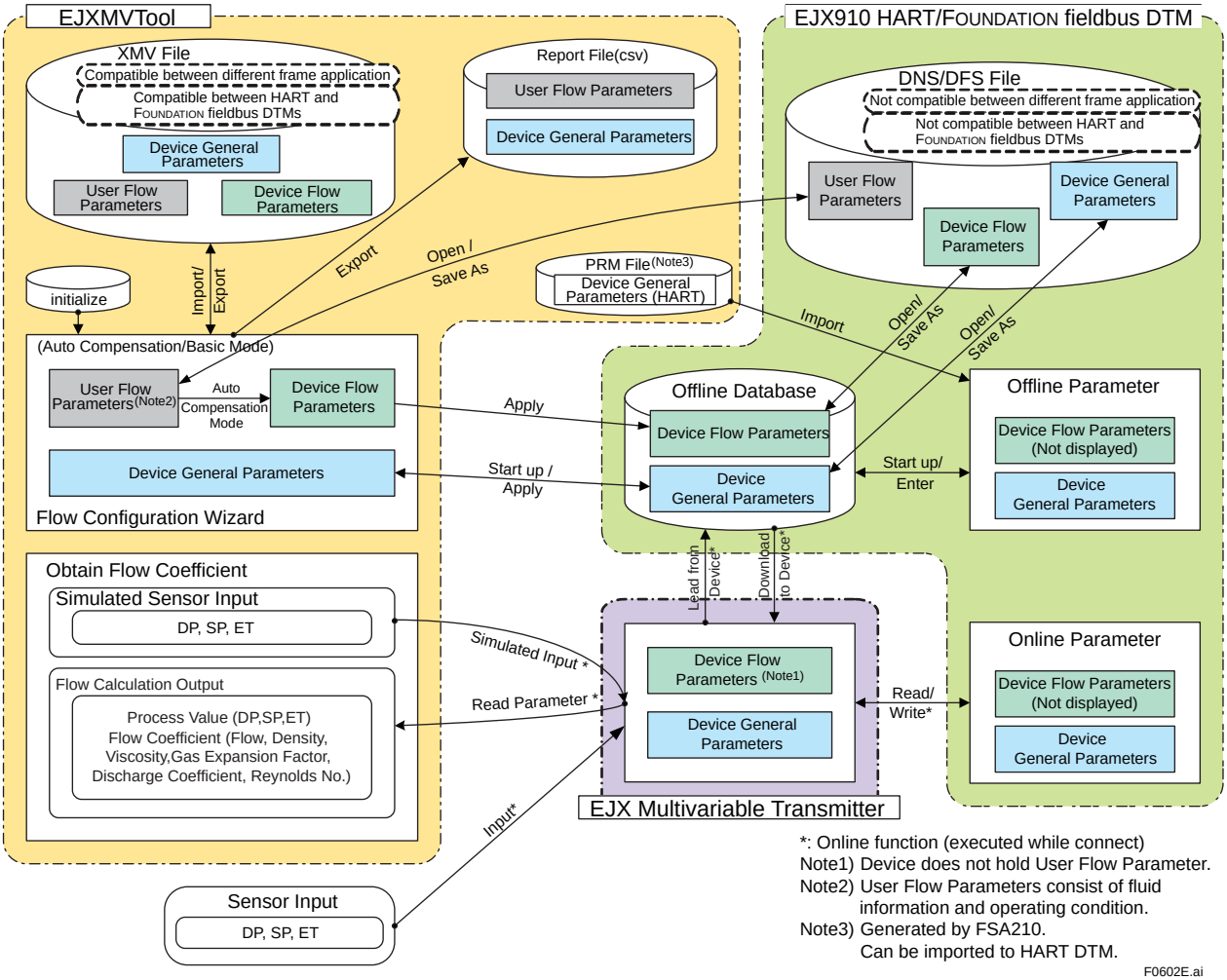
Displayed items may slightly differ according to communication protocol.

(2) Menu and Function

Menu				Functions		Reference	Program
Cennect				Device Management	Connect a device	Refer to section 6.2	EJX910 HART/ FOUNDATION fieldbus DTM, DYF(SoftDL) FOUNDATION fieldbus DTM
Disconnect					Disconnect a device		
Parameter	Online Parameter				Opens the online parameters view		
	Offline Parameter				Opens the offline parameters view		
Additional Functions	Diag / Service				Open Diagnosis view		
	Observe				Open Observe view		
	Flow Configuration Wizard			Flow Parameter Management -Flow Configuration-	Calculate flow configuration data of a device	Refer to section 6.3, chapter 7, 8	EJXMVTool DYFMVTool
		Initialize	Initialize		Initialization (Needed only if configuration has been done before)		
		Import	Import XMV (EJXMVTool)		Flow configuration file management		
			Import VMV (DYFMVTool)				
			Import PRM (EJXMVTool)		Import FSA210 PRM file		
		Export	Export XMV (EJXMVTool)		Flow configuration file management		
			Export VMV (DYFMVTool)				
		Report	Report		Flow configuration report file		
		Help	EJXMVTool Help		FlowNavigator Program Instruction Manual		
			DYFMVTool Help				
			EJXMVTool About		Version information		
			DYFMVTool About				
	Obtain Flow Coefficient			Flow Parameter Management -Confirming Flow Configuration-	Obtain Flow coefficient from a device	Refer to chapter 7	EJXMVTool
		Help	EJXMVTool Help		FlowNavigator Program Instruction Manual		
			EJXMVTool About		Version information		
	About			Device Management	Show DTM information	Rerer to section 6.2	EJX910 HART/ FOUNDATION fieldbus DTM, DYF(SoftDL) FOUNDATION fieldbus DTM
Upload from Device					Load from a device		
Download to Device					Store to a device		
Print	Online Parameter				Print the Online Parameter		
	Offline Parameter				Print the Offline Parameter		
	Diagnosis				Print the Diagnosis Parameter		
	Observe				Print the Observe Parameter		
Property					Show property information		

6.1.2 Data Flow Diagram

(1) EJXMVTool



*: Online function (executed while connect)
Note1) Device does not hold User Flow Parameter.
Note2) User Flow Parameters consist of fluid information and operating condition.
Note3) Generated by FSA210.
Can be imported to HART DTM.

F0602E.ai

Figure 6.2 Data flow diagram of EJXMVTool

(2) DYFMVTool

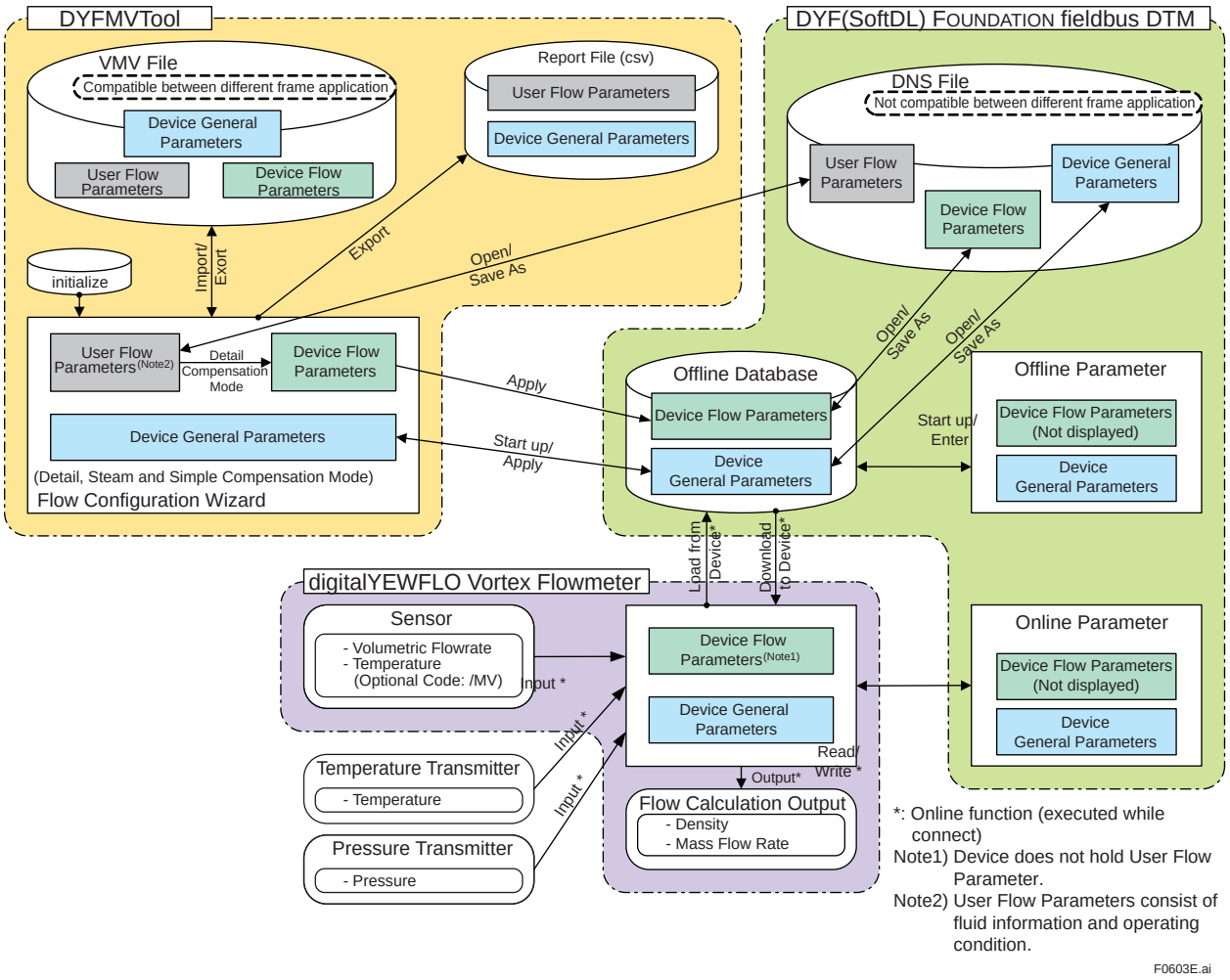


Figure 6.3 Data Flow Diagram of DYFMVTool

6.1.3 Flow Calculation of Device and FlowNavigator

(1) EJX Multivariable Transmitter

Refer to the instruction manual “EJX910A and EJX930A Multivariable Transmitters” (IM 01C25R01-01E)

(2) digitalYEWFLO Vortex Flowmeter

Followings give an overview of the calculation modes.

• Detail (Gas / Liquid) Compensation Mode

- Gas temperature pressure compensation (Detail)

  The mass flow rate of the gas is calculated based on the process temperature and pressure by referring to the physical property database of FlowNavigator Resource.
  The temperature value is the output of digitalYEWFLO Built-in Temperature Sensor (Optional Code /MV) or Temperature Transmitter. The pressure value is the output of Pressure Transmitter.

- Liquid temperature compensation (Detail)

  The mass flow rate of the liquid is calculated based on the process temperature by referring to the physical property database of FlowNavigator Resource. The temperature value is the output of digitalYEWFLO Built-in Temperature Sensor (Optional Code: /MV) or Temperature Transmitter.

• Steam Compensation Mode

- Saturated steam (Temperature)

  The mass flow rate of the saturated steam is calculated based on the process temperature by referring to the saturated steam table (a process temperature) in the device. The process temperature value is the output of digitalYEWFLO Built-in Temperature Sensor (Optional Code: /MV) or Temperature Transmitter.

- Saturated steam (Pressure)

  The mass flow rate of the saturated steam is calculated based on the process pressure by referring to the saturated steam table (a process pressure) in the device. The process pressure value is the output of Pressure Transmitter.

- Superheated steam

  The mass flow rate of the superheated steam calculated based on the process temperature and pressure by referring to the superheated steam table in the device. The process temperature value is the output of digitalYEWFLO Built-in Temperature Sensor (Optional Code: /MV) or Temperature Transmitter, and the process pressure value is the output of Pressure Transmitter.

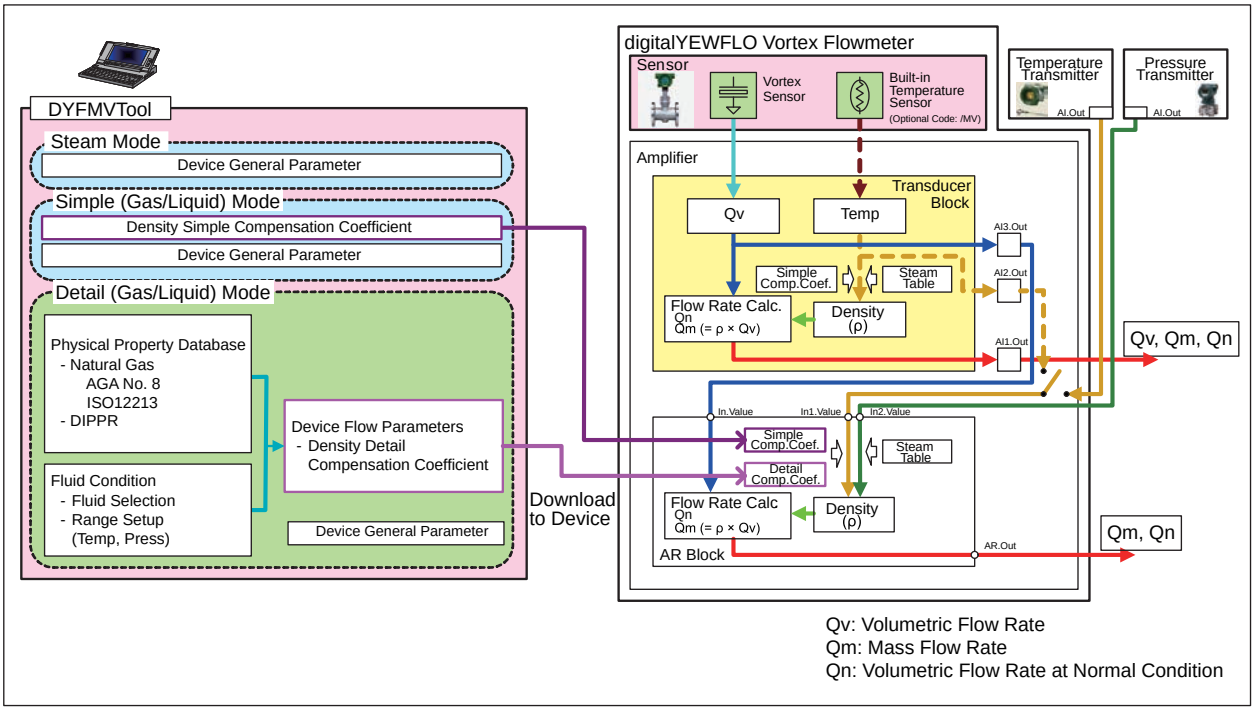
• Simple (Gas / Liquid) Compensation Mode

- Gas temperature pressure compensation

  The mass flow rate of the gas is calculated based on the process temperature and pressure by using the density correction value input by users in FlowNavigator. The temperature value is the output of digitalYEWFLO Built-in Temperature Sensor (Optional Code: /MV) or Temperature Transmitter. The pressure value is the output of Pressure Transmitter.

- Liquid temperature compensation

  The mass flow rate of the liquid is calculated based on the process temperature by using the density correction value input by users in FlowNavigator. The temperature value is the output of digitalYEWFLO Built-in Temperature Sensor (Optional Code: / MV) or Temperature Transmitter.



F0604E.ai

Figure 6.4 digitalYEWFLO Vortex Flowmeter and FlowNavigator Block Diagram

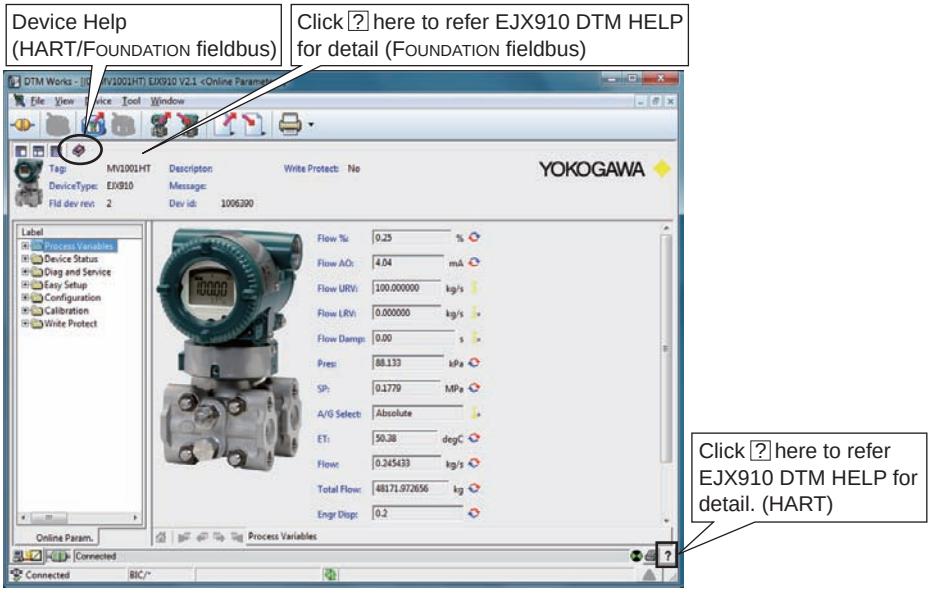
6.2 Device Management

Device management is a function of Device DTM.

Please refer to Device DTM HELP for detail.

Please also refer to FieldMate User's Manual for operation.

This function is described with EJX910 HART DTM as an example.



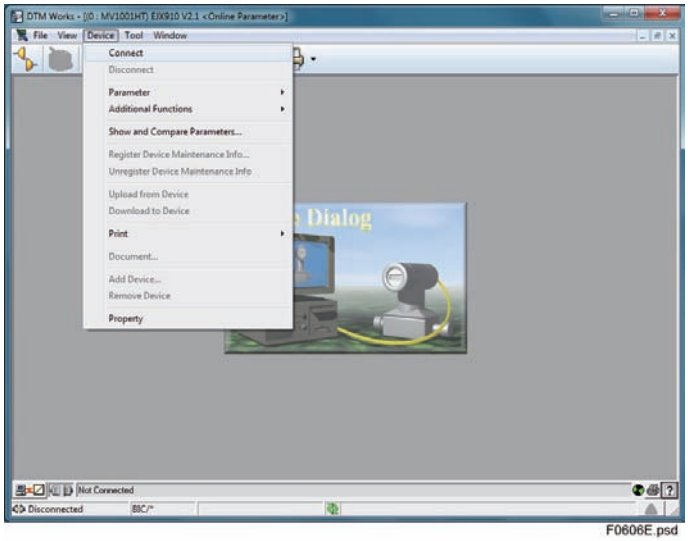
F0605E.ai

Figure 6.5 DTM HELP

6.2.1 Connect / Disconnect

(1) How to Connect

Click the [Device] → [Connect]



F0606E.psd

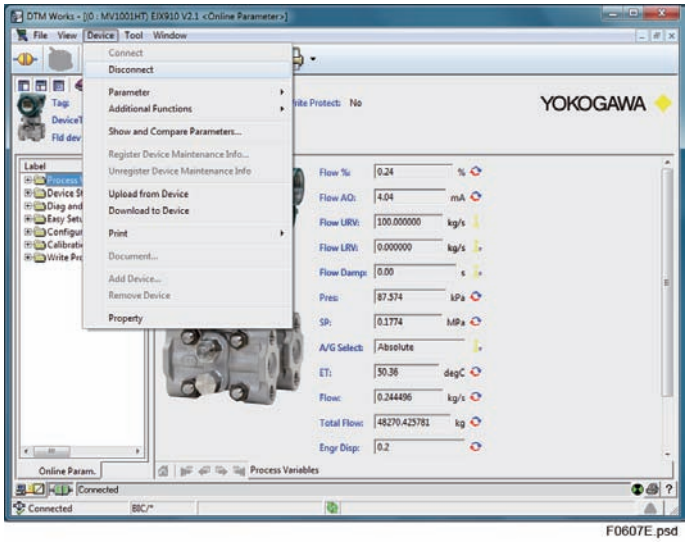
Figure 6.6a How to Connect

NOTE

'Connect' menu is active only while the device is disconnected.

(2) How to Disconnect

Click the [Device] → [Disconnect]



F0607E.psd

Figure 6.6b How to Disconnect

NOTE

'Disconnect' menu is active only while the device is connected.

6.2.2 Parameter

Online Parameter:
The parameters of the device can be edited directly in online status.

Offline Parameter :
The parameters of the device can be edited and stored in offline database.

Parameters saved in offline database can be downloaded to the device by using “Download to Device” function. Parameters in the device can be uploaded to the offline database by using “Upload from Device” function. Uploaded parameters can be edited in the offline parameter window.

(1) Online Parameter

Click the [Device] → [Parameter] → [Online Parameter]

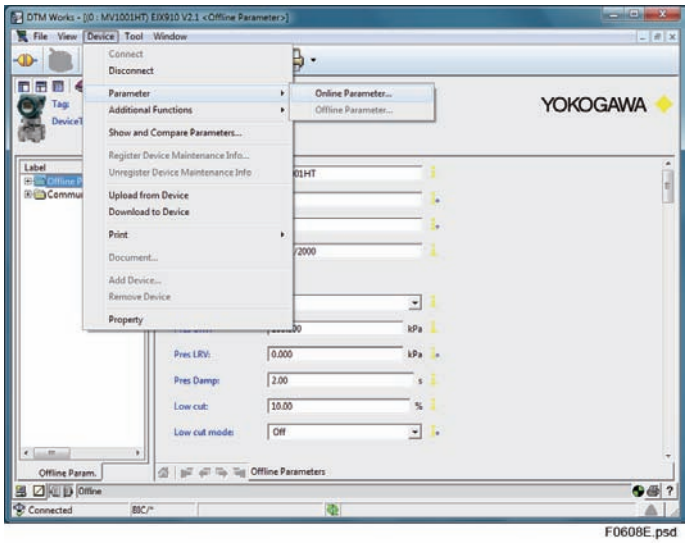


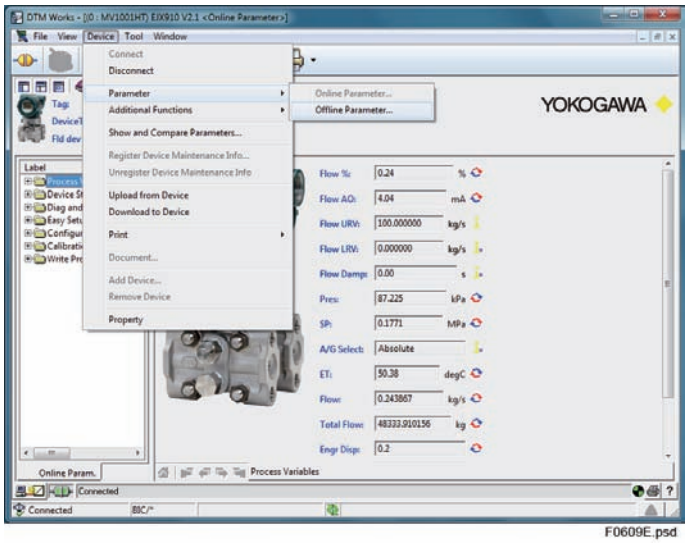
Figure 6.7 Online Parameter

NOTE

‘Online Parameter’ menu is active only while the device is connected.

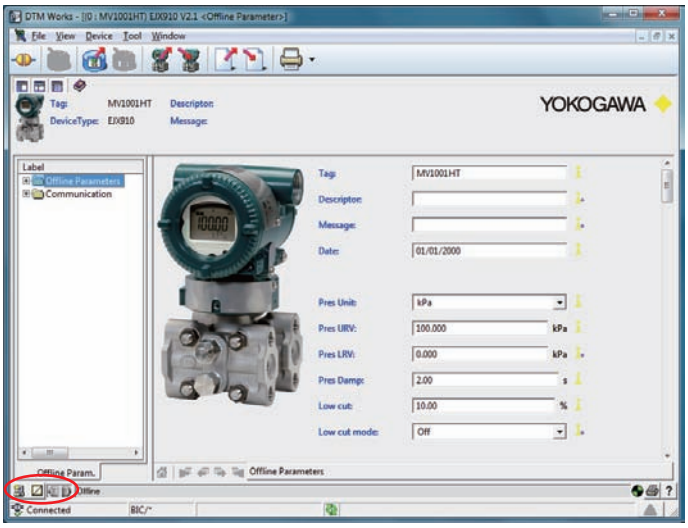
(2) Offline Parameter

Click the [Device] → [Parameter] → [Offline Parameter]



F0609E.psd

Figure 6.8a Go to Offline Parameter



F0610E.ai

Figure 6.8b Offline Parameter

6.2.3 Upload from Device / Download to Device

(1) How to load from a device

• HART DTM / FOUNDATION fieldbus DTM

1. Click the [Device] → [Parameter] → [Offline Parameter]
2. Click the [Device] → [Upload from Device]

Uploading icon on the tool bar can also be used to execute upload.

