



Level



Pressure



Flow



Temperature



Liquid Analysis



Registration



Systems Components



Services



Solutions

Operating Instructions

ControlCare Field Controller

Commissioning and Configuration

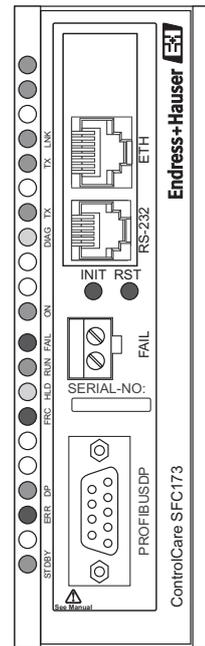
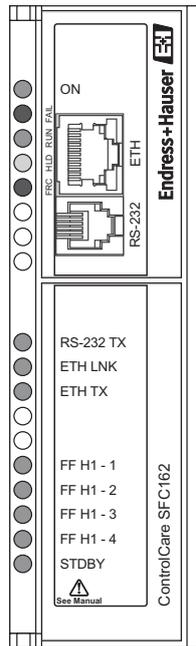


Table of Contents

Revision History	2		
Product Version	2		
Registered Trademarks	2		
1 Safety	3		
1.1 Designated use	3		
1.2 Installation, commissioning and operation	3		
1.3 Operational safety	3		
1.4 Conventions and icons	4		
1.5 ControlCare documents	5		
2 Getting Started	6		
2.1 Preliminaries	6		
2.2 Installing Application Designer Suite	7		
2.3 Installing the OPC Servers only	10		
2.4 Upgrades	11		
2.4.1 Upgrade ControlCare Application Designer	11		
2.5 Additional Tools	12		
2.5.1 Adobe Reader	12		
2.5.2 OPC Data Spy	12		
2.6 Checking Your Installation	13		
2.6.1 License	13		
2.6.2 Application versions	13		
2.7 Deinstalling ControlCare Application Designer Suite	14		
3 FF Field Controller	15		
3.1 Open ControlCare Application Designer	15		
3.2 Create a FF project	16		
3.3 Determine the naming preferences	17		
3.4 Add a bridge (SFC162)	18		
3.5 Add a fieldbus segment	19		
4 PROFIBUS Field Controller	20		
4.1 Open ControlCare Application Designer	20		
4.2 Create a PROFIBUS project	21		
4.3 Add a gateway (SFC173)	22		
4.4 Add a PROFIBUS segment	23		
5 Configuring the Field Controller	25		
5.1 Customise the Controller I/O blocks	25		
5.1.1 Resource block	26		
5.1.2 Transducer block	26		
5.2 Configure the I/O transducer blocks	27		
5.2.1 Hardware configuration block	27		
5.2.2 Temperature transducer block	30		
5.3 Add and configure the I/O function blocks	32		
5.3.1 CHANNEL parameter	32		
5.3.2 Create input/output function blocks	33		
5.3.3 Analog Input block	34		
5.3.4 Discrete Input block	36		
5.3.5 Pulse Input block	37		
5.3.6 Multiple Analog Input block	38		
5.3.7 Multiple Discrete Input block	39		
5.3.8 Analog Output block	40		
5.3.9 Discrete Output block	42		
5.3.10 Multiple Analog Output block	43		
5.3.11 Multiple Discrete Output block	44		
5.4 Next steps	45		
6 Going On-line	46		
6.1 Connecting the Field Controller to the subnet	46		
6.1.1 Networks with two or more Field Controllers	46		
6.1.2 Network with DHCP Server	46		
6.1.3 Networks without a DHCP Server	47		
7 Trouble-Shooting	51		
7.1 Simulation	51		
7.2 Factory initialisation and reset	52		
7.3 Field Controller	53		
7.4 Application Designer	54		
7.5 Updating the firmware	55		
Index	60		

Revision History

Product version	Manual	Changes	Remarks
2.00.xx	BA035S/04/en/01.05	Original manual	Split from previous manual BA021S/04/en of 07.02
2.01.xx	BA035S/04/en/08.05	Setup	Setup modified, Update added, OpenOCS added
		Editorial	Descriptions of function blocks descriptions improved
2.01.xx	BA035S/04/en/03.06	Setup OpenPCS	Service Pack 1: No effect on operation
2.02.xx	BA035S/04/en/07.06	Setup	Chapter 2: Setup changed to install all components
		Editorial	<ul style="list-style-type: none"> ■ Simulation for Local I/O added (Chapter 7.1) ■ Pulse Input block description revised (Chap. 5.3.5)

Product Version

The table below indicates the product versions of the main components of ControlCare Field-based Control System. More details on the individual components can be seen in About ControlCare

Product Version	Component	Version
V2.02.xx	ControlCare Application Designer Suite	Version 2.02.xx
	ControlCare PROFIBUS Configurator	Version 2.9xx
	ControlCare Field Control (OPC) Server	Version 3.11.xx
	ControlCare Device Libraries*	Version 2.02.xx
	Control Care Manuals	Version 2.02.xx
*Version No. may increase independent of Product Version as the latest devices are added to the library		

Registered Trademarks

PROFIBUS®

Registered trademark of the PROFIBUS User Organisation, Karlsruhe Germany.

FOUNDATION™ Fieldbus

Trademark of the Fieldbus Foundation, Austin, TX 78759, USA

HART®

Registered trademark of the HART Communication Foundation, Houston, USA

Microsoft®, Windows®, Windows 2000®, Windows XP®, Windows 2003 Server® and the Microsoft logo are registered trademarks of the Microsoft Corporation.

Acrobat Reader® is a registered trade mark of the Adobe Systems Incorporated.

All other brand and product names are trademarks or registered trademarks of the companies and organisations in question

1 Safety

1.1 Designated use

ControlCare is a field-based control system comprising hardware and software modules. It can be used to visualize, monitor and control production processes. The hardware described in this manual allows a modular FOUNDATION Fieldbus or PROFIBUS controller to be built. It comprises a number of separate units that may include power supply modules, power conditioning modules, fieldbus linking devices, controllers, interfaces, analog I/O and discrete I/O units. The approved usage of the individual units used in the system can be taken from the corresponding parts of these operating instructions.

1.2 Installation, commissioning and operation

ControlCare Field Controller modules have been designed to operate safely in accordance with current technical safety and EU directives. Essential to their use is the ControlCare Application Designer software, which allows control strategies to be created for both FOUNDATION Fieldbus and PROFIBUS applications. Field devices, links, junction boxes, cables and other hardware comprising the Fieldbus system must also be designed to operate safely in accordance with current technical safety and EU directives.

If devices are installed incorrectly or used for applications for which they are not intended, or if the controller is not configured correctly, it is possible that dangers may arise. For this reason, the system must be installed, connected, configured, operated and maintained according to the instructions in this and the associated manuals: personnel must be authorised and suitably qualified.

1.3 Operational safety

Location

Field Controllers must be mounted in a permanent and weather-protected location in a safe area. The environment shall be a metal cabinet or an installation frame with a well grounded mounting plane. The environment shall be protected.

Hazardous areas

The controller must be connected to networks operating in explosion hazardous areas via barriers or other safety components. When installing components in explosion hazardous areas:

- Ensure that all installation and maintenance personnel are suitably qualified
- Check that all equipment has the appropriate safety certificates
- Observe the specifications in the device certificates as well as national and local regulations.

This topic is discussed in BA013S (FF Guidelines) and BA034S (PROFIBUS Guidelines).

EMC

All modules are suitable for industrial use and conform with the following standard, see Appendix:

- EN 61326: 1997/A1: 1998
Interference emission: Class A apparatus
Interference immunity: as per Annex A, industrial environment

Depending upon the environment in which the bus is operating, particular attention should be paid to the grounding of the bus cables. This topic is discussed in BA013S (FF Guidelines) and BA034S (PROFIBUS Guidelines).

IP Address

Field Controller is normally configured from a workstation connected into the control system backbone. You will require a unique IP address to set it up.

**Warning**

The use of IP addresses is strictly controlled. Usually your system administrator will be authorised to allocate unique addresses. Assigning an unauthorised address to a Field Controller may result in conflicts within your system and the failure of the associated devices!

Since the system can be accessed and manipulated through the various Field Controller tools, it is advisable to control access both to the workstation and the folders in which the configuration is stored. Always make a back-up of the project.

Technical improvement

Endress+Hauser reserves the right to make technical improvements to its software and equipment at any time and without prior notification. Where such improvements have no effect on the operation of the equipment, they are not documented. If the improvements effect operation, a new version of the operating instructions is normally issued.

1.4 Conventions and icons

In order to highlight safety relevant or alternative operating procedures in the manual, the following conventions have been used, each indicated by a corresponding icon in the margin.

Safety conventions

Icon	Meaning
	A note highlights actions or procedures which, if not performed correctly, may indirectly affect operation or may lead to an instrument response which is not planned
	Caution! Caution highlights actions or procedures which, if not performed correctly, may lead to personal injury or incorrect functioning of the instrument
	Warning! A warning highlights actions or procedures which, if not performed correctly, will lead to personal injury, a safety hazard or destruction of the instrument

1.5 ControlCare documents

Table 1.1 indicates the documents, planned and realized, containing safety relevant information, installation, commissioning and operating instructions for the equipment and software associated with Field Controller.

All documentation available at the time of release is included on the ControlCare CD-ROM and is installed in **Start=>Programs=>Endress+Hauser=ControlCare=Manuals** during set-up.

Component	Description	Document type	Designation	Order No.
System	ControlCare System Overview	Operating manual	BA016S/04/en	56004883
	ControlCare System Design	Operating manual	BA039S/04/en	Planned
	ControlCare System Specifications	Operating manual	BA040S/04/en	56004888
Software	Application Designer Overview	Operating manual	BA017S/04/en	71014301
	Application Designer Drawing Tool	Operating manual	BA032S/04/en	Planned
	Application Designer: FF Tutorial	Operating manual	BA019S/04/en	70101151
	Application Designer: PROFIBUS Tutorial	Operating manual	BA036S/04/en	70101152
	Application Designer: MODBUS Tutorial	Operating manual	BA037S/04/en	70101153
	Application Designer: IEC 61131 Tutorial	Operating manual	BA038S/04/en	70101386
	Field Control (OPC) Servers	Operating manual	BA018S/04/en	71031428
Field Controller	Hardware Installation Guide	Operating manual	BA021S/04/en	56004885
	Commissioning and Configuration	Operating manual	BA035S/04/en	56004887
Function Blocks	Function Block Manual	Operating manual	BA022S/04/en	56004886
Set-Up	Getting Started	Operating manual	BA020S/04/en	56004884
General	FOUNDATION Fieldbus Guidelines	Operating manual	BA013S/04/en	70100707
	PROFIBUS Guidelines	Operating manual	BA034S/04/en	56004242

Tab. 1-1: ControlCare Documentation

2 Getting Started

ControlCare Application Designer Suite runs on the operating systems Windows 2000, Windows XP and Windows Server 2003 with the service packs indicated in the **System Requirements**:

- You need to have administrator rights for the installation of the ControlCare Application Designer Suite.
- Application Designer Suite operates with a license protection key. Any licence keys already used on your computer should be unplugged before the software is installed.
- You will be warned, if the system requirements are not met.

2.1 Preliminaries

- 1 Place the ControlCare CD-ROM in your CD-ROM drive, the Setup menu appears just after the CD has been inserted.
- 2 First check that your computer fulfils the minimum **System Requirements** as described below



- 3 Before starting the installation it is advisable to carefully read the **Release Notes**.

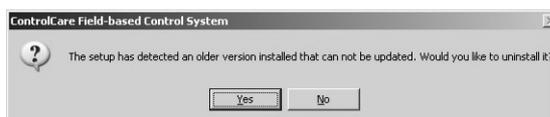


2.2 Installing Application Designer Suite

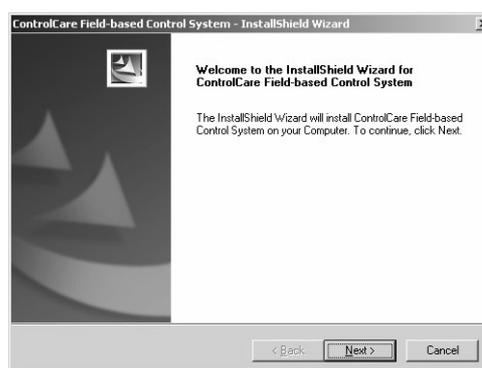
- 1 Click on **ControlCare Field-based Control System** to initiate the software installation process.



- 2 The setup program starts the installation process:
 - If an old ControlCare version is installed on your computer, you will be asked if you wish to uninstall it



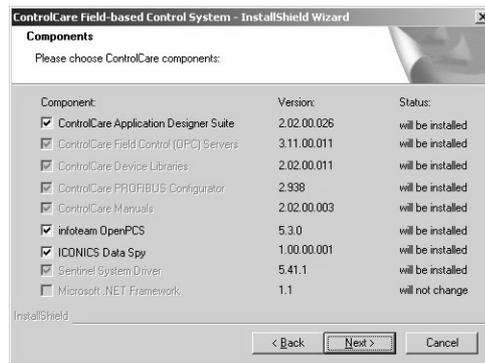
- Press **Yes** to this and the following two confirmation dialogs
 - The setup program deinstalls the old ControlCare Application Designer Suite
 - When the **Uninstall Complete** dialog appears, press **Finish** to close the procedure
- 3 If ControlCare was not installed previously or after deinstallation is complete the **Welcome** dialog appears



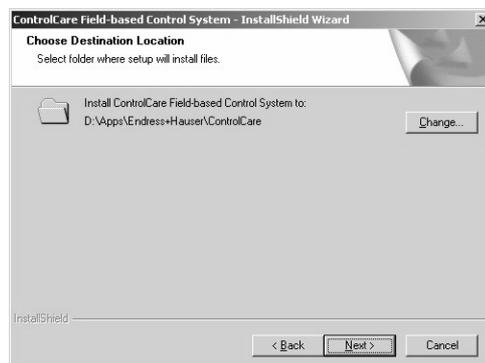
- Continue the installation by clicking **Next**

4 The **License Agreement** now appears

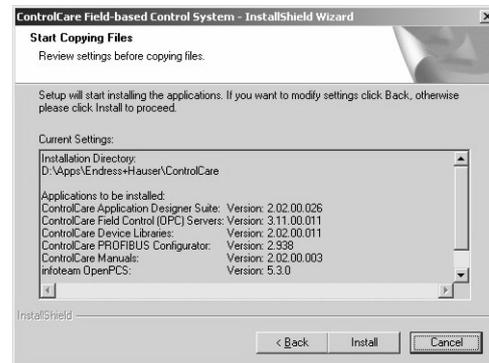
- Read the agreement, then check the button saying that you agree with it
- **Print** will cause a copy of the license agreement to be printed out
- Continue the installation by clicking **Next**

5 The **Components** dialog appears

- Press **Next** to accept the default settings

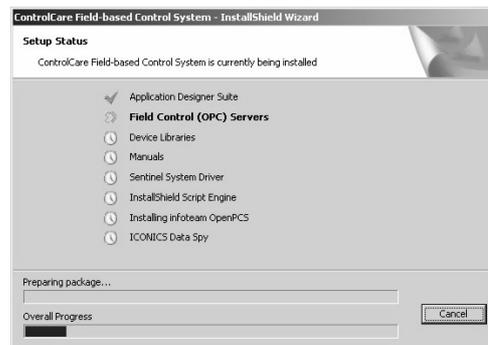
6 The **Choose Destination Location** dialog appears

- Press Change and follow the instructions if you want to select a different destination.
- Press Next to accept the default destination and/or to continue installation.

