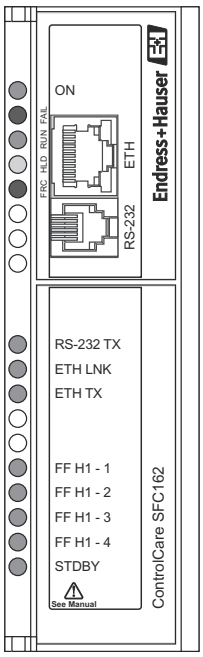
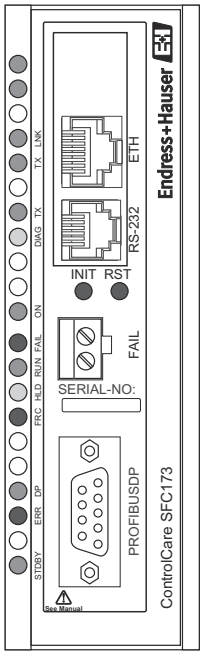
Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Operating Instructions

ControlCare Field Controller

Commissioning and Configuration





BA 035S/04/en/06.10
Software Version 2.05.xx
Nr. 56004887

Endress+Hauser

People for Process Automation

Table of Contents

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	■ Simulation for Local I/O added (Chapter 7.1) ■ Pulse Input block description revised (Chap. 5.3.5)
2.03.xx	BA035S/04/en/06.07	Setup	■ Update and deinstallation improved
		Program	■ New preferences dialog (packing) ■ Assign All Tags added
		Going on-line	■ New HSE Network Tools program ■ New Field Controller Web Server program
		Trouble-Shooting	■ New FC Tools program and firmware download ■ New Exchange procedure
2.04.xx	BA035S/04/en/12.08	System requirements	■ Windows Vista now supported
		Aliasing, Embedded hybrid FB	■ Aliasing added to Preferences, Chapter 3.3 ■ Aliasing added to HC configuration, Chapter 5.2.1 ■ Note Hybrid FB added to Channel, Chapter 5.3.1
2.05.xx	BA035S/04/en/06.10	General	■ Version, documentation table, windows support
		Getting Started	■ Screenshots updated
		Trouble-Shooting	■ FRC LED description updated for battery power

Product Version

Details of product version and the individual components of Application Designer Suite can be seen in the About ControlCare dialog:

Start=>Programs=>Endress+Hauser=>ControlCare=>Tools=>About ControlCare

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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 sytem 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 installion 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 emmision: 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!

It is recommended that ControlCare Field Controllers and OPC servers are not installed in an office network, as the large data packets exchanged between office equipment may lead to timeouts and intermittent communication errors. Ideally, the ControlCare system network should operate within its own IP domain; if this is not possible it should be separated from other parts of the network by a managed switch.

Since the system can be accessed and manipulated through the various Field Contoller 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 documentated. 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	70104301
	Application Designer: Local I/O Tutorial	Operating manual	BA032S/04/en	71095009
	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 61131-3 Ladder Logic Tutorial	Operating manual	BA038S/04/en	70101386
	Application Designer: IEC 61131-3 Structured Text Tutorial	Operating manual	BA056S/04/en	71060063
	Field Control (OPC) Servers	Operating manual	BA018S/04/en	71031428
	SFC162 Visitor	Operation manual	BA069S/04/en	71113457
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, Windows Server 2003 and Windows Vista 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.
- Windows Firewall may want to block some features of the program: if the dialog box appears during setup, click **Unblock** to ensure correct function.

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.

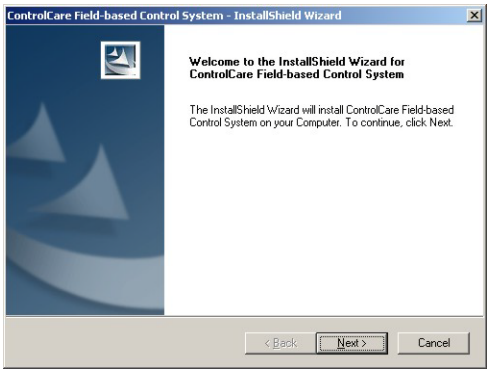
2 The setup program starts the installation process:
If a ControlCare version <02.02.xx is found on your computer, you will be asked to deinstall it.

- Press **OK** to close the warning dialog window
- Open the **Windows Control Panel** and uninstall Application Designer and if appropriate OpenPCS using the **Add/Remove** function
- Restart the setup program - see Step 1

If a ControlCare version greater or equal to 02.02.xx is found on your computer, a modified Welcome dialog appears

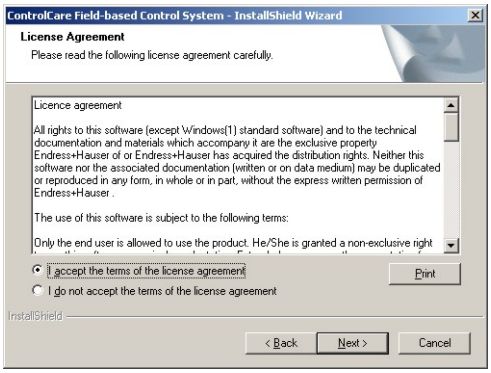
- Continue the installation by clicking **Next**
- The installation continues as described in Chapter 2.4, Upgrades.

3 If ControlCare was not installed previously the **Welcome** dialog appears



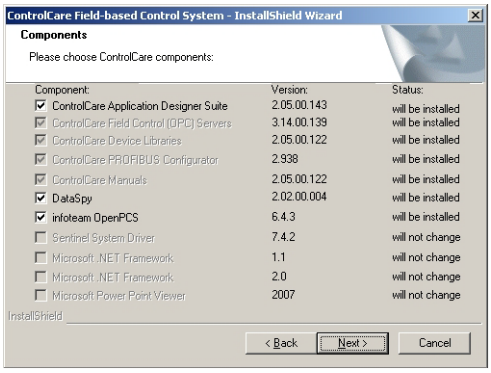
- Continue the installation by clicking **Next**

4 The **Licence Agreement** now appears



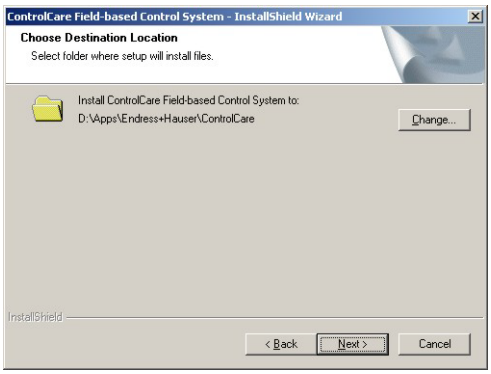
– Read the agreement, then check the button saying that you agree with it
– **Print** will cause a copy of the license agreement to be printed out
– Continue the installation by clicking **Next**