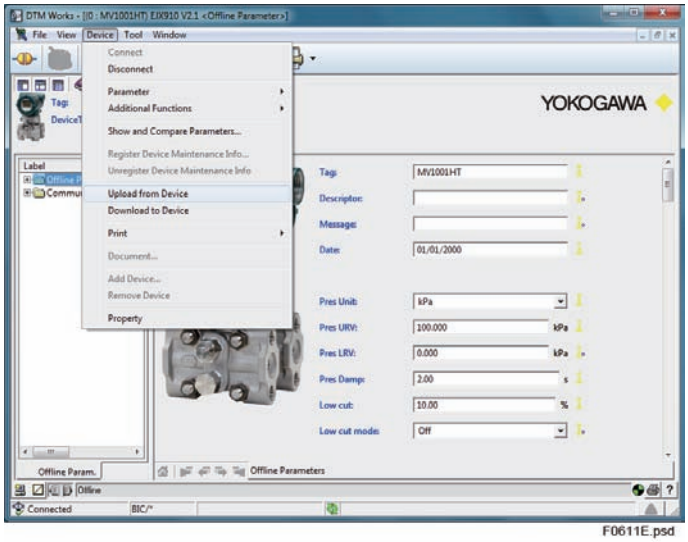


Figure 6.9 Upload from Device

Offline Parameters (“Device Flow Parameters” and “Device General Parameters”) are uploaded from the device to offline database. “Device General Parameters” can be edited using offline parameter window.

If an error occurs, an error message dialog will be displayed.

IMPORTANT

Before starting operation, execute ‘Upload from Device’, so that the “Device General Parameters” in the offline database is synchronized with the device.

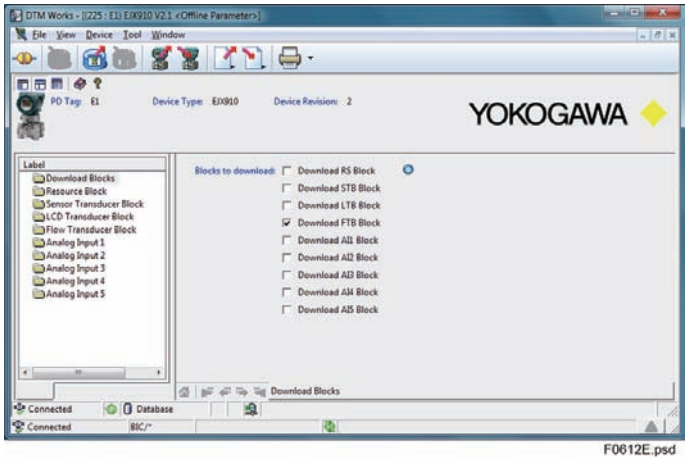
(2) How to download to a device

• HART DTM

1. Click the [Device] → [Parameter] → [Offline Parameter]
2. Click the [Device] → [Download to Device]

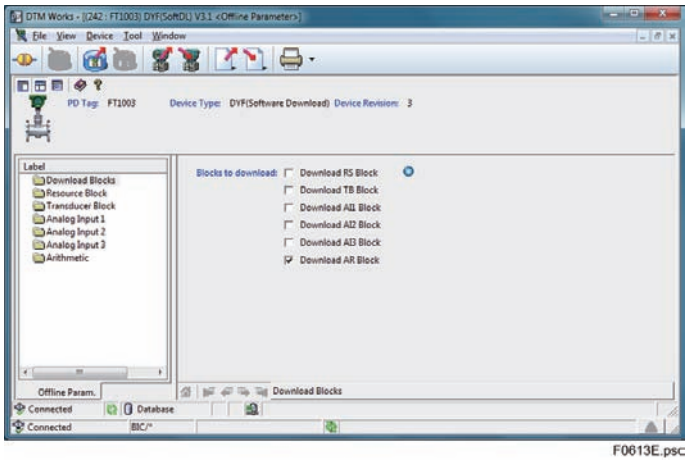
• FOUNDATION fieldbus DTM

1. Click the [Device] → [Parameter] → [Offline Parameter]
2. Check the checkbox of the function blocks downloading to a device.



F0612E.psd

Figure 6.10a Checkbox of Blocks to Download (EJX910 FOUNDATION fieldbus DTM)



F0613E.psc

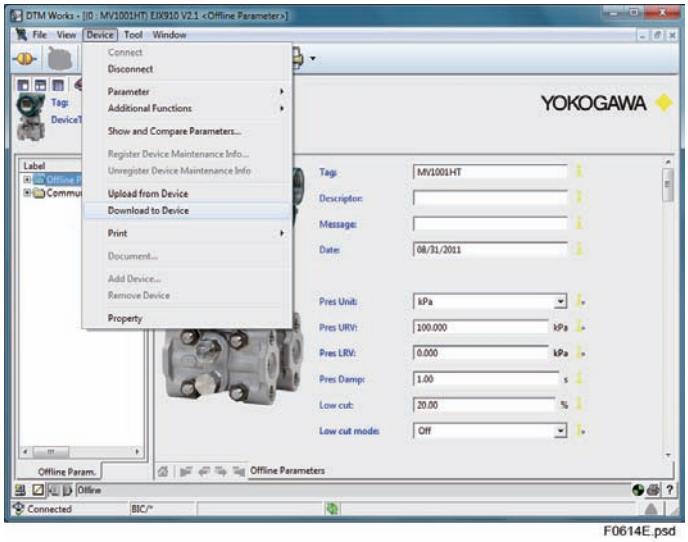
Figure 6.10b Checkbox of Blocks to Download (DYF(SoftDL) FOUNDATION fieldbus DTM)

IMPORTANT

- It is recommended to select all blocks.
- Following block must be checked to download “Device Flow Parameters” set by Flow Configuration Wizard.
  EJX910 FOUNDATION fieldbus DTM: Download FTB Block
  DYF(SoftDL) FOUNDATION fieldbus DTM: Download AR Block

3. Click the [Device] → [Download to Device]

Downloading icon on the tool bar can also be used to execute download.



F0614E.psd

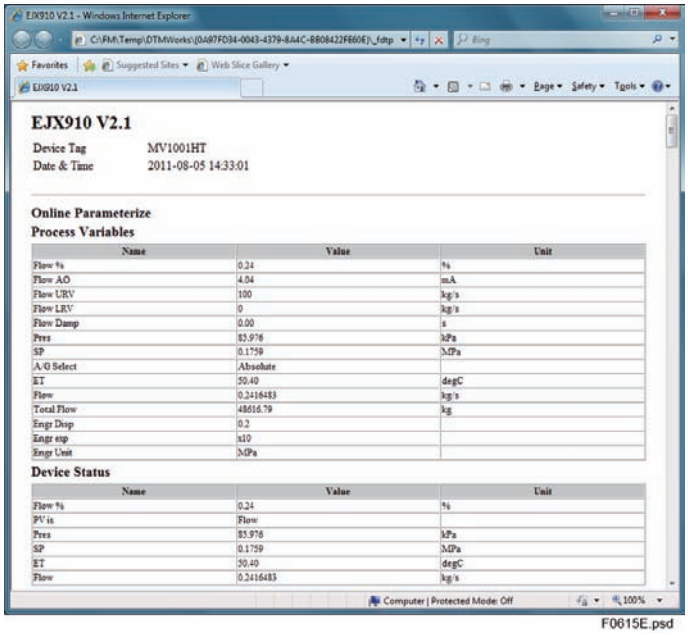
Figure 6.10c Download to Device

6.2.4 Print

Parameters can be printed out by using print function.

Click the [Device] → “Print”.

Select “Online Parameter”, “Offline Parameter”, “Diagnosis” or “Observe”.



F0615E.psd

Figure 6.11 Print (Online Parameter)

6.2.5 Properties

The Device DTM version number is shown when this menu is clicked.

Click the [Device] → “Property”.

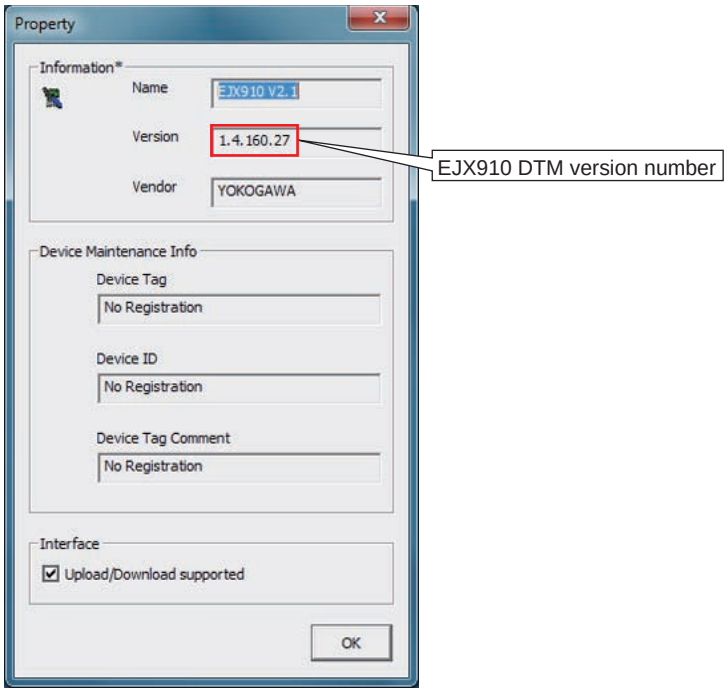


Figure 6.12 Property

6.2.6 Additional functions

(1) Diagnosis (for HART)

Diagnostics related parameters are shown.

Click the [Device] → [Additional Functions] → [Diagnosis]

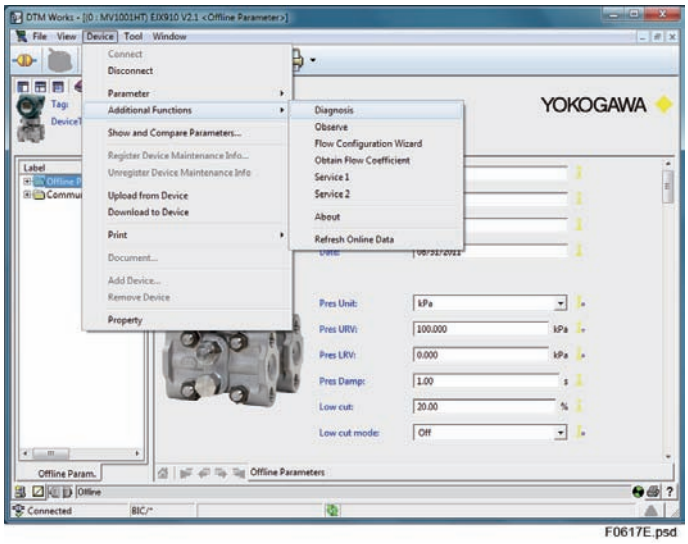


Figure 6.13a Diagnosis

(2) Observe (for HART)

Process variables related parameters are shown.

Click the [Device] → [Additional Functions] → [Observe]

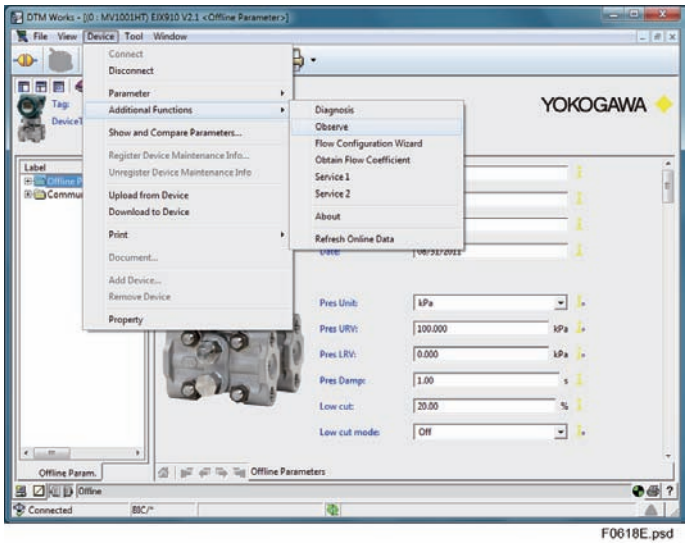


Figure 6.13b Observe

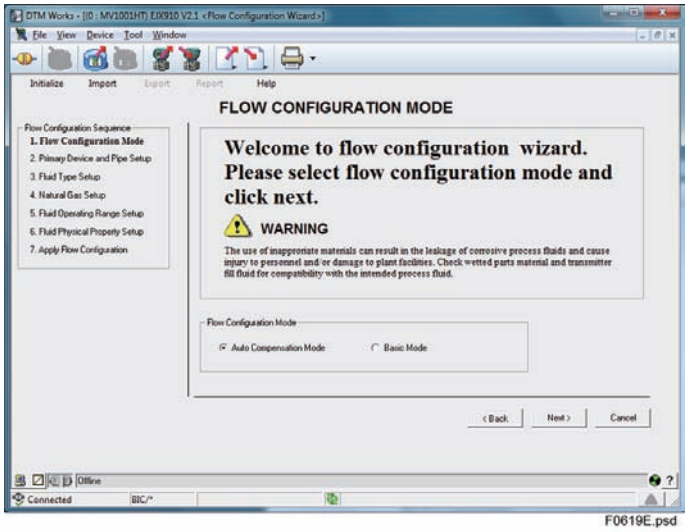
6.3 Flow Parameters Management

Flow Parameters Management consists of Flow Configuration Wizard and Obtain Flow Coefficient.

This section describes the file management in the Flow Configuration Wizard.

Click the [Device] → [Additional Functions] → [Flow Configuration Wizard]

This function is described with EJXMVTool as an example.



F0619E.psd

Figure 6.14 Top Menu Screen of Flow Configuration Wizard

WARNING

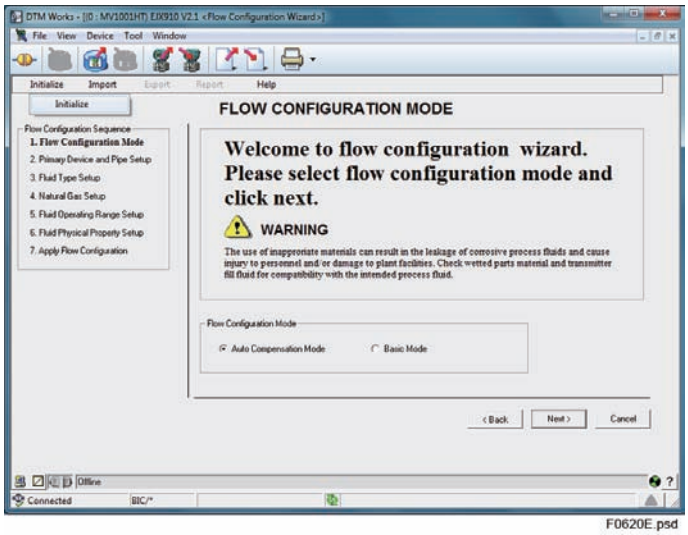
The use of inappropriate materials can result in the leakage of corrosive process fluids and cause injury to personnel and/or damage to plant facilities. Check wetted parts materials and transmitter fill fluid for compatibility with the intended process fluid.

6.3.1 Initialize

Initialize flow configuration parameters.

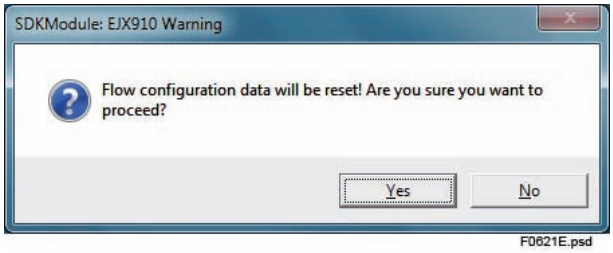
NOTE

Initialize can be used only in the Flow Configuration Mode screen.



F0620E.psd

Figure 6.15a Initializing



F0621E.psd

Figure 6.15b Initializing Message

6.3.2 Import

(1) Import Flow Configuration .XMV file.

"User Flow Parameters" and "Device Flow Parameters" for EJX Multivariable Transmitter can be imported.

(2) Import Flow Configuration *.VMV file

"User Flow Parameters" and "Device Flow Parameters" for digitalYEWFLO Vortex Flowmeter can be imported.

NOTE

Refer to '9.1 Configuration File' for information of file format of Flow Configuration file.
Import can be used in the Flow Configuration Mode screen.

NOTE

The XMV file made on the FSA210 is compatible with FSA120.

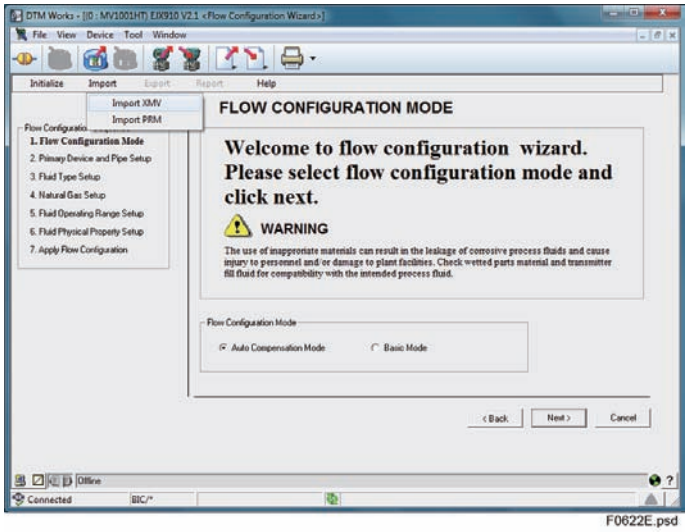


Figure 6.16a Importing a File

NOTE

Flow Configuration Wizard R1.02.01 or later does not allow setting the gauge pressure to the Reference pressure. If importing .XMV file in which the Reference pressure is configured as the gauge pressure using R1.02.00 or earlier, the following message is displayed.

Figure 6.16b Information Message for Reference Pressure

Reenter the absolute pressure equivalent to the displayed gauge pressure for the Reference Condition in Fluid Operating Range Setup screen.

6.3.3 Export

"User Flow Parameters" and "Device Flow Parameters" can be exported.

NOTE

Refer to '9.1 Configuration file' for information of file format of Flow Configuration file.
Export can be used only in the Apply Flow Configuration screen.

NOTE

The XMV file made on the FSA210 is compatible with FSA120.

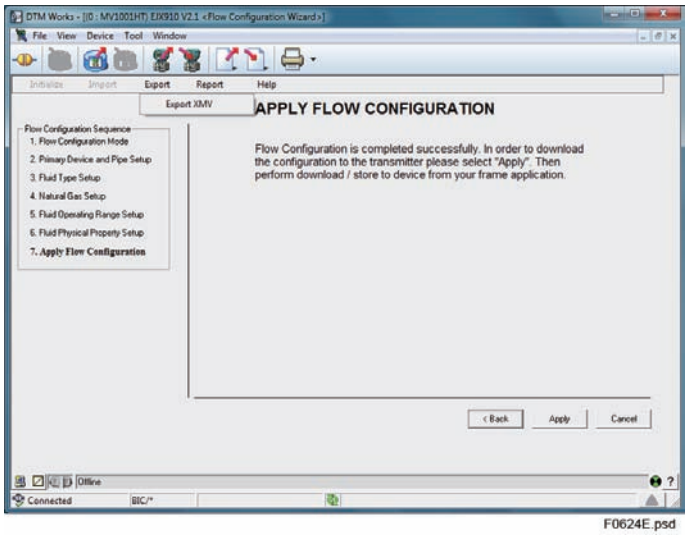


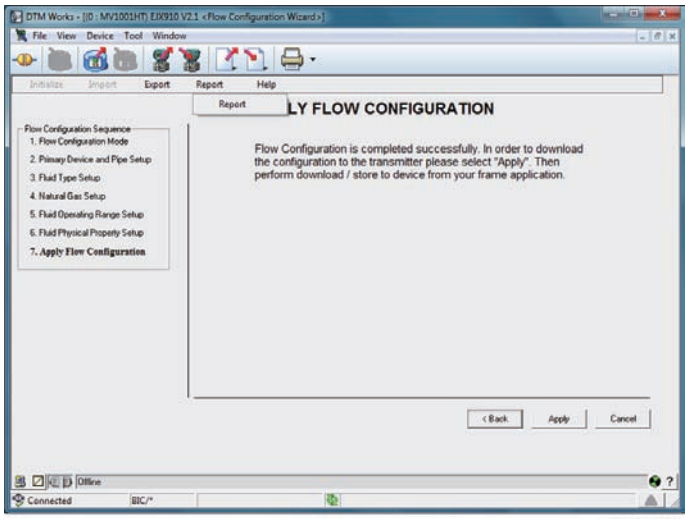
Figure 6.17 Exporting a File

6.3.4 Report

Export “User Flow Parameters” and “Device General Prameters” in CSV File format.

NOTE

Report can be used only in the Apply Flow Configuration screen.



F0625E.psd

Figure 6.18 Report

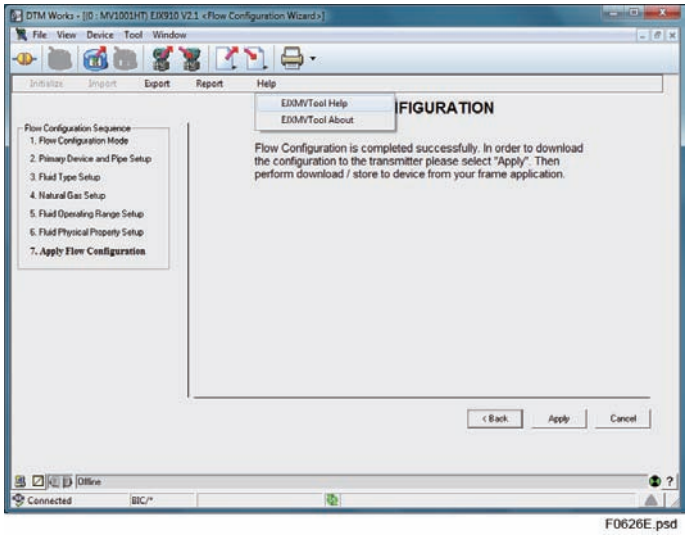
NOTE

User name on the report may be shown as “unknown” on those frame application which does not support user authorization function.

6.3.5 Help

(1) EJXMVTool Help / DYFMVTool Help

The EJXMVTool manual map or DYFMVTool manual map opens when this menu is clicked.



F0626E.psd

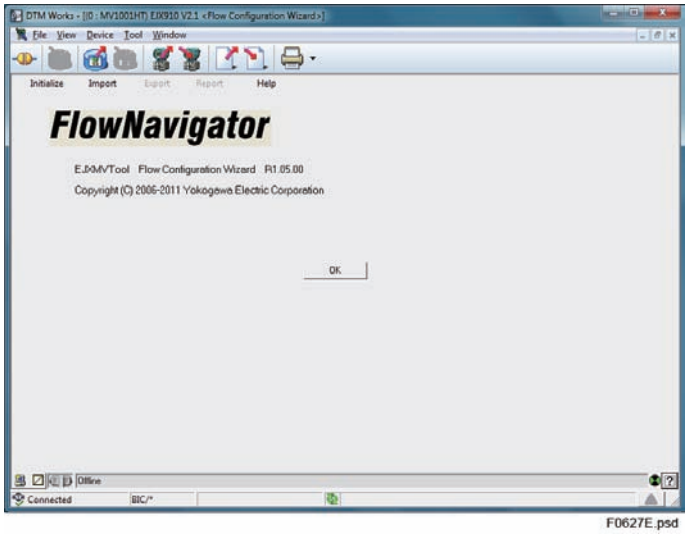
Figure 6.19 Help

NOTE

EJXMVTool / DYFMVTool Online Help uses Adobe Reader. Install Adobe Reader to view Online Help.

(2) EJXMVTool About / DYFMVTool About

The version number of Flow Configuration Wizard is shown when this menu is clicked.



F0627E.psd

Figure 6.20 About

7. Operation of EJXMVTool

7.1 Flow Configuration Wizard (Auto Compensation Mode)

7.1.1 Flow Configuration Mode

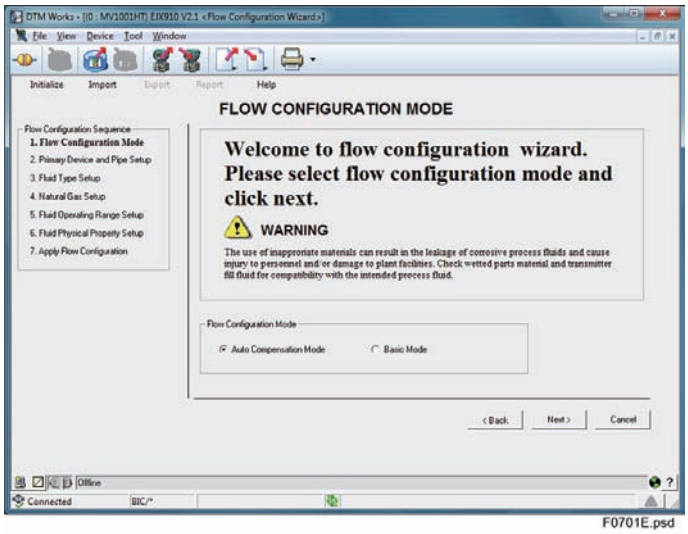


Figure 7.1 Flow Configuration Mode screen

Select desired flow configuration mode and click [Next].