7 The **Start Copying Files** dialog appears

- Read the list the applications to be installed
- If you want to change anything, press **Back** until you reach the appropriate screen
- Continue the installation by pressing **Install**

8 ControlCare Application Designer Suite will now be installed



- You are informed of progress through the **Setup Status** dialog
- Answer **Yes** should you be prompted to delete a previous version of OpenPCS

9 The Installation Complete dialog appears after everything was installed



- Press **Finish** to complete the procedure and close the dialog
- Plug the hard key into the USB or parallel port of your computer

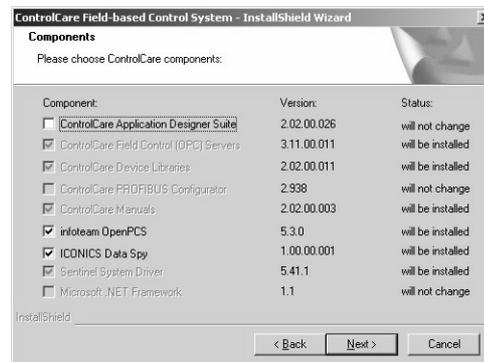
2.3 Installing the OPC Servers only

The sequence is essentially the same as that described in Chapter 2.2.

- 1 Click on ControlCare Field-based Control System to initiate the software installation process.



- 2 The **Welcome** dialog appears, continue the installation by clicking **Next**
- 3 The **Licence Agreement** now appears.
 - Read the agreement, then check the button saying that you agree with it
 - Continue the installation by clicking **Next**
- 4 The **Components** dialog appears



- Deselect both the Application Designer and OpenPCS boxes
 - The remaining components are those needed for the OPC server
 - Press **Next** to continue with the installation
- 5 Follow the wizard instructions to complete the installation, see Chapter 1.2, Steps 6 to 9.

2.4 Upgrades

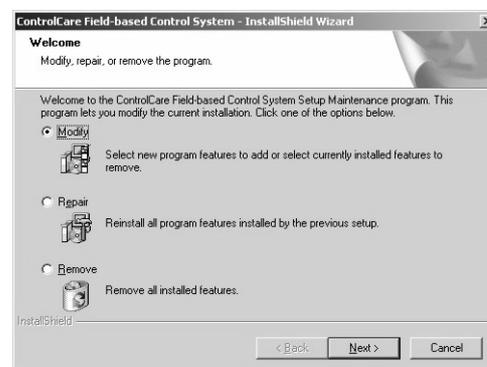
All previous versions of the ControlCare Application Designer Suite must be deleted before V2.02 can be installed (see Chapter 1.2, Step 2). For future releases it will be possible to upgrade from the Setup menu.

2.4.1 Upgrade ControlCare Application Designer

- 1 Click on ControlCare Field-based Control System to initiate the software installation process.



- 2 If the setup program detects an earlier version of ControlCare Application Designer Suite on your computer, the installation continues as described from Step 3 of Chapter 2.2.
- 3 If the setup program detects the same version of ControlCare Application Designer Suite on your computer, it starts the installation process with the dialog below:



- Select **Modify** then click on **Next**
- 4 In the **Components** dialog press **Next** to accept the default settings
 - Alternatively select the components you wish to update and press Next.
 - 5 When the **Maintenance Complete** dialog appears, press **Finish** to finish the procedure and close the dialog.

2.5 Additional Tools

2.5.1 Adobe Reader

All current manuals related to ControlCare hardware and software products and other auxiliary information manuals are copied to your computer during installation. You require Adobe Reader Version 5.0 or higher to read them. If not already on your computer, you can install the latest version as described below.

- 1 Go to the main menu on the ControlCare CD-ROM and select **Adobe Reader**



- 2 Now choose the language version and follow the instructions in the Installation Wizard.

- 3 To open a manual from your computer select **Start=>Programs=>Endress+Hauser=>ControlCare=>Manuals=>English**

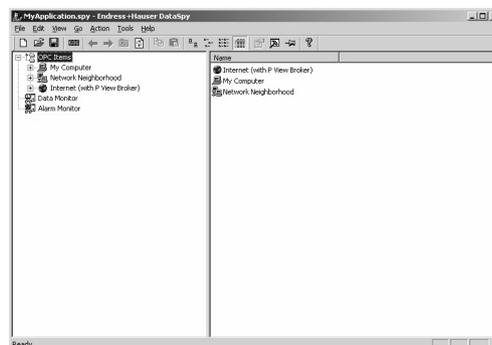
From the Setup menu

- **Getting Started** opens a PDF version of the Getting Started manual
- **Open Documentation** opens the folder containing the manuals.

2.5.2 OPC Data Spy

OPC Data Spy is a simple OPC client tool that is installed with ControlCare Application Designer Suite. It allows the values output by devices in a fieldbus network to viewed and monitored.

- 1 Open OPC Data Spy
 - **Start=>Programs =>Endress+Hauser=>ControlCare=>Tools=>OPC Data Spy**



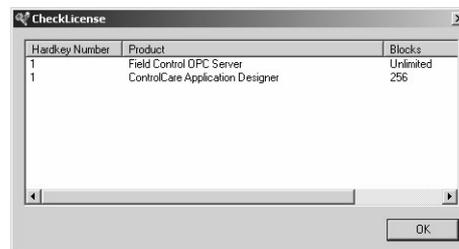
- 2 Instructions on use are to be found in the online help.

2.6 Checking Your Installation

2.6.1 License

You can check your license to see the number of Tags and Function Blocks that are supported. This information is also required should you want to request a Tags license upgrade.

- 1 Open Check Licence:
 - **Start=>Programs =>Endress+Hauser=>ControlCare=>Tools=>Check License**
- 2 In the example, it can be seen that there are two licenses in the hard key (dongle):

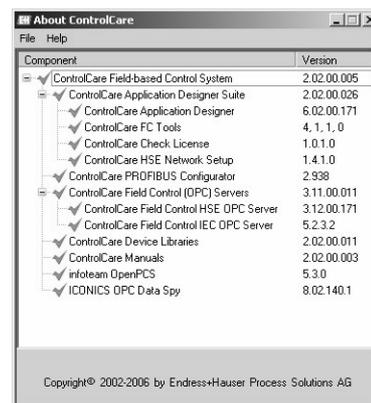


- Field Control OPC Server supports an unlimited number of tags
- ControlCare Application Designer supports 256 Function Blocks.

2.6.2 Application versions

It is sometimes necessary to check all product related version information, for example, when you are looking for product support or a product update.

- 1 Open About ControlCare:
 - **Start=>Programs =>Endress+Hauser=>ControlCare=>Tools=>About ControlCare**



- 2 A dialog box now appears containing all version information for ControlCare software components.
 - It can be copied onto the clipboard by selecting the text within the box by scrolling the mouse over it.
 - Now press the sequence "**Ctrl+Insert**" to copy it and "**Shift+Insert**" to paste it into another text document.

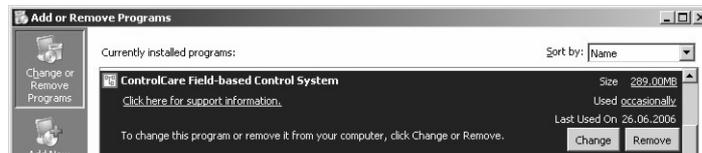
2.7 Deinstalling ControlCare Application Designer Suite

Once ControlCare Application Designer Suite has been installed, it can be deinstalled if required via the Windows Control Panel.

- 1 Select **Start=>Settings=>ControlPanel** then click on **Add or Remove Programs**



- 2 Select **ControlCare Field-based Control System** and then **Remove**



- 3 You will be asked to confirm the removal of particular software components. Confirm that you want to remove them with **Yes**
- 4 Windows proceeds with the de-installation
 - Pressing **“Cancel”** aborts the de-installation process.

Note!



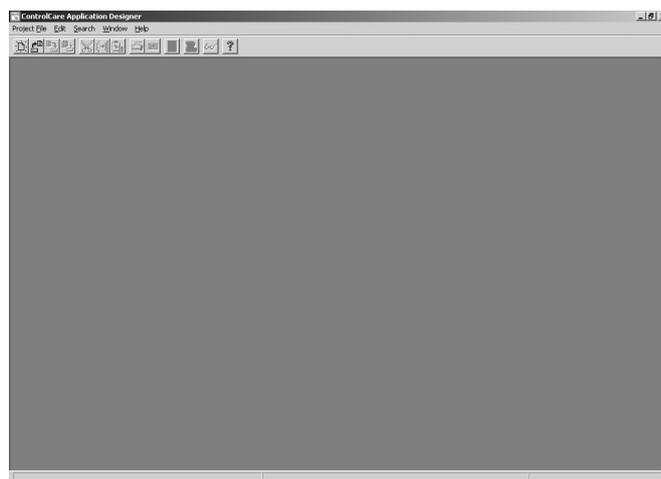
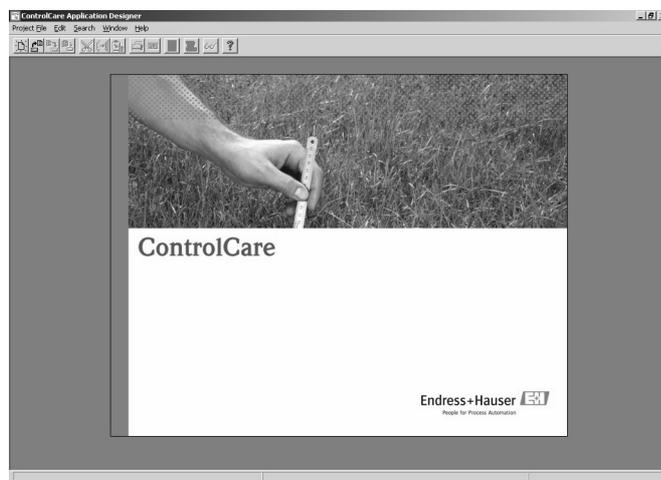
- In the event that field devices were already integrated in ControlCare Application Designer, the associated files (DDs & CFF) will not be deleted. Similarly if configuration files for projects have been created, they will not be removed, The files can be found in the location they had before ControlCare was deinstalled.

3 FF Field Controller

The Field Controller is configured with the ControlCare Application Designer software. Before you use this for the first time, check that your hard key (dongle) is connected to your computer (This is not necessary if you have a demo license or intend to use it as a demo version only).

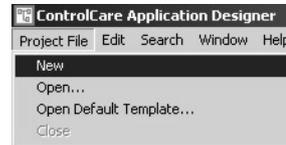
3.1 Open ControlCare Application Designer

- 1 Start Application Designer:
Start=>Programs =>Endress+Hauser=>ControlCare Application Designer
 - The welcome screen appears, followed by an empty project window

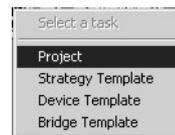


3.2 Create a FF project

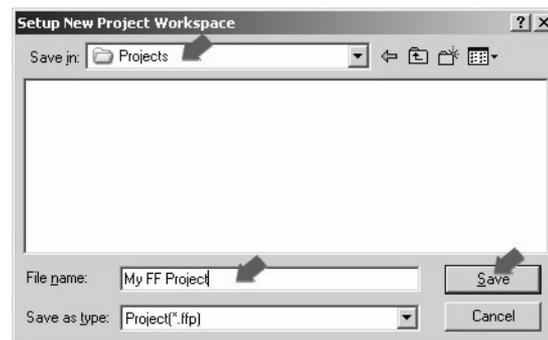
- 1 The project starts from a blank application screen
 - With the right mouse key select **Project File=>New**



- 1 The **Document Type** box appears: Click the option **Project**



- 2 The **New Project** dialog box opens:

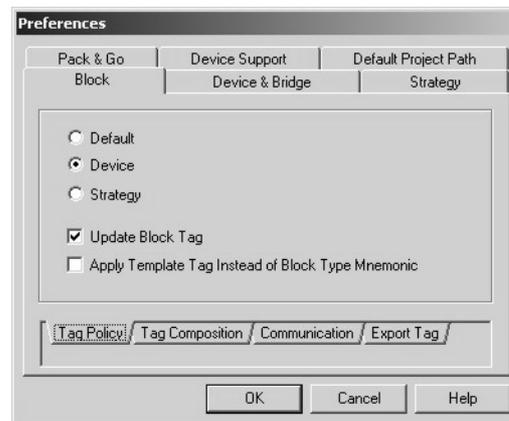


1. Choose the folder where the project will be saved.
 2. Type the name of the project in the File Name box.
 3. Click **Save**.
- If the new project is not to be created, click **Cancel**.
- 3 ControlCare Application Designer automatically creates a folder with the entered file name within the selected folder.

3.3 Determine the naming preferences

Before you start, you can set preferences for the way your project is created. Of particular interest at this stage is the labelling of the function blocks.

- 1 Press **Project File => Preferences**
 - The **Preferences** Dialog appears



Tag Policy

Tag Policy determines how the blocks are labelled by default if no tag names are entered

- 1 Select the folder **Block** and the subfolder **Tag Policy**, then check the following buttons
 - **Device**
 - **Update Block Tag**
- 2 Press **OK** to confirm your selection
 - Application Designer will now automatically rename any blocks created in the control strategy window as they are assigned to the devices by adding the device tag as prefix.

Tag Composition

Tag Composition determines how the block identifiers are added to the block tag if no block name is entered.

- 1 Select the subfolder **Tab Composition**:
 - Enter a mnemonic separator: for this manual the setting was "-"
Default setting is "_" and mandatory if flexible function blocks are to be used
 - Check **Prefix**
- 2 Press **OK** to confirm your selection
 - Application Designer will now automatically compose the blocks according to your selection, e.g. TagName-Block-n or TagName_Block_n.