5 The **Components** dialog appears



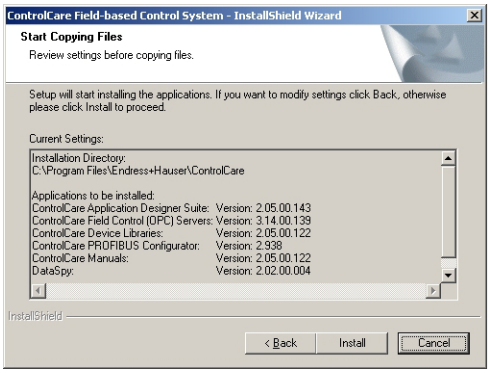
– Press **Next** to accept the default settings

6 The **Choose Destination Location** dialog appears



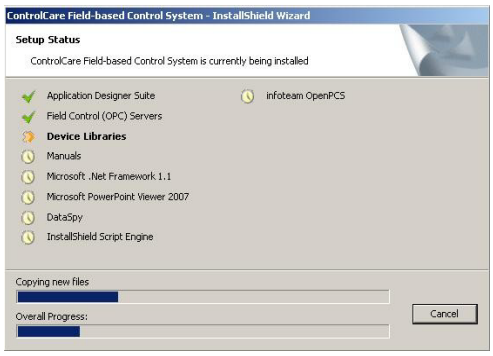
– Press Change and follow the instructions if you want to select a different destination.
– Press Next to accept the default destination and/or to continue installation.

7 The **Start Copying Files** dialog appears



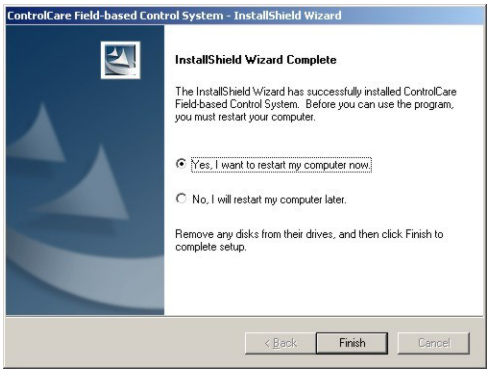
– Read the list the applications to be installed
– If you want to change anything, press **Back** until you reach the appropriate screen
– Continue the installation by pressing **Install**

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
– After computer restart, 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.

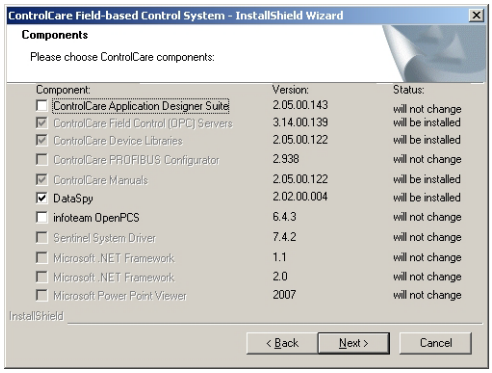
1 Click on ControlCare Field-based Control System to initiate the software installation process.

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.

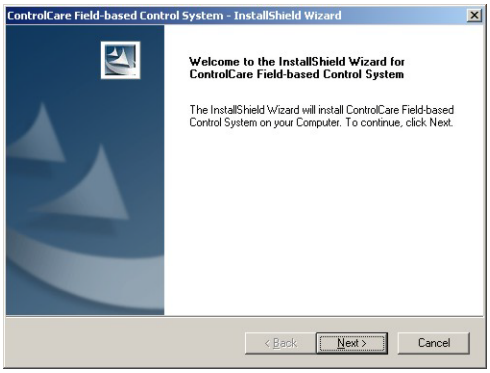
2.4 Upgrades

Only ControlCare Versions greater than or equal to 2.02.xx can be upgraded.

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

2 IThe setup program detects the earlier version of Application Designer Suite

- The **Welcome** to update page appears
- To continue click on **Next**



3 In the **Components** dialog press **Next** to accept the default settings

- Alternatively select the components you wish to update and press **Next**.

4 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.

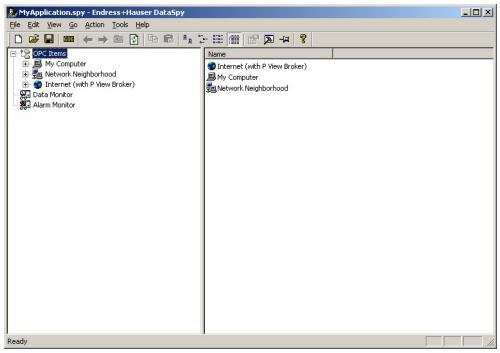
3 To open a manual from your computer select
Start=>Programs=>Endress+Hauser=>ControlCare=>Manuals=>English

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.

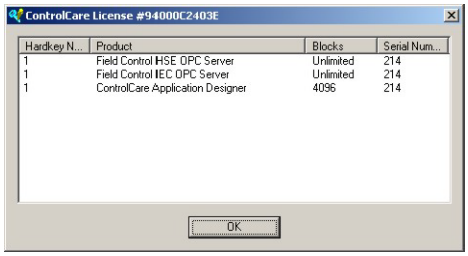
2.6 Checking Your Installation

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):

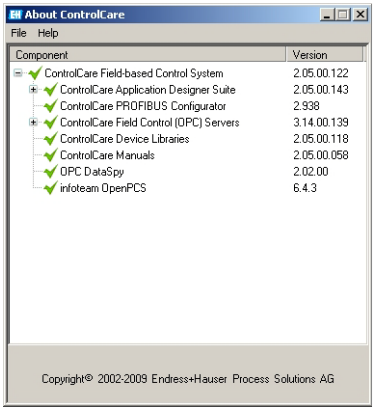


   – Field Control HSE OPC Server supports an unlimited number of tags
   – Field Control IEC OPC Server supports an unlimited number of tags
   – ControlCare Application Designer supports 4096 Function Blocks.

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.