Flow Configuration Mode

- Auto Compensation Mode (Default)

  Configuration of the fluid physical properties and primary device for the EJX Multivariable Transmitter can be performed using a dialog window.

- Basic Mode

  Flow operation and density compensation are performed conventionally, with the flow factors being input manually.

7.1.2 Primary Device and Pipe Setup

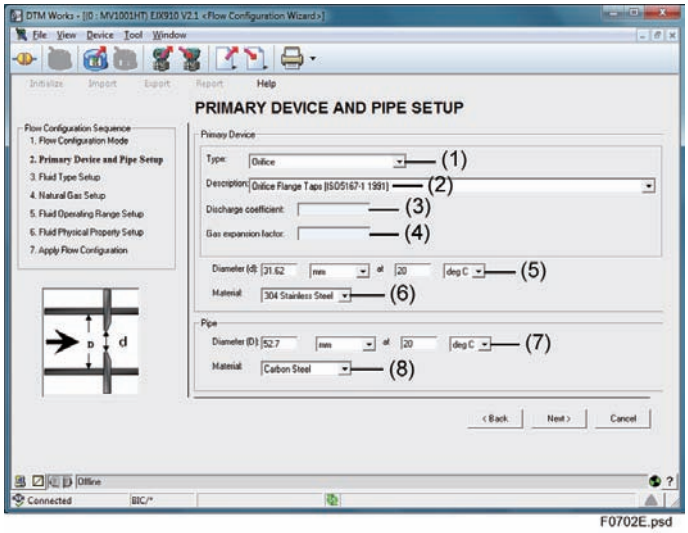


Figure 7.2 Primary Device and Pipe Setup Screen

(1) Primary Device Type

The device types are Selectable from the followings:

Type
Orifice
Nozzle
Venturi
Fix

(2) Primary Device Description

The primary device selectable from followings.

Table 7.1 Primary Device

Type	Primary Device
Orifice	Orifice Corner Taps [ISO5167-1 1991]
	Orifice Corner Taps [ISO5167-2 2003]
	Orifice Corner Taps [ASME MFC-3M 1989]
	Orifice Flange Taps [ISO5167-1 1991]
	Orifice Flange Taps [ISO5167-2 2003]
	Orifice Flange Taps [ASME MFC-3M 1989]
	Orifice Flange Taps [AGA No.3 1992]
	Orifice D and D/2 Taps [ISO5167-1 1991]
	Orifice D and D/2 Taps [ISO5167-2 2003]
	Orifice D and D/2 Taps [ASME MFC-3M 1989]
Nozzle	ISA1932 nozzle [ISO5167-1 1991/ ISO5167-3 2003]
	Long radius nozzle [ISO5167-1 1991/ ISO5167-3 2003]
	ASME FLOW NOZZLES [ASME MFC-3M 1989]
Venturi	Venturi nozzle [ISO5167-1 1991/ ISO5167-3 2003]
	Classical Venturi tube “as cast” convergent section [ISO5167-1 1991/ ISO5167-4 2003]
	ASME Venturi Tubes With a rough Cast or Fabricated Convergent [ASME MFC-3M 1989]
	Classical Venturi tube with a machined convergent section [ISO5167-1 1991/ ISO5167-4 2003]
	ASME Venturi Tubes With a machined convergent section [ASME MFC-3M 1989]
	Classical Venturi tube with a rough-welded sheet-iron convergent section [ISO5167-1 1991/ ISO5167-4 2003]
FIX	Fixed Mode *1

*1: Sets the discharge coefficient and gas expansion factor to a fixed value

(3) Discharge Coefficient of the Primary Device

This parameter is active only when 'Fix' selected for [Type].
Input the Discharge Coefficient manually when 'Fix' is selected.

(4) Primary Device Gas Expansion Factor

This parameter is active only when 'Fix' selected for [Type].
Input the Gas Expansion Factory manually when 'Fix' is selected.

(5) Primary Device Sizing

Set the following values and select a unit.
Diameter of Differential Producer
unit: mm (default)/in
measuring temperature: 20 (default)
unit: degC (default), degF, Kelvin

(6) Primary Device Material

The primary device material selectable from followings.
Thermal expansion of the primary device is automatically calculated according to the material.

Table 7.2 Primary device material

Material	Remarks
304 Stainless Steel	Default
316 Stainless Steel	
Carbon Steel	
Hastelloy C	
Monel	

(7) Pipe Sizing

Set the following values and select a unit.
Pipe inside Diameter
unit: mm (default) / in
Measuring temperature: 20 (default)
unit: degC (default), degF, Kelvin

(8) Pipe material

The pipe material selected from followings.
Thermal expansion of pipe is automatically calculated according to the material.

Table 7.3 Pipe material

Pipe Material	Remarks
304 Stainless Steel	
316 Stainless Steel	
Carbon Steel	Default
Hastelloy C	
Monel	

7.1.3 Fluid Setup

Auto compensation mode supported physical property database of fluid.

Table 7.4 Fluid setup

Type	Category	Name/Method
Gas or Steam	Gas (DIPPR)	DIPPR database
	Natural gas	AGA8 Detail Characterization Method
		AGA8 Gross Characterization Method 1
		AGA8 Gross Characterization Method 2
		ISO12213 molar-composition analysis
		ISO12213 physical properties
	Gas (custom data table)	User's numerical input
	Steam	IAPWS/IF97 Water and steam(1997)
Liquid	Liquid (DIPPR)	DIPPR database
	Liquid (custom data table)	User's numerical input

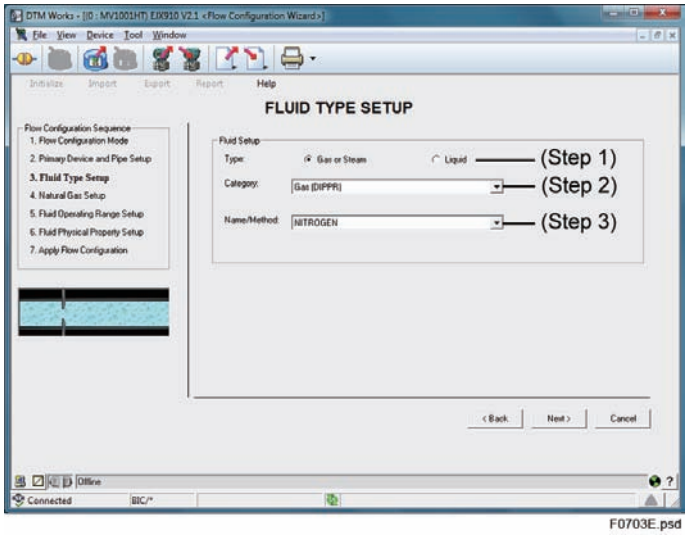


Figure 7.3 Fluid Type Setup Screen

Step 1

Select the type of fluid;

- Gas or Steam (Default) (Go to Step 2)
- Liquid (Go to Step 3)

Step 2

When “Gas or Steam” is selected for [Type], select the Category from the following;

- Natural Gas (Default)
- Steam
- Gas (DIPPR)
- Gas (Custom Data Table)

When “Natural Gas (Default)” is selected for [Category], select the Fluid name/Method from the followings;
- AGA8 Detail Characterization Method (Default)
- AGA8 Gross Characterization Method 1
- AGA8 Gross Characterization Method 2
- ISO12213 molar-composition analysis
- ISO12213 physical properties

When “Steam” is selected for [Category], select the Fluid name/Method from the followings;
- Superheated and Saturated steam
- Saturated steam

When “Gas (DIPPR)” is selected for [Category], select the Fluid name/Method from the followings;

Table 7.5 Physical property database

Fluid name	Fluid name	Fluid name
Acetic Acid (*)	Hydrogen Cyanide	Propadiene
Acetone	Hydrogen Peroxide	Propane
Acetonitrile	Hydrogen Sulfide	Propylene
Acetylene	Isobutane	Pyrene
Acrylonitrile	Isobutene	Styrene
Air	Isobutylbenzene	Sulfur Dioxide
Allyl Alcohol	Isopentane	Toluene
Ammonia	Isoprene	Trichloroethylene
Argon	Isopropanol	Trichlorofluoromethane
Benzaldehyde	m-chloronitrobenzene	Vinyl Acetate
Benzene	m-dichlorobenzene	Vinyl Chloride
Benzoic Acid (*)	Methane	Vinyl Cyclohexene
Benz Alcohol	Methanol	Water
Biphenyl	Methyl Acrylate	1-Butene
Bromine	Methyl Ethyl Ketone	1-Decene
Carbon Dioxide	Methyl Vinyl ether	1-Decanal
Carbon Monoxide	Monochlorobenzene	1-Decanol
Carbon Tetrachloride	n-Butane	1-Dodecene
Chlorine	n-Butanol	1-Dodecanol
Chlorodifluoromethane	n-Butyraldehyde	1-Heptanol
Chloroprene	n-Butyronitrile	1-Heptene
Chlorotrifluoroethylene	n-Decane	1-Hexene
Cycloheptane	n-Dodecane	1-Hexadecanol
Cyclohexane	n-Heptadecane	1-Octanol
Cyclopentane	n-Heptane	1-Octene
Cyclopentene	n-Hexane	1-Nonanal
Cyclopropane	n-nonane	1-Nonanol
Dichlorodifluoromethane	n-Octane	1-Pentadecanol
Divinyl Ether	n-Pentane	1-Pentanol
Ethane	Neon	1-Pentene
Ethanol	Neopentane	1-Undecanol
Ethylamine	Nitric Acid (*)	1,1,2,2-Tetrafluoroethane
Ethylbenzene	Nitric Oxide	1,1,2-Trichloroethane
Ethylene	Nitrobenzene	1,2,4-Trichlorobenzene
Ethylene Glycol	Nitroethane	1,2-Butadiene
Ethylene Oxide	Nitrogen	1,3-Butadiene
Fluorene	Nitromethane	1,3,5-Trichlorobenzene
Furan	Nitrous Oxide	1,4-Dioxane
Helium-4	Oxygen	1,4-Hexadiene
Hydrazine	Pentafluoroethane	2-Methyl-1-Pentene
Hydrogen	Phenol	2,2-Dimethylbutane
Hydrogen Chloride	Phosphoric Acid (*)	

*: Only for liquid.

When “Gas (Custom Data Table)” is selected for [Category], Set the custom Fluid name/Method in the blank box.

Step 3

When “Liquid” is select for [Type], select the Category from the followings;

- Liquid (DIPPR)
- Liquid (Custom)

When Liquid (DIPPR) is selected for [Category], select the Fluid name/Method from the materials shown in Table 7.5.
When Liquid (Custom) is selected for [Category], set the Fluid name/Method in the blank box.

7.1.4 Natural Gas Setup

(1) AGA8 Detail Characterization Method

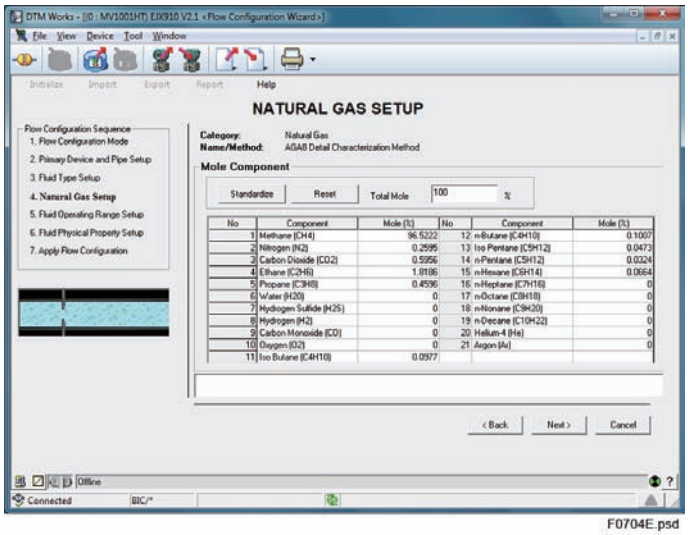


Figure 7.4 Natural Gas Setup Screen (1)

Input the value as mole percent for each component shown in Table 7.6.
The each value must be specified with in the range shown in Table 7.6.
Total mole percent must become 100%.

- Standardize: Standardize the mole component value.

  Click [Standardize] button when total mol percent does not become 100%.
- Reset: Reset the mole component value
- Total mole: Total mole percent is displayed

NOTE

In case that “Total Mole” is displayed as “100%”, error message is displayed as follows.
“The total mole should exactly be 100%”
Click [Standardize] button.

Table 7.6 AGA 8 Mole Valid Range

#	Component	Mole Valid Range (Expanded Range)
1	CH4 Methane mole percent	0–100 %
2	N2 Nitrogen mole percent	0–100 %
3	CO2 Carbon Dioxide mole percent	0–100 %
4	C2H6 Ethane mole percent	0–100 %
5	C3H8 Propane mole percent	0–12 %
6	H2O Water mole percent	0–Dew Point % *3
7	H2S Hydrogen Sulfide mole percent	0–100 %
8	H2 Hydrogen mole percent	0–100 %
9	CO Carbon Monoxide mole percent	0–3.0 %
10	O2 Oxygen mole percent	0–21 %
11	C4H10 i-Butane mole percent	0–6 % *1
12	C4H10 n-Butane mole percent	0–6 % *1
13	C5H12 i-Pentane mole percent	0–4 % *2
14	C5H12 n-Pentane mole percent	0–4 % *2
15	C6H14 n-Hexane mole percent	0–Dew Point % *3
16	C7H16 n-Heptane mole percent	0–Dew Point % *3
17	C8H18 n-Octane mole percent	0–Dew Point % *3
18	C9H20 n-Nonane mole percent	0–Dew Point % *3
19	C10H22 n-Decane mole percent	0–Dew Point % *3
20	He Helium mole percent	0–3.0 %
21	Ar ARGON	1–1.0 %

*1: ISOBUTANE (C4H10) and n-BUTANE (C4H10)'s sum cannot exceed 6 %.
*2: ISOPENTANE (C5H12) and n-Pentane (C5H12)'s sum cannot exceed 4 %.
*3: Upper limit Dew Point is not checked by the tool.

(2) AGA8 Gross Characterization Method 1

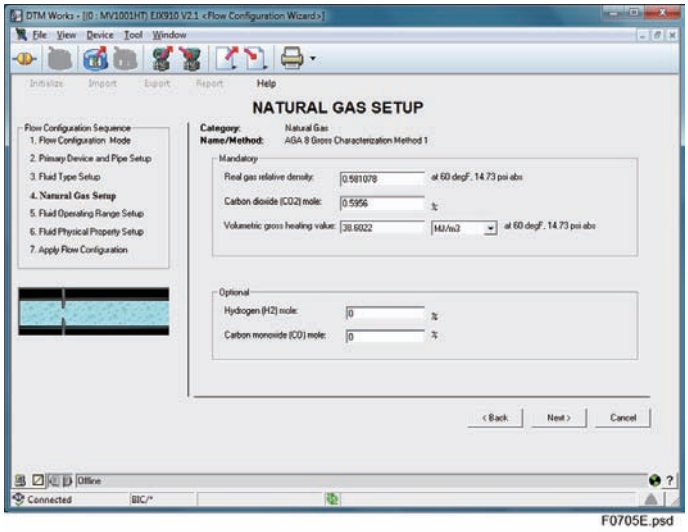


Figure 7.5 Natural Gas Setup Screen (2)

Table 7.7 Input & Valid Range (Expanded Range)

Contents		Expanded Range	Remarks
Mandatory	Real Gas Relative Density	0.554–0.87	at 14.73 psi abs 60 °F (at 101.56 kPa abs and 15.56 °C)
	CARBON DIOXIDE (CO2) mole	0–30%	
	Volumetric Gross Heating Value	17.76–42.87 MJ/m3 (477–1150 BTU/ft3)	at 14.73 psi abs 60 °F (at 101.56 kPa abs and 15.56 °C)
Optional	HYDROGEN (H2) mole	0–10%	
	CARBON MONOXIDE (CO) mole	0–3%	

(3) AGA8 Gross Characterization Method 2

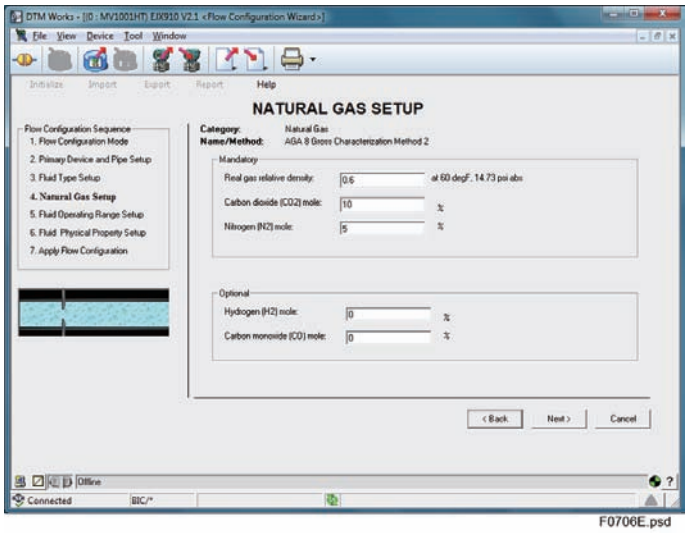


Figure 7.6 Natural Gas Setup Screen (3)

Table 7.8 Input & Valid Range (Expanded Range)

Contents		Expanded Range	Remarks
Mandatory	Relative Density	0.554–0.87	at 14.73 psi abs 60 °F (at 101.56 kPa abs and 15.56 °C)
	CARBON DIOXIDE (CO2) mole	0–30%	
	NITROGEN (N2) mole	0–50%	
Optional	HYDROGEN (H2) mole	0–10%	
	CARBON MONOXIDE (CO) mole	0–3%	

(4) ISO12213 molar-composition analysis

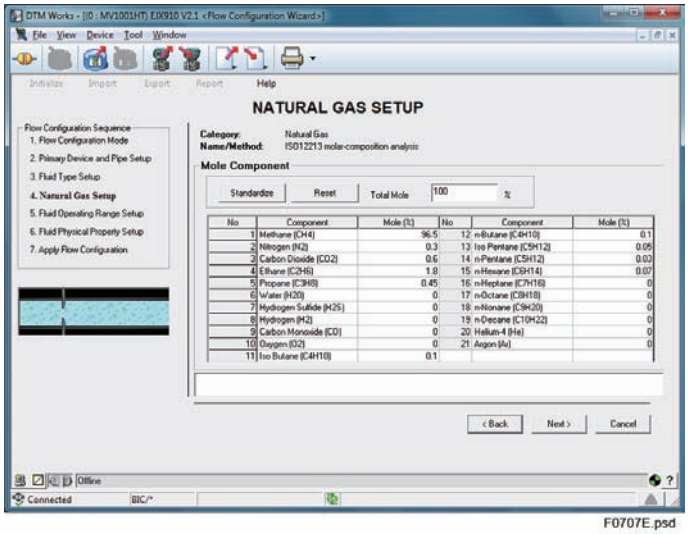


Figure 7.7 Natural Gas Setup Screen (4)

Input the value as mole percent for each component shown in Table 7.9.

The each value must be specified within the range shown in Table 7.9.
Total mole percent must become 100%.

- Standardize: Standardize the mole component value.
  Click [Standardize] button when total mol percent does not become 100%.
- Reset: Reset the mole component value
- Total mole: Total mole percent is displayed

NOTE

In case that “Total Mole” is displayed as “100%”, error message is displayed as follows.
“The total mole should exactly be 100%”
Click [Standardize] button.

Table 7.9 ISO12213 Mole Valid Range

#	Component	Mole Valid Range (Expanded Range)
1	CH4 Methane mole percent	50–100 %
2	N2 Nitrogen mole percent	0–50 %
3	CO2 Carbon Dioxide mole percent	0–30 %
4	C2H6 Ethane mole percent	0–20 %
5	C3H8 Propane mole percent	0–5 %
6	H2O Water mole percent	0–0.015 %
7	H2S Hydrogen Sulfide mole percent	0–0.02 %
8	H2 Hydrogen mole percent	0–10 %
9	CO Carbon Monoxide mole percent	0–3 %
10	O2 Oxygen mole percent	0–0.02 %
11	C4H10 i-Butane mole percent	0–1.5 % *1
12	C4H10 n-Butane mole percent	0–1.5 % *1
13	C5H12 i-Pentane mole percent	0–0.5 % *2
14	C5H12 n-Pentane mole percent	0–0.5 % *2
15	C6H14 n-Hexane mole percent	0–0.1 %
16	C7H16 n-Heptane mole percent	0–0.05 %
17	C8H18 n-Octane mole percent	0–0.05 %
18	C9H20 n-Nonane mole percent	0–0.05 %
19	C10H22 n-Decane mole percent	0–0.05 %
20	He Helium mole percent	0–0.5 %
21	Ar ARGON	0–0.02 %

*1: ISOBUTANE (C4H10) and n-BUTANE (C4H10) ‘s sum cannot exceed 1.5 %.
*2: ISOPENTANE (C5H12) and n-Pentane (C5H12) ‘s sum cannot exceed 0.5 %.

(5) ISO12213 physical properties

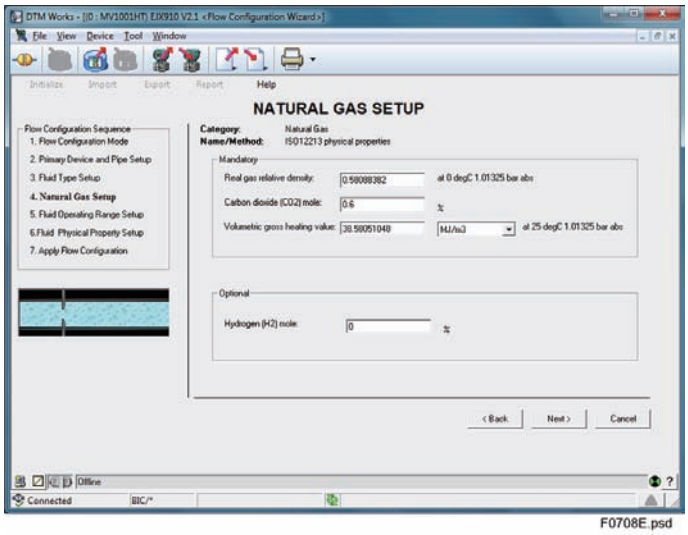


Figure 7.8 Natural Gas Setup Screen (5)

Table 7.10 Input & Valid Range (Expanded Range)

Contents		Expanded Range	Remarks
Mandatory	Relative Density	0.55–0.9	at 0°C, 1.01325 bar abs
	CARBON DIOXIDE (CO2) mole	0–30%	
	Volumetric Gross Heating Value	20–48 MJ/m3	at 25°C, 1.01325 bar abs
Optional	HYDROGEN (H2) mole	0–10%	

7.1.5 Fluid Operating Range Setup

(1) Gas or Steam (excluding Category: Saturated steam),

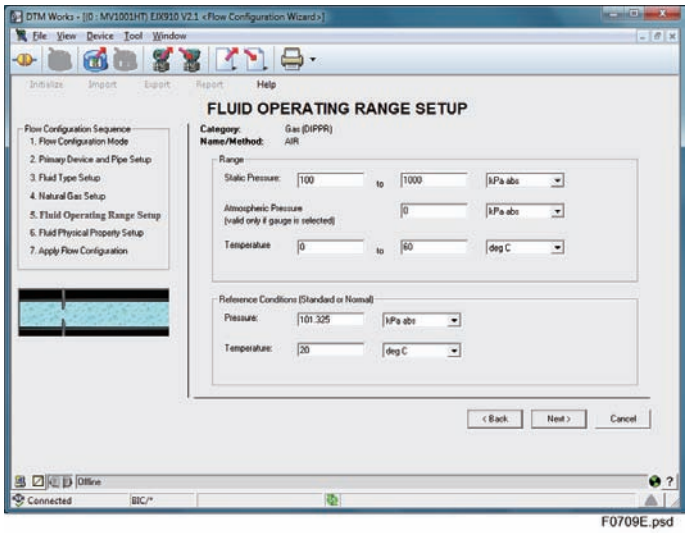


Figure 7.9 Fluid Operating Range Setup Screen (1)

Input operating ranges and select units

Pressure and Temperature units are selectable from following.

Pressure unit: kPa abs, bar abs, psi abs, kPa gauge, bar gauge, psi gauge

Atmospheric Pressure unit: psi abs, bar abs, kPa abs

Temperature unit: degC, degF, Kelvin

Input reference condition and select units

Pressure and Temperature units are selectable from following.

Pressure unit: kPa abs, bar abs, psi abs

Temperature unit: degC, degF, Kelvin

NOTE

- After clicking the [Next] button, if a “The specified operating condition includes both gas and liquid phases.” information message is displayed, the operating condition is near the acceptable limits for liquid and gas.