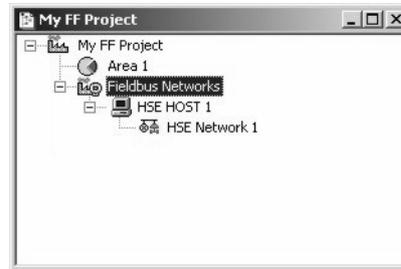
Export Tag

Export Tag causes tags to be automatically exported every time the project goes online

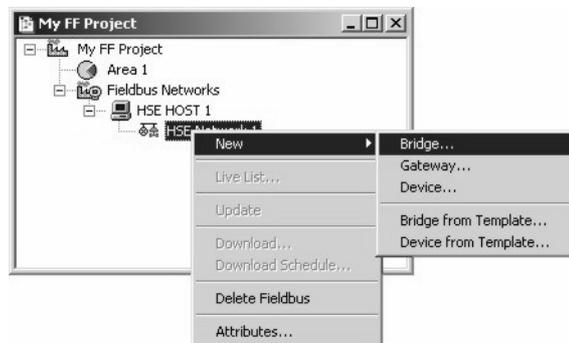
- 1 Select the subfolder **Export Tag**
 - Check the **Automatic** button
- 2 Press **OK** to confirm your selection

3.4 Add a bridge (SFC162)

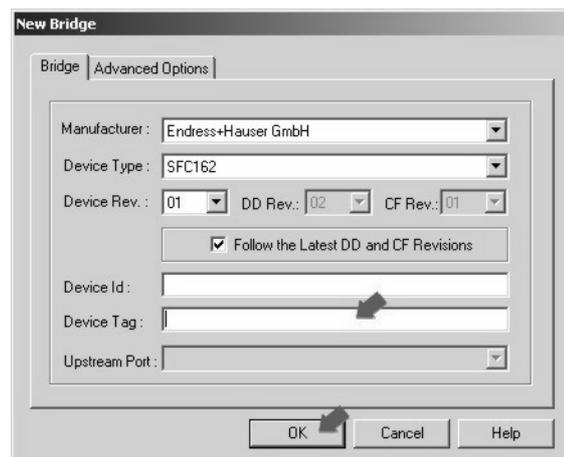
- 1 On saving, ControlCare Application Designer automatically creates a project, adding the HSE fieldbus network and the HSE Host
 - Click on + to expand the tree:



- 2 Now right-click on the **HSE Network** leaf and select **New=>Bridge**



- 3 The **New Bridge** dialog box appears:
Select the SFC162 Field Controller and type in a device TAG

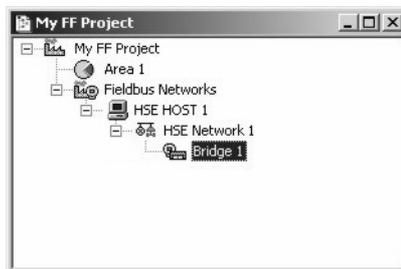


If you do not type in a tag, the default will be "Bridge n", where n is a consecutive number. At this point, the Fieldbus Network does not have a direct correspondence to any of the existing controllers.

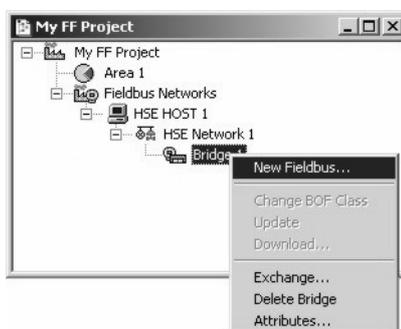
- 4 Press **OK** to create the Bridge.
- 5 Repeat Steps 1 to 4 for as many bridges as you have in your network.

3.5 Add a fieldbus segment

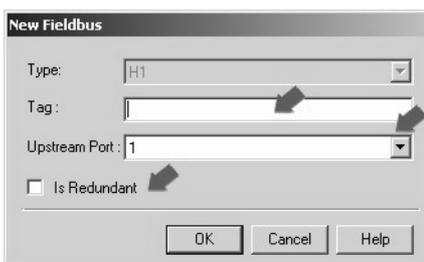
- 1 The project now looks like this:



- 2 Right click on the bridge you just created, here "**Bridge 1**", and select **New Fieldbus**.



- 3 The **New Fieldbus** dialog box appears:
Enter a Fieldbus TAG, select the fieldbus port on the SFC162
Check the **Is Redundant** box, only if this fieldbus is to be connected to another SFC162 Field Controller



If you do not type in a tag, the default will be "Fieldbus n", where n is a consecutive number. At this point, the Fieldbus Network does not have a direct correspondence to any of the existing controllers.

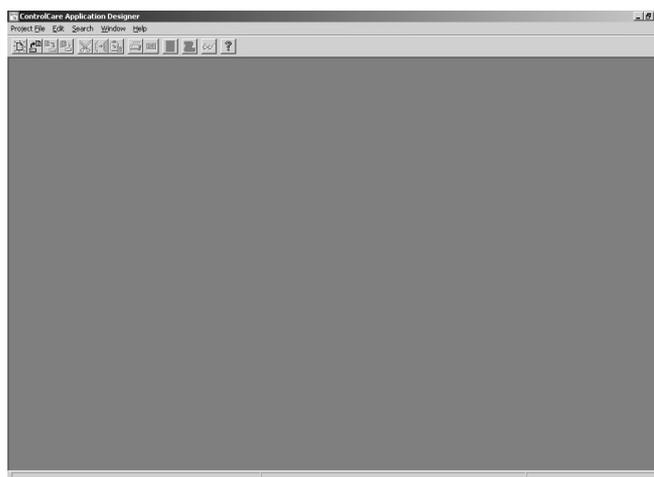
- 4 Press **OK** to create the Fieldbus.
- 5 Open **Project File**, then press **Save**, to save the project.
- 6 Repeat Steps 1 to 5 for as many fieldbus as are in use.
- 7 You can now proceed with Configuring the Field Controller, see Chapter 5.

4 PROFIBUS Field Controller

The Field Controller is configured with the ControlCare Application Designer software. Before you use this for the first time, check that your hardkey (dongle) is connected to your computer (This is not necessary if you have a demo license or intend to use it as a demo version only).

4.1 Open ControlCare Application Designer

- 1 Start Application Designer:
Start=>Programs =>Endress+Hauser=>ControlCare Application Designer
 - The welcome screen appears, followed by an empty project window



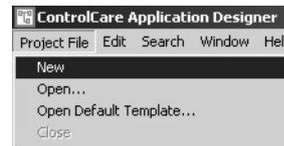
4.2 Create a PROFIBUS project



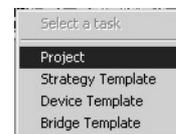
Note!

- If you have both a PROFIBUS and FOUNDATION Fieldbus controller in your network, and have already created a FF project, select it through **Project File=>Open** and turn to Chapter 4.3.

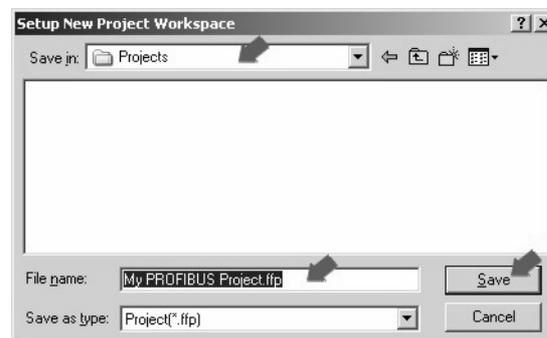
- 1 The project starts from a blank application screen
 - With the right mouse key select **Project File=>New**



- 2 The **Document Type** box appears: Click the option **Project**



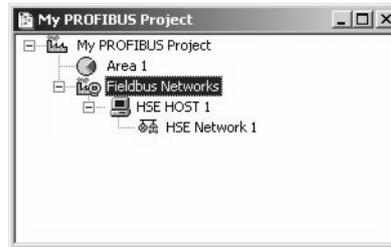
- 3 The **New Project** dialog box opens:



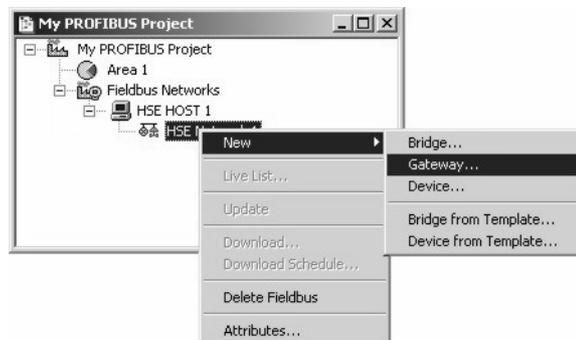
1. Choose the folder where the project will be saved.
2. Type the name of the project in the File Name box.
3. Click **Save**.
If the new project is not to be created, click **Cancel**.
- 4 ControlCare Application Designer automatically creates a folder with the entered file name within the selected folder.
- 5 At this point you can set the project preferences, see Chapter 3.3.

4.3 Add a gateway (SFC173)

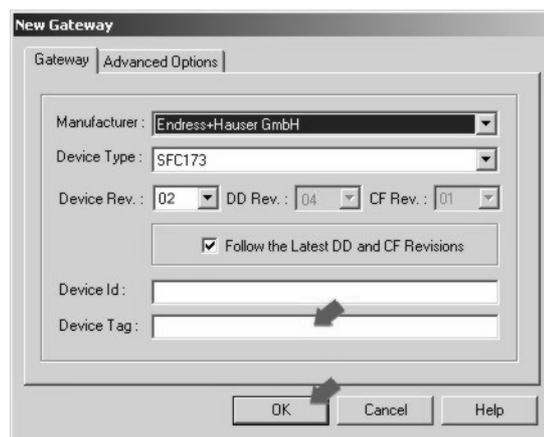
- 1 On saving, ControlCare Application Designer automatically creates a project, adding the HSE fieldbus network and the HSE Host
 - Click on + to expand the tree:



- 2 Now right-click on the **HSE Network** leaf and select **New=>Gateway**



- 3 The **New Gateway** dialog box appears:
Select the SFC173 Field Controller and type in a device TAG

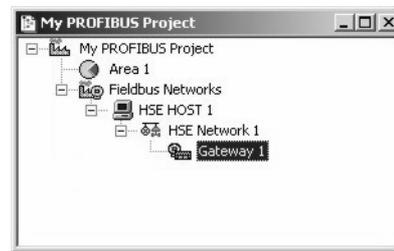


If you do not type in a tag, the default will be "Gateway n", where n is a consecutive number. At this point, the Fieldbus Network does not have a direct correspondence to any of the existing controllers.

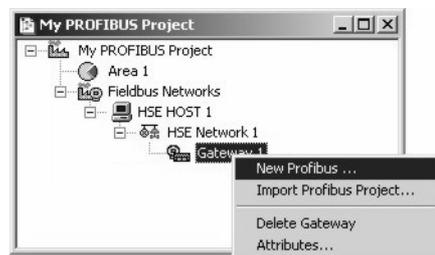
- 4 Press **OK** to create the Gateway.
- 5 Repeat Steps 1 to 4 for as many gateways as you have in your network.

4.4 Add a PROFIBUS segment

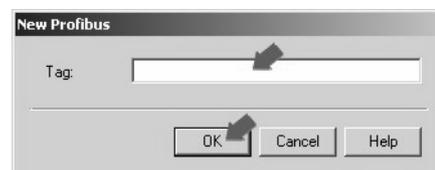
- 1 The project now looks like this:



- 2 Right click on the bridge you just created, here "**Gateway 1**", and select **New Profibus**.

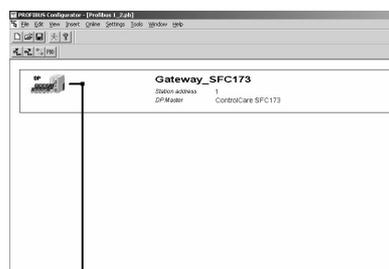


- 3 The **New Profibus** dialog box appears:
Enter a Fieldbus TAG

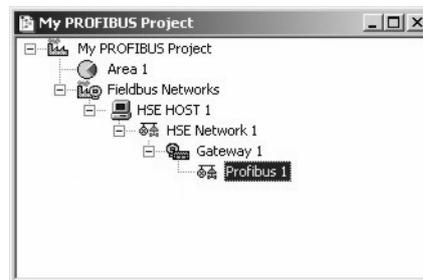


If you do not type in a tag, the default will be "Profibus n", where n is a consecutive number. At this point, the Fieldbus Network does not have a direct correspondence to any of the existing controllers.

- 4 Press **OK** to create the PROFIBUS segment.
- 5 The **ControlCare PROFIBUS Configurator** opens



- 6 You can either create the segment now:
 - See Application Designer PROFIBUS Tutorial, BA036S/04/en,or
create it at a later date:
 - Resume configuration by double-clicking on the leaf "Profibus n"
 - In the PROFIBUS window that opens, right-click on "Profibus n" again
 - Select **Modify PROFIBUS Configuration**
- 7 Select **File=>Save** to store the PROFIBUS project, then **Exit** to close the window
- 8 The PROFIBUS I/O Mapping dialog appears
 - Select **OK** to close the dialog
- 9 The Profibus segment is now added to the project:



- 10 Open **Project File**, then press **Save**, to save the project.
- 11 Repeat Steps 1 to 10 for each gateway that you have created.
- 12 You can now proceed with Configuring the Field Controller, see Chapter 5.

5 Configuring the Field Controller



Note!

- The SFC162 and SFC173 Field Controllers are configured in exactly the same way.

When the Field Controller is created, ControlCare Application Designer automatically adds the following function blocks to it (Mnemonic separator set set to "-", see Chapter 3.3):

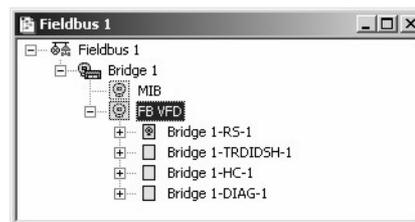
- Resource Block: Device Tag-RS-n
- Transducer Block: Device Tag-TRDIDSH-n (FF) or Device Tag-PBTRD-n (PROFIBUS)
- Hardware Configuration Block: Device Tag-HC-n
- Diagnosis block: Device Tag-DIAG-n

Where n is a consecutive number and Device Tag your name for the Field Controller. In addition a temperature transducer block can be added when the SFC 445 Temperature Input module is in use.

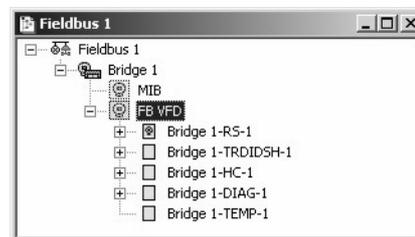
5.1 Customise the Controller I/O blocks

Procedure

- 1 Start the configuration by clicking on the Fieldbus/Profibus branch in your project: A fieldbus window opens. Expand the Field Controller branch to display the various blocks:



- 2 If the Field Controller has one or more SFC 445 Temperature Input modules, add a TEMP block for each:
 - Right click on the **FB VFD** node and select **New Block**
 - In the New Block dialog, select the Block Type **Temperature Transducer**
 - If necessary, enter a new Device Tag (otherwise the block will be numbered consecutively)
 - Press **OK** to create the block
 - The new block is added to the Field Controller
 - Repeat for any further Temperature Transducer blocks.

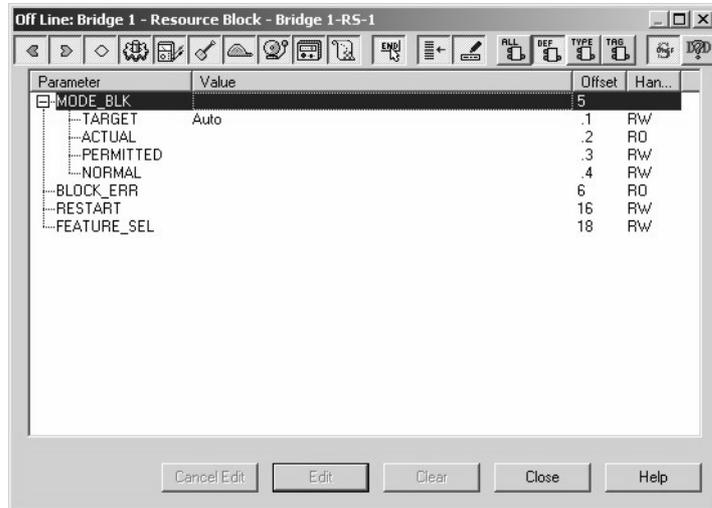


- 3 When all required transducer blocks are present, configure each as described in the following sections.