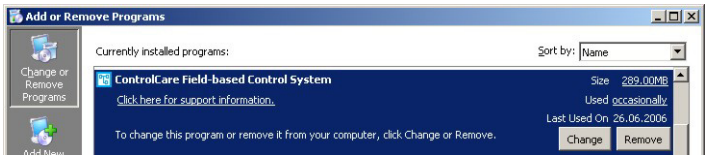
   – It can be copied onto the clipboard by selecting the text within the box by scrolling the mouse over it.
   – Now press the sequence "**Crtl+Insert**" to copy it and "**Shift+Insert**" to paste it into another text document.
   – The information contained may differ from the screenshot above which was made before the final build of the currrent version

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.

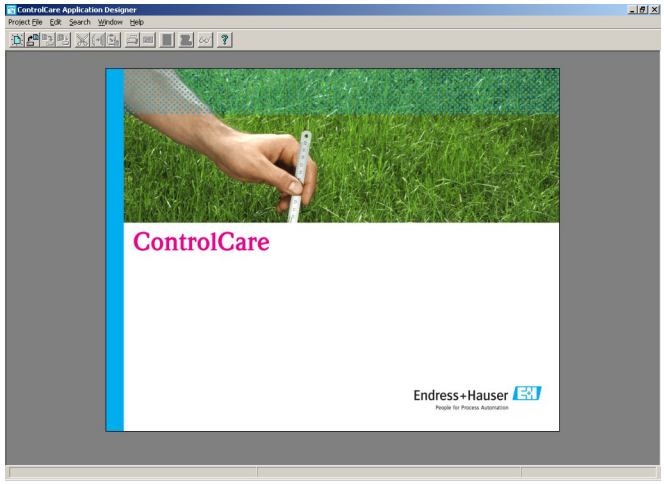
3 FF Field Controller

The Field Controller is configured with the ControlCare Application Designer software. Before you use this for the first time, check that the 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

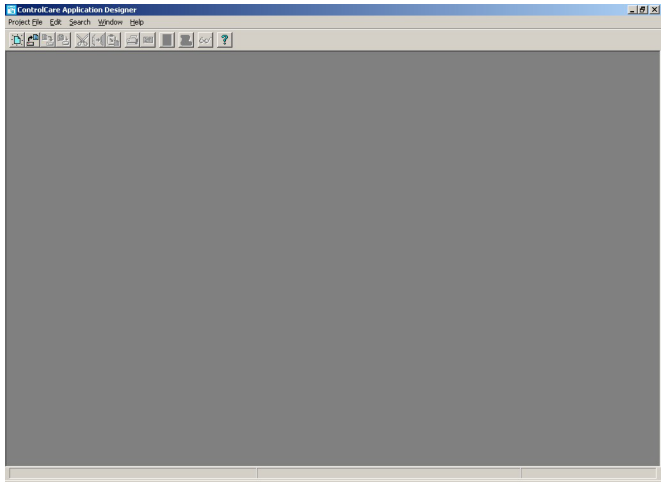
1 Start Application Designer:
Start=>Programs =>Endress+Hauser=>ControlCare Application Designer

- The welcome screen appears
- If projects already exist, the last one use will be automatically loaded at this stage.



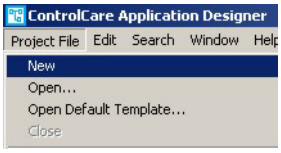
2 The first time you use the program, the workspace remains blank

- If projects already exist, the last one used will be loaded as default
- The default settings of the workspace management can be changed by selecting **Project File => Preferences => Workspace Layout**

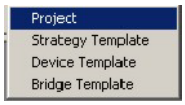


3.2 Create a FF project

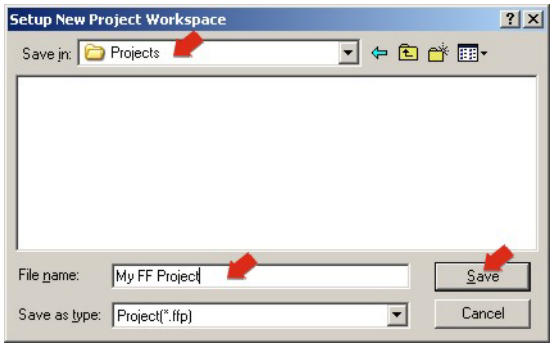
1 The project starts from a blank application screen
– With the right mouse key select **Project File=>New**



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



2 The **Setup New Project Workspace** dialog box opens:



– Choose the folder where the project will be saved.
– Type the name of the project in the File Name field.
– Click **Save**.

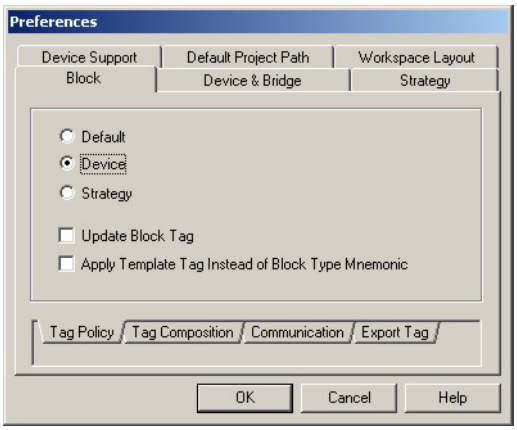
If the new project is not to be created, click **Cancel.**

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 **Tag 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
  – Press **OK** to confirm your selection

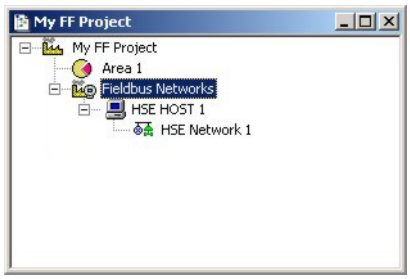
Strategy

Strategy determines the default shape of the function block icons in the stratagy window and also whether the aliasing function is enabled

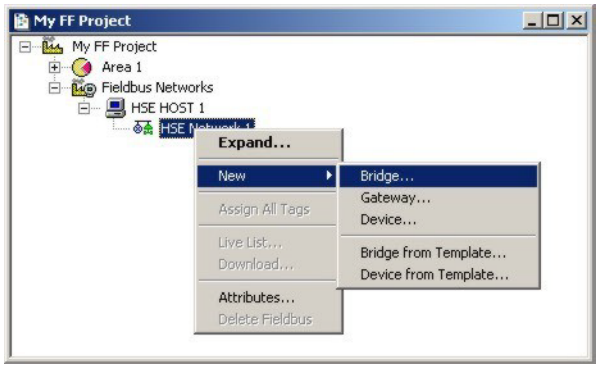
2 Select the subfolder **Strategy**
  – Select the default shape for function block objects
  – Select "Aliasing Input Dialog Box" if you want to use your own input and output labels in the strategy
  – Press **OK** to confirm your selection