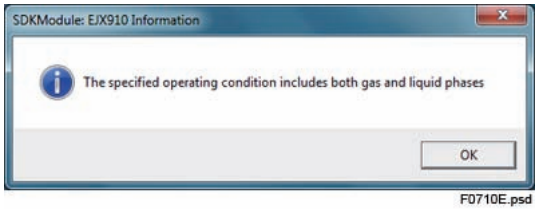


Figure 7.10 Warning message

- Please confirm the density value on the following page (fluid physical property setup page) and continue configuration.
- If the temperature and pressure range input on the Fluid Operating Range Setup is too wide, there is a probability of the calculation error of density is big.
- These ranges are used only for the density and viscosity calculation.
- Ranges of Transmitter are not changed.

(2) Gas or Steam (Category: Saturated steam)

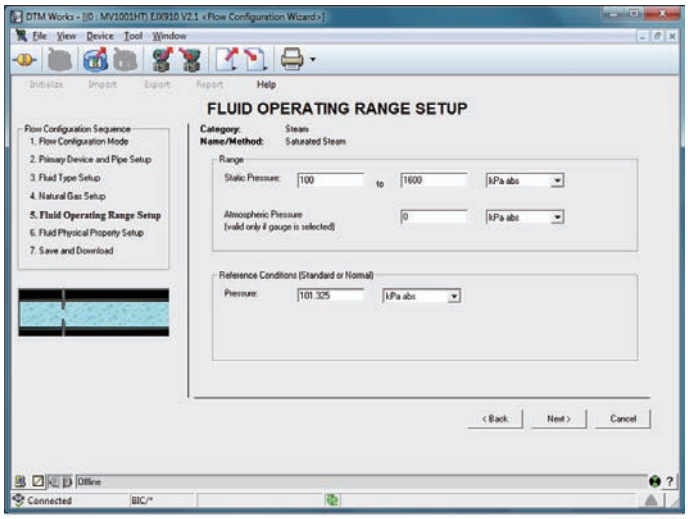


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Figure 7.11 Fluid Operating Range Setup Screen (2)

Input operating range and select units

Pressure unit is selectable from kPa abs, bar abs, psi abs, kPa gauge, bar gauge, psi gauge

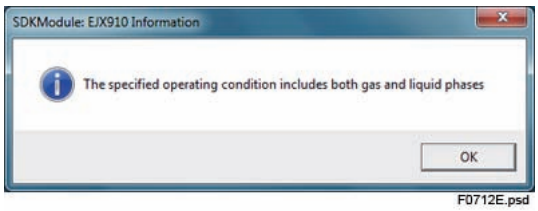
Atmospheric Pressure unit is selectable from: psi abs, bar abs, kPa abs

Input reference condition and select units

Pressure unit is selectable from kPa abs, bar abs, psi abs

NOTE

- After clicking the [Next] button, if a “The specified operating condition includes both gas and liquid phases.” information message is displayed, the operating condition is near the acceptable limits for liquid and gas.

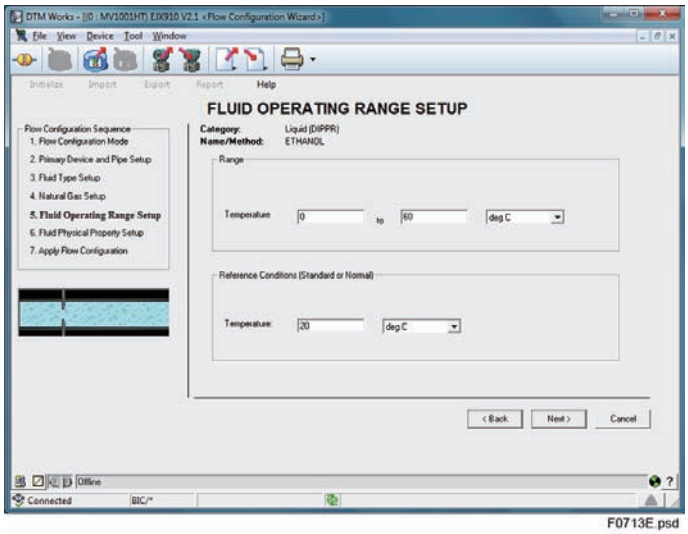


F0712E.psd

Figure 7.12 Warning message

- Please confirm the density value on the following page (fluid physical property setup page) and continue configuration.
- If the pressure range input on the Fluid Operating Range Setup is too wide, there is a probability of the calculation error of density is big.
- These ranges are used only for the density and viscosity calculation.
- Ranges of Transmitter are not changed.

(3) Liquid



F0713E.psd

Figure 7.13 Fluid Operating Range Setup Screen (3)

Input operating range and select units

Temperature unit is selectable from degC, degF or Kelvin.

Input reference condition and select units

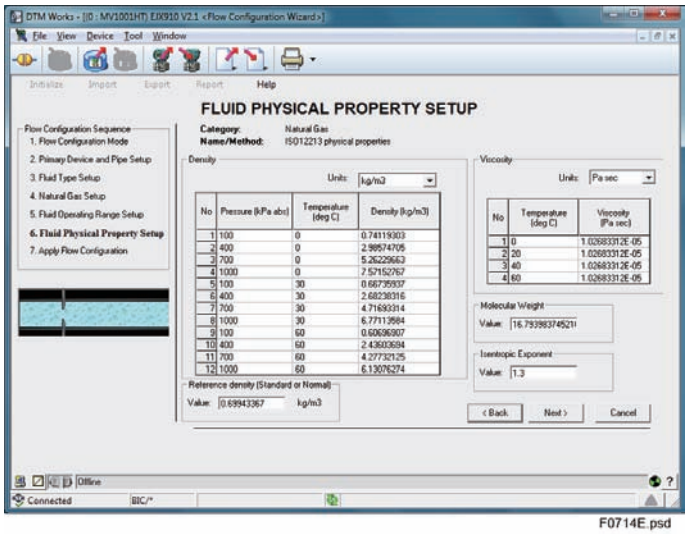
Temperature unit is selectable from degC, degF or Kelvin.

NOTE

- Please confirm the density value on the following page (fluid physical property setup page) and continue configuration.
- If the temperature range input on the Fluid Operating Range Setup is too wide, there is a probability of the calculation error of density is big.
- This range are used only for the density and viscosity calculation.
- Range of Transmitter are not changed.

7.1.6 Fluid Physical Property Setup

(1) Gas or Steam



F0714E.psd

Figure 7.14 Fluid Physical Property Setup Screen (1)

Confirm the value of density, viscosity, molecular weight and isentropic exponent.

Units can selectable from following.

Density: kg/m3 (Default), lb/ft3

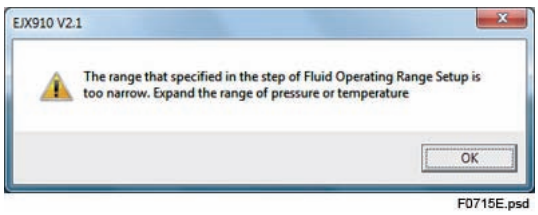
Viscosity: Pa sec, lb/ft sec

NOTE

The density and viscosity value can be customized.
The Isentropic exponent value can be customized.
The molecular weight value can be customized.
The value is shown after entering return key.

NOTE

If the “The range that specified in the step of Fluid Operating Range Setup is too narrow. Expand the range of pressure or temperature” error message is displayed when the Next button is clicked, the temperature and pressure range input on the Fluid Operating Range Setup is narrow. Please specify another value (wider range) and try again.



F0715E.psd

Figure 7.15 Information message for setting range

(2) Liquid

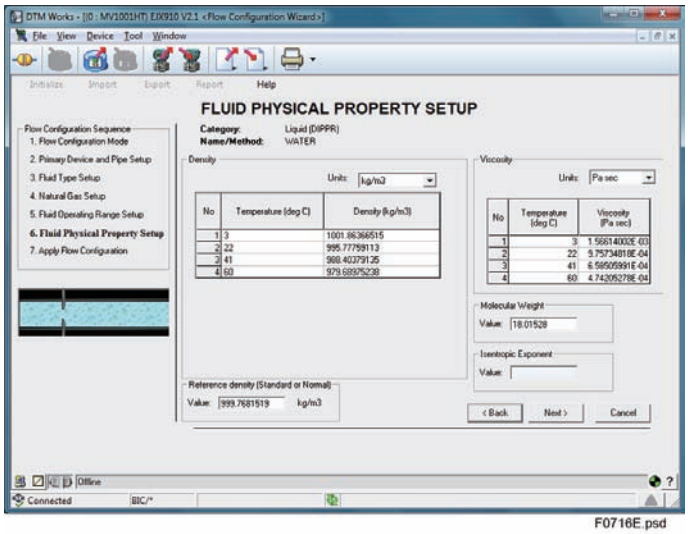


Figure 7.16 Fluid Physical Property Setup Screen (2)

Confirm the value of density, viscosity and molecular weight.

Units can selected from following.

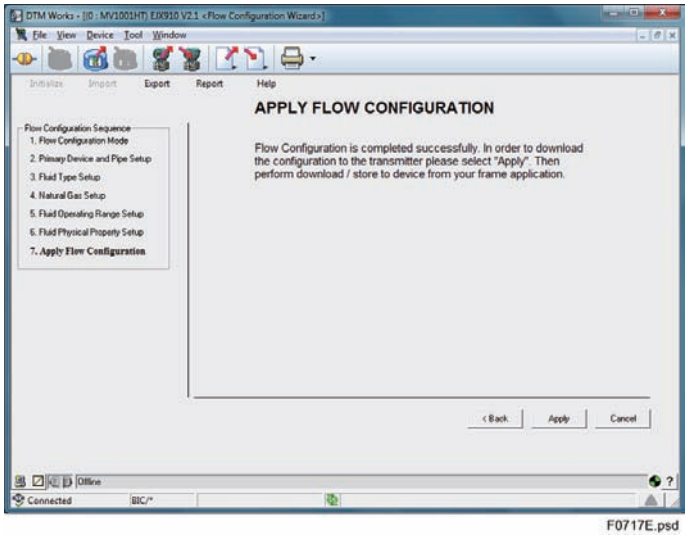
Density: kg/m3 (Default), lb/ft3

Viscosity: Pa sec, lb/ft sec

NOTE

The density and viscosity value can be customized.
The molecular weight value can be customized.
The value is shown when entering return key.

7.1.7 Apply Flow Configuration



F0717E.psd

Figure 7.17 Apply Flow Configuration

In order to download the configuration to the transmitter please select “Apply”.

Then perform download / store to device from Device DTM. (Refer to section 6.2.3).

Please refer to Chapter 5 and Figure 6.2.

7.2 Flow Configuration Wizard (Basic Mode)

7.2.1 Flow Configuration Mode

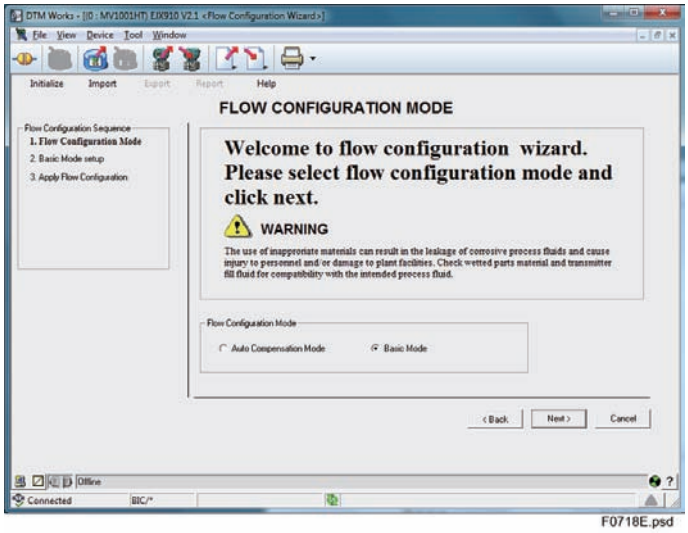


Figure 7.18 Flow Configuration Mode Screen (Basic mode)

Flow Configuration Mode

- Auto Compensation Mode (Default)

  Configuration of the fluid physical properties and primary device for the EJX Multivariable Transmitter can be performed using a dialog window.

- Basic Mode

  Flow operation and density compensation are performed conventionally, with the flow factors being input manually.

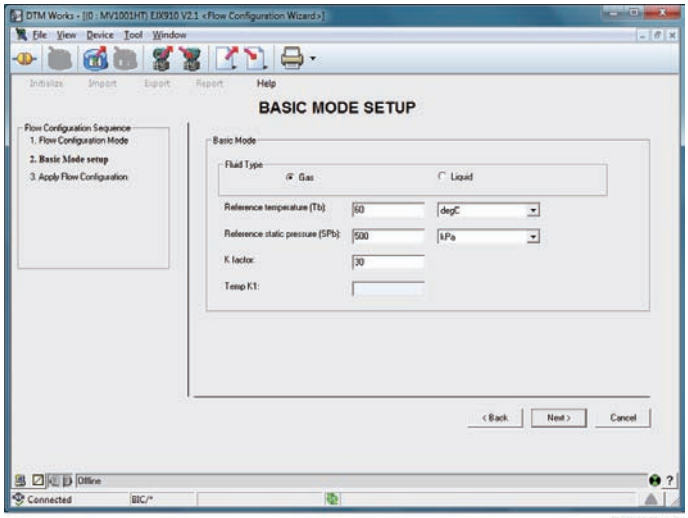
NOTE

1. The flow unit is not automatically converted in basic mode.
2. The flow range is set to LRV=0 and URV=100 when the Flow Configuration Mode is changed to Basic Mode or Auto Compensation Mode.

7.2.2 Basic Mode Setup

Select a Fluid Type from “Gas” or “Liquid”.

(1) Gas (Default)



F0719E.psdl

Figure 7.19 Basic Mode Setup Screen

- Input Reference Temperature (Tb), Reference Static Pressure (SPb), and Kfactor.

NOTE

The static pressure value is according to the transmitter’s abs and gauge selection (A/G select). But same unit character is used for both absolute and gauge.

The procedure for setting the BASIC Mode is as follows. For details on how to calculate the Kfactor, refer to the EJX910A and EJX930A Multivariable Transmitters User’s Manual (IM 01C25R01-01E).

Table 7.11 Flow Operational Expression

Fluid type	Flow unit Category *3	Kfactor *2	Flow Equation
Liquid	Mass Flow	$Kfactor = \pi/4 \times Nc \times C/\sqrt{1-\beta^4} \times \varepsilon \times d^2 \times \sqrt{2 \times \rho b}$	$Qm \text{ or } Qv \text{ or } Qv\_norm = \underline{Kfactor} \times \sqrt{\Delta P \times (1+\underline{Temp\ K1} \times (T-\underline{Tb}))}$ *1
	Normal·Standard Volume Flow	$Kfactor = \pi/4 \times Nc \times C/\sqrt{1-\beta^4} \times \varepsilon \times d^2 \times \sqrt{2 \times \rho b}\ /\ \rho norm$	
	Volume Flow	$Kfactor = \pi/4 \times Nc \times C/\sqrt{1-\beta^4} \times \varepsilon \times d^2 \times \sqrt{2 / \rho b}$	
Gas	Mass Flow	$Kfactor = \pi/4 \times Nc \times C/\sqrt{1-\beta^4} \times \varepsilon \times d^2 \times \sqrt{2 \times \rho b \times 1/K}$	$Qm \text{ or } Qv\_norm = \underline{Kfactor} \times \sqrt{\Delta P \times \underline{Tb}/T \times SP/\underline{SPb}}$ *1
	Normal·Standard Volume Flow	$Kfactor = \pi/4 \times Nc \times C/\sqrt{1-\beta^4} \times \varepsilon \times d^2 \times \sqrt{2 \times \rho b \times 1/K}\ /\ \rho norm$	
	Volume Flow	$Kfactor = \pi/4 \times Nc \times C/\sqrt{1-\beta^4} \times \varepsilon \times d^2 \times \sqrt{2/(\rho b \times 1/K)}$	$Qv = \underline{Kfactor} \times \sqrt{\Delta P \times T/\underline{Tb} \times \underline{SPb}/SP}$ *1

T0701E.ai

*1: ＿＿＿ mark indicate User Input
*2: Kfactor must be calculated according to the Flow unit category
*3: Reter to table 7.5, 7.6, 7.7

Table 7.12 Symbol

#	Symbol	Description
1	Qm	Mass Flow
2	Qv	Volume Flow
3	Qv_norm	Normal·Standard Volume Flow
4	Nc	Unit convert factor
5	Kfactor	Basic flow Calculation factor
6	C	Discharge Coefficient
7	ε	Expansion Factor
8	β	Diameter Ratio
9	d	Diameter of orifice
10	Δp	Differential Pressure (Transmitter Setting unit)
11	ρb	Base Density on Tb, SPb Condition
12	ρnorm	Density on Normal, Standard condition
13	Tb	Reference temperature unit: K
14	T	Temperature unit: K
15	SPb	Reference static pressure unit: kPa abs
16	SP	Static Pressure unit: kPa abs
17	Temp K1	The density rate of change per temperature 1degC of a density base value (value which set 100% to 1) For volume flow: set 0.
18	K	Compressibility factor

(2) Liquid

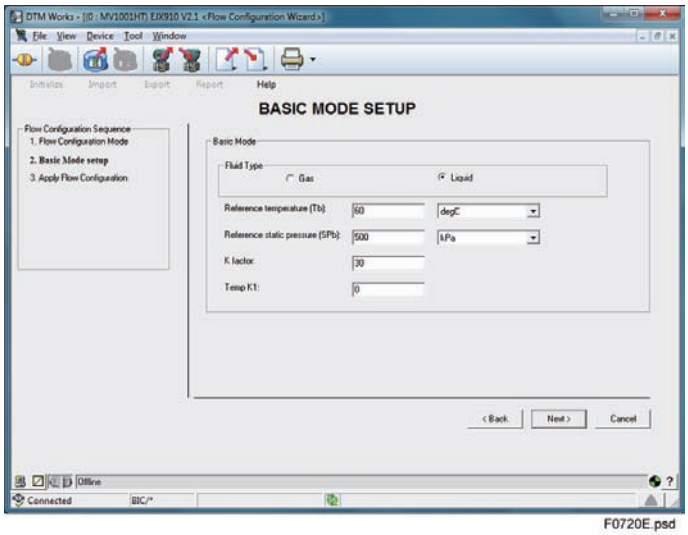


Figure 7.20 Basic Mode Setup for Liquid

- Input Reference Temperature (Tb), Kfactor, Temp K1
- Input Reference static pressure to 0. (This factor is used for gas)

NOTE

Reter to IM01C25R01-01E for the calculation of these flow factors.

7.2.3 Apply Flow Configuration

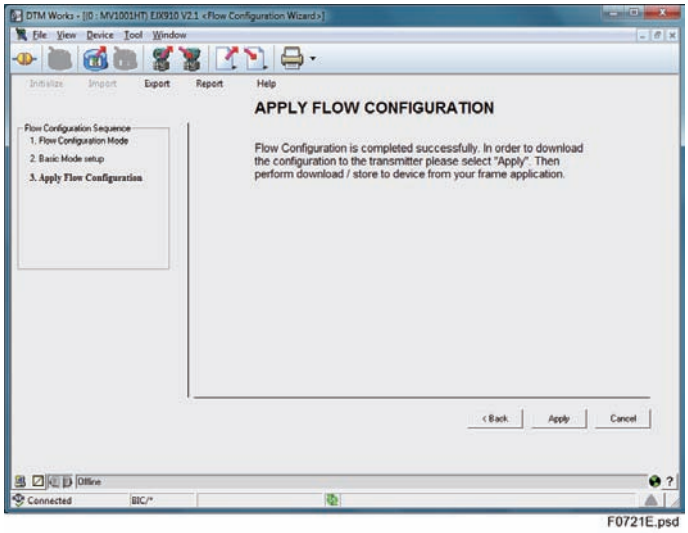


Figure 7.21 Apply Flow Configuration Screen

In order to download the configuration to the transmitter please select “Apply”.

Then perform download / store to device from Device DTM. (Refer to section 6.2.3).

Please also refer to Chapter 5 and Figure 6.2.

7.3 Obtain Flow Coefficient

Click the [Device] → [Additional Functions] → [Obtain Flow Cofficient]

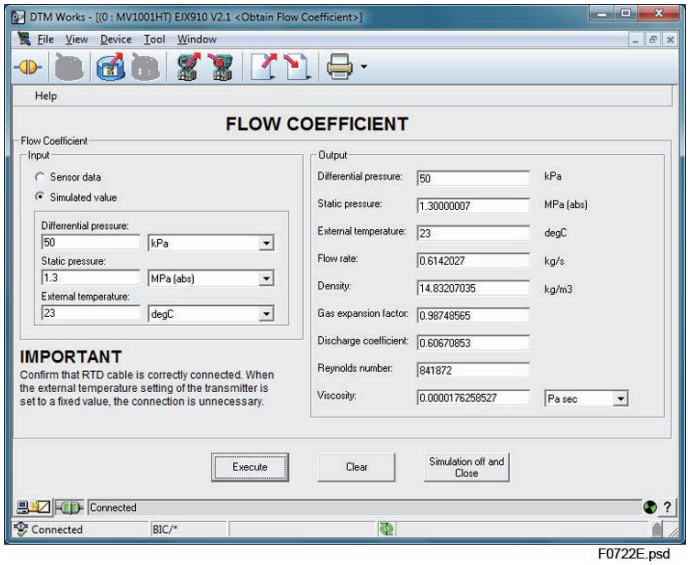


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Figure 7.22 Obtain Flow Coefficient

The flow coefficient can be obtained from the transmitter (input selection: sensor data or simulated data). The above flow coefficient window is displayed when sensor data is selected.

Execute flow simulation for confirmation of configured flow parameters. Input differential pressure, static pressure (absolue) and temperature value and confirm that desired flow is obtained.

When the simulation is executed, it is necessary to connect RTD or mock resistance (about 100Ω) to the transmitter.

Once selecting “simulated value” and press the [Execute] button, the transmitter is transferred to simulation mode. The transmitter will remain in the simulation mode for approximately 10 minutes and automatically return to normal mode. (Regarding the simulation duration time, refer to User’s Manual IM 01C25R02-01E “EJX910A and EJX930A Multivariable Transmitter HART Communication Type” and IM 01C25R03-01E “EJX910A and EJX930A Fieldbus Communication Type”)

Press [Simulation off and close] button if you wish to finish the simulation mode immediately.

CAUTION

While executing Obtain Flow Coefficient on the FOUNDATION fieldbus DTM, do not write the parameters of the EJX Multivariable Transmitter from other parameter setting tools.

NOTE

- This menu is active only when the transmitter is connected.
- In Basic mode density output data is always 0.

NOTE

If one of following alarm occurs, all the output data is held to the value before alarm occurs.
AL. 01(CAP.ERR)
AL. 02(AMP.ERR)
AL. 03(ET.ERR)
For detail alarm information, refer to User's Manual IM 01C25R03-01E "EJX910A and EJX930A Fieldbus Comminication Type".

EJXMVTool Help

Click the [Help] → [EJXMVTool Help]

The EJXMVTool online manual opened when this menu is clicked.

EJXMVTool About

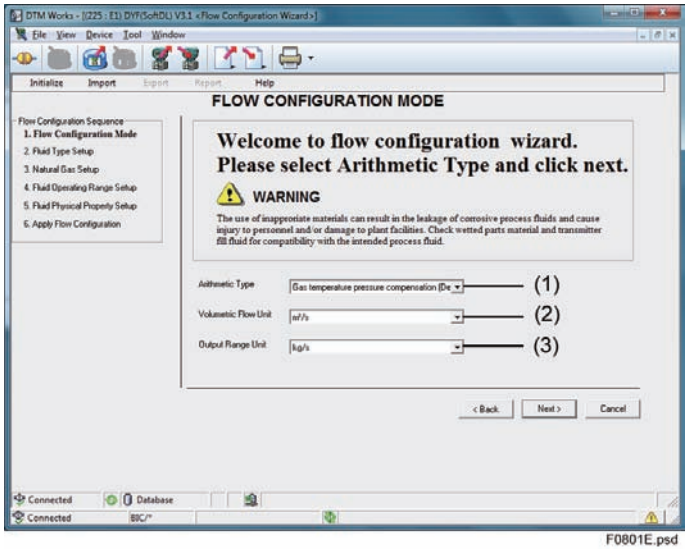
Click the [Help] → [EJXMVTool About]

The EJXMVTool version number is shown when this menu is clicked.

8. Operation of DYFMVTool

8.1 Flow Configuration Wizard (Detail Compensation Mode)

8.1.1 Flow Configuration Mode



F0801E.psd

Figure 8.1 Flow Configuration Mode screen

Select desired flow configuration mode and click [Next].

Flow Configuration Mode

- Select

  (1) Arithmetic Type

  Select calculation type in AR Block

  • Detail (Gas / Liquid) Compensation Mode

  - Gas temperature pressure compensation (Detail)

  - Liquid temperature compensation (Detail)

  (2) Volumetric Flow Unit

  Select Flowrate unit for AR Block input

  (3) Output Range Unit

  Select Flowrate unit for AR Block output

IMPORTANT

Temperature Unit and Pressure Unit are to be set in Offline Parameter for Detail Compensation Mode.
Set units according to input temperature and pressure unit.