5.1.1 Resource block

Procedure

- 1 Right click on the Field Controller resource block **Device Tag-RS-n** and select **Off Line Characterization** (or double click on the leaf). The Characterization dialog opens:

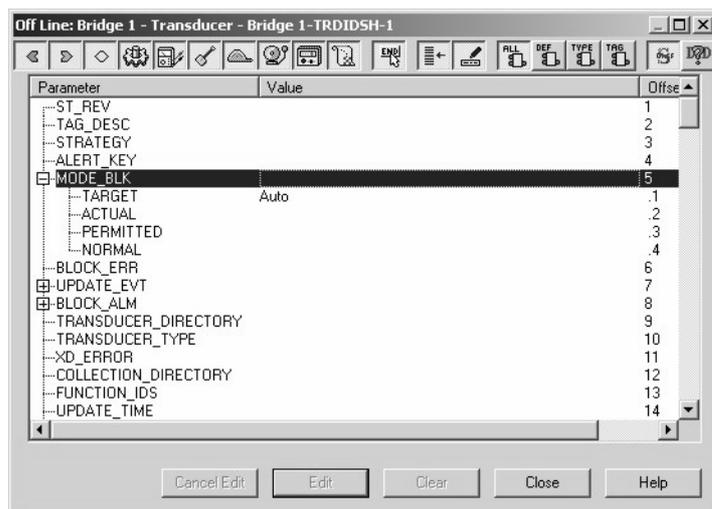


- 2 Expand the MODE_BLK node and check that the Target Mode is set to Auto
 - If this is not the case, select the **Target** node then click the **Edit** button
 - Select **Auto** from the drop-down menu, click **End Edit** to confirm the selection
 - Click **Close** to leave the dialog.

5.1.2 Transducer block

Procedure

- 1 Right click on the Field Controller transducer block **Device Tag-TRDIDSH-n** or **Device Tag-PBTRD-n** and select **Off Line Characterization**. The Characterization dialog opens.



- 2 Expand the MODE_BLK node and check that the Target Mode is set to Auto
 - If this is not the case, select the **Target** node then click the **Edit** button
 - Select **Auto** from the drop-down menu, click **End Edit** to confirm the selection
 - Click **Close** to leave the dialog.

Detailed information on the other parameters in this block can be found in the Function Block manual BA022S/04/en.

5.2 Configure the I/O transducer blocks

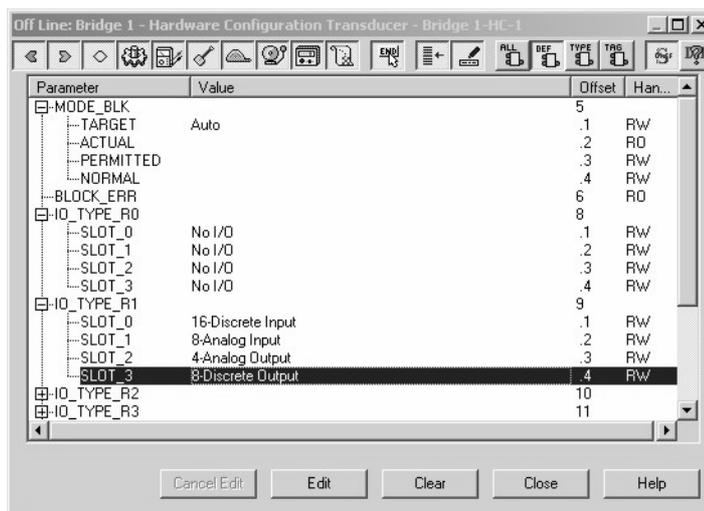
5.2.1 Hardware configuration block

This block configures the module type for each slot in the Field Controller rack. The physical arrangement of the modules on the rack assemblies with the addresses 0 to 14 is declared in the parameters **IO_TYPE_R0** to **IO_TYPE_R14** respectively. Each **IO_TYPE_Rx** parameter has four slot parameters, **SLOT_0** to **SLOT_3**, where the module type is entered. (Addressing and slot numbers are explained in Chapters 3.5.3 and 3.5.4 of BA021S/04/en).

On execution, Application Designer writes to all declared output modules and reads all declared input modules. If any I/O module has failed in this scan, it is indicated in **BLOCK_ERR** and the **MODULE_STATUS_x** parameters.

Procedure

- 1 Right click on the Field Controller hardware configuration block **Device Tag-HC-n** and select **Off Line Characterization**. The Characterization dialog opens
- 2 Expand the **MODE_BLK** node and check that the Target Mode is set to Auto
 - If this is not the case, select the **Target** node then click the **Edit** button
 - Select **Auto** from the drop-down menu, click **End Edit** to confirm the selection
 - Click **Close** to leave the dialog.
- 3 The slots in **IO_TYPE_R0** are preset to "No I/O" when the bridge/gateway is created
 - Do not change these settings, even when the rack address "0" is not used
 - Do not configure I/O modules in the **IO_TYPE_R0** parameter, it is not allowed
- 4 If the Field Controller is not at address "0" or you have local I/O in your rack, expand the appropriate **IO-TYPE_Rx** node add the module type to the slots
 - Select the **SLOT_No**, then click the **Edit** button
 - Select the module type from the drop-down menu:
 - Use "No I/O" for controllers, power supplies, conditioners etc
 - Use "Available" for dummy modules or unused slots
 - Click on **End Edit** after each change
 - Continue until all modules have been mapped to the correct positions in the rack.



- 5 Repeat Step 3 for all rack assemblies in the rack
- 6 Click **Close** to end configuration and save the project.
 - The Device Tag-HC-n node will now have the configured parameters attached

I/O types and blocks

Designation	Description	I/O type	Function Block
	Available slot	No I/O	None
SFC050	Power Supply 90-264 VAC	No I/O	None
SFC056	Power Supply for Backplane 20-30 VDC	No I/O	None
SFC162	FF Field Controller, 1x100 Mbps, 4xH1	No I/O	RS/TRD/HC_TRD DIAG
SFC173	PROFIBUS Field Controller, 1x100 Mbps, 4xH1	No I/O	RS/TRD/HC_TRD DIAG
SFC252	Power Supply for Fieldbus	No I/O	None
SFC353	4-channel Power Supply Impedance	No I/O	None
SFC411	2 Groups of 8 24 VDC Inputs (Isolated)	16-discrete input	MDI/DI
SFC415	2 Groups of 8 24 VDC Inputs (Sink, Isolated)	16- discrete input	MDI/DI
SFC420	1 Group of 8 On/Off Switches	8- discrete input	MDI/DI
SFC428	2 Groups of 8 NO Relays Outputs	16- discrete output	MDO/DO
SFC432	1 Group of 8 24 VDC Inputs and 1 Group of 4 NO Relays	8- discrete input/ 4- discrete output	MDI/DI MDO/DO
SFC435	1 Group of 8 24 VDC Inputs and 1 Group of 4 NC Relays	8- discrete input/ 4- discrete output	MDI/DI MDO/DO
SFC438	1 Group of 8 24 VDC Inputs and 1 Group of 2 NO and 2 NC Relays	8- discrete input/ 4- discrete output	MDI/DI MDO/DO
SFC441	2 Groups of 8 pulse inputs - low frequency	16-pulse input	PUL
SFC442	2 Groups of 8 pulse inputs - high frequency	16-pulse input	PUL
SFC444	1 Group of 8 analog inputs with shunt resistors	8-analog input	MAI/AI
SFC445	1 Group of 8 temperature inputs	8-temperature	MAI/AI
SFC446	1 Group of 4 analog output	4-analog output	MAO/AO
SFC457	1 Group of 8 differential analog inputs with shunt resistors	8-analog input	MAI/AI
SFC467	2 Groups of 8 pulse inputs - AC	16-pulse input	PUL

Tab. 5-1: : I/O types and corresponding function blocks

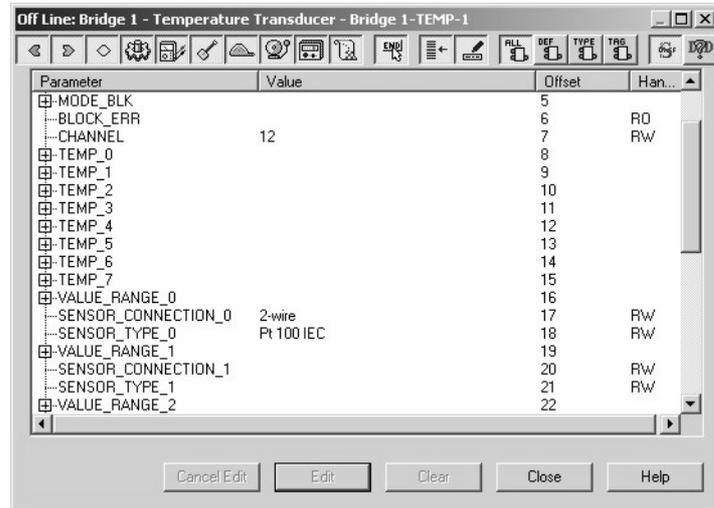
HC block parameters

Parameter	Valid range/ Options	Default value	Description/Action
ST_VER		0	Increments on every static parameter change
TAG_DESC		blanks	User specific text of 32-characters to uniquely identify the block
STRATEGY	0 to 255	0	User specific value that may be used in configuration and diagnostics as a key in sorting block information
ALERT_KEY	1 to 255	1	User specific value that may be used in sorting the alarms and events generated by the block
MODE_BLK	TARGET	O/S	Set to AUTO
BLOCK_ERR	0 to 15		Error status of hardware and software components associated with the block
REMOTE_IO			Set to Remote I/O master (MODBUS applications only)
IO_TYPE_R0		0	Module type for rack 0, slots 0 to 3 Preset to "Not I/O" - do not change
IO_TYPE_R1		0	Select module type for rack 1, slots 0 to 3
IO_TYPE_R2		0	Select module type for rack 2, slots 0 to 3
IO_TYPE_R3		0	Select module type for rack 3, slots 0 to 3
IO_TYPE_R4		0	Select module type for rack 4, slots 0 to 3
IO_TYPE_R5		0	Select module type for rack 5, slots 0 to 3
IO_TYPE_R6		0	Select module type for rack 6, slots 0 to 3
IO_TYPE_R7		0	Select module type for rack 7, slots 0 to 3
IO_TYPE_R8		0	Select module type for rack 8, slots 0 to 3
IO_TYPE_R9		0	Select module type for rack 9, slots 0 to 3
IO_TYPE_R10		0	Select module type for rack 10, slots 0 to 3
IO_TYPE_R11		0	Select module type for rack 11, slots 0 to 3
IO_TYPE_R12		0	Select module type for rack 12, slots 0 to 3
IO_TYPE_R13		0	Select module type for rack 13, slots 0 to 3
IO_TYPE_R14		0	Select module type for rack 14, slots 0 to 3
MODULE_STATUS_R0_3			Status of modules in rack 0-3
MODULE_STATUS_R4_7			Status of modules in rack 4-7
MODULE_STATUS_R8_11			Status of modules in rack 8-11
MODULE_STATUS_R12_14			Status of modules in rack 12-14
UPDATE_EVT			This alert is generated by any change to the static data
BLOCK_ALM			The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status attribute. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.

5.2.2 Temperature transducer block

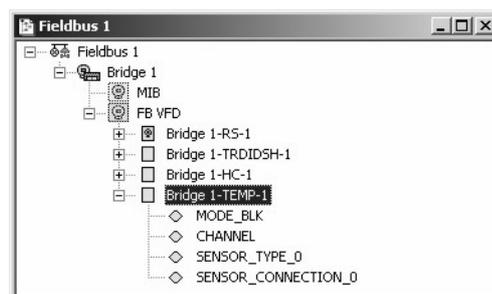
A temperature transducer block is required for every SFC445 temperature module in the rack. The module has eight input channels for RTD, TC, mV or Ohm. The block mode, channel, sensor connection and sensor type at each input channel must be configured for each module.

- 1 Right click on the Field Controller hardware configuration block **Device Tag-TEMP-n*** and select **Off Line Characterization**. The Characterization dialog opens:



- 2 Expand the **MODE_BLK** node and set the Target Mode to Auto
 - Select the **Target** node then click the **Edit** button
 - Select **Auto** from the drop-down menu, click **End Edit** to confirm the selection
 - Click **Close** to leave the dialog.
- 3 Set **CHANNEL** to the rack number and slot, where the SFC445 is installed
 - Select **CHANNEL**, then click the **Edit** button
 - Enter the CHANNEL value (Rack+Slot, counting from 00: e.g. Rack 1, Slot 2 = 12)
 - Click on **End Edit**
- 4 Configure the sensor connection and sensor type used at each input channel.
 - Select the **SENSOR_CONNECTION_X**, then click the **Edit** button
 - Select the connection type from the drop-down menu, click on **End Edit**
 - Select the **SENSOR_TYPE_X**, then click the **Edit** button
 - Select the sensor type from the drop-down menu, click on **End Edit**
 - Continue until all input channels have been mapped correctly.

If the sensor connection is not on view, press the **ALL** button in the toolbar.
- 5 Click **Close** to end configuration and save the project.
The TEMP-X Device Tag node will now have the configured parameters attached



Temperature Block parameters

Parameter	Valid range/ Options	Default value	Description/Action
ST_VER		0	Increments on every static parameter change
TAG_DESC		blanks	User specific text of 32-characters to uniquely identify the block
STRATEGY	0 to 255	0	User specific value that may be used in configuration and diagnostics as a key in sorting block information
ALERT_KEY	1 to 255	1	User specific value that may be used in sorting the alarms and events generated by the block
*MODE_BLK	TARGET	O/S	Set to AUTO
BLOCK_ERR	0 to 15		Error status of hardware and software components associated with the block
REMOTE_IO			Set to Remote I/O master
*CHANNEL.		0	The rack and slot number of the associated SFC 445 module coded as RRS
TEMP_0...TEMP_7			The temperature value at input point 0...7
VALUE_RANGE_0.... VALUE_RANGE_7		0-100%	When the point is connected to an AI block, this is a copy of XD_SCALE.
*SENSOR_CONNECTION_0. .. SENSOR_CONNECTION_7	1, 2, 3	1	Type of sensor connection for points 0...7 1 = differential, 2 = 2-wire, 3 = 3-wire
*SENSOR_TYPE_0 ... SENSOR_TYPE_7	menu	Pt100	The type of sensor connected to points 0...7 (Select from pull-down menu)
UPDATE_EVT			This alert is generated by any change to the static data
BLOCK_ALM			The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status attribute. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.
*Parameters must be configured for every input used, every SFC445 module requires a separate Temperature Block			

5.3 Add and configure the I/O function blocks

Once the Hardware Configuration and Temperature transducer blocks have been configured, they must be connected to input and output function blocks so that the I/O signals are available to the Field Controller system.



Note!

- BA 022S/04/en, Function Block Manual, contains a general description of the function block process, including the alarming and I/O options that have been omitted for simplicity here. It also contains a detailed explanation of all function block parameters.

5.3.1 CHANNEL parameter

The connecting element between transducer and function block is the channel parameter. For the Field Controller I/O modules, this is compiled according to the following hierarchy:

Level	Range
Rack (R)	0 – 14
Slot (S)	0 – 3
Group (G)	0 – 1
I/O Point (P)	0 – 7 9 = whole group

The value in the CHANNEL parameter is given by the value RSGP:

- Rack assembly address (R):
Each rack assembly has a unique address between 0 and 14.
The rack assembly with the address "0" cannot be used by the I/O modules.
- Slot (S): Each rack assembly has four slots. One slot supports one I/O module.
Slots are numbered from 0 (first slot) to 3 (last slot).
- Group (G): Ordinal number of group in the specified I/O module
Groups are numbered from 0 (first group) to number of groups minus 1.
- Point (P): Ordinal number of I/O point in a group
I/O points are numbered from 0 (first I/O point) to 7 (last I/O point in the group)
9 means the whole group of points and is used when a module is connected to a MAI, MDI, MAO or MDO function block.