3.4 Add a bridge (SFC162)

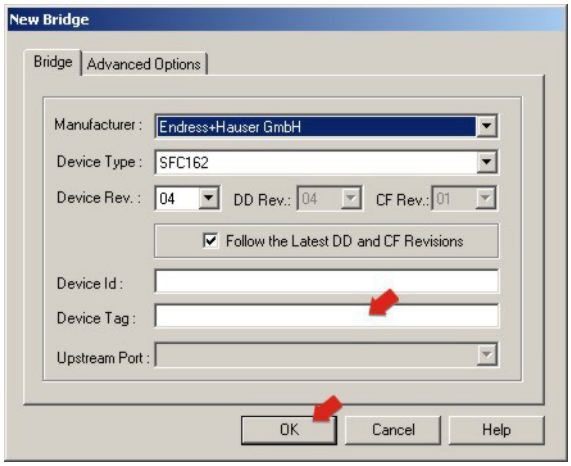
1 On saving, ControlCare Application Designer automatically creates a project, adding the HSE fieldbus network and the HSE Host
– Click on + to expand the tree:



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.

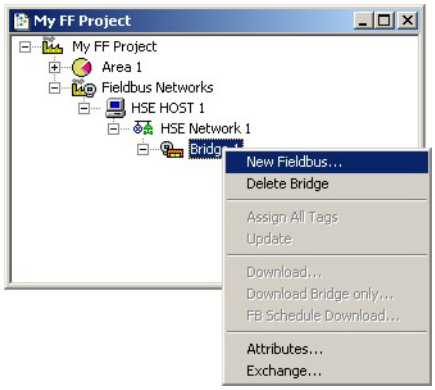
4 Press **OK** to create the Bridge.

5 Repeat Steps 1 to 4 for as many bridges as you have in your network.

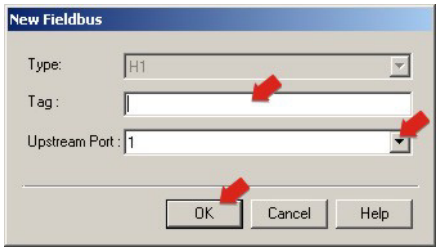
3.5 Add a fieldbus segment

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
  If you do not type in a tag, the default will be "Fieldbus n", where n is a consecutive number.
– Enter the number of the fieldbus port of the SFC162
– Press **OK** to create the Fieldbus.

4 Open **Project File**, then press **Save**, to save the project.

5 Repeat Steps 1 to 5 for as many fieldbuses as are in use (max. 4 per bridge).

6 You can now proceed with Configuring the Field Controller, see Chapter 5.

– More information on creating FF projects is to be found in the FF Tutorial.

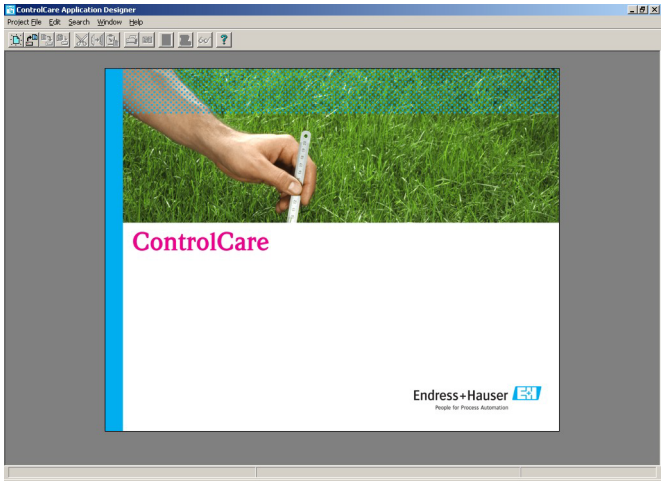
4 PROFIBUS Field Controller

The Field Controller is configured with the ControlCare Application Designer software. Before you use this for the first time, check that the 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

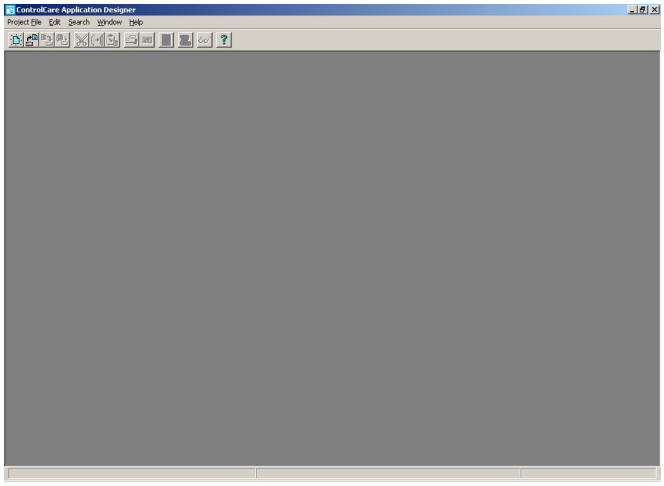
1 Start Application Designer:
Start=>Programs =>Endress+Hauser=>ControlCare Application Designer

- The welcome screen appears
- If projects already exist, the last one use will be automatically loaded at this stage.



2 The first time you use the program, the workspace remains blank

- If projects already exist, the last one used will be loaded as default
- The default settings of the workspace management can be changed by selecting **Project File => Preferences => Workspace Layout**

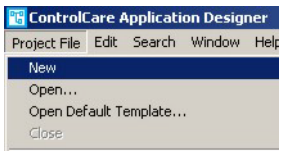


4.2 Create a PROFIBUS project

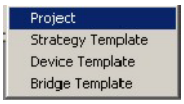
Note!

- 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.

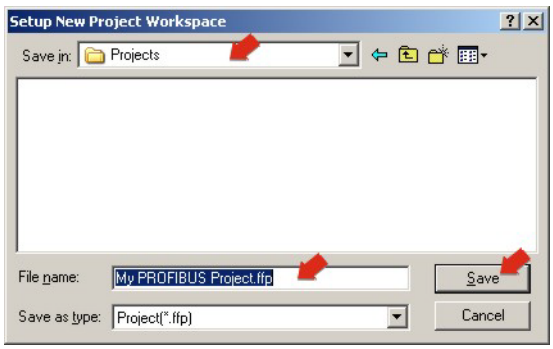
1 The project starts from a blank application screen
   – With the right mouse key select **Project File=>New**



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



3 The **Setup New Project Workspace** dialog box opens:



   – Choose the folder where the project will be saved.
   – Type the name of the project in the File Name field.
   – Click **Save**.