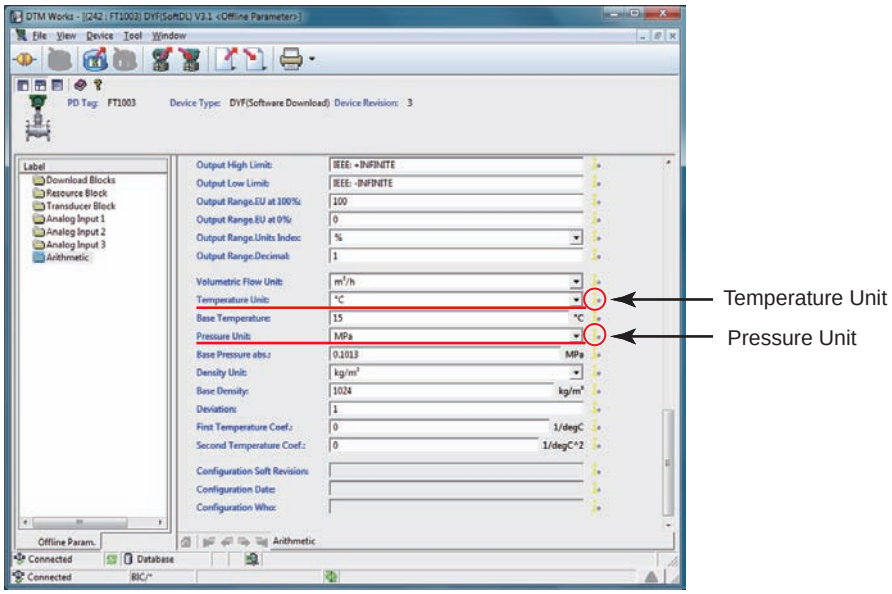


Figure 8.2 Offline – Arithmetic after Flow Configuration Wizard is executed.

Temperature Unit and Pressure Unit in AR Block are not configured by Flow Configuration Wizard Detail Compensation Mode.
Set manually using Offline Parameter.

8.1.2 Fluid Type Setup

Table 8.1 Fluid type setup

Type	Category	Name/Method
Gas	Natural gas	AGA8 Detail Characterization Method
		AGA8 Gross Characterization Method 1
		AGA8 Gross Characterization Method 2
		ISO12213 molar-composition analysis
		ISO12213 physical properties
	Gas (DIPPR)	DIPPR database
	Gas (custom data table)	User's numerical input
Liquid	Liquid (DIPPR)	DIPPR database
	Liquid (custom data table)	User's numerical input

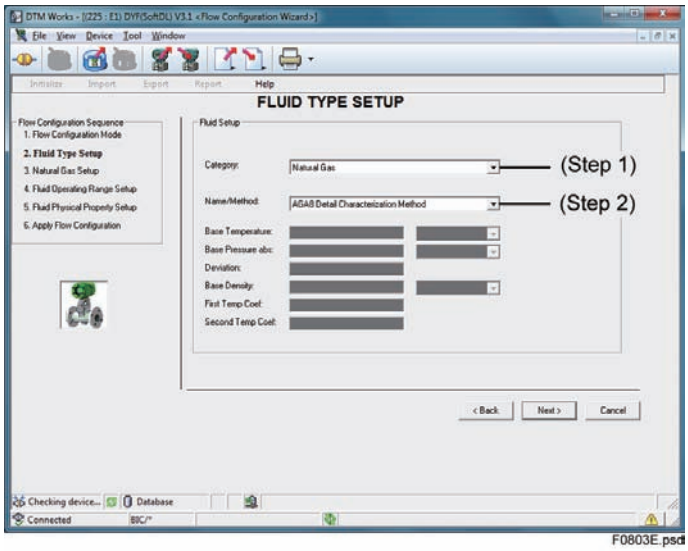


Figure 8.3 Fluid Type Setup Screen

(1) In case of Gas temperature pressure compensation

Step 1

Select the Category from the followings;

- Natural Gas
- Gas (DIPPR)
- Gas (custom data table)

Step 2-1

When “Natural Gas” is selected from “Category”, select “Name/Method” from the followings;

- AGA8 Detail Characterization Method
- AGA8 Gross Characterization Method 1
- AGA8 Gross Characterization Method 2
- ISO12213 molar-composition analysis
- ISO12213 physical properties

Step 2-2

When “Gas (DIPPR)” is selected from “Category”, select “Name/Method” DYFMVTool supports the materials shown in Table 8.2.

Step 2-3

When “Gas (custom data table)” is selected from “Category”, set the custom Fluid Name/Method in the blank box.

(2) In case of Liquid temperature compensation

Step 1

Select the “Category” from the followings;

- Liquid (DIPPR)
- Liquid (custom data table)

Step 2-1

When “Liquid (DIPPR)” is selected from “Category”, select “Name/Method”. DYFMVTool supports the materials shown in Table 8.2.

Step 2-2

When “Liquid(custom data table)” is selected from “Category”, set the custom Fluid Name/Method in the blank box.

Table 8.2 Physical property database

Fluid name
Acetic Acid (*)
Acetone
Acetonitrile
Acetylene
Acrylonitrile
Air
Allyl Alcohol
Ammonia
Argon
Benzaldehyde
Benzene
Benzoic Acid (*)
Benz Alcohol
Biphenyl
Bromine
Carbon Dioxide
Carbon Monoxide
Carbon Tetrachloride
Chlorine
Chlorodifluoromethane
Chloroprene
Chlorotrifluoroethylene
Cycloheptane
Cyclohexane
Cyclopentane
Cyclopentene
Cyclopropane
Dichlorodifluoromethane
Divinyl Ether
Ethane
Ethanol
Ethylamine
Ethylbenzene
Ethylene
Ethylene Glycol
Ethylene Oxide
Fluorene
Furan
Helium-4
Hydrazine
Hydrogen
Hydrogen Chloride
Hydrogen Cyanide
Hydrogen Peroxide
Hydrogen Sulfide

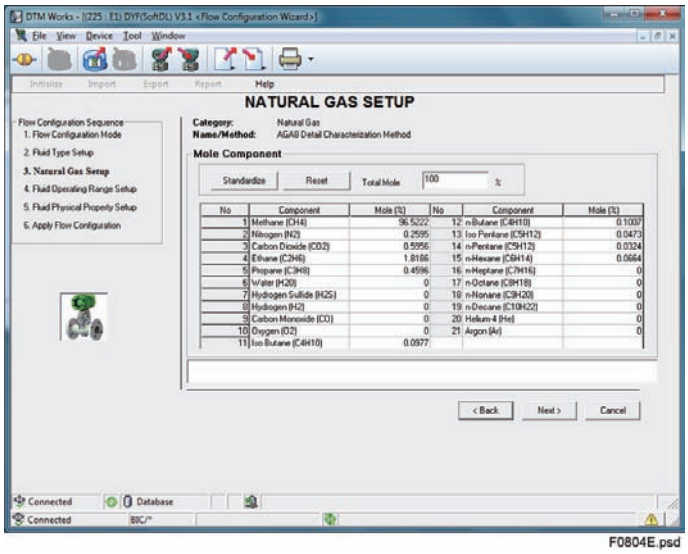
Fluid name
Isobutane
Isobutene
Isobutylbenzene
Isopentane
Isoprene
Isopropanol
m-chloronitrobenzene
m-dichlorobenzene
Methane
Methanol
Methyl Acrylate
Methyl Ethyl Ketone
Methyl Vinyl ether
Monochlorobenzene
n-Butane
n-Butanol
n-Butyraldehyde
n-Butyronitrile
n-Decane
n-Dodecane
n-Heptadecane
n-Heptane
n-Hexane
n-nonane
n-Octane
n-Pentane
Neon
Neopentane
Nitric Acid (*)
Nitric Oxide
Nitrobenzene
Nitroethane
Nitrogen
Nitromethane
Nitrous Oxide
Oxygen
Pentafluoroethane
Phenol
Phosphoric Acid (*)
Propadiene
Propane
Propylene
Pyrene
Styrene
Sulfur Dioxide

Fluid name
Toluene
Trichloroethylene
Trichlorofluoromethane
Vinyl Acetate
Vinyl Chloride
Vinyl Cyclohexene
Water
1-Butene
1-Decene
1-Decanal
1-Decanol
1-Dodecene
1-Dodecanol
1-Heptanol
1-Heptene
1-Hexene
1-Hexadecanol
1-Octanol
1-Octene
1-Nonanal
1-Nonanol
1-Pentadecanol
1-Pentanol
1-Pentene
1-Undecanol
1,1,2,2-Tetrafluoroethane
1,1,2-Trichloroethane
1,2,4-Trichlorobenzene
1,2-Butadiene
1,3-Butadiene
1,3,5-Trichlorobenzene
1,4-Dioxane
1,4-Hexadiene
2-Methyl-1-Pentene
2,2-Dimethylbutane

*: Only for liquid.

8.1.3 Natural Gas Setup

(1) AGA8 Detail Characterization Method



F0804E.psd

Figure 8.4 Natural Gas Setup screen (1)

Input mole component of 21 materials.

Range must be checked as Table 8.3.

Total mole percent must become 100%.

- Standardize: Standardize the mole component value.
  Click [Standardize] button when total mole percent does not become 100%.
- Reset: Reset the mole component value
- Total mole: Total mole percent is displayed

NOTE

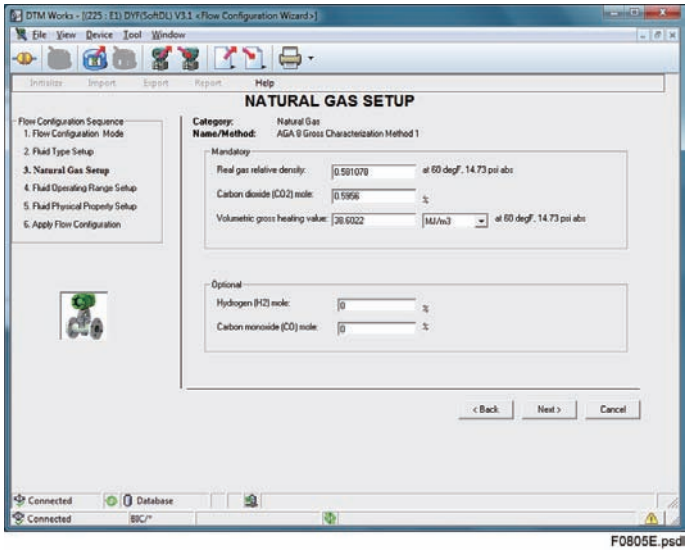
In case that “Total Mole” is displayed as “100%”, error message is displayed as follows.
“The total mole should exactly be 100%”
Click [Standardize] button.

Table 8.3 AGA 8 Mole Valid Range

#	Component	Mole Valid Range (Expanded Range)
1	CH4 Methane mole percent	0–100 %
2	N2 Nitrogen mole percent	0–100 %
3	CO2 Carbon Dioxide mole percent	0–100 %
4	C2H6 Ethane mole percent	0–100 %
5	C3H8 Propane mole percent	0–12 %
6	H2O Water mole percent	0–Dew Point %*3
7	H2S Hydrogen Sulfide mole percent	0–100 %
8	H2 Hydrogen mole percent	0–100 %
9	CO Carbon Monoxide mole percent	0–3.0 %
10	O2 Oxygen mole percent	0–21 %
11	C4H10 i-Butane mole percent	0–6 %*1
12	C4H10 n-Butane mole percent	0–6 %*1
13	C5H12 i-Pentane mole percent	0–4 %*2
14	C5H12 n-Pentane mole percent	0–4 %*2
15	C6H14 n-Hexane mole percent	0–Dew Point %*3
16	C7H16 n-Heptane mole percent	1–Dew Point %*3
17	C8H18 n-Octane mole percent	2–Dew Point %*3
18	C9H20 n-Nonane mole percent	3–Dew Point %*3
19	C10H22 n-Decane mole percent	4–Dew Point %*3
20	He Helium mole percent	0–3.0 %
21	Ar ARGON	1–1.0 %

*1: ISOBUTANE (C4H10) and n-BUTANE (C4H10)'s sum cannot exceed 6 %.
*2: ISOPENTANE (C5H12) and n-Pentane (C5H12)'s sum cannot exceed 4 %.
*3: Upper limit Dew Point is not checked by the tool.

(2) AGA8 Gross Characterization Method 1



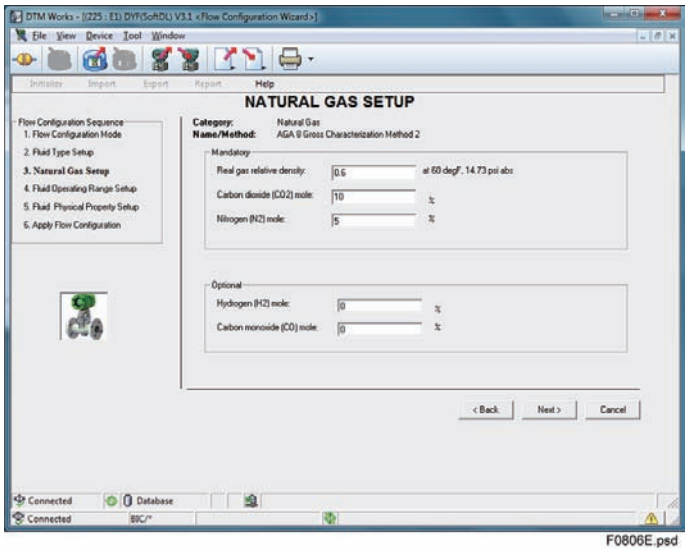
F0805E.psdl

Figure 8.5 Natural Gas Setup screen (2)

Table 8.4 Input & Valid Range (Expanded Range)

Contents		Expanded Range	Remarks
Mandatory	Real Gas Relative Density	0.554–0.87	at 14.73 psi abs 60 °F (at 101.56 kPa abs and 15.56 °C)
	CARBON DIOXIDE (CO2) mole	0–30 %	
	Volumetric Gross Heating Value	17.76–42.87 MJ/m3 (477–1150 BTU/ft3)	at 14.73 psi abs 60 °F (at 101.56 kPa abs and 15.56 °C)
Optional	HYDROGEN (H2) mole	0–10 %	
	CARBON MONOXIDE (CO) mole	0–3 %	

(3) AGA8 Gross Characterization Method 2



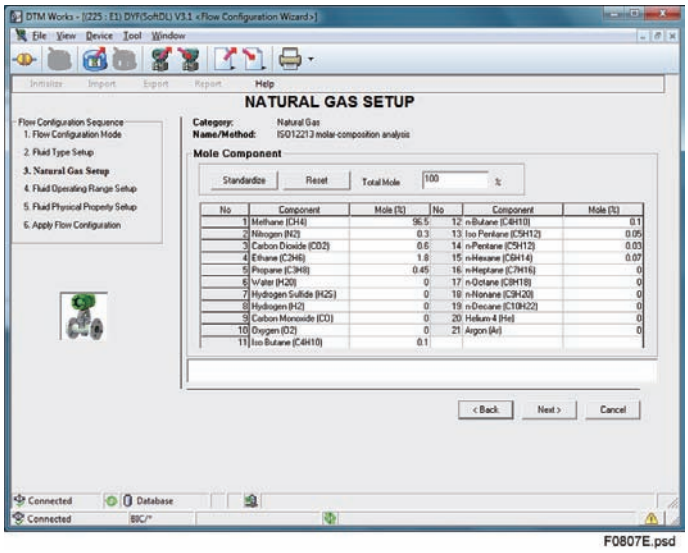
F0806E.psd

Figure 8.6 Natural Gas Setup screen (3)

Table 8.5 Input & Valid Range (Expanded Range)

Contents		Expanded Range	Remarks
Mandatory	Relative Density	0.554–0.87	at 14.73 psi abs 60 °F (at 101.56 kPa abs and 15.56 °C)
	CARBON DIOXIDE (CO2) mole	0–30 %	
	NITROGEN (N2) mole	0–50 %	
Optional	HYDROGEN (H2) mole	0–10 %	
	CARBON MONOXIDE (CO) mole	0–3 %	

(4) ISO12213 molar-composition analysis



F0807E.psd

Figure 8.7 Natural Gas Setup screen (4)

Input mole component of 21 materials.

Range must be checked as Table 8.6.

Total mole percent must become 100%.

- Standardize: Standardize the mole component value.
  Click [Standardize] button when total mole percent does not become 100%.
- Reset: Reset the mole component value
- Total mole: Total mole percent is displayed

NOTE

In case that “Total Mole” is displayed as “100%”, error message is displayed as follows.
“The total mole should exactly be 100%”
Click [Standardize] button.

Table 8.6 ISO12213 Mole Valid Range

#	Component	Mole Valid Range (Expanded Range)
1	CH4 Methane mole percent	50–100 %
2	N2 Nitrogen mole percent	0–50 %
3	CO2 Carbon Dioxide mole percent	0–30 %
4	C2H6 Ethane mole percent	0–20 %
5	C3H8 Propane mole percent	0–5 %
6	H2O Water mole percent	0–0.015 %
7	H2S Hydrogen Sulfide mole percent	0–0.02 %
8	H2 Hydrogen mole percent	0–10 %
9	CO Carbon Monoxide mole percent	0–3 %
10	O2 Oxygen mole percent	0–0.02 %
11	C4H10 i-Butane mole percent	0–1.5 %*1
12	C4H10 n-Butane mole percent	0–1.5 %*1
13	C5H12 i-Pentane mole percent	0–0.5 %*2
14	C5H12 n-Pentane mole percent	0–0.5 %*2
15	C6H14 n-Hexane mole percent	0–0.1 %
16	C7H16 n-Heptane mole percent	0–0.05 %
17	C8H18 n-Octane mole percent	0–0.05 %
18	C9H20 n-Nonane mole percent	0–0.05 %
19	C10H22 n-Decane mole percent	0–0.05 %
20	He Helium mole percent	0–0.5 %
21	Ar ARGON	0–0.02 %

*1: ISOBUTANE (C4H10) and n-BUTANE (C4H10)’s sum cannot exceed 6 %.
*2: ISOPENTANE (C5H12) and n-Pentane (C5H12)’s sum cannot exceed 4 %.

(5) ISO12213 physical properties

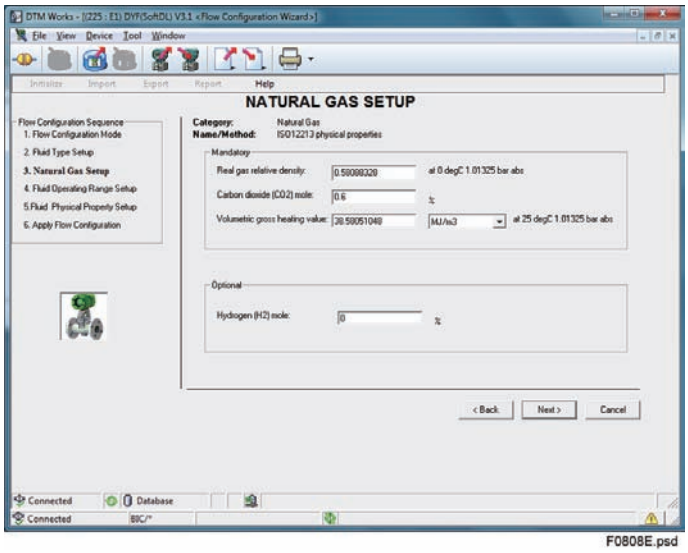


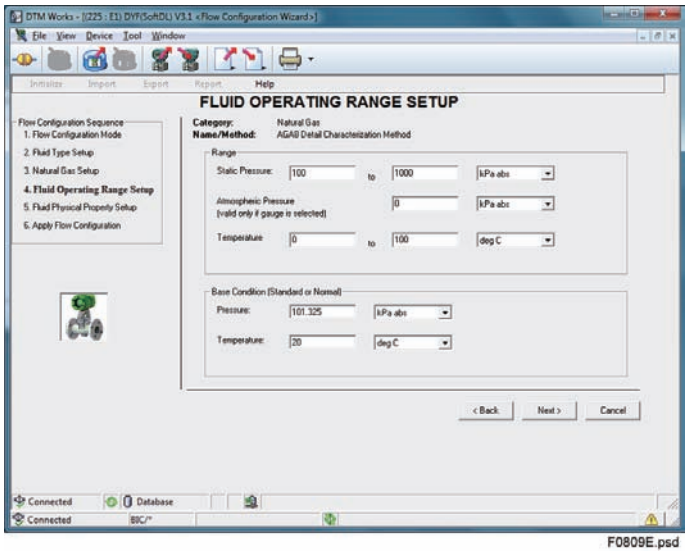
Figure 8.8 Natural Gas Setup screen (5)

Table 8.7 Input & Valid Range (Expanded Range)

Contents		Expanded Range	Remarks
Mandatory	Relative Density	0.55–0.9	at 0°C, 1.01325 bar abs
	CARBON DIOXIDE (CO2) mole	0–30 %	
	Volumetric Gross Heating Value	20–48 MJ/m3	at 25°C, 1.01325 bar abs
Optional	HYDROGEN (H2) mole	0–10 %	

8.1.4 Fluid Operating Range Setup

(1) Gas



F0809E.psd

Figure 8.9 Fluid Operating Range Setup screen (1)

Input operating ranges and select units

Pressure and Temperature units are selectable from following.

Pressure unit: kPa abs, bar abs, psi abs, kPa gauge, bar gauge, psi gauge

Atmospheric Pressure unit: psi abs, bar abs, kPa abs

Temperature unit: degC, degF, Kelvin

Input Base Condition and select units

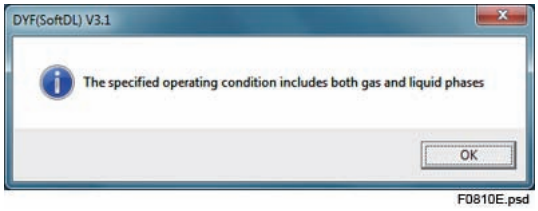
Pressure and Temperature units are selectable from following.

Pressure unit: kPa abs, bar abs, psi abs, kPa gauge, bar gauge, psi gauge

Temperature unit: degC, degF, Kelvin

NOTE

- After clicking the [Next] button, if a “The specified operating condition includes both gas and liquid phases.” information message is displayed, the operating condition is near the acceptable limits for liquid and gas.



F0810E.psd

Figure 8.10 Warning message

- Please confirm the density value on the following page (fluid physical property setup page) and continue configuration.
- If the temperature and pressure range input on the “Fluid Operating Range Setup” is too wide, there is a probability of the calculation error of density is big.
- These ranges are used only for the density and viscosity calculation.
- Ranges of Flowmeter are not changed.

(2) Liquid

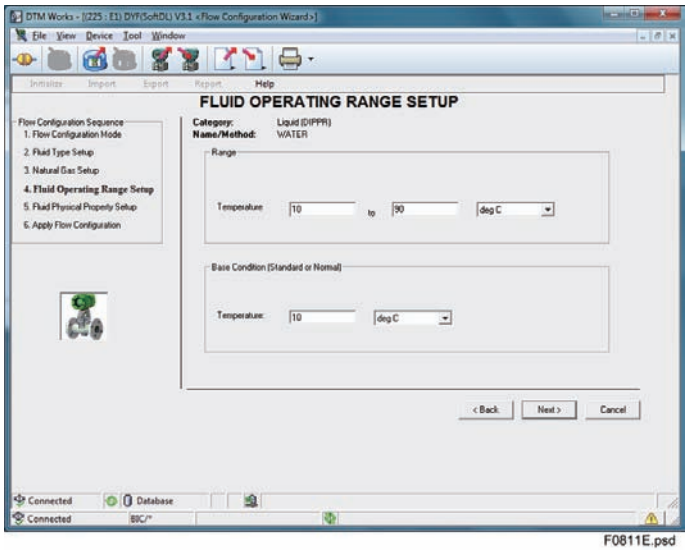


Figure 8.11 Fluid Operating Range Setup screen (3)

Input operating range and select units

Temperature unit is selectable from degC, degF or Kelvin.

Input Base Condition and select units

Temperature unit is selectable from degC, degF or Kelvin.

NOTE

- Please confirm the density value on the following page (fluid physical property setup page) and continue configuration.
- If the temperature range input on the “Fluid Operating Range Setup” is too wide, there is a probability of the calculation error of density is big.
- This range are used only for the density and viscosity calculation.
- Range of Flowmeter are not changed.

8.1.5 Fluid Physical Property Setup

(1) Gas

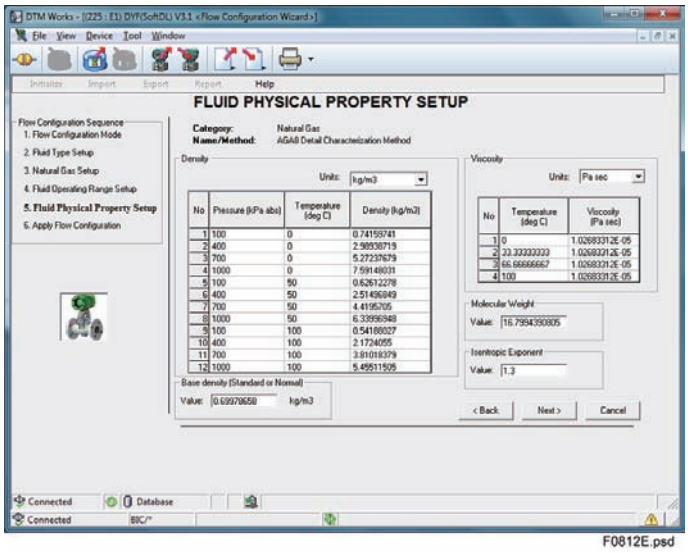


Figure 8.12 Fluid Physical Property Setup Screen (1)

Confirm the value of density, viscosity, molecular weight and isentropic exponent.