Thus, a single I/O point in the Field Controller may be identified by specifying the rack (R), slot (S), group (G) and point (P). As the CHANNEL parameter in the multiple I/O blocks (MIO) must specify the whole group (8 points), the point must be 9, that means the whole group. For example:

- The CHANNEL parameter 1203 means rack 1, slot 2, group 0 and I/O point 3.
- The CHANNEL parameter for a MAI block 10119 means rack 10, slot 1, group 1 and I/O point 9, i.e. the whole group.

MODE_BLK	5	RW
BLOCK_ERR	6	RO
CHANNEL	10119	7 RW
OUT_1	8	
OUT_2	9	

Provided that the HC transducer block is configured before the CHANNEL parameter, the system verifies that the I/O type configured in the HC block is suitable for block type. If the CHANNEL parameter of the AI block accesses an I/O of a different type, the setting will be rejected during download.

5.3.2 Create input/output function blocks

For each I/O module configured in the HC transducer block, create the Input or Output Function Block associated with it, see Table 4-1, Chapter 4.7.1:

- AI – Analog Input: for individual inputs requiring signal characterisation
- DI – Discrete Input: for individual inputs requiring signal characterisation
- PUL – Pulse Input: for pulse inputs
- MAI – Multiple Analog Input: for complete groups of analog points
- MDI – Multiple Discrete Input: for complete groups of discrete points
- AO – Analog Output: for individual outputs requiring signal characterisation
- DO – Discrete Output: for individual outputs requiring signal characterisation
- MAO – Multiple Analog Output: for complete groups of analog points
- MDO – Multiple Discrete Output: for complete groups of discrete points

General procedure

- 1 In the fieldbus view, right click on the **FB VFD** node of the Field Controller and select **New Block**, the New block dialog appears:

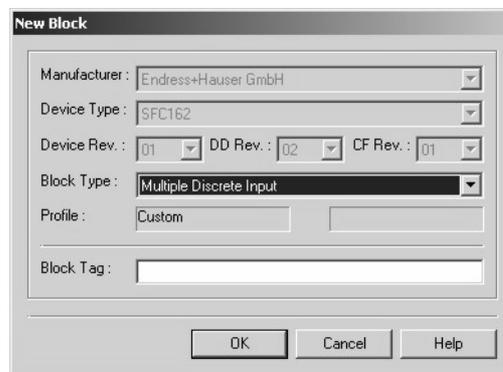


Fig. 5-1: New Block dialog window

- 2 In the New Block dialog, select the Block Type you require, see also Table 4-1
 - If necessary, enter a new Device Tag (otherwise the block will be numbered consecutively)
 - Press **OK** to create the block
 - The new block is added to the Field Controller
- 3 Repeat Steps 2 and 3 until all the appropriate input and output function blocks have been created for the I/O modules in the rack.
- 4 Configure each block as described in the following sections.
- 5 When the control strategy is being created, see ControlCare Application Designer Overview, see BA017S/04/en or the appropriate tutorial, the configured block can be simply dragged and dropped from the fieldbus view into the strategy workspace and linked to the other blocks. No further configuration is necessary.

5.3.3 Analog Input block

The Analog Input block is fully configurable and provides characterization for the incoming signal. The **OUT** value has the range and units configured in the **OUT_SCALE** parameter.

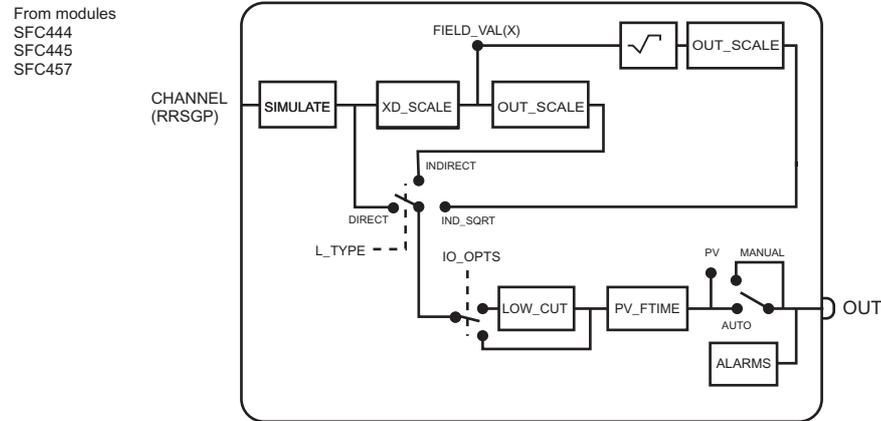


Fig. 5-2 Schematic diagram of Analog Input block

Procedure

- 1 In the fieldbus view, right click on the Analog Input block **Device Tag-AI-n** and select **Off Line Characterization**. The Characterization dialog opens.
 - Press the **ALL** button in the toolbar to display all parameters
- 2 Expand the **MODE_BLK** node and set the Target Mode to Auto
 - Select the **Target** node then click the **Edit** button
 - Select **Auto** from the drop-down menu, click **End Edit** to confirm the selection
 - Click **Close** to leave the dialog.
- 3 Set **CHANNEL** to the input connected to the block as defined in Section 5.3.1
 - Select **CHANNEL**, then click the **Edit** button
 - Enter the CHANNEL value (Rack+Slot+Group+Point)
 - Click on **End Edit**
- 4 Set **L_TYPE** to "Indirect" or "Indirect Sq Root" (for Δp flow analog input)
 - Select **L_TYPE**, click the **Edit** button, select parameter , then click on **End Edit**
- 5 Expand **XD_SCALE** and set the parameters according to the signal from the input point.
 - EU_100 is the upper range limit of the input signal, e.g. 20
 - EU_0 is the lower range limit of the input signal, e.g. 4
 - UNIT_INDEX is the unit of the input signal, e.g. mA
 - DECIMAL is the number of figures behind the decimal point
 In each case click the **Edit** button, enter or select parameter , then click on **End Edit**
 For the SFC445 Temperature module, the ranges and units are listed overleaf.
- 6 Expand **OUT_SCALE** and set the parameters according to the signal to be output.
 - EU_100 is the upper range limit of the output signal, e.g. 100
 - EU_0 is the lower range limit of the output signal, e.g. 0
 - UNIT_INDEX is the unit of the output signal, e.g. %
 - DECIMAL is the number of figures behind the decimal point
 In each case click the **Edit** button, enter or select parameter , then click on **End Edit**
- 7 For flow measurements a low-flow cut-off limit can be set as follows:
 - Select the **IO_OPTS** parameter and click on **Edit**
 - Select the **Low Cut-Off** option and click **End Edit**
 - Select the **CUT_OFF** parameter, click on **Edit**, enter the limit in OUT_SCALE units
 - Click on **End Edit**.

- 8 For a damped output use the **PV_FTIME** parameter
 - Select the **PV_FTIME** parameter and click on **Edit**
 - Enter the time constant (s) then click on **End Edit**.
- 9 If required, set alarms in the **ALARM** parameter set, see BA022S/04/en
- 10 Repeat the process for all inputs to AI blocks

SFC445 temperature ranges (XD_SCALE)

RTD	2-wire or 3-wire		Differential	
	Range °C	Range °F	Range °C	Range °F
Cu10 GE	–20 to 250	–4 to 482	–270 to 270	–486 to 486
Ni 120 DIN	–50 to 270	–58 to 518	–320 to 320	–576 to 576
Pt50 IEC	–200 to 850	–328 to 1562	–1050 to 1050	–1890 to 1890
Pt100 IEC	–200 to 850	–328 to 1562	–1050 to 1050	–1890 to 1890
Pt500 IEC	–200 to 450	–328 to 842	–650 to 650	–1170 to 1170
Pt50 JIS	–200 to 600	–328 to 1112	–800 to 800	–1440 to 1440
Pt100 JIS	–200 to 600	–328 to 1112	–800 to 800	–1440 to 1440

Thermocouples	2-wire or 3-wire		Differential	
	Range °C	Range °F	Range °C	Range °F
B NBS	+100 to 1800	+212 to 3272	–1700 to 1700	–3060 to 3060
E NBS	–100 to 1000	–238 to 1832	–1100 to 1100	–1980 to 1980
J NBS	–150 to 750	–238 to 1382	–900 to 900	–1620 to 1620
K NBS	–200 to 1350	–328 to 2462	–1550 to 1550	–2790 to 2790
N NBS	–100 to 1300	–148 to 2372	–1400 to 1400	–2520 to 2520
R NBS	0 to 1750	32 to 3182	–1750 to 1750	–3150 to 3150
S NBS	0 to 1750	32 to 3182	–1750 to 1750	–3150 to 3150
T NBS	–200 to 400	–328 to 752	–600 to 600	–1080 to 1080
L DIN	–200 to 900	–328 to 1652	–1100 to 1100	–1980 to 1980
U DIN	–200 to 600	–328 to 1112	–800 to 800	–1440 to 1440

Electrical	Single	Differential
Unit	Range	Range*
mV	–6 to +22	–29 to + 28
	–10 to 100	–110 to 110
	–50 to 500	–550 to 550
Ohms	0 to 100	–100 to 100
	0 to 400	–400 to 400
	0 to 2000	–2000 to 2000
*Each sensor must be designed for the single range		

5.3.4 Discrete Input block

The Discrete Input block is fully configurable and provides characterization for the incoming signal. The **OUT_D** value can be inverted setting the appropriate option in the **IO_OPTS** parameter.

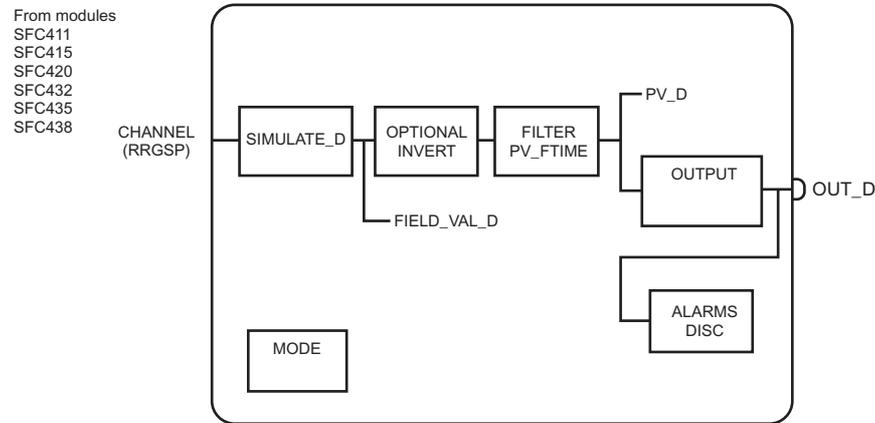


Fig. 5-3 Schematic diagram of Discrete Input block

Procedure

- 1 In the fieldbus view, right click on the Discrete Input block **Device Tag-DI-n** and select **Off Line Characterization**. The Characterization dialog opens.
 - Press the **ALL** button in the toolbar to display all parameters
- 2 Expand the **MODE_BLK** node and set the Target Mode to Auto
 - Select the **Target** node then click the **Edit** button
 - Select **Auto** from the drop-down menu, click **End Edit** to confirm the selection
 - Click **Close** to leave the dialog.
- 3 Set **CHANNEL** to the input connected to the block as defined in Section 5.3.1
 - Select **CHANNEL**, then click the **Edit** button
 - Enter the CHANNEL value (Rack+Slot+Group+Point)
 - Click on **End Edit**
- 4 If you want to invert the signal do it as follows:
 - Select the **IO_OPTS** parameter and click on **Edit**
 - Select the **Invert** option and click **End Edit**
- 5 For a delayed output use the **PV_FTIME** parameter
 - Select the **PV_FTIME** parameter and click on **Edit**
 - Enter the delay time (s) then click on **End Edit**.
- 6 If required, set an alarm in the **DISC_ALM** parameter set, see BA022S/04/en
- 7 Repeat the process for all inputs to DI blocks

5.3.5 Pulse Input block

The Pulse Input Block provides analog output values based on a pulse (counter) transducer input. Two primary outputs are available:

- **OUT** provides an analog rate based on the number of pulses counted per block execution. It is characterized by **PULSE_VAL** and **TIME_UNITS** and the engineering units are selected by scaling the output: the resulting range can be alarmed.
- **OUT_ACCUM** is the accumulated number of pulses and is intended to be connected to an integrator block for differencing, conversion, and integration. It is used when the count rate is low relative to the block execution rate. The counter is reset by putting the block into MAN mode and entering a new value for **OUT_ACCUM**.

More detailed information is to be found in the Function Block manual BA022S/04/en.

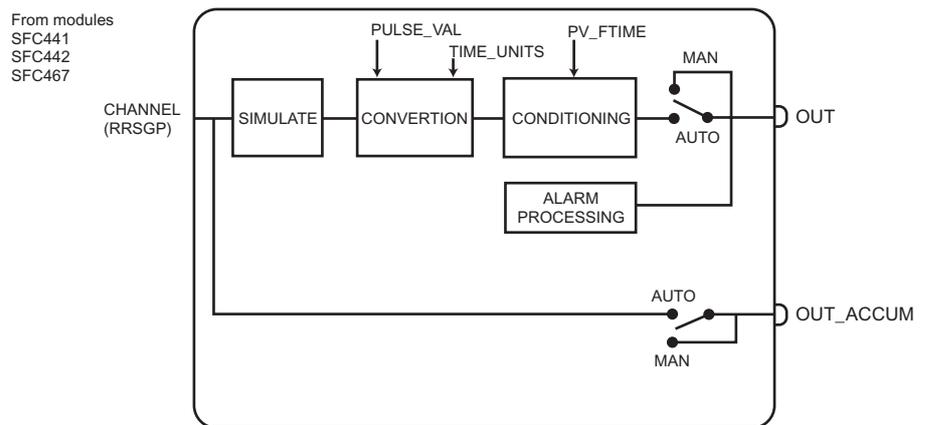


Fig. 5-4 Schematic diagram of Pulse Input block

Procedure

- 1 In the fieldbus view, right click on the Pulse Input block **Device Tag-PUL-n** and select **Off Line Characterization**. The Characterization dialog opens.
 - Press the **ALL** button in the toolbar to display all parameters
- 2 Expand the **MODE_BLK** node and set the Target Mode to Auto
 - Select the **Target** node then click the **Edit** button
 - Select **Auto** from the drop-down menu, click **End Edit** to confirm the selection
 - Click **Close** to leave the dialog.
- 3 If you are using the **OUT** parameter, set the conversion parameters:
 - Select **PULSE_VAL**, click **Edit**, enter the engineering quantity associated with one pulse, then click **End Edit**
 - Select **TIME_UNITS**, click **Edit**, select the units from the drop-down menu, then click **End Edit**
 - Expand **OUT_SCALE** and enter **EU_100**, **EU_0**, **UNITS_INDEX** (Engineering units) and **DECIMAL**, clicking **Edit** to change and **End Edit** to accept parameters.
 - For a damped output use the **PV_FTIME** parameter
 - Select the **PV_FTIME** parameter and click on **Edit**
 - Enter the delay time (s) then click on **End Edit**.
- 4 Set **CHANNEL** to the input connected to the block as defined in Section 5.3.1
 - Select **CHANNEL**, then click the **Edit** button
 - Enter the CHANNEL value (Rack+Slot+Group+Point)
 - Click on **End Edit**
- 5 If required, set an alarm in the **ALARM** parameter set, see BA022S/04/en
- 6 Repeat the process for all inputs to PULSE blocks

5.3.6 Multiple Analog Input block

The Multiple Analog Input block scales up to eight electrical input signals of 4 mA to 20 mA or 1 mV to 5 mV to **OUT_x** values of 0% to 100%. The block can be used together with the SFC444 and SFC457 analog input modules. If other input signals are used with these modules, Analog Input blocks must be used.