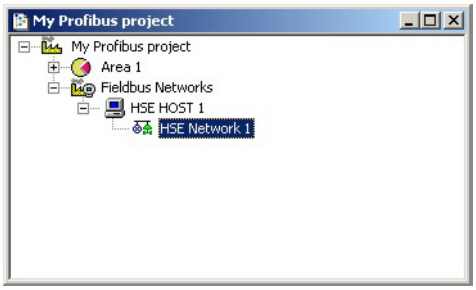
   If the new project is not to be created, click **Cancel.**

4 ControlCare Application Designer automatically creates a folder with the entered file name within the selected folder.

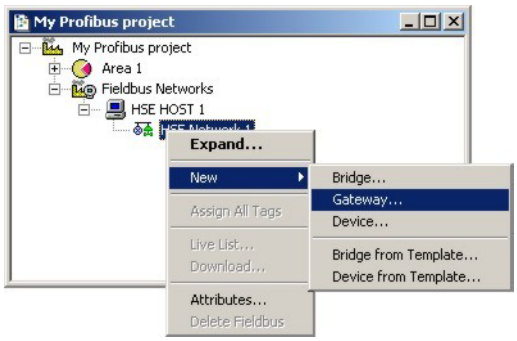
5 At this point you can set the project preferences, see Chapter 3.3.

4.3 Add a gateway (SFC173)

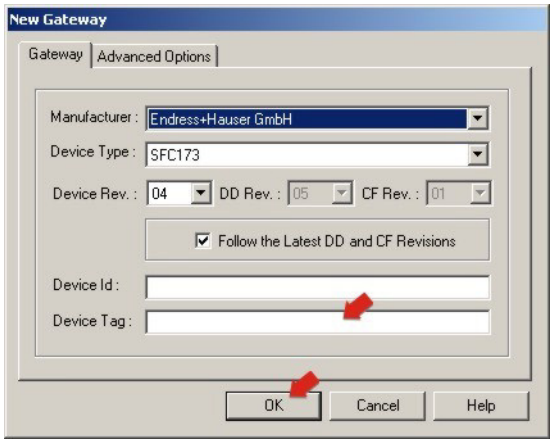
1 On saving, ControlCare Application Designer automatically creates a project, adding the HSE fieldbus network and the HSE Host



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



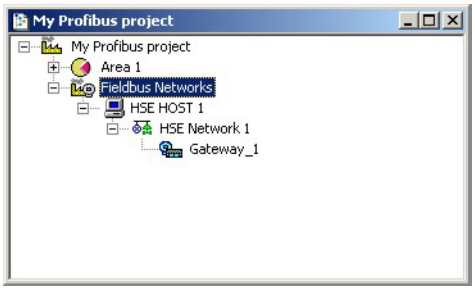
If you do not type in a tag, the default will be "Gateway n", where n is a consecutive number. At this point, the Fieldbus Network does not have a direct correspondence to any of the existing controllers.

4 Press **OK** to create the Gateway.

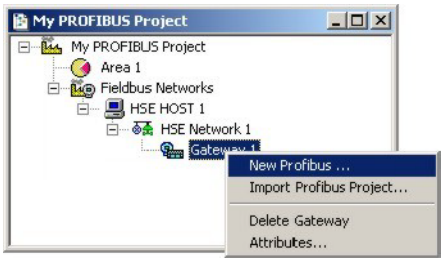
5 Repeat Steps 1 to 4 for as many gateways as you have in your network.

4.4 Add a PROFIBUS segment

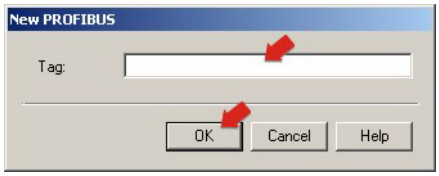
1 The project now looks like this:



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

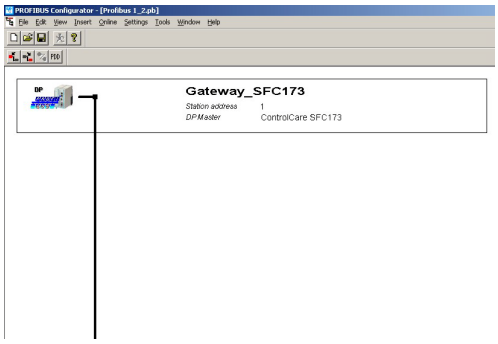


3 The **New Profibus** dialog box appears:



– Enter a Profibus TAG
  If you do not type in a tag, the default will be "Profibus n", where n is a consecutive number.
– Press **OK** to create the Fieldbus.

4 The **ControlCare PROFIBUS Configurator** opens

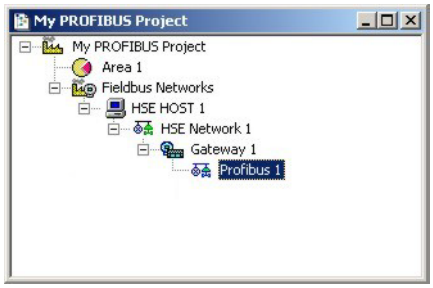


5 You can either create the segment now:
– See Application Designer PROFIBUS Tutorial, BA036S/04/en,
or
create it at a later date:
– Resume configuration at any time by double-clicking on the leaf "Profibus n"
– In the PROFIBUS window that opens, right-click on "Profibus n" again
– Select **Modify PROFIBUS Configuration**

6 Select **File=>Save** to store the PROFIBUS project, then **Exit** to close the window

7 The PROFIBUS I/O Mapping dialog appears
– Select **OK** to close the dialog

8 The Profibus segment is now added to the project:



9 Open **Project File**, then press **Save**, to save the project.

10 Repeat Steps 1 to 10 for each gateway that you have created.

11 You can now proceed with Configuring the Field Controller, see Chapter 5.

– More information on creating PROFIBUS projects is to be found in the PROFIBUS Tutorial.

5 Configuring the Field Controller

Note!