Units can selectable from following.

Density: kg/m3 (Default), lb/ft3

Viscosity: Pa sec, lb/ft sec

NOTE

The density and viscosity value can be customized.
The isentropic exponent value can be customized.
The molecular weight value can be customized.
The value is shown after entering return key.

NOTE

If the “The range that specified in the step of Fluid Operating Range Setup is too narrow. Expand the range of pressure or temperature” error message is displayed when the Next button is clicked, the temperature and pressure range input on the “Fluid Operating Range Setup” is narrow.
Please specify another value (wider range) and try again.

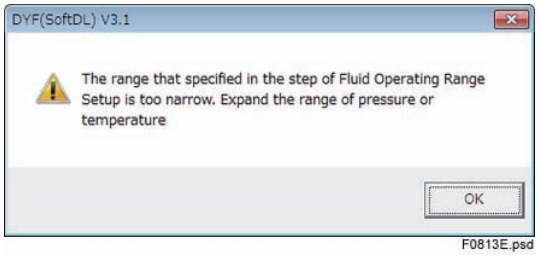
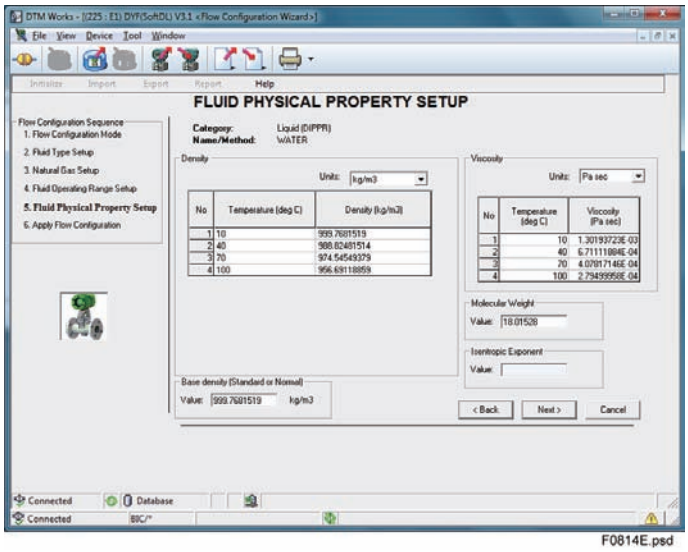


Figure 8.13 Information message for setting range

(2) Liquid



F0814E.psd

Figure 8.14 Fluid Physical Property Setup Screen (2)

Confirm the value of density, viscosity and molecular weight.

Units can selected from following.

Density: kg/m3 (Default), lb/ft3

Viscosity: Pa sec, lb/ft sec

NOTE

The density and viscosity value can be customized.
The molecular weight value can be customized.
The value is shown when entering return key.

8.1.6 Apply Flow Configuration

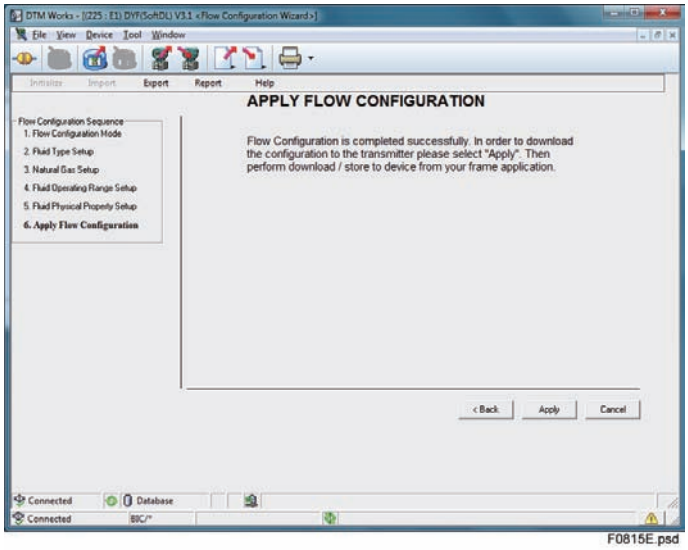


Figure 8.15 Apply Flow Configuration Screen

In order to download the configuration to the device, click “Apply”.

Then perform “Download to Device” from Device DTM. (Refer to section 6.2.3)

Execute Apply for setting compensation condition in Offline.

Refer to Chapter 5 and Figure 6.3.

NOTE

Following shows “Device General Parameters” which is applied to “Offline Database”.

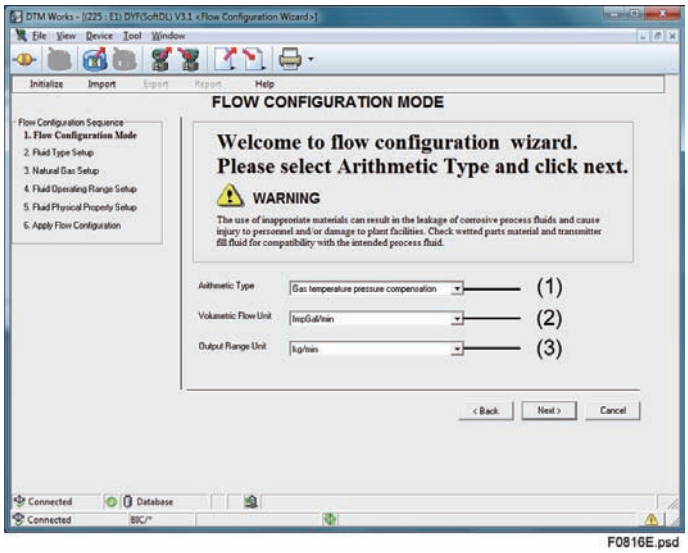
Table 8.8 “Device General Parameters” applied to “Offline Database”

	Detail Compensation Mode	
	Gas temperature pressure compensation (Detail)	**Liquid temperature compensation (Detail)**
Arithmetic Type	Applied	Applied
Bias	Applied (Always "0")	Applied (Always "0")
Gain	Applied (Always "1")	Applied (Always "1")
Bias Input 1	Applied (Always "0")	Applied (Always "0")
Gain Input 1	Applied (Always "1")	Applied (Always "1")
Bias Input 2	Applied (Always "0")	Applied (Always "0")
Gain Input 2	Applied (Always "1")	Applied (Always "1")
Output Range.Unit Index	Applied	Applied
Volumetric Flow Unit	Applied	Applied
Temperature Unit	— *1	— *1
Base Temperature	—	—
Pressure Unit	— *1	—
Base Pressure abs	—	—
Density Unit	Applied	Applied
Base Density	Applied	Applied
Deviation	—	—
First Temperature Coef.	—	—
Second Temperature Coef.	—	—

Applied : Target parameter is applied by DYFMVTool
*1: Temperature Unit and Pressure Unit in AR Block are not configured by Flow Configuration Wizard Detail Compensation Mode.
Set manually using Offline Parameter. Refer to section 8.1.1.

8.2 Flow Configuration Wizard (Steam, Simple Compensation Mode)

8.2.1 Flow Configuration Mode



F0816E.psd

Figure 8.16 Flow Configuration Mode screen

Select desired flow configuration mode and click [Next].

Flow Configuration Mode

• Select

(1) Arithmetic Type

Select calculation type in AR Block

• Steam Compensation Mode

- Saturated steam (Temperature)
- Saturated steam (Pressure)
- Superheated steam

• Simple Gas/Liquid Compensation Mode

- Gas temperature pressure compensation
- Liquid temperature compensation

(2) Volumetric Flow Unit

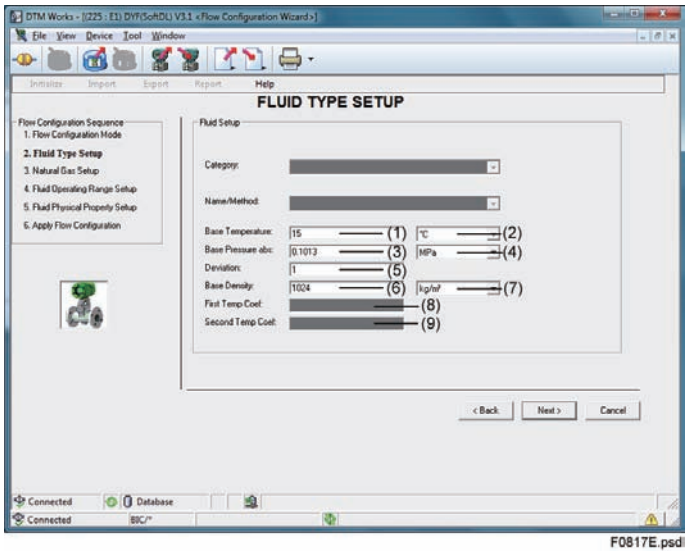
Select Flowrate unit in AR Block input.

(3) Output Range Unit

Select Flowrate unit in AR Block output.

8.2.2 Fluid Type Setup

Set parameters (1) to (9) according to Arithmetic Type.



F0817E.psd

Figure 8.17 Fluid Type Setup Screen

(1), (2) Base Temperature

Set the standard temperature and select temperature unit.

(3), (4) Base Pressure abs

Set the standard abs pressure and select pressure unit.

(5) Deviation

Set the gas deviation factor.

(6), (7) Base Density

Set the standard density and select density unit.

(8) First Temp. Coef.

Set 1st temperature factor for density compensation equation in liquid

(9) Second Temp. Coef.

Set 2nd temperature factor for density compensation equation in liquid

8.2.3 Apply Flow Configuration

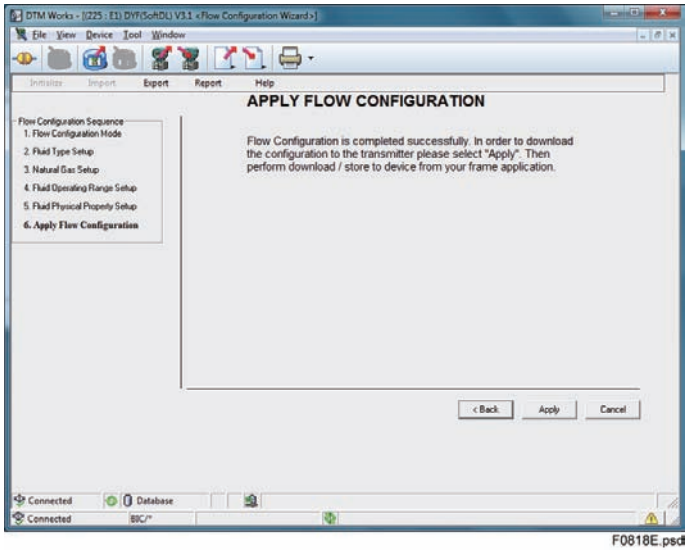


Figure 8.18 Apply Flow Configuration Screen

In order to download the configuration to the device, click “Apply”.

Then perform “Download to Device” from Device DTM. (Refer to section 6.2.3)

Refer to Chapter 5 and Figure 6.3.

NOTE

Following shows “Device General Parameters” which is applied to “Offline Database”.

Table 8.9 “Device General Parameters” applied to “Offline Database”

	Simple Compensation Mode				
	Saturated steam (Temperature)	Saturated steam (Pressure)	Superheat steam	Gas temperature pressure compensation	Liquid temperature compensation
Arithmetic Type	Applied	Applied	Applied	Applied	Applied
Bias	Applied (Always "0")	Applied (Always "0")	Applied (Always "0")	Applied (Always "0")	Applied (Always "0")
Gain	Applied (Always "1")	Applied (Always "1")	Applied (Always "1")	Applied (Always "1")	Applied (Always "1")
Bias Input 1	Applied (Always "0")	Applied (Always "0")	Applied (Always "0")	Applied (Always "0")	Applied (Always "0")
Gain Input 1	Applied (Always "1")	Applied (Always "1")	Applied (Always "1")	Applied (Always "1")	Applied (Always "1")
Bias Input 2	Applied (Always "0")	Applied (Always "0")	Applied (Always "0")	Applied (Always "0")	Applied (Always "0")
Gain Input 2	Applied (Always "1")	Applied (Always "1")	Applied (Always "1")	Applied (Always "1")	Applied (Always "1")
Output Range.Unit Index	Applied	Applied	Applied	Applied	Applied
Volumetric Flow Unit	Applied	Applied	Applied	Applied	Applied
Temperature Unit	Applied	—	Applied	Applied	Applied
Base Temperature	—	—	—	Applied	Applied
Pressure Unit	—	Applied	—	Applied	—
Base Pressure abs	—	—	—	Applied	—
Density Unit	Applied	Applied	Applied	Applied *1	Applied
Base Density	—	—	—	Applied *1	Applied
Deviation	—	—	—	Applied	—
First Temperature Coef.	—	—	—	—	Applied
Second Temperature Coef.	—	—	—	—	Applied

Applied: Target parameter is applied by DYFMVTool
*1: Not applied when output unit is Normal or Standard

8.3 How to Confirm Flow Configuration

After performing flow configuration for the device by using "Flow Configuration Wizard" and "Download to Device", execute the following procedures to confirm the configuration.

NOTE

Regarding start up procedure of digitalYEWFLO and DYFMVTool, refer to Appendix B-1.

IMPORTANT

Use function block scheduling and connection tool for DYFMVTool. After using these setting tool, finish the program before starting FlowNavigator.

The procedures differ depending on whether AR Block is used standalone or connected with other devices.

Case1: AR Block is standalone. Refer to section 8.3.1

Case2: AR Block is connected with other devices. Refer to section 8.3.2

Figure 8.19 shows the parameters for confirming the flow configuration.

Regarding Flow Calculation of digitalYEWFLO and DYFMVTool, refer to section 6.1.3 and the document "Model DY Vortex Flowmeter, Model DYA Vortex Flow Converter, Fieldbus Communication Type" (IM 01F06F00-01E).

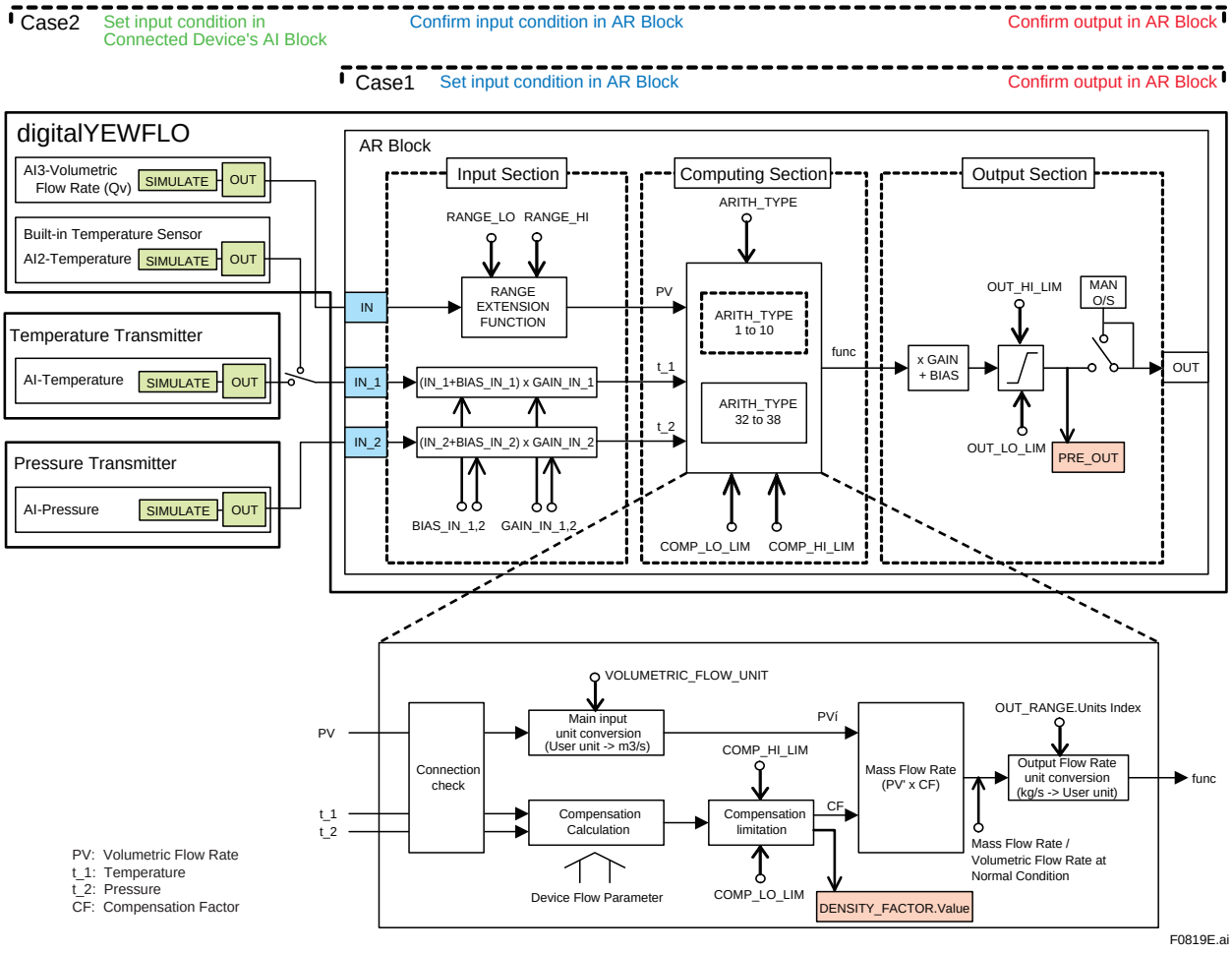


Figure 8.19 Parameters for flow configuration confirmation

8.3.1 Case1: Arithmetic Function Block is Standalone

Following is the procedures for confirming flow configuration in case AR Block is standalone.

Step 1 Set function block scheduling information

Set the function block scheduling information to activate digitalYEWFLO AR Block.
Regarding function block scheduling, refer to Appendix B-2.

Step 2 Open Online Parameter in Device DTM

Start Device DTM to display the Online Parameter screen.
([Device] → [Parameter] → [Online Parameter])

IMPORTANT

Turn on the alarm output of AR Block at TB: ALARM_PERFORM.
Default setting for the alarm output of AR Block is off.
([Online Parameter] → [Transducer Block] → [Alerts])

Step 3 Set input conditions in AR Block

Set value to following input parameters (Refer to Figure 8.19 and Table 8.10):
"Input.Value", "Input1.Value" and "Input2.Value"
([Online Parameter] → [Arithmetic] → [Dynamic Variables])

Table 8.10 Input conditions in AR Block

Input	Device	Function Block	Parameter	
			Value	Unit
Volumetric Flow Rate	digitalYEWFLO	AR Block (Input Section) IN	Input.Value (Relative Index: 14) <Effective Mode: Auto/MAN/OOS>	Volumetric Flow Unit (Relative Index: 37)
Temperature		AR Block (Input Section) IN_1	Input 1.Value (Relative Index: 16) <Effective Mode: Auto/MAN/OOS>	Temperature Unit (Relative Index: 38)
Pressure		AR Block (Input Section) IN_2	Input 2.Value (Relative Index: 17) <Effective Mode: Auto/MAN/OOS>	Pressure Unit (Relative Index: 40)

IMPORTANT

Confirm the settings in "Volumetric Flow Unit", "Temperature Unit", and "Pressure Unit".
Regarding "Temperature Unit", "Pressure Unit", refer to section 8.1.1.
([Online Parameter] → [Arithmetic] → [Configuration] → [Density Factor Parameters])

IMPORTANT

Before entering the input parameters, set the Function Block Mode in AR Block by referring to Table 8.10.

IMPORTANT

Before inputting values, set "Good_NonCascade::NonSpecific:NotLimited" status in the following parameters:
“Input.Status”, “Input1.Status” and “Input2.Status”
([Online Parameter] → [Arithmetic] → [Configuration] → [Input Parameters])
*: To show "Good_NonCascade::NonSpecific:NotLimited", open the pull-down menu of each Status parameter and press the [G] key.

Step 4 Confirm output in AR Block

Confirm the value of the following output parameters (Refer to Figure 8.19 and Table 8.11):

“Density Factor.Value” and ”Pre Output.Value”.
([Online Parameter] → [Arithmetic] → [Dynamic Variables])

Table 8.11 Output in AR Block

Output	Device	Function Block	Parameter	
			Value	Unit
Density	digitalYEWFLO	AR Block (Computing Section) DENSITY_FACTOR	Density Factor.Value (Relative Index: 48) <Effective Mode: Auto/MAN/OOS>	Density Factor Unit (Relative Index: 49)
Mass Flow Rate		AR Block (Output Section) PRE_OUT	Pre Output.Value (Relative Index: 9) <Effective Mode: Auto/MAN/OOS>	Output Range.Units Index (Relative Index: 11)

IMPORTANT

Make sure that no alarming status of AR Block is shown in Device Status, and then confirm the value of output parameters. Refer to Appendix B-3 for alarm.
([Online Parameter] → [Device Status] → [Diagnostic List])

IMPORTANT

Make sure "Good_NonCascade::NonSpecific:NotLimited" status of the following parameters before confirming the values:
“Density Factor.Status” and “Pre Output.Status”
([Online Parameter] → [Arithmetic] → [Dynamic Variables])

NOTE

Confirm the settings in "Density Factor Unit" and "Output Range.Unit Index".
([Online Parameter] → [Arithmetic] → [Configuration] → [Density Factor Parameters])
([Online Parameter] → [Arithmetic] → [Configuration] → [Output Parameters])

8.3.2 Case2: AR Block is Connected with Other Devices

The procedures below are for confirming flow configuration when AR Block is connected with other devices.

Step 1 Set function block scheduling information

Set the function block scheduling information to activate digitalYEWFLO AR Block and the connected function block. Regarding function block scheduling, refer to Appendix B-2.

Step 2 Set function block connection information

Connect the function block output to digitalYEWFLO AR Block input. Regarding function block connection, refer to Appendix B-2.

Step 3 Open Online Parameter in Device DTM

Start Device DTM to display the Online Parameter screen.
([Device] → [Parameter] → [Online Parameter])

IMPORTANT

Turn on the alarm output of AR Block at TB: ALARM_PERFORM.
Default setting for the alarm output of AR Block is off.
([Online Parameter] → [Transducer Block] → [Alerts])

IMPORTANT

Confirm the settings in "Volumetric Flow Unit", "Temperature Unit" and "Pressure Unit".
Regarding "Temperature Unit", "Pressure Unit", refer to section 8.1.1.
([Online Parameter] → [Arithmetic] → [Configuration] → [Density Factor Parameters])

Step 4 Set input conditions in Connected Device's AI Block

Set the value in the following input parameters (Refer to Figure 8.19 and Table 8.12):
Input the values of volumetric flow rate, temperature, and pressure in Manual mode or Simulation mode of Connected Device's AI Block.

Table 8.12 Input conditions in Connected Device's AI Block

Input	Device	Function Block	Parameter	
			Value	Unit
Volumetric Flow Rate	digitalYEWFLO	AI3 Block OUT or AI3 Block SIMULATE	Output.Value (Relative Index: 8) <Effective Mode: Auto> or Simulate.Simulate Value (Relative Index: 9) <Effective Mode: Auto/MAN>	Output Scale.Units Index (Relative Index: 11)
Temperature	digitalYEWFLO (In case Using built-in temperature output)	AI2 Block OUT or AI2 Block SIMULATE	Output.Value (Relative Index: 8) <Effective Mode: MAN> or Simulate.Simulate Value (Relative Index: 9) <Effective Mode: Auto/MAN>	Output Scale.Units Index (Relative Index: 11)
	Temperature Transmitter (In case Using external temperature output)	AI Block OUT or AI Block SIMULATE	Output.Value (Relative Index: 8) <Effective Mode: MAN> or Simulate.Simulate Value (Relative Index: 9) <Effective Mode: Auto/MAN>	Output Scale.Units Index (Relative Index: 11)
Pressure	Pressure Transmitter	AI Block OUT or AI Block SIMULATE	Output.Value (Relative Index: 8) <Effective Mode: MAN> or Simulate.Simulate Value (Relative Index: 9) <Effective Mode: Auto/MAN>	Output Scale.Units Index (Relative Index: 11)

IMPORTANT

Before write parameter, set the Function Block Mode in AI Block according to Table 8.12

Step 5 Confirm input conditions in AR Block

Confirm that the following parameters are the same values input in <Step 4>.
"Input.Value", "Input1.Value" and "Input2.Value"
([Online Parameter] → [Arithmetic] → [Dynamic Variables])
Refer to Table 8.10.