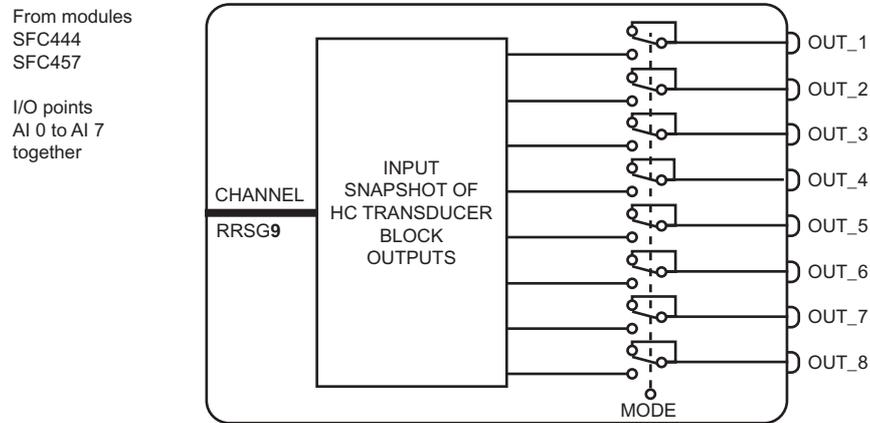


Fig. 5-5 Schematic diagram of Multiple Analog Input block

Procedure

- 1 In the fieldbus view, right click on the Multiple Analog Input block **Device Tag-MAI-n** and select **Off Line Characterization**. The Characterization dialog opens.
 - Press the **ALL** button in the toolbar to display all parameters
- 2 Expand the **MODE_BLK** node and set the Target Mode to Auto
 - Select the **Target** node then click the **Edit** button
 - Select **Auto** from the drop-down menu, click **End Edit** to confirm the selection
 - Click **Close** to leave the dialog.
- 3 Set **CHANNEL** to the input connected to the block as defined in Section 5.3.1
 - Select **CHANNEL**, then click the **Edit** button
 - Enter the CHANNEL value (Rack+Slot+Group+9)
 - Click on **End Edit**

Properties

The input channels of the SFC444 and SFC457 can be configured individually by jumpers on the printed circuit board to accept current or voltage signals, default setting current, see Chapter 3.5.1 of operating instructions BA021S/04/en, Field Controller: Hardware Installation. The OUT value is proportional to the electrical signal over the range 0 mA to 40 mA and 0 V to 10 V. The MAI block converts the input as shown in Table 5-2.

Value	Current			Voltage		
	Input value	OUT value	OUT status	Input value	OUT value	OUT status
Underrange limit	0 mA	-25%	GOOD	0 V	-25%	GOOD
Lower range limit	4 mA	0 %	GOOD	1 V	0 %	GOOD
Upper range limit	20 mA	100%	GOOD	5 V	100%	GOOD
Overrange limit	40 mA	225%	GOOD	10 V	225%	GOOD
Out of range	>40 mA	BAD	BAD	>10 V	BAD	BAD

Tab. 5-2: OUT value as a function of input signal for SFC444 and SFC457 modules

5.3.7 Multiple Discrete Input block

The Multiple Discrete Input block converts up to eight electrical input signals of low or high value into **OUT_Dx** values of 0 or 1. It can be used together with the SFC411, SFC415, SFC420, SFC432, SFC435 and SFC438 discrete input and discrete input/output modules. If signal characterization is required, Discrete Input blocks must be used.

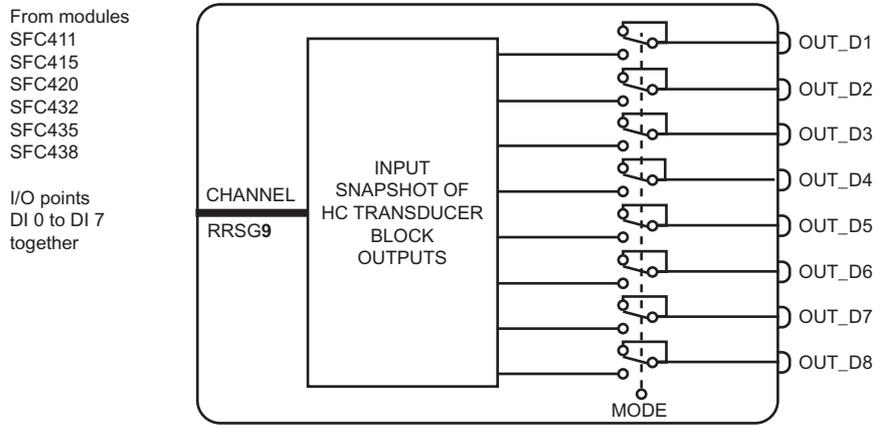


Fig. 5-6 Schematic diagram of Multiple Discrete Input block

Procedure

- 1 In the fieldbus view, right click on the Multiple Discrete Input block **Device Tag-MDI-n** and select **Off Line Characterization**. The Characterization dialog opens.
 - Press the **ALL** button in the toolbar to display all parameters
- 2 Expand the **MODE_BLK** node and set the Target Mode to Auto
 - Select the **Target** node then click the **Edit** button
 - Select **Auto** from the drop-down menu, click **End Edit** to confirm the selection
 - Click **Close** to leave the dialog.
- 3 Set **CHANNEL** to the input connected to the block as defined in Section 5.3.1
 - Select **CHANNEL**, then click the **Edit** button
 - Enter the CHANNEL value (Rack+Slot+Group+9)
 - Click on **End Edit**

Properties

The MDI block converts the input signals as into **OUT_Dx** = "0" or "1" as shown in Table 5-3.

OUT_Dx Value	SFC411	SFC415	SFC420	SFC432, SFC435 SFC438
ON state level (True) OUT_Dx = 1	18 – 30 VDC	0 – 5 VDC, < 200 Ω	Switch latched	15 – 30 VDC
OFF state level (False) OUT_Dx = 0	0 – 5 VDC	20 – 30 VDC, > 10 kΩ	Switches unlatched	0 – 5 VDC

Tab. 5-3: OUT_Dx value as a function of input signal for discrete input modules

5.3.8 Analog Output block

The Analog Output block is fully configurable and provides characterization for the outgoing signal. The **OUT** value is scaled with the **PV_SCALE** and **XD_SCALE** parameters.

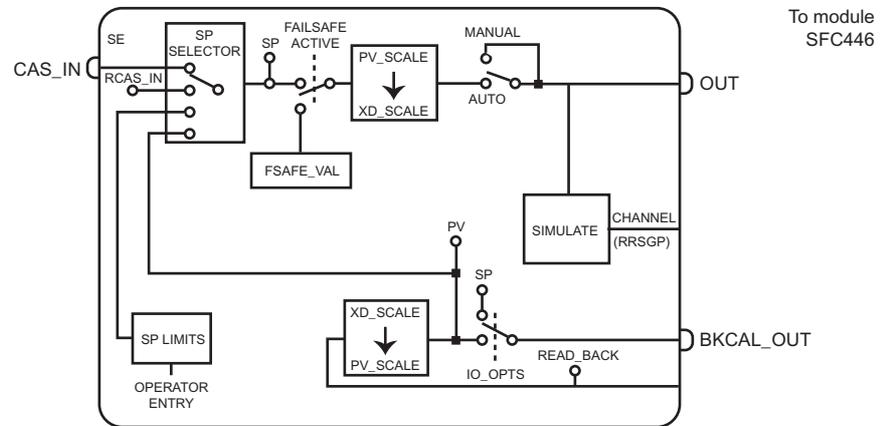


Fig. 5-7 Schematic diagram of Analog Output block

Procedure

- 1 In the fieldbus view, right click on the Analog Output block **Device Tag-AO-n** and select **Off Line Characterization**. The Characterization dialog opens.
 - Press the **ALL** button in the toolbar to display all parameters
- 2 Expand the **MODE_BLK** node and set the Target Mode to Auto
 - Select the **Target** node then click the **Edit** button
 - Select **Auto** from the drop-down menu, click **End Edit** to confirm the selection
 - Click **Close** to leave the dialog.
- 3 Set **CHANNEL** to the input connected to the block as defined in Section 5.3.1
 - Select **CHANNEL**, then click the **Edit** button
 - Enter the CHANNEL value (Rack+Slot+Group+Slot)
 - Click on **End Edit**
- 4 Expand **PV_SCALE** and set the parameters according to the input signal.
 - EU_100 is the upper range limit of the input signal, e.g. 100
 - EU_0 is the lower range limit of the input signal, e.g. 0
 - UNIT_INDEX is the unit of the input signal, e.g. %
 - DECIMAL is the number of figures behind the decimal point for displays
 In each case click the **Edit** button, enter or select parameter, then click on **End Edit**
- 5 Expand **XD_SCALE** and set the parameters according to the signal output by the I/O module
 - EU_100 is the upper range limit of the output signal, e.g. 20
 - EU_0 is the lower range limit of the output signal, e.g. 4
 - UNIT_INDEX is the unit of the output signal, e.g. mA
 - DECIMAL is the number of figures behind the decimal point for displays
 In each case click the **Edit** button, enter or select parameter, then click on **End Edit**
- 6 Repeat the process for all inputs to AO blocks

Properties

The AO block uses the OUT values to force electrical signals as shown in Tables 4-4 to 4-6. The type of output is determined by the wiring (current or voltage) and DIP switch (Range end value 5 DC or 10 VDC)

■ Current output

The parameters XD_SCALE_EU_100 and XD_SCALE_EU_0 set the range end values of the current signal output by the module. This is normally a standard 0 mA to 20 mA/4 mA to 20 mA signal, but other ranges within these limits are possible. The current output is independent of the setting of the Voltage Range DIP switch on the module and is directly proportional to the OUT value.

XD_SCALE	Range 0 mA to 20 mA		Range 4 mA to 20 mA	
	Value	Output	Value	Output
EU_100	20	20 mA	20	20 mA
EU_0	0	0 mA	4	4 mA
Unit	mA	–	mA	–

Tab. 5-4: Current output of SFC446 module as a function of the XD_SCALE settings

■ Voltage output (DIP switch OFF = range end 5V)

The parameters XD_SCALE_EU_100 and XD_SCALE_EU_0 set the range end values of the voltage signal output by the module. This is normally a standard 1V to 5 V/-5 V to +5 V signal, but other ranges within these limits are possible. The voltage output is dependent of the setting of the Voltage Range DIP switch on the module and is directly proportional to the OUT value.

XD_SCALE	Range 1 V to 5 V		Range -5 V to +5 V	
	Value	Output	Value	Output
EU_100	5	5 VDC	5	5 VDC
EU_0	1	1 VDC	-5	-5 VDC
Unit	V	–	V	–

Tab. 5-5: Voltage output of SFC446 module with DIP switch OFF as a function of the XD_SCALE settings

■ Voltage output (DIP switch ON = range end 10V)

The parameters XD_SCALE_EU_100 and XD_SCALE_EU_0 set the range end values of the voltage signal output by the module. This is normally a standard 2V to 10 V/-10 V to +10 V signal, but other ranges within these limits are possible. The voltage output is dependent of the setting of the Voltage Range DIP switch on the module and is directly proportional to the OUT value. The readback and OUT value reflect the XD_SCALE entries, not the voltage that can be measured at the output.

XD_SCALE	Range 2 V to 10 V		Range -10V to +10V	
	Value	Output	Value	Output
EU_100	5	10 VDC	5	10 VDC
EU_0	1	2 VDC	-5	-10 VDC
Unit	V	–	V	–

Tab. 5-6: Voltage output of SFC446 module with DIP switch ON as a function of the XD_SCALE settings

5.3.9 Discrete Output block

The Discrete Output block is fully configurable and provides characterization for the outgoing signal. Depending on the value of **OUT_D** the corresponding "True/1" or "False/0" signal is forced at the electrical output of the connected module relay output module SFC428, SFC432, SFC435 or SFC438.

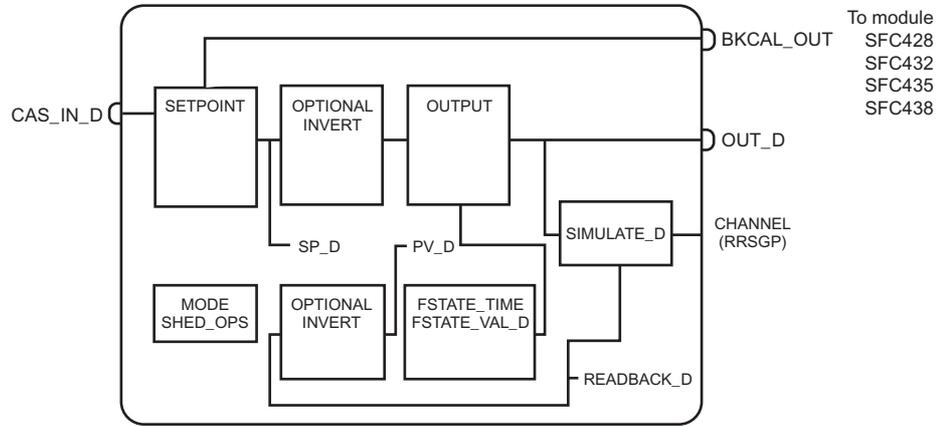


Fig. 5-8 Schematic diagram of the Discrete Output block

Procedure

- 1 In the fieldbus view, right click on the Discrete Output block **Device Tag-DO-n** and select **Off Line Characterization**. The Characterization dialog opens.
 - Press the **ALL** button in the toolbar to display all parameters
- 2 Expand the **MODE_BLK** node and set the Target Mode to Auto
 - Select the **Target** node then click the **Edit** button
 - Select **Auto** from the drop-down menu, click **End Edit** to confirm the selection
 - Click **Close** to leave the dialog.
- 3 Set **CHANNEL** to the input connected to the block as defined in Section 5.3.1
 - Select **CHANNEL**, then click the **Edit** button
 - Enter the CHANNEL value (Rack+Slot+Group+Slot)
 - Click on **End Edit**
- 4 If you want to invert the signal do it as follows:
 - Select the **IO_OPTS** parameter and click on **Edit**
 - Select the **Invert** option and click **End Edit**
- 5 For a delayed output on recognition of a fault, use the **FSTATE_TIME** parameter
 - Select the **FSTATE_TIME** parameter and click on **Edit**
 - Enter the delay time (s) then click on **End Edit**.
- 6 Repeat the process for all inputs to DO blocks

Properties

The DO block forces the output signals as shown in Table 5-7. NO (Normally open) and NC (normally closed) is the state of the relay when power is not applied.