- The SFC162 and SFC173 Field Controllers are configured in exactly the same way
- The configuration of the local I/O in connection with the hybrid block with embedded I/O is described in more detail in the Application Designer Local I/O tutorial, BA032S/04/en

When the Field Controller is created, ControlCare Application Designer automatically adds the following function blocks to it, where n is a consecutive number and Device Tag your name for the Field Controller (Mnemonic separator set set to "-", see Chapter 3.3):

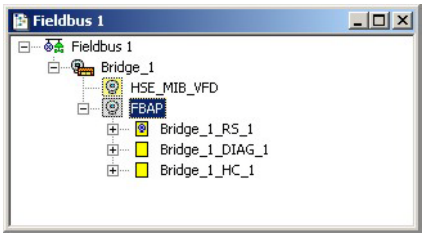
- Resource Block: Device Tag-RS-n
- Transducer Block: Device Tag-PBTRD-n for the SFC173 Field Controller
- Hardware Configuration Block: Device Tag-HC-n
- Diagnosis block: Device Tag-DIAG-n

In addition a temperature transducer block must be manually added for every SFC445 Temperature Input module in use.

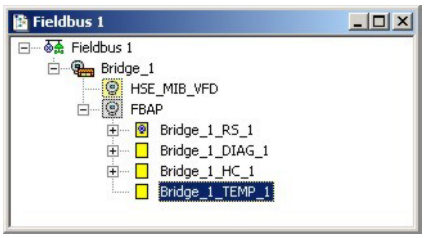
5.1 Customise the Controller I/O blocks

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 SFC445 Temperature Input modules, add a Temperature Transducer block (TEMP) for each module:
- Right click on the **FBAP** 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 until there is a Temperature Transducer block for each SFC445 module.

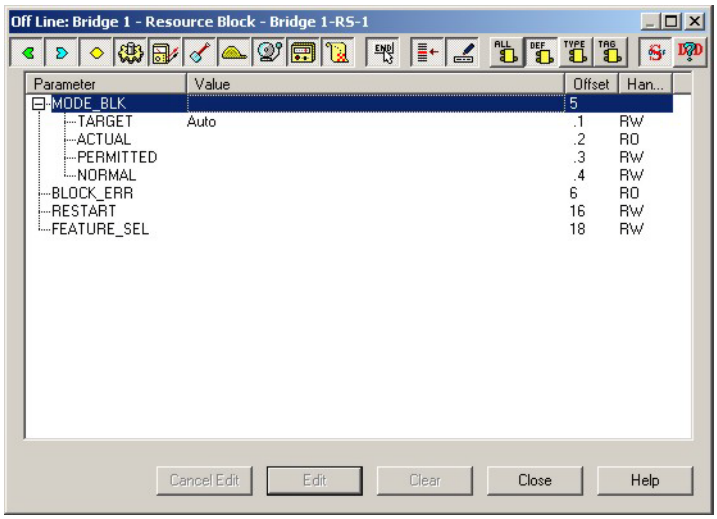


3 When all required transducer blocks blocks are present, configure each as described in the following sections.

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:

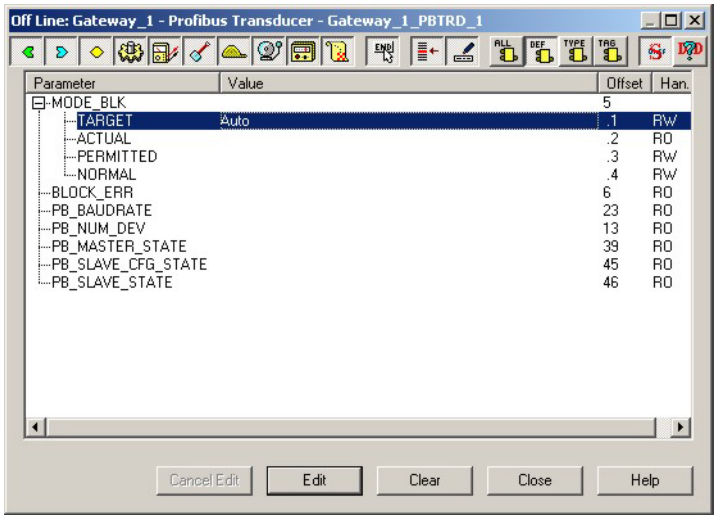


2 Expand the **MODE_BLK** node and check that the Target Mode is set to **Auto**
- If this is not the case, select the **Target** node then click the **Edit** button
- Select **Auto** from the drop-down menu, click **End Edit** to confirm the selection
- Click **Close** to leave the dialog.

5.1.2 Transducer block

Procedure

1 For the SFC173 Field Controller, right click on the transducer block **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, the Field Controller 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.

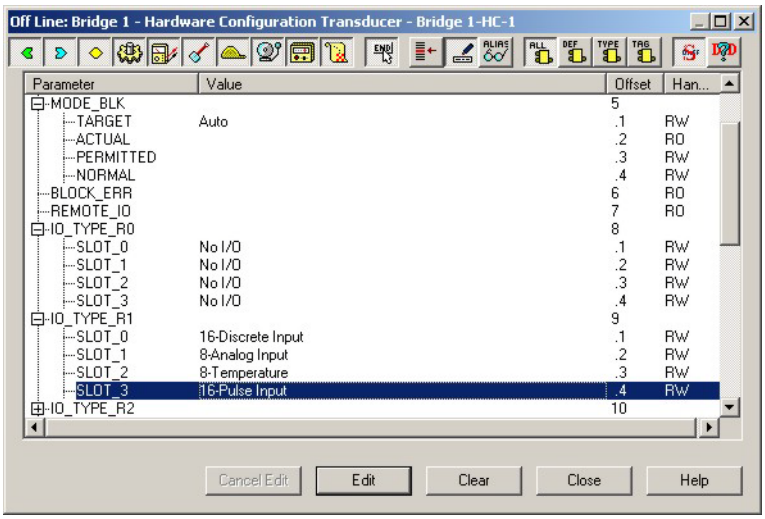
Procedure

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

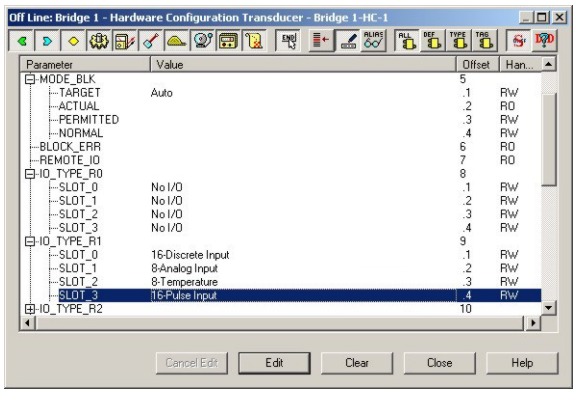
2 Expand the **MODE_BLK** node and check that the Target Mode is set to Auto
- If this is not the case, select the **Target** node then click the **Edit** button
- Select **Auto** from the drop-down menu, click **End Edit** to confirm the selection
- Click **Close** to leave the dialog.