IMPORTANT

Set "Good" status in the following parameters before inputting values:
"Input.Status", "Input1.Status" and "Input2.Status"
([Online Parameter] → [Arithmetic] → [Configuration] → [Input Parameters])

IMPORTANT

In DYF(SoftDL) FOUNDATION fieldbus DTM, "Input.Value", "Input1.Value" and "Input2.Value" are defined as non-volatile parameters.
In Device DTM, the update time for non-volatile parameters on the Online Parameter screen is set to 300 seconds as default. Set the value of "Refreshtime for STATICs" to about 30 seconds because longer time is needed to display parameters in the default configuration.
(Device DTM menu: [Device] → [Additional functions] → [Communication])

Step 6 Confirm output in AR Block

Refer to section 8.3.1 <Step 4>

9. File Format

9.1 Configuration File

(1) FlowNavigator file

Table 9.1 Configuration File Information

Category	File Name	Location	Flow Configuration Wizard		Description
			Import Menu	Export Menu	
Flow Parameter File	*.xmv	Desk Top (short cut) \ [UserName] \ Documents (Default)	○	○	This file consist of following parameter: - User Flow Parameters - Device Flow Parameters EJXMVTool driven on the different frame application can access the file. Compatible between both protocol, HART and FOUNDATION fieldbus.
	*.vmv		○	○	This file consist of following parameter: - User Flow Parameters - Device Flow Parameters DYFMVTool driven on the different frame application can access the file.
HART General Parameters File	*.prm	Desk Top (short cut) \ [UserName] \ Documents (Default)	○	—	HART Device General Parameters (only for FSA210 user)

(2) Frame Application project file (.dns/dfs file for FieldMate)

In the project file, project information specific to each frame application is saved in addition to the Device DTM and FlowNavigator parameters shown in below. Only that frame application can use the file.

- User Flow Parameters
- Device Flow Parameters
- Device General Parameters

For detail, refer to the section 3.4.1, 4.6.4 and 6.1.2.

9.2 Other Files

Table 9.2 Other files

Category	File Name	Location (FSA120 R1.04 or later)	Location *3 (FSA120 R1.03 or before)	Flow Configuration Wizard		Automatically Created	Description
				Import Menu	Export Menu		
Report File	*.csv	Desk Top (short cut) \ [UserName] \ Documents (Default)	[Windows XP] Desk Top (short cut) \ My Documents (Default) [Windows Vista] Desk Top (short cut) \ [UserName] \ Documents (Default)	—	○	—	User Flow Parameters and Device General Parameters in CSV file format.
Obtain Flow Coefficient Log File	EJXMVTool HART: FlowCoeff.log (FlowCoeff1.log (Backup)) *1	<HomeDrive>: \ YokogawaFlowNavigator	<DTMInstDrive>: \ Program Files \ Yokogawa \ DTMs \ EJXMVTool	—	—	○	Data log of ObtainFlowCoeff. Process Value (DP, SP, ET) Flow Coefficient (Flow, Density, Viscosity, Gas Expansion Factor, Discharge Coefficient, Reynolds No.)
	EJXMVTool FOUNDATION fieldbus: FlowCoeffFF.log (FlowCoeffFF1.log (Backup)) *1	<HomeDrive>: \ YokogawaFlowNavigator	<DTMInstDrive>: \ Program Files \ Yokogawa \ DTMs \ YokFFFramework \ EJXMVToolFF *2				
Physical Property Error Log File	EJXMVTool HART: EJXMVTool.log (EJXMVTool1.log (Backup)) *1	<HomeDrive>: \ YokogawaFlowNavigator	<DTMInstDrive>: \ Program Files \ Yokogawa \ DTMs \ EJXMVTool	—	—	○	Physical property Error Log File
	EJXMVTool FOUNDATION fieldbus: EJXMVToolFF.log (EJXMVToolFF1.log (Backup)) *1	<HomeDrive>: \ YokogawaFlowNavigator	<DTMInstDrive>: \ Program Files \ Yokogawa \ DTMs \ YokFFFramework \ EJXMVToolFF *2				
	DYFMVTool FOUNDATION fieldbus: DYFMVToolFF.log (DYFMVToolFF1. log (Backup)) *1	<HomeDrive>: \ YokogawaFlowNavigator	<DTMInstDrive>: \ Program Files \ Yokogawa \ DTMs \ YokFFFramework \ DYFMVToolFF				

<HomeDrive>: Drive where users folder exists
<DTMInstDrive>: DTM installed drive

*1: Log file maximum size is 1 Mbyte per file.
If it exceeds its maximum size, it will be copied to a backup file.

*2: If you update from FSA120 R1.02.00 or R1.02.01, the log file is saved to the following location.
<DTMInstDrive>:\Program Files\Yokogawa\DTMs\EJXMVTool FOUNDATION fieldbus

Version number of EJXMVTool	Software Version	
R1.02.00	FieldMate	R1.02.10
	Additional Resource Disk	R1.02.00
R1.02.01	FieldMate	R1.02.10
	Additional Resource Disk	R1.02.01

*3: The location where log files are installed is as follows by the difference of Windows XP and Vista.
Windows XP
<DTMInsrDrive>:\Program Files\Yokogawa\DTMs\...
Windows Vista
<HomeDrive>:\Users\[username]AppData\Local\VirtualStore\Program Files\Yokogawa\DTMs\...

10. Error Message

Error message is shown in both pop up message and error log file (EJXMVTool.log/DYFMVTool.log).

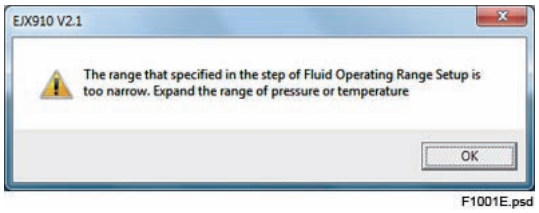


Figure 10.1 Error message example

In case of Physical Property error, code and sub code is shown in error log file (EJXMVTool.log/DYFMVTool.log).

10.1 Error Message

Table 10.1 Error message

Code	Sub code	Information Message	Explanation	Recovery
600	8	[Display] The range that specified in the step of Fluid Operating Range Setup is too narrow. Expand the range of Pressure or Temperature. [Log file] Physical Calc lib Error - ERR_RANK	Rank deficient	The temperature or pressure range which was set by the user at the Fluid Operating Range Setup is too narrow. Try another range value.

Appendix A. FSA210 Uninstallation

To uninstall all the program of FSA210 Mass Flow Configuration software, you need to take the following three steps.

(1) Uninstall field communication server

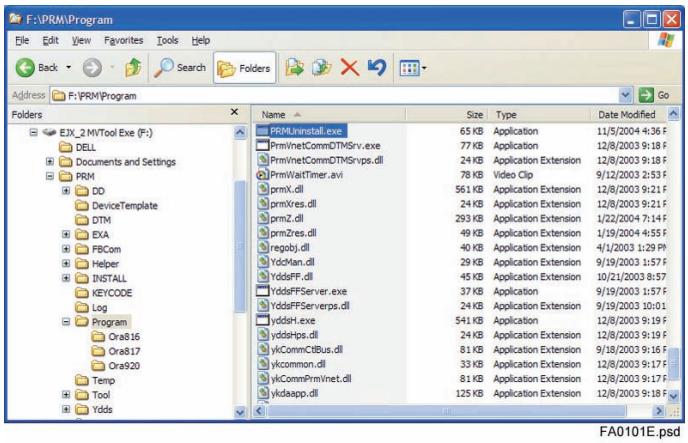
Execute <FieldInstDrive>:\PRM\Program\PRMUninstall.exe

Double-click the filename in Windows Explorer.

<FieldInstDrive> is the drive on which field communication server is installed.

<FieldInstDrive> is the drive where the PRM directory is located.

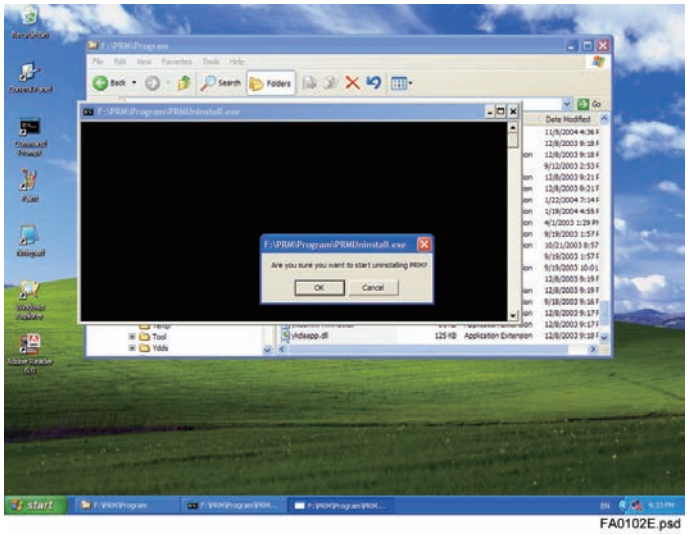
The default drive is the same drive on which Windows is installed.



FA0101E.psd

Figure A1.1

Click [OK].

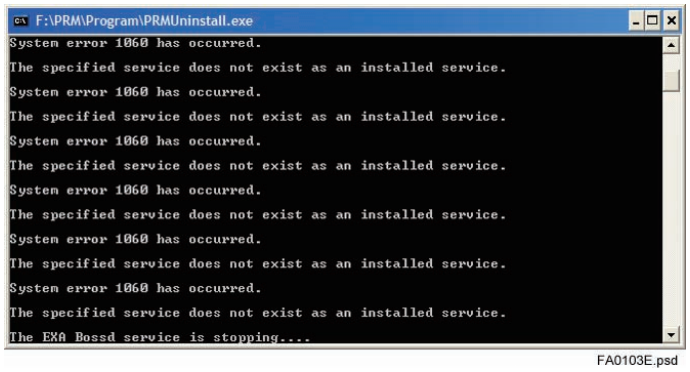


FA0102E.psd

Figure A1.2

NOTE

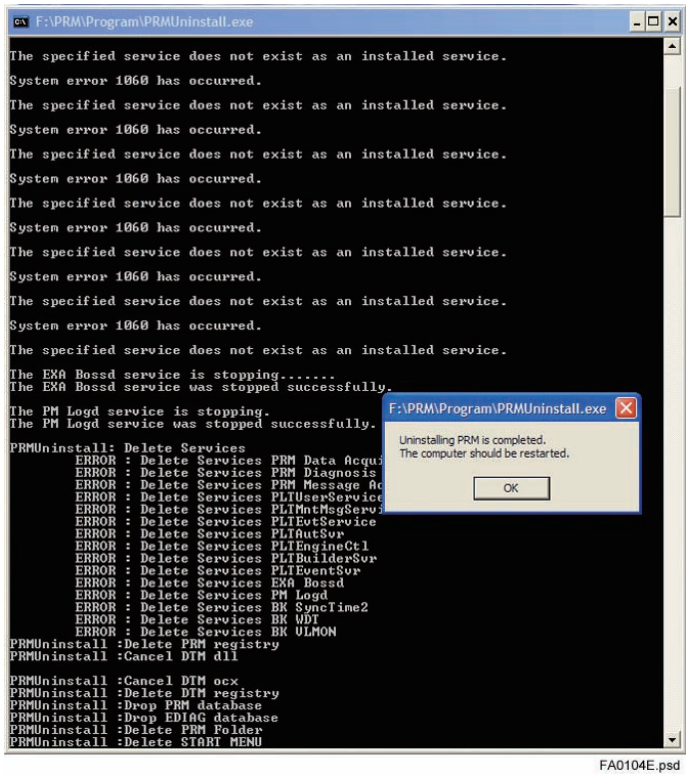
It takes a few seconds for the EXA Bossed service to stop.



FA0103E.psd

Figure A1.3

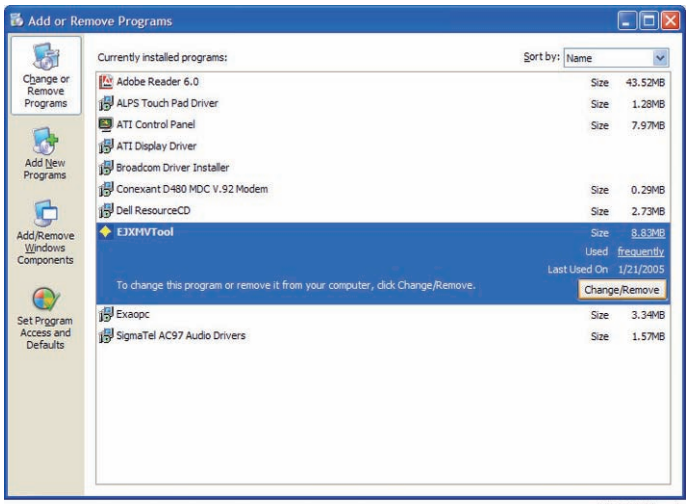
Click [OK].



FA0104E.psd

Figure A1.4

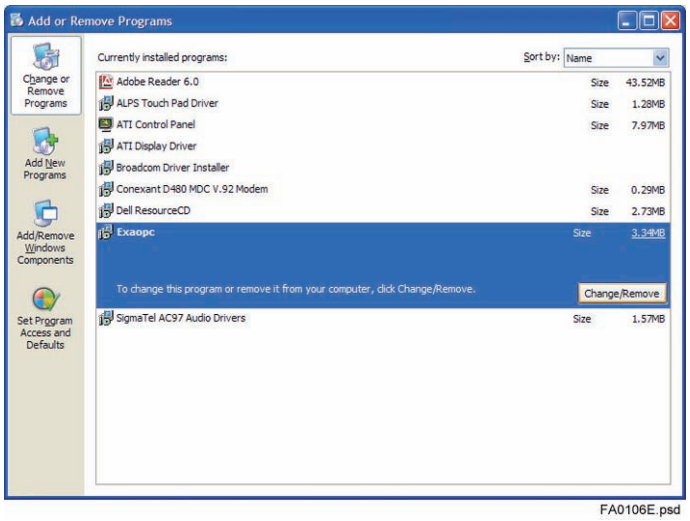
(2) Uninstall the EJXMVTool program with the Add or Remove Programs function of the Windows Control Panel.
Select EJXMVTool and click [Change/Remove].



FA0105E.psd

Figure A1.5

(3) Uninstall Exaopc
Use the Add or Remove Programs function of the Windows Control Panel to uninstall Exaopc.
Select Exaopc and click [Change/Remove].



FA0106E.psd

Figure A1.6

Click [OK].

Figure A1.7

Click [Yes],

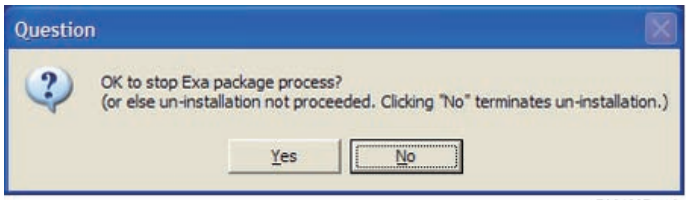


Figure A1.8

Select [Yes] and click [Finish]. This will reboot the computer.

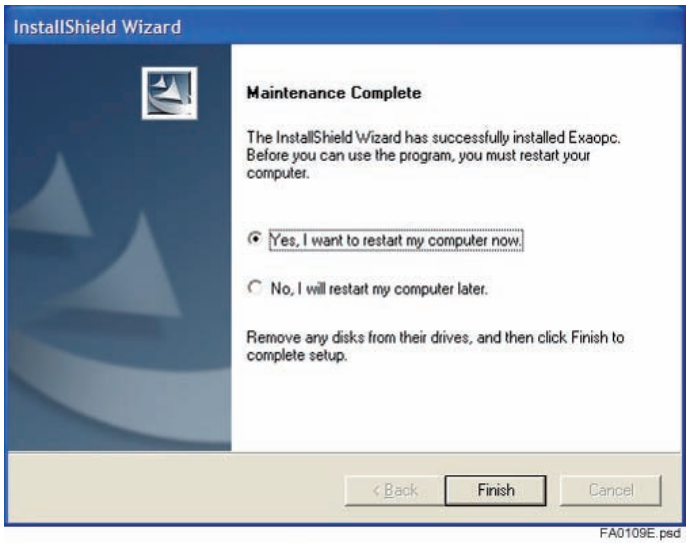


Figure A1.9

NOTE

After finishing uninstallation, some files remain in Field Communication Server \PRM directory.

Appendix B. Device Information

B-1 Start up Procedure of Device and FlowNavigator

(1) digitalYEWFLO and DYFMVTool

The flow chart below shows the start-up procedure of digitalYEWFLO and DYFMVTool.

Set digitalYEWFLO FOUNDATION fieldbus according to the chart and then proceed to "DYFMVTool -Flow Configuration-" and "DYFMVTool -Confirm Flow Configuration-".

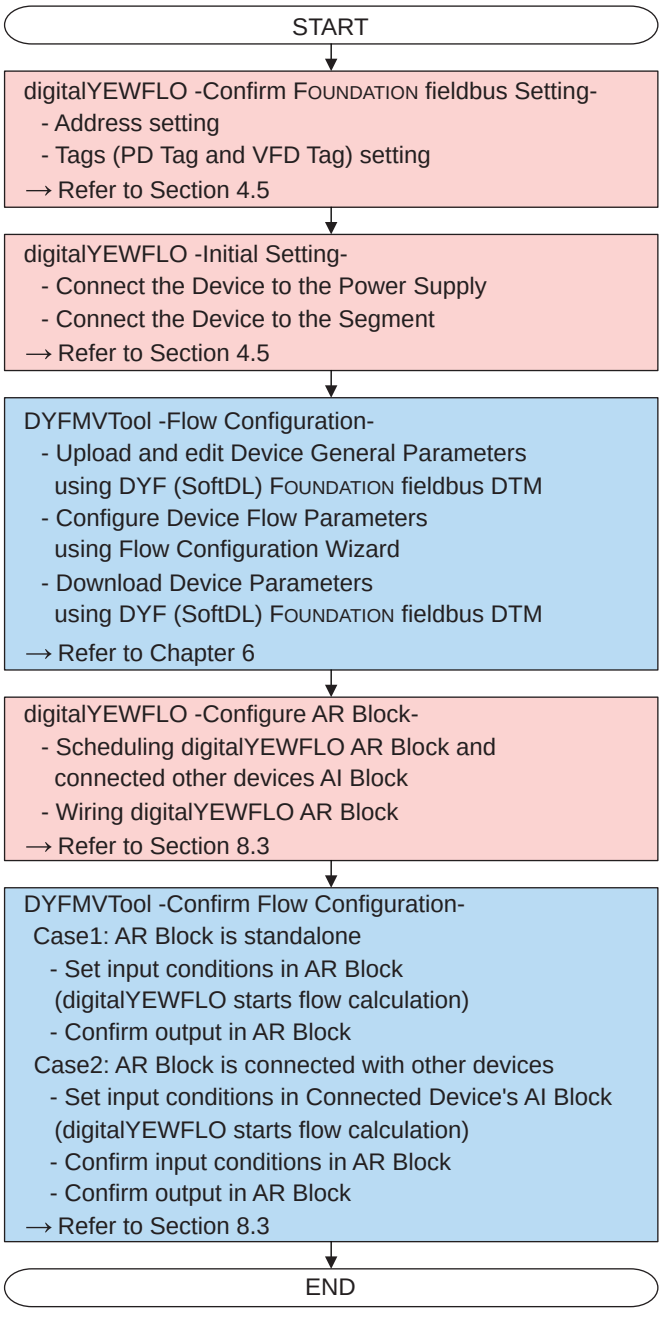


Figure B1.1 Start up Procedure of digitalYEWFLO and DYFMVTool

B-2 How to Configure digitalYEWFLO AR Block

This section explains how to set the function block scheduling and connection information with the following device as an example.

In this example, NI-FBUS Configurator 3.1 is used as a setting tool.

Table B2.1 Object device (Case 1: AR Block is standalone)

	Value	Device	Function Block	Input to AR Block	Output from AR Block	Factory setting of scheduling information
(1)	Mass Flow Rate	digitalYEWFLO	AR Block	—	○	—

Table B2.2 Object device (Case 2: AR Block is connected with other devices)

	Value	Device	Function Block	Input to AR Block	Output from AR Block	Factory setting of scheduling information
(1)	Volumetric Flow Rate (Qv)	digitalYEWFLO	AI3 Block	—	○	—
(2)	Temperature	Temperature Transmitter (Yokogawa YTA320)	AI1 Block	—	○	○
(3)	Pressure	Pressure Transmitter (Yokogawa EJX510A)	AI1 Block	—	○	○
(4)	Mass Flow Rate	digitalYEWFLO	AR Block	—	○	—

Step 1 Confirm the installation status of the device DD.

To set the device by using NI-FBUS Configurator, the device DD must be successfully installed in the following folder.

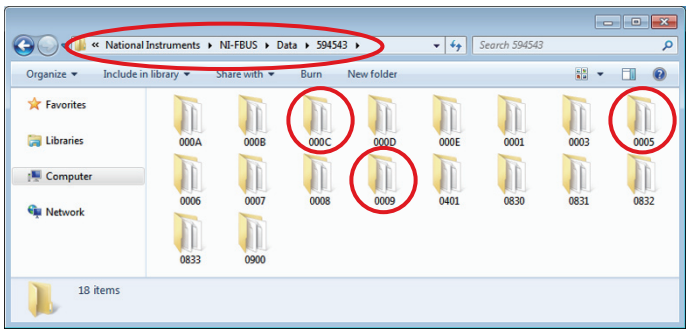
“<WinInstDrive>:\Program Files\National Instruments\NI-FBUS\Data\594543”

(<WinInstDrive>: Windows installed drive)
(The folder name “594543” indicates that the manufacturer is Yokogawa Electric Corporation.)

The DD files are saved for each model in the folder. Confirm that the latest DD files (FileName: AABB.ffo, AABB.sym*) are installed for each device.

(*: AA = “Device Revision”, BB = “DD Revision”, For example: 0301.ffo and 0301.sym)

- digitalYEWFLO: Folder name “0009”
- YTA320: Folder name “0005”
- EJX510A: Folder name “000C”



FB0201E.ai

Figure B2.1 Confirmation of DD installation

NOTE

To obtain an appropriate DD file, download and install from the FOUNDATION fieldbus website.
<http://www.fieldbus.org/>

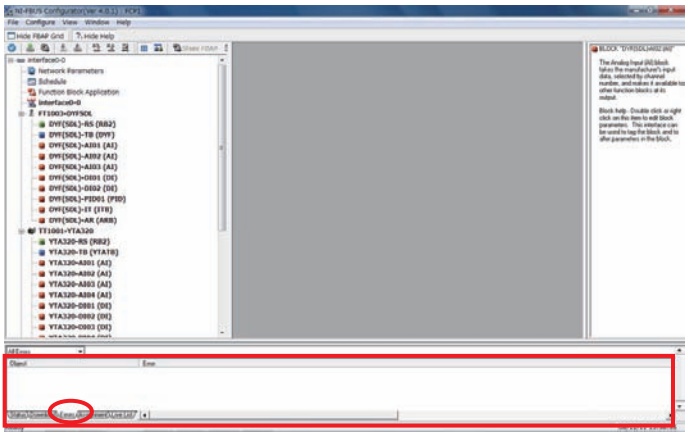
Step 2 Start NI-FBUS Configurator

Start NI-FBUS Configurator.

[All programs] → [National Instruments] → [NI-FBUS] → [NI-FBUS Configurator]

Wait for a while to load device information.

After loading the information, click the Error tab and confirm there is no error information.



FB0202E.ai

Figure B2.2 After starting NI-FBUS Configurator

Step 3 Upload function block scheduling and connection information

Follow the procedures below to load the function block scheduling and connection information from the segment where the device exists. The setting information appears on the "Function Block Application" screen after loading.

<Menu: [Configure] → [Upload Configuration]>

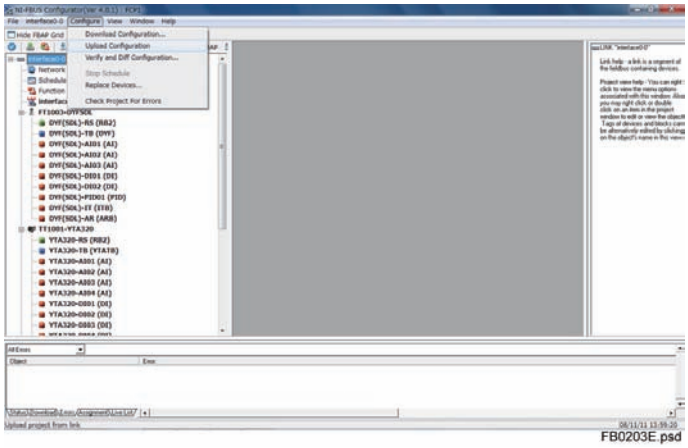


Figure B2.3 Before “Upload Configuration”

CAUTION

"Upload Configuration" must be executed before setting the function block scheduling and connection information.
Without up-loading, the setting information in the device is overwritten.

NOTE

When any block has scheduling information set at shipment, it appears on the “Function Block Application” screen. Refer to Table B2.1, B2.2.