OUT_D	SFC428, SFC432, SFC438 (NO relay)	SFC435, SFC438 (NC relay)
0	Activated	Deactivated
1	Deactivated	Activated

Tab. 5-7: Relay status of the output module as a function of OUT_D

5.3.10 Multiple Analog Output block

The Multipler Analog Output block forces up to eight electrical output signals between 0 mA and 20 mA, -5 V and 5 V or -10 V to 10 V depending upon the wiring and DIP switch setting of the connected SFC446 module. The output current or voltage of **Point x** is directly proportional to the **IN_x** value, see Table 5-9.

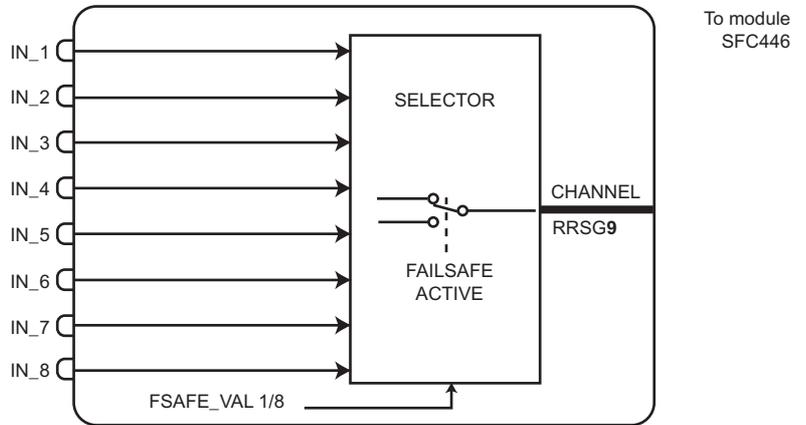


Fig. 5-9 Schematic diagram of the Multiple Analog Output block

Procedure

- 1 In the fieldbus view, right click on the Multiple Analog Output block **MAO-X Device Tag** and select **Off Line Characterization**. The Characterization dialog opens.
 - Press the **ALL** button in the toolbar to display all parameters
- 2 Expand the **MODE_BLK** node and set the Target Mode to Auto
 - Select the **Target** node then click the **Edit** button
 - Select **Auto** from the drop-down menu, click **End Edit** to confirm the selection
 - Click **Close** to leave the dialog.
- 3 Set **CHANNEL** to the input connected to the block as defined in Section 5.3.1
 - Select **CHANNEL**, then click the **Edit** button
 - Enter the CHANNEL value (Rack+Slot+Group+9)
 - Click on **End Edit**
- 4 If you want to set fault values for the signal do it as follows:
 - Open each parameter with **Edit** and click **End Edit** after the parameter has been set
 - Select **FSTATE_TIME** and enter a delay between fault recognition and block reaction
 - Select **MO_OPS** and check all inputs where a fault values will apply, check the appropriate inputs where this fault value is to be used on start-up
 - Select the **FAULT_VALX** parameter of each input checked, and enter the fault value.
- 5 Repeat the process for all inputs to MAO blocks.

Properties

The MAO block forces the output signals shown in Table 5-8. The type of output is determined by the wiring (current or voltage) and DIP switch (Range end value 5 VDC or 10 VDC)

IN_x	Current	Voltage (DIP switch OFF)	Voltage (DIP switch ON)
100 %	20 mA	5 VDC	10 VDC
0 %	4 mA	1 VDC	2 VDC
-25%	0 mA	0 VDC	0 VDC
-150%	N/A	-5 VDC	-10 VDC

Tab. 5-8: Current and voltage output of SFC446 module as a function of configuration

5.3.11 Multiple Discrete Output block

The Multiple Discrete Output block forces the electrical outputs of the connected relay output module SFC428, SFC432, SFC435 or SFC438 to "True/1" or "False/0" according to the value of **IN_Dx**, which must be "0" or "1". If signal inversion is required, the Discrete Output block must be used.

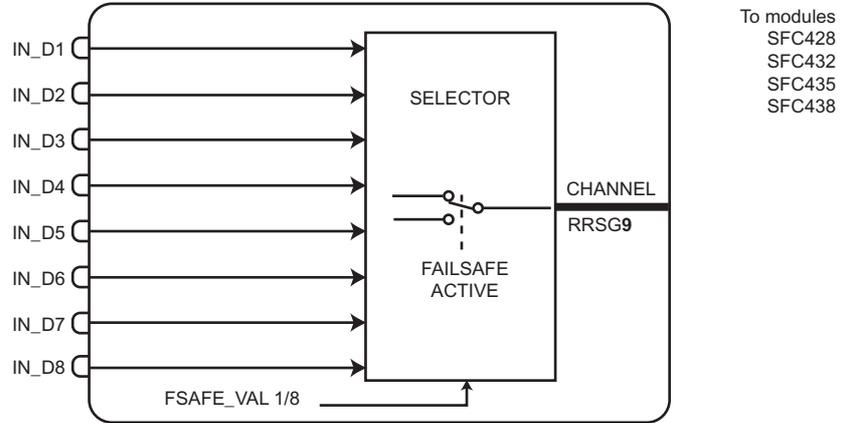


Fig. 5-10 Schematic diagram of Multiple Discrete Output block

Procedure

- 1 In the fieldbus view, right click on the Multiple Discrete Output block **Device Tag-MDO-n** and select **Off Line Characterization**. The Characterization dialog opens.
 - Press the **ALL** button in the toolbar to display all parameters
- 2 Expand the **MODE_BLK** node and set the Target Mode to Auto
 - Select the **Target** node then click the **Edit** button
 - Select **Auto** from the drop-down menu, click **End Edit** to confirm the selection
 - Click **Close** to leave the dialog.
- 3 Set **CHANNEL** to the input connected to the block as defined in Section 5.3.1
 - Select **CHANNEL**, then click the **Edit** button
 - Enter the CHANNEL value (Rack+Slot+Group+9)
 - Click on **End Edit**
- 4 If you want to set fault values for the signal do it as follows:
 - Open each parameter with **Edit** and click **End Edit** after the parameter has been set
 - Select **FSTATE_TIME** and enter a delay between fault recognition and block reaction
 - Select **MO_OPS** and check all inputs where a fault values will apply, check the appropriate inputs where this fault value is to be used on start-up
 - Select the **FAULT_VALDX** parameter of each input checked, and enter the fault value.
- 5 Repeat the process for all MDO blocks.

Properties

The MDO block forces all output signals as shown in Table 5-9. NO (Normally open) and NC (normally closed) is the state of the relay when power is not applied.

IN_Dx	SFC428, SFC432, SFC438 (NO relay)	SFC435, SFC438 (NC relay)
0	Activated	Deactivated
1	Deactivated	Activated

Tab. 5-9: Relay status of the output module as a function of OUT_D

5.4 Next steps

Once you have assigned all I/O module signals to the appropriate function blocks, you can now use them to create your control strategy. You must:

- Create the complete control strategy
- Assign the function blocks to the devices
- Assign tags
- Download the finished project to the Field Controller

These procedures are described in the following manuals:

Component	Description	Document type	Designation	Order No.
Software	Application Designer: FF Tutorial	Operating manual	BA019S/04/en	70101151
	Application Designer: PROFIBUS Tutorial	Operating manual	BA036S/04/en	70701152
	Application Designer: MODBUS Tutorial	Operating manual	BA037S/04/en	70701153
	Application Designer: IEC 61131 Tutorial*	Operating manual	BA038S/04/en	7070xxxx
Function blocks	Function Block Manual	Operating manual	BA022S/04/en	56004886

* This manual will be added to the CD-ROM when it is completed

Before the download can be made, you must connect the Field Controller to the subnet. This procedure is described in the next chapter.

6 Going On-line

6.1 Connecting the Field Controller to the subnet

After the Field Controller and other components have been physically installed in the Fieldbus network (subnet), it must be set-up. Since it is operating in a network, it requires an IP address. The procedure depends on the whether the subnet has a DHCP server and whether there is more than one Field Controller in the network.

Note!



- Although DHCP is supported, we recommend the use of fixed IP addresses, see Chapter 6.1.3.
- Administration rights are required to change IP addresses
- The procedures here are shown with Windows XP – for Windows 2000, consult your System Administrator
- The **Internet Protocol TCP/IP** must be installed on your computer

6.1.1 Networks with two or more Field Controllers

If more than one Field Controller is connected to a subnet, the following procedure must be followed for each unit before going on-line:

Procedure

- 1 Check that all Field Controllers are switched off.
- 2 Now switch on the first controller and check that the LEDs ETH xxx and RUN are lit.
- 3 Press down the left push-button (Factory Init / Reset) and hold it firmly while pressing the right push-button three times: check that the LED FORCE is flashing three times a second.

Note!



If you forget the number of times you pressed the right push-button, check how often the LED Force is flashing: after the fifth press, it blinks once a second. (the function is rotative).

- 4 Release the left push-button and the system will execute a RESET. The firmware will then operate with the standards values for IP address and the subnet mask.
- 5 If your network has a DHCP server (consult the administrator of your network) the Field Controller will now be allocated a new IP address and connected to your subnet. Otherwise it will have IP address 192.168.164.100 (SFC162) or 192.168.164.101 (SFC173) and you must execute the steps under "Networks without a DHCP Server".
- 6 Repeat the procedure for all other units in the subnet.

6.1.2 Network with DHCP Server

A Dynamic Host Configuration Protocol Server (DHCP server) automatically registers the presence of the Field Controller in the subnet and allocates an IP address to it. If there is only one Field Controller in the subnet, the IP address will be set-up automatically after it has been turned on.

6.1.3 Networks without a DHCP Server

If your subnet does not have a DHCP server, the IP address of your computer must be changed temporarily. If you are not sure how to do this, consult your network administrator.

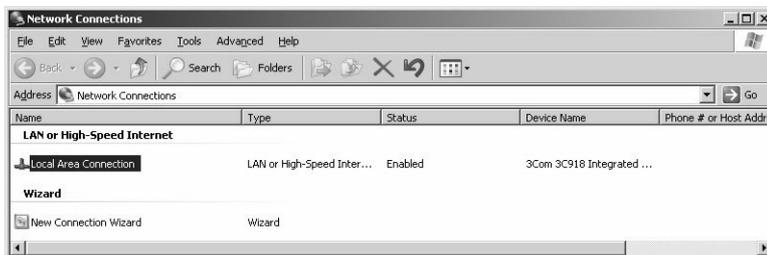


Warning

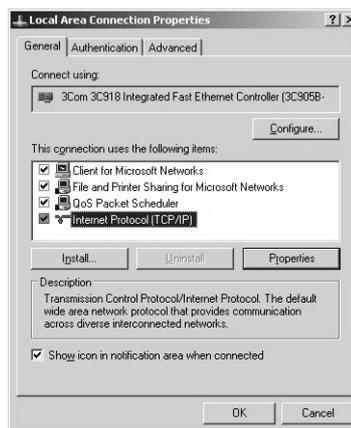
- The use of IP addresses is strictly controlled. Usually your system administrator will be authorised to allocate unique addresses. Assigning an unauthorised address to a Field Controller may result in conflicts within your system and the failure of the associated devices!

Change your computer's IP address

- 1 Right-click **Start =>Settings =>Control Panel =>Network Connections**

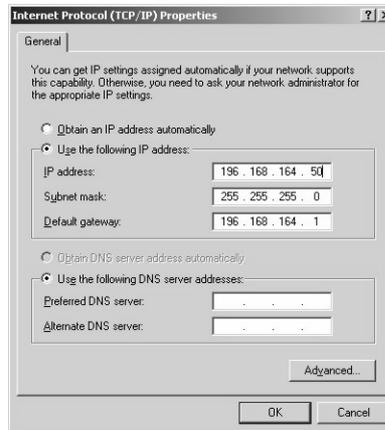


- 2 Right-click **Local Area Connection => Properties**



- 3 Using the left mouse button, double-click **Internet Protocol (TCP/IP)** or click once, then click **Properties**.
- 4 Note the original values of IP address and Subnet Mask of the computer to restore them at end of the operation.

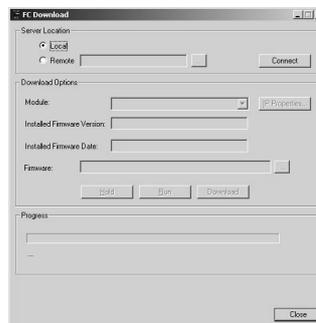
- 5 Change the IP address and the Subnet Mask of the computer, so that it is in the same subnet as the Field Controller.
 - IP Address 192.168.164.XXX and network mask (Subnet Mask) 255.255.255.0.
 - Do not use the addresses 192.168.164.100 or 101, as these are reserved as default addresses for the Field Controllers SFC162 and SFC173 respectively



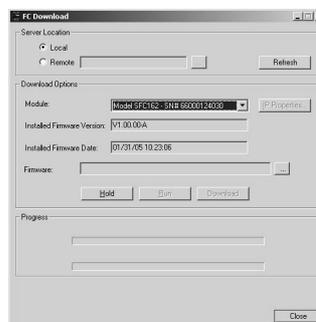
- 6 Click on the **OK** button to complete the procedure

Set the Field Controller IP address

- 7 Now call FC Tools: **Programs =>Endress+Hauser=>ControlCare=>Tools=>FC Tools**
- 8 Choose the Field Control (OPC) Server path, default **Local**, then press **Connect**



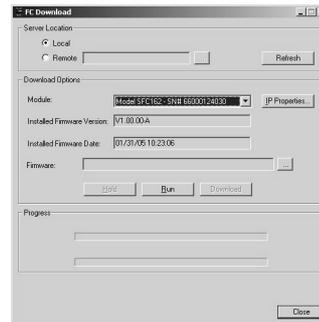
- 9 Select the desired Field Controller module option **Module** using its serial number as reference. The serial number is printed on the inside of the module door.



- 10 Press the **Hold** button to interrupt the firmware that is being executed in the module
 - A confirmation window appears, press **Yes** to continue
 - Any application running on the Field Controller will be stopped at this point



- 11 Check that the HOLD LED on the Controller module is lit, then press **Connect** to continue with the procedure.

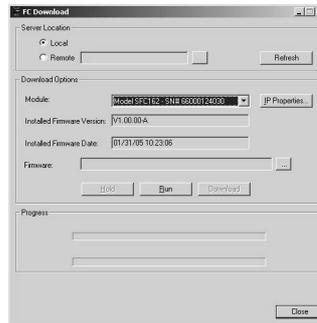


- If the HOLD LED does not light, there is a communication problem: Type PING 192.168.164.100 or 101 in the DOS command window and check whether the Field Controller is found. If there is a reply, replace the Ethernet cable by a cross-cable and try Step 10 again.
- 12 Reselect the desired Controller module, then click on the **IP Properties** button. Now check the option **Specify an IP address**, then enter the IP Address and the Subnet Mask
 - Answer **Yes** to the confirmation box
 - Now enter the Field Controller address given to you by your system administrator (in our example 10.10.10.128)
 - Make a note of the IP addresses and the corresponding Controller serial number. This will help in the identification and diagnosis of possible faults.