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
- If the alias function is enabled, parameter names can be overwritten by double clicking
- Click on **End Edit** after each change
- Continue until all modules have been mapped to the correct positions in the rack.



5 Now click on the **Block Tag Assignment** segment of the **SLOT_0** node to open the correspondiing configuration menu:



– Select the function block to which the module is to be connected see Chapter 5.3.3 to 5.3.7 for more details on block usage
– Repeat the procedure for all other occupied slots

6 Repeat Steps 4 and 5 for all rack assemblies in the rack

7 Click **Close** to end configuration and save the project.
– The Device Tag-HC-n node will now have the configured parameters attached
– The connected function blocks will be automatically created with the correct channel number, see Chapter 5.3.1
– If the alias function is enabled, the **Rename** dialog can be called by right click

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/HC/DIAG
SFC173	PROFIBUS Field Controller, 1x100 Mbps, 4xH1	No I/O	RS/HC/DIAG
SFC252	AC Power Supply for Fieldbus	No I/O	None
SFC260	DC 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

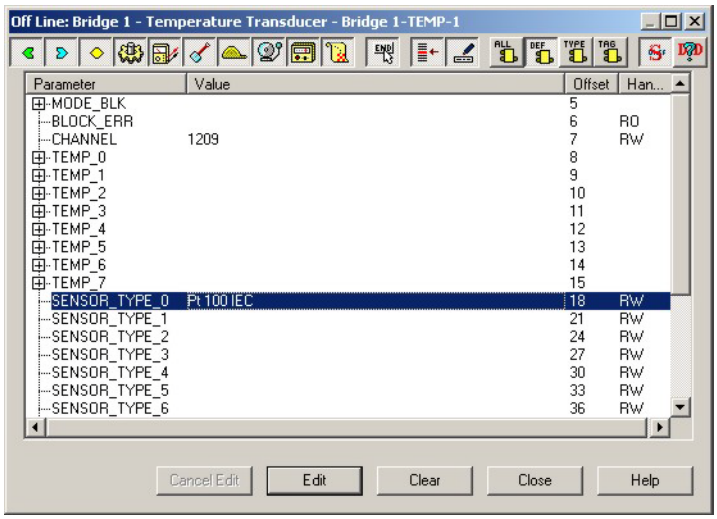
Parameter	Valid range/ Options	Default value	Description/Action
ST_VER		0	Increments on every static parameter change
TAG_DESC		blanks	User specific text of 32-characters to uniquely identify the block
STRATEGY	0 to 255	0	User specific value that may be used in configuration and diagnositics as a key 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.
HFB_STATUS_R0_3			Status of and hybrid function block connected to rack 0-3
HFB_STATUS_R4_7			Status of and hybrid function block connected to rack 4-7
HFB_STATUS_R8_11			Status of and hybrid function block connected to rack 8-11
HFB_STATUS_R12_14			Status of and hybrid function block connected to rack 12-14

Tab. 5-2: Harware Configuration Block parameters

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:



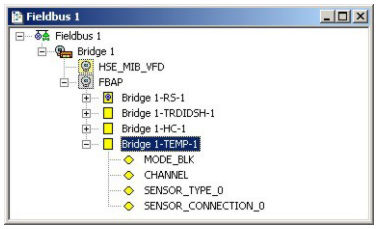
2 Expand the **MODE_BLK** node and set the Target Mode to **Auto**
- Select the **Target** node then click the **Edit** button
- Select **Auto** from the drop-down menu, click **End Edit** to confirm the selection
- Click **Close** to leave the dialog.

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+09, e.g. Rack 1, Slot 2, 09 = 1209 (see Chapter 5.3.1)
- Click on **End Edit**

4 Configure the sensor connection and sensor type used at each input channel.
- Select the **SENSOR_TYPE_X**, then click the **Edit** button
- Select the sensor type from the drop-down menu, click on **End Edit**
- Select the **SENSOR_CONNECTION_X**, then click the **Edit** button
- Select the connection 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 (the parameters are under VALUE_RANGE_x in the reverse order)

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 diagnositics 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
*CHANNEL.		0	The rack and slot number of the associated SFC445 module coded as per Chapter 5.3.1, whereby G = 0 and P = 9 (whole)
TEMP_0...TEMP_7			The temperature value and status 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

Note!

- If the multiple embedded hybrid I/O block is used to integrate the local I/O modules, the channel parameter is not required. Instead a special tool, called by clicking on the block leaf, guides the user through the configuration, see the Local I/O tutorial, BA032S/04/en.

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 an 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, meaning 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.

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. In this case the channel is set to "0" and a corresponding error is set in the BLOCK_ERR parameter, which can be viewed online.

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 **FBAP** node of the Field Controller and select **New Block**, the New block dialog appears:

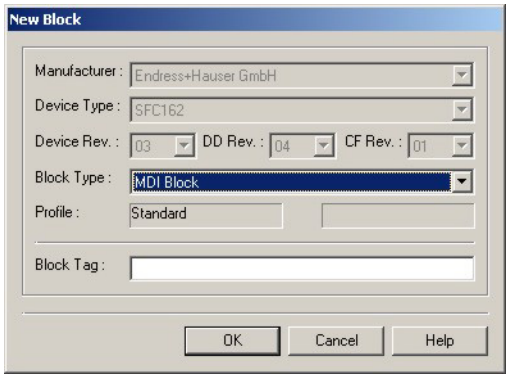


Fig. 5-1: New Block dialog window

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 1 and 2until 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.

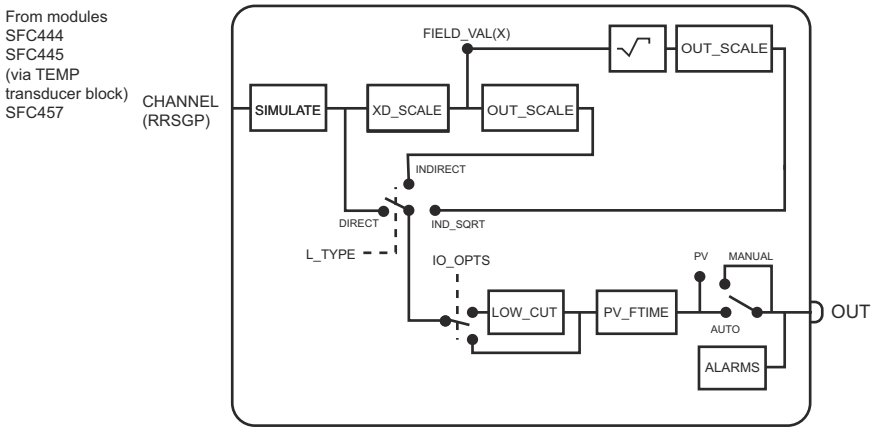


Fig. 5-2 Schematic diagram of Analog Input block

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 defiined 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 alarm priorities and limits with the **XX_PRI and XX_LIM** parameters, 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	
Type	**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	
Type	**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_OPS** parameter.