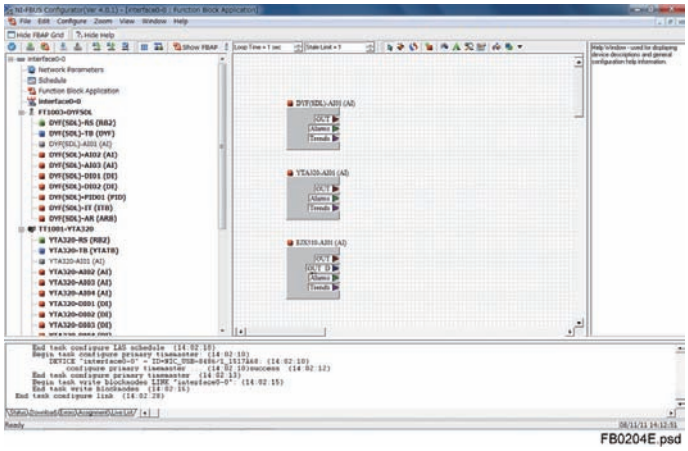


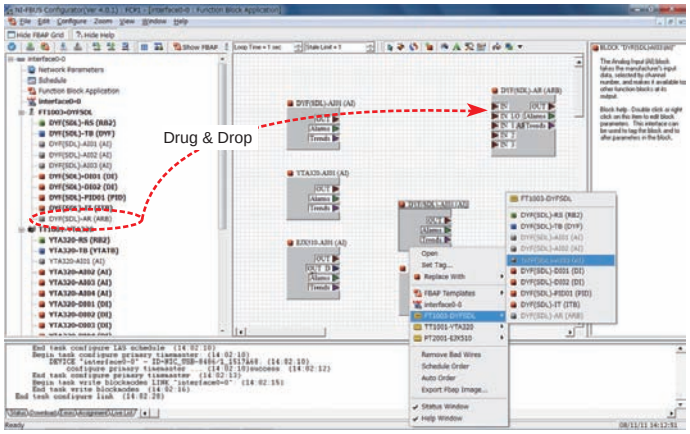
Figure B2.4 After “Upload Configuration”

Step 4 Set function block scheduling information

Arrange any function block shown in Table B2.1 or Table B2.2 on the "Function Block Application" screen.

IMPORTANT

In “Case 2: AR Block is connected with other devices”, arrange digitalYEWFLO AR Block at the end.
Otherwise, digitalYEWFLO will not carry out the flow calculation correctly.

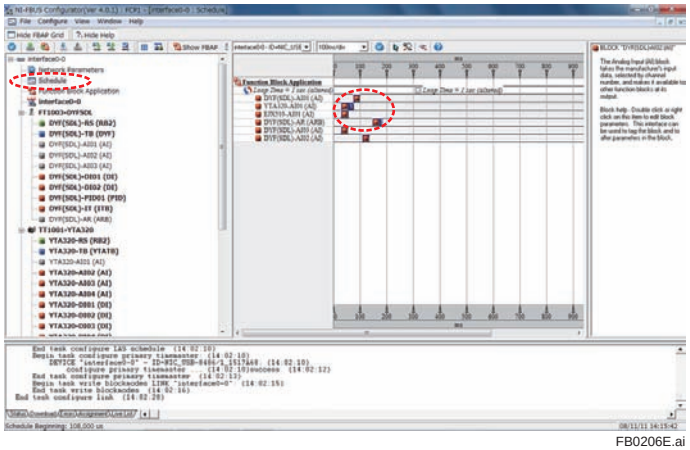


FB0205E.ai

Figure B2.5 How to configure the function block scheduling

Double-click "Schedule" at the left of the screen to confirm the execution sequence of arranged function blocks.

The figure below describes the sequence in “Case 2: AR Block is connected with other devices”.



FB0206E.ai

Figure B2.6 After double clicking “Schedule”

Proceed to < Step 6 > if there is no need to set the function block connection.

Step 5 Set function block connection information

Double-click "Function Block Application" on the left of the screen to display "Function Block Application".

Click "Wiring Tool" on the menu bar to connect the blocks as shown in Table B2.3.

Table B2.3 Function blocks for wiring

	Value	Device	Function Block		Device	Function Block
(1)	Volumetric Flow Rate (Qv)	digitalYEWFLO	AI3 Block OUT	➔	digitalYEWFLO	AR Block IN
(2)	Temperature	Temperature Transmitter (Yokogawa YTA320)	AI1 Block OUT	➔	digitalYEWFLO	AR Block IN_1
(3)	Pressure	Pressure Transmitter (Yokogawa EJX510A)	AI1 Block OUT	➔	digitalYEWFLO	AR Block IN_2

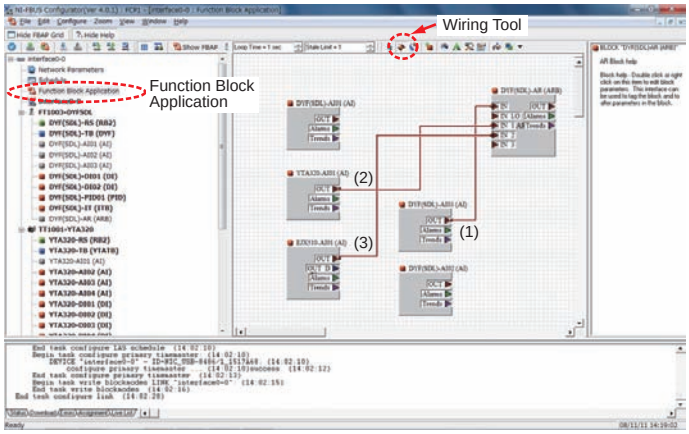


Figure B2.7 How to configure the function block connection

Step 6 Download function block scheduling and connection information

Write the function block scheduling and connection information in the segment where the device exists after completing the setting.

<Menu: [Configure] → [Download Configuration]>

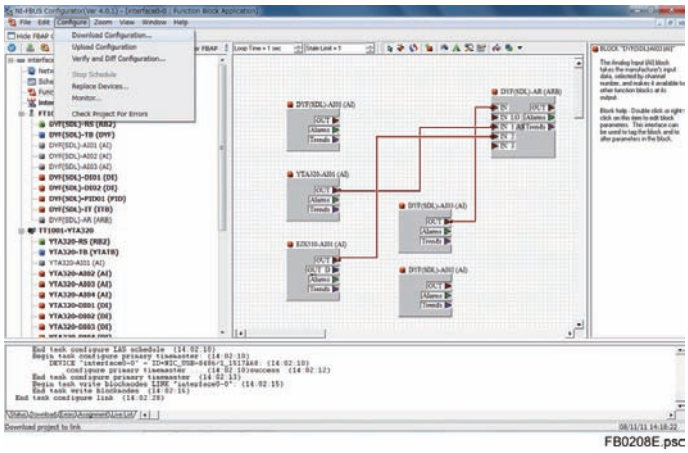


Figure B2.8 Before "Download Configuration"

Click "Download Configuration" to show the "Download Configuration" pop-up window.

Then set options ("Clear Devices" and "Automatic Mode Handling" are recommended) and click "Download".

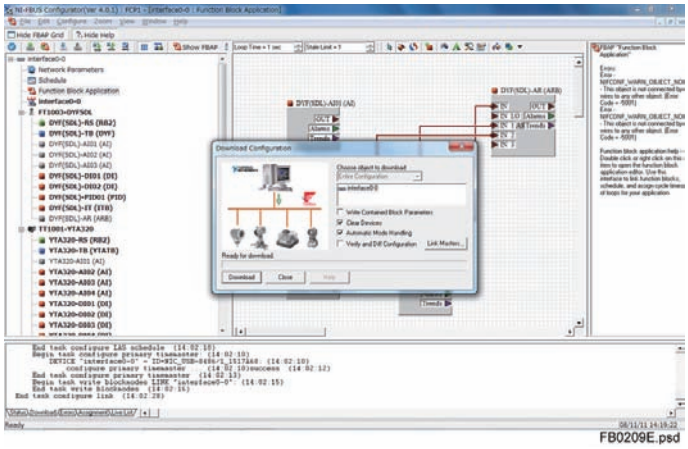


Figure B2.9 “Download Configuration” pop up window

After this, the function block scheduling and connection information is written in the segment where the device exists.

After writing, a message window appears to ask whether to save the project setup information. Save it if necessary.

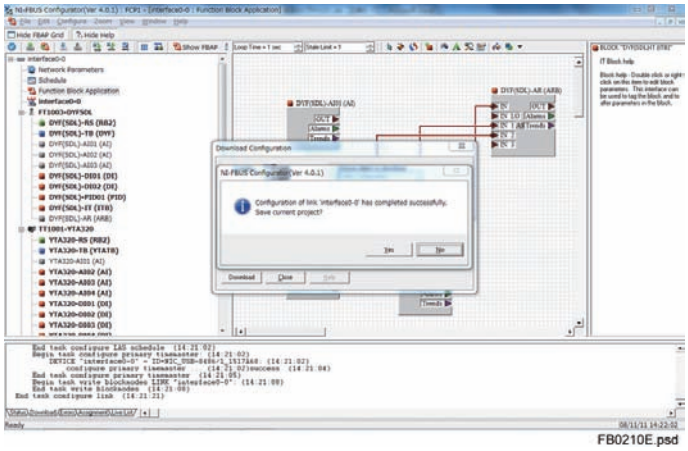


Figure B2.10 Message for saving the current project

B-3 How to Check digitalYEWFLO AR Block Alarm

Confirm AR Block functions correctly by following the procedures below.

Step 1 Open Online Parameter in Device DTM

Start Device DTM to display the Online Parameter screen.

([Device] → [Parameter] → [Online Parameter])

IMPORTANT

Turn on the alarm output of AR Block at TB: ALARM_PERFORM.
Default setting for the alarm output of AR Block is off.
(Online Parameter: [Transducer Block] → [Alerts])

Step 2 Open the Device Status screen

Display the alarm of AR Block in Diagnostic List of the Device Status screen.

([Online Parameter] → [Device Status] → [Diagnostic List])

NOTE

The alarm information on AR Block appears under “Others” of Diagnostic List.

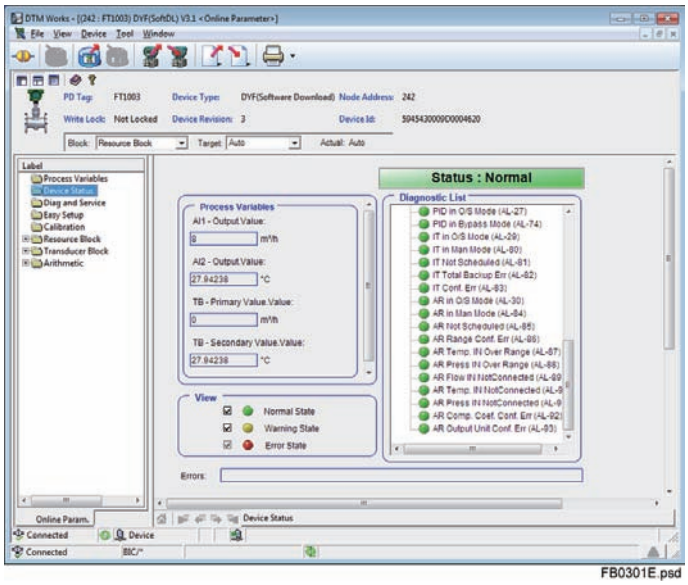


Figure B3.1 Device Status screen

Step 3 Check the alarm in AR Block

Confirm that the following alarms are not displayed in Diagnostic List of the Device Status screen.

If any alarm is displayed for AR Block, take the appropriate measure by referring to the table below.

Table B3.1 Alarm list of AR Block for flow configuration

Alarm No.	Alarm Label	Counter Measure
AL-85	AR Not Scheduled	Make a schedule of AR Block
AL-86	AR Range Conf. Err	Change the value as AR Range High (AR.RANGE_HI) is larger than AR Range Low (AR.RANGE_LO)
AL-87	AR Temp. IN Over Range	This case is out of specification. Refer to IM01F06F00-01E or Check the engineering setting or AR Temperature Unit (AR.AR_TEMPERATURE_UNIT)
AL-88	AR Press IN Over Range	This case is out of specification. Refer to IM01F06F00-01E or Check the engineering setting or AR Pressure Unit (AR.AR_PRESSURE_UNIT) and AR Bias Input2 (AR.BIAS_IN_2)
AL-89	AR Flow IN NotConnected	Connect the volumetric flow data into AR Input (AR.IN)
AL-90	AR Temp. IN NotConnected	Connect the temperature data into AR Input1 (AR.IN_1)
AL-91	AR Press IN NotConnected	Connect the pressure data into AR Input2 (AR.IN_2)
AL-92	AR Comp. Coef. Conf. Err	Execute “Flow Configuration Wizard” again and download to the device.
AL-93	AR Output Unit Conf. Err	Refer to IM 01F06F00-01E or Check the AR Output Range.Units Index (AR.OUT_RANGE.Unit Index) and AR Arithmetic Type (AR.ARITH_TYPE)

NOTE

As for device alarms other than AR Block, refer to Instruction Manual "Model DY Vortex Flowmeter, Model DYA Vortex Flow Converter, and Fieldbus Communication Type" (IM 01F06F00-01E).

Appendix C. HART Communication Device Information

C-1 Installing Software for Communication Device

The USB FieldMate modem driver is installed automatically.

Check that “CP210x USB to UART Bridge Controller” is installed using Add or Remove Programs (Windows XP) or Programs and Features (Windows Vista) in the Control Panel.

If the installation is not performed correctly, double-click the following file.

“<FieldMate CD-ROM>:\USB_Modem_Driver\FMModemInstaller.exe”

C-2 How to Confirm COM Port

Find out which COM port the modem will be connected to.

Select the Start menu. Click [Control Panel]

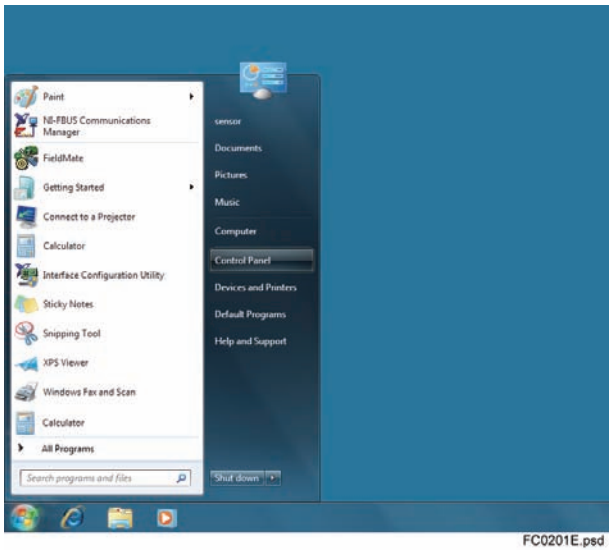


Figure C2.1 Start Menu

Click [System and Security]

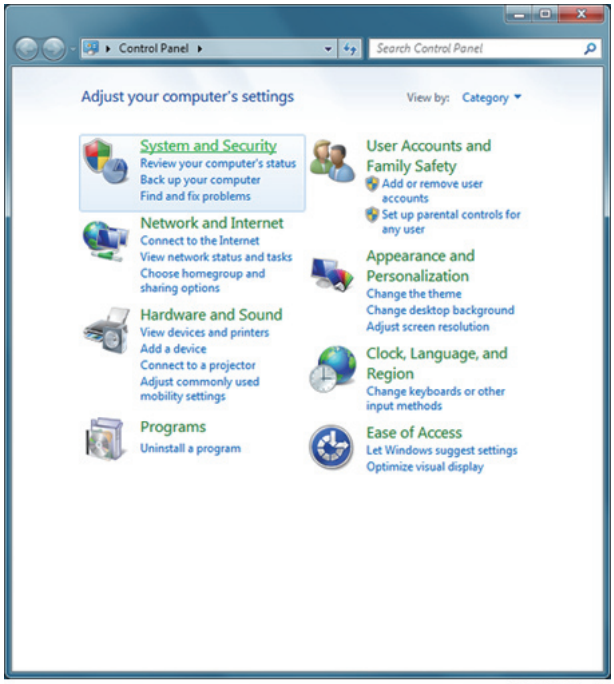


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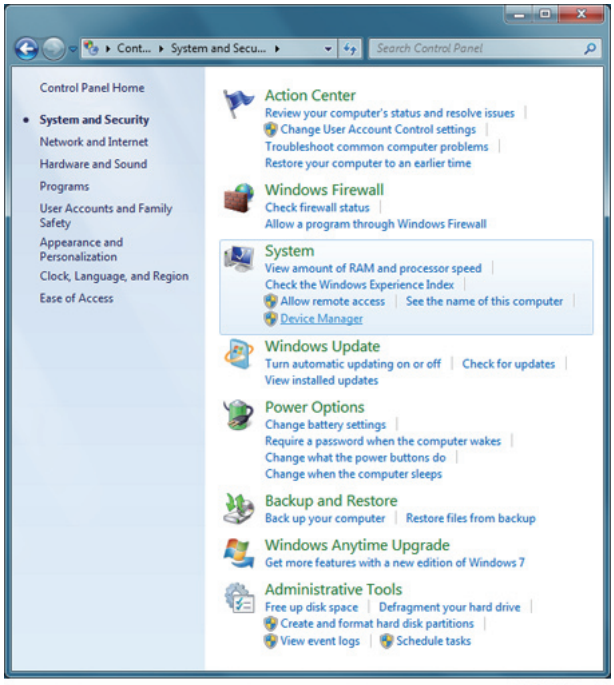
Figure C2.2a Control Panel

Click [System] → [Device Manager]



FC0202bE.psd

Figure C2.2b System and Security

Click [Ports (COM & LPT)] to find out the port number of “CP210xUSB to UART Bridge Controller”.

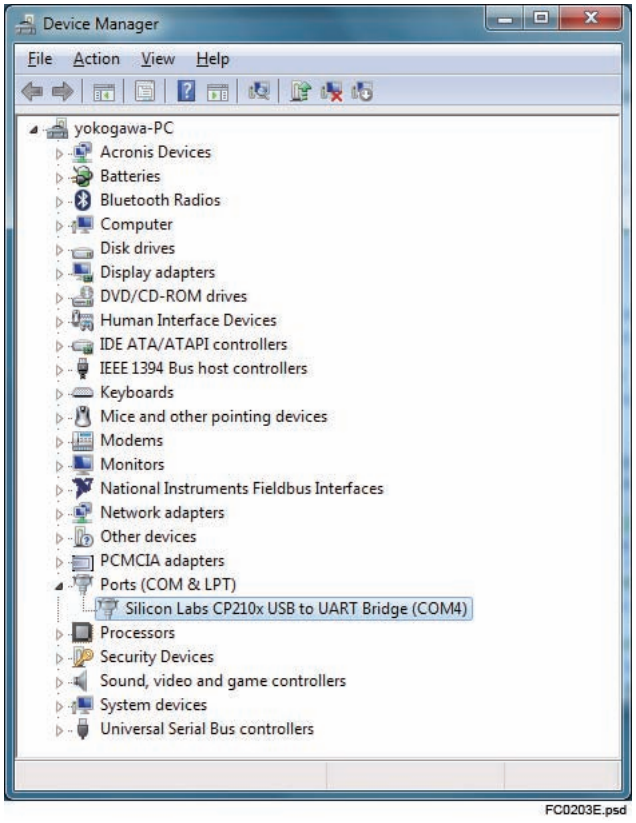


Figure C2.3 COM port number

Appendix D. FOUNDATION fieldbus Communication Device Information

D-1 Installing Software for Communication Device

D-1-1 NI-FBUS Card

Install software according to following procedure.

Step 1 **Install the NI-FBUS Communications Manager**

Step 2 **Restart PC**

D-2 Setting Software for Communication Device

D-2-1 NI-FBUS Card

Define the port of NI-FBUS card as follows using “Interface Configuration Utility”.

IMPORTANT

Start the program as an Administrator or user with an Administrative authority.

(1) Activate the program

On PC, click the following order and activate the program

Click [Start] → [All Programs] → [National Instruments] → [NI-FBUS] → [Utilities] → [Interface Configuration Utility]

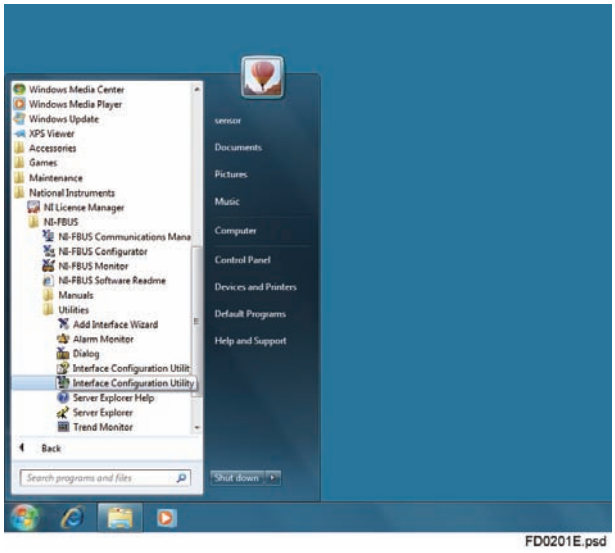


Figure D2.1 Starting NI-FBUS Utility

(2) Select the port

On the screen shown up, select “Port0" and press “Edit”.

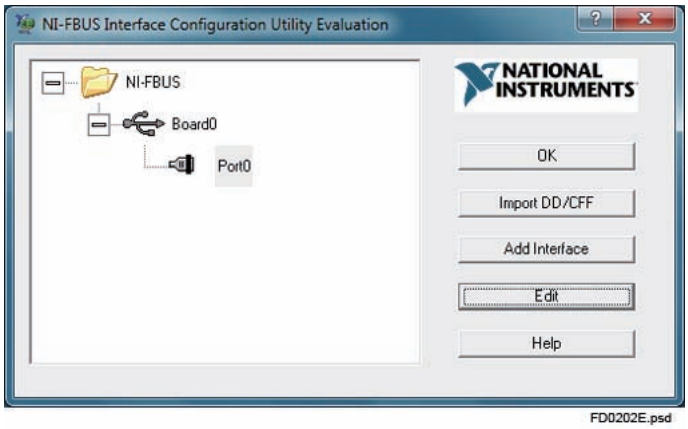


Figure D2.2 NI-FBUS Interface Config Screen

(3) Setting

After that, on the screen shown up, select the items indicated as below.

Figure D2.3 NI-FBUS H1 Port Properties

Device Address: Select [Visitor]

Device Type: Select [Link Master Device]

Usage: Select [NI-FBUS]

CAUTION

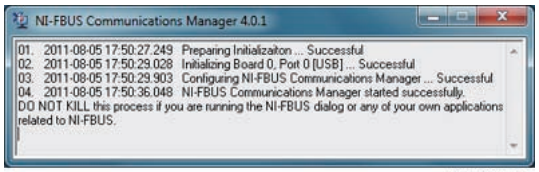
When connect the NI-FBUS card to the Fieldbus segment when other Link Master may exist, be sure to set the above beforehand.
If not, setting may cause disturbance of control.

D-3 Starting Software for Communication Device

D-3-1 NI-FBUS Card

Please Start the NI-FBUS Communications Manager as follows.

Click [Start] → [All Programs] → [National Instruments] → [NI-FBUS] → [NI-FBUS Communications Manager].



FD0301E.psd

Figure D3.1 Starting NI-FBUS

Revision Information

- Title : FSA120
  Flow Configuration Software
- Manual No. : IM 01C25R51-01E

Edition	Date	Page	Revised Item
1st	Sep. 2006	—	New publication
2nd	Jan. 2007	—	Full-fledged revision due to the release of HART DTM and change of the product architecture.
3rd	Aug. 2007	5-1 to 5-4 6-6 6-13 6-19 6-23 6-27 and 6-28	5. Correct the note number for 'Download to device'. 6.1.2 Add Note regarding updating on Offline parameters screen in EJX910 FF DTM. 6.2.2 Add Note for xmv file made in FSA120 R.102.00 or before. 6.3.3 Correct the method name for steam. 6.3.4 Correct the mole valid range. 6.3.5 Delete the gauge pressure unit from the reference pressure unit.
4th	Feb. 2008	— 3-1 to 3-4 6-6 6-7 to 6-9 7-2	Replace screens due to the release of FieldMate R1.03. 3. Change the operating environment and components. 6.1.2 Delete Note regarding updating on Online parameters screen in EJX910 FF DTM. 6.1.3 Add the procedure in FF parameters downloading. 7.2 Change the location where the OFC log file for FF is saved to.
5th	Dec. 2008	—	Change the operating environment of software and hardware due the release of FieldMate R2.
6th	June 2010	—	Full-fledged revision because of adding the DYFMVTool program for digitalYEWFLO Vortex Flowmeter and change of the product name to "FieldMate FlowNavigator".
7th	Sep. 2011		Correspond to Windows 7 and HART protocol revision 7.
8th	Aug. 2012	2-1, 3-3 3-2 D-2, D-3 —	Add the USB FieldMate Modem as option Revise the Software Operating Environment Change the Setting Correct errors