- 13 Click on **OK** to finish the operation
- 14 Now change the address of your computer as described in Steps 1 to 6 to the new domain, so that it can continue to communicate with the Field Controller at its new address:
 - **Start =>Settings =>Control Panel =>Network Connections**
 - **Local Area Connection => Properties**
 - **Protocol (TCP/IP)=>Properties**
 - Enter an unused IP address and the subnet work address of the new domain (For our example e.g. 10. 10.10.55 and default subnet address)
 - Press **OK** to finish the process

- 15 Now return to FC Tools and click on **Run** to start the execution of the Field Controller firmware again

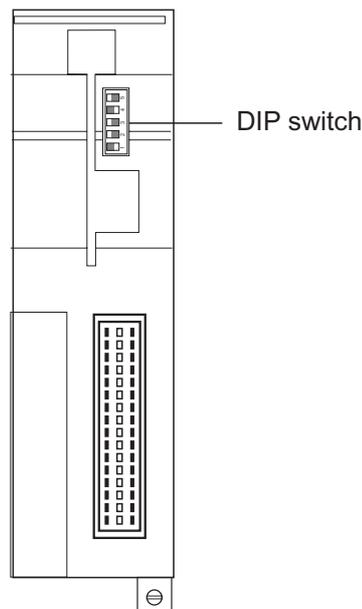


- 16 Check that the HOLD LED on the Field Controller has extinguished, then press **Close**.
- If the HOLD LED does not extinguish, there is a communication problem:
Type PING the new IP address in the DOS command window and check whether the Field Controller is found. If there is a reply, replace the Ethernet cable by a cross-cable and try Step 10 again.
- 17 The selected Controller module has now been connected. Now repeat Steps 1 to 16 for all other Controller modules.
- 18 When IP addresses have been assigned to all Field Controllers, reset your computer's address to the original values.

7 Trouble-Shooting

7.1 Simulation

All I/O function blocks running with the system can be set to simulation mode to check the function of the control strategies in which they are integrated. For blocks connected to the local I/O of the controller, simulation must first be enabled at the DIP switch on the rear of the Field Controller, which can be accessed with a small screwdriver blade.



To enable simulation set Switch 3 "SIMULATION" to "ON"



When all blocks and strategies have been checked, it is advisable to reset the SIMULATION switch to OFF.

Simulated values

When the Field Controller is started, the status "SimulationActive" will be flagged in the **BLOCK_ALM** parameter **SUB_CODE** of the Field Controller Resource and I/O block as well as in the **BLOCK_ERR** parameter. Simulation is activated in the Input and Output blocks as follows:

- 1 Set the **MODE_BLK** to OOS, then set **ENABLE/DISABLE** to Active.
- 2 Set **SIMULATE_VALUE** and/or **SIMULATE_STATUS** by pressing **Edit**, modifying the value and confirming the change with **End Edit**.
- 3 Set the **MODE_BLK** to Auto, the the simulated values will be used by the block.
- 4 When simulation is complete, deactivate the simulation in the block and at the DIP-switch on the Field Controller.

7.2 Factory initialisation and reset



Warning!

- Do not use the pushbuttons located in the Field Controller unless you are certain that you want to reset the system.

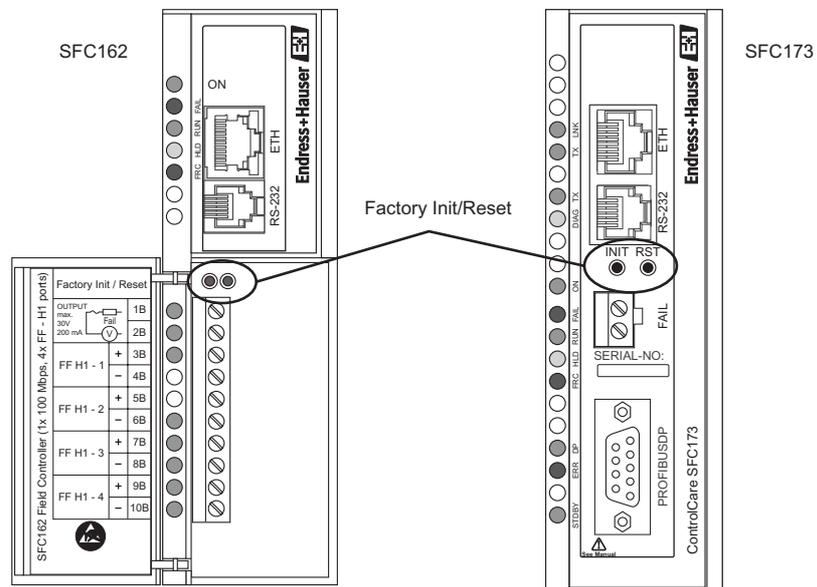


Fig. 7-1: Position of the Init and RESET pushbuttons on the Field Controllers

Two pushbuttons located on the Field Controller, see Fig 6.1, allow the system to be initialised and reset. The function and effect of the buttons is described in the table below

- To "click " the pushbuttons use a pointed instrument (e.g. a ballpoint pen).
- Any mode can be exited by keeping the right pushbutton pressed and releasing the left pushbutton.
- The rate at which the **FORCE** LED is flashing indicates the current mode..

Function	Effect	Procedure
Reset	Resets system: the last configured IP Address is used	<ul style="list-style-type: none"> Click the right pushbutton - the system resets (takes several seconds) If IP Address is found, a new one is assigned automatically Verify that the RUN and ETH LNK LEDs are lit.
Factory Init	Deletes application, the last configured IP Address is retained	<ul style="list-style-type: none"> Keeping the left pushbutton pressed, click the right pushbutton Check that the FORCE LED flashes once a second. Release the left push button. The system resets, see above.
HOLD	Stops all activities on the fieldbus	<ul style="list-style-type: none"> With the RUN LED lit, keep the left pushbutton pressed and then double click the right pushbutton, checking that the FORCE LED flashes twice a second. Release the left pushbutton and the system will execute the RESET and then enter the HOLD mode. Verify that the HOLD and ETH LNK LEDs remain lit. With the Field Controller in this mode, you can use the FC Tools Wizard to update the firmware or change the IP address. <p>Use the Reset again, case you want to return to the execution mode (RUN).</p>

7.3 Field Controller

Problem	Remedy
FC Tools does not show all the Field Controllers that are in the sub-network	There is probably an IP address conflict in this sub-Network. <ul style="list-style-type: none"> Disconnect all the Field Controllers from the sub-Network and execute the procedure "Connecting the Field Controller to its Sub-Network" for each module, assuring that the address to be used is not associated with other equipment of the network.
FC Tools does not find the Field Controller	<ul style="list-style-type: none"> Make sure that the initial connection procedure was followed and the Field Controller is operating in the same subnet and not with the default address 192.168.164.100/101 Check that the Ethernet cable, see above Check if the network adapter is on and OK: Execute a PING command to its own IP, via DOS PROMPT. Check if the Ethernet connection is OK: Execute a PING command to the Field Controller.
FC Tools does not put the Field Controller in HOLD	Use the Mode HOLD procedure of Factory Init/Reset. <ul style="list-style-type: none"> With the Field Controller in HOLD mode, execute the firmware update procedure, Section 7.3, using the steps of item 2. If the problem persists, check the related TCP/IP connection (check the cables and ETH LNK LED)
Firmware begins to execute but after a certain time it stops	It might be a configuration problem. <ul style="list-style-type: none"> Use the Factory Init procedure and configure the Field Controller again. If the problem persists, download the firmware again as described in Chapter 7.3
HOLD LED remains lit	If the HOLD LED remains lit after the Field Controller has been turned on, the firmware may be invalid. <ul style="list-style-type: none"> Update the firmware as described in Chapter 7.3
ETH LNK LED does not light	Check if the cable is connected correctly, or that the cable is not damaged. Check the specification of the cables: <ul style="list-style-type: none"> SFC 954 - Cable Standard. To be used in a network between the Field Controller and a Switch/HUB. SFC 955 - Crossed Cable (Cross). To be used point to point between a PC and the Field Controller
ERR LED is lit (SFC173)	PROFIBUS DP error <ul style="list-style-type: none"> PROFIBUS DP connection has been lost, check connections One or more slaves have not been correctly configured for cyclic data exchange, see BA036S/04/en, Application Designer, PROFIBUS tutorial
FRC LED is flashing (Force)	Field Controller is in reset mode <ul style="list-style-type: none"> Complete the RESET procedure
STDBY LED is lit	Field Controller is in stand-by mode (redundant application)

7.4 Application Designer

Problem	Remedy
Field Controller does not appear in HSE live list	No connection to Field Controller <ul style="list-style-type: none"> ■ Field Controller is on HOLD, set it to RUN mode ■ IP address is not configured correctly, use PING to check, see Chapter 7.2
Red cross appears on the HSE Network	No connection to Field Controller <ul style="list-style-type: none"> ■ Field Controller is on HOLD, set it to RUN mode ■ IP address is not configured correctly, use PING to check, see Chapter 7.2
Red cross appears on the Field Controller	No communication with Field Controller <ul style="list-style-type: none"> ■ No Ethernet connection with Field Controller, check connection, IP address etc, see above ■ No Device-ID set in the Field Controller
Device does not appear in the live list	Communication error <ul style="list-style-type: none"> ■ The device is not powered up ■ The project has been updated but no download has been made yet
Configuration does not download	You have either a communication problem or the configuration is not complete <ul style="list-style-type: none"> ■ Check that you are on-line - press the On-line button ■ Check that your computer is in the same address domain ■ Check that you have assigned the Field Controller tag ■ Check that you have exported all tags OPC server ■ Check that the parameters are in the recommended order ■ Check that the OPC server is running (look for icon in bottom line)
Parameter appears red in the on-line control strategy	The parameter has a bad status <ul style="list-style-type: none"> ■ Check that the Block Mode is Auto (or Cas) ■ Check that the block has been correctly configured ■ Check that the device is still live (live list) ■ Check that the device address is the same as that you have in your configuration (live list) ■ Check that the parameter has been correctly configured in the FOUNDATION Fieldbus Configurator

7.5 Updating the firmware

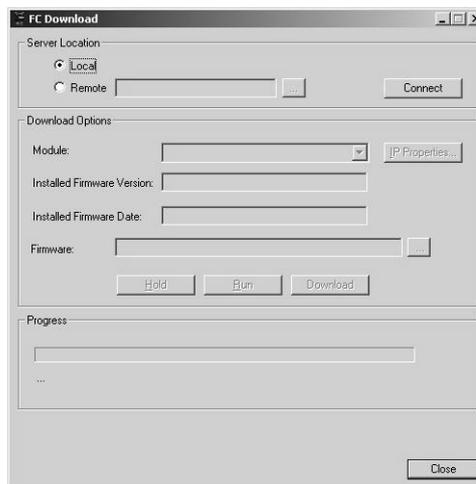


Warning!

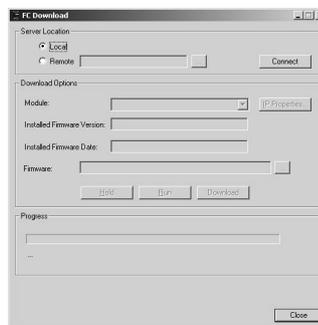
- Do not update the firmware of your Field Controller unless you have been expressly asked to do so by Endress+Hauser Service. Your ControlCare application is delivered with the firmware already installed in the Field Controller.

Firmware update

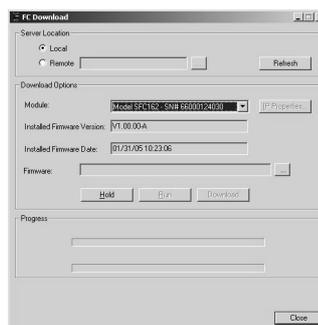
- Call FC Tools by clicking **Programs =>Endress+Hauser=>ControlCare=>Tools=>FC Tools**
- Choose the Field Control (OPC) Server path, default **Local**, then press **Connect**



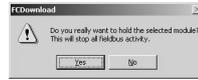
- Choose the Field Control (OPC) Server path, default **Local**, then press **Connect**



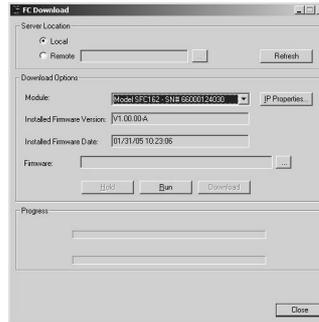
- Select the desired Field Controller module option **Module** using its serial number as reference. The serial number is printed on the inside of the module door.



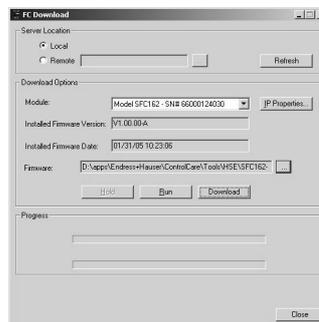
- 5 Press the **Hold** button to interrupt the firmware that is being executed in the module
 - A confirmation window appears, press **Yes** to continue
 - Any application running on the Field Controller will be stopped at this point



- 6 Check that the HOLD LED on the Controller module is lit, then press **Connect** to continue with the procedure.



- 7 Reselect the desired Controller module
 - Note the current firmware version installed in the Field Controller
- 8 Click on the browse button "..."
 - The computer automatically locates all firmware versions and displays them in a dialog box
 - SFC1xx-VXX.YY.ZZ-A
 - SFC1xx is the Field Controller designation
 - VXX.YY.ZZ is the Firmware Version number
 - Firmware with the same primary version index ("VXX.") as the old firmware will run in the Field Controller
- 9 Select the latest firmware version, then press **Open**
 - The program returns to the overview window



- 10 Now press **Download** to start the firmware download to the controller
 - Confirm the download action with **Yes**
 - The download takes about 5 minutes
- 11 When the download is completed, a status window will appear with the message "Program Downloaded Successfully"
 - Press **OK** to close the dialog box
 - The Field Controller is automatically placed in the "Run Mode" on completion of the download: Check that the RUN LED is lit.



- 12 Press **Close** to close FC tools.

For your notes

For your notes

Index

A

Add or Remove Programs	14
Adobe Reader	12
Analog Input block	34
Analog Output block	40
Application Designer	54
Assigning an IP address	46

C

CHANNEL parameter	32
Commissioning	3
Configuration	53
ControlCare Field-based Control System	7
ControlCare PROFIBUS Configurator	23
Controller I/O blocks	25

D

DHCP Server	46, 47
Discrete Input block	36
Discrete Output block	42
Document Type	16, 21
Download	55
Downloading the firmware	55

E

EMV	3
Explosion protection	5
Export Tag	17

F

Factory initialisation	52
FF Field Controller	15
FF project	16
Field Controller	5, 46, 53
FieldController set-up	46

H

Hardware configuration block	27
HC block parameters	29
HSE Network	18, 22

I

I/O function blocks	32
I/O modules	25
I/O types and blocks	28
Installation	3

M

Modify PROFIBUS Configuration	24
Multiple Analog Input block	38
Multiple Analog Output block	43
Multiple Discrete Input block	39
Multiple Discrete Output block	44

N

New Bridge	18
New Fieldbus	19
New Gateway	22
New Profibus	23
New Project	16, 21

O

OPC client	12
OPC Data Spy	12
OPC Servers	10
Operation	3

P

Preferences	17
PROFIBUS Field Controller	20
PROFIBUS project	21
Project	15
Project File	16, 19, 21, 24
Pulse Input block	37

R

Release notes	6
Resource block	26

S

Safety	3
Safety conventions	4
SFC445 temperature ranges	35
Simulated values	51
System requirements	6

T

Tag Composition	17
Tag Policy	17
Temperature block	30
Temperature Block parameters	31
Transducer block	26

www.endress.com/worldwide

Endress+Hauser 
People for Process Automation