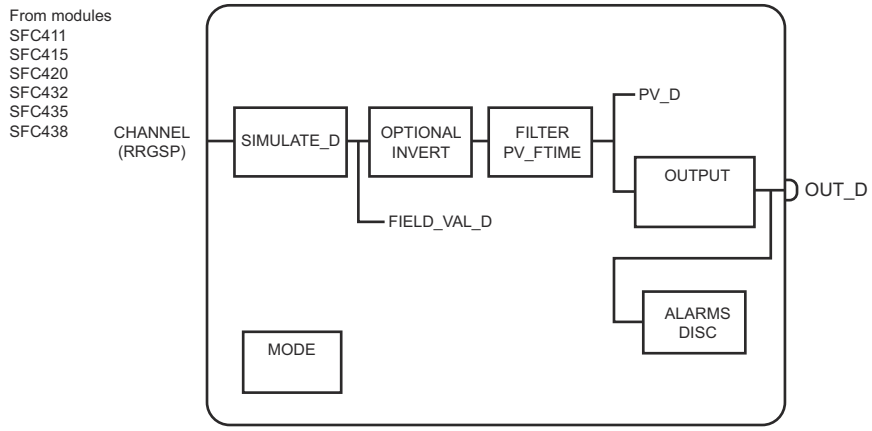


Fig. 5-3 Schematic diagram of Discrete Input block

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 defiined 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 priority and limit with the **DISC_PRI** and **DISC_LIM** parameters, 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.

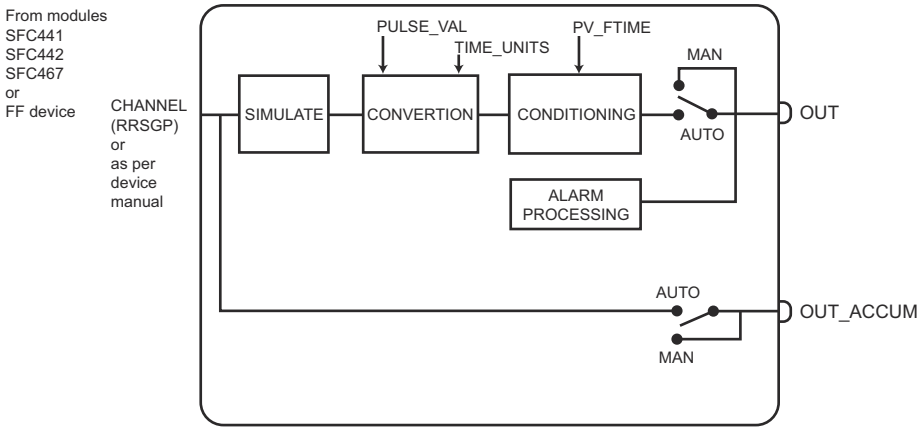


Fig. 5-4 Schematic diagram of Pulse Input block

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, the 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 defiined 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 alarm priorities and limits with the **XX_PRI and XX_LIM** parameters, see Function Block Manual, 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 V to 5 V 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.

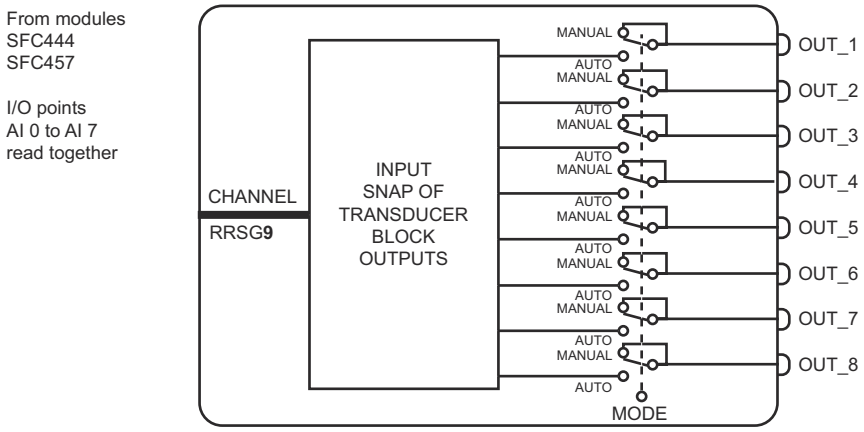


Fig. 5-5 Schematic diagram of Multiple Analog Input block

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 defiined 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. 5-3: 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.

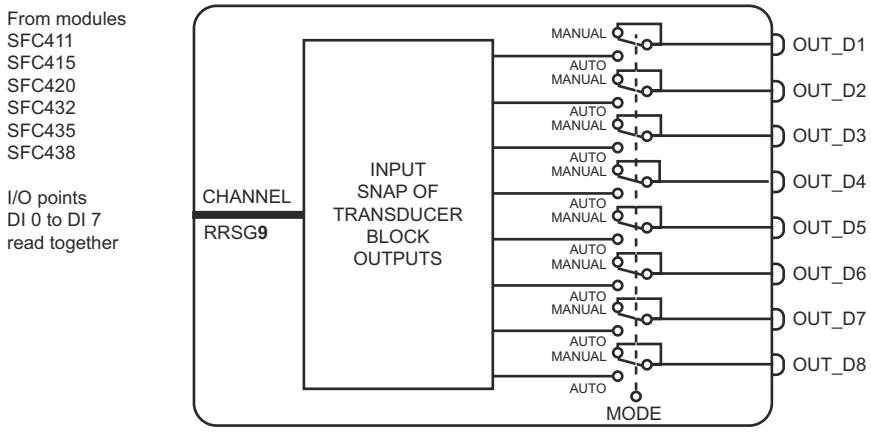


Fig. 5-6 Schematic diagram of Multiple Discrete Input block

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 defiined 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. 5-4: 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.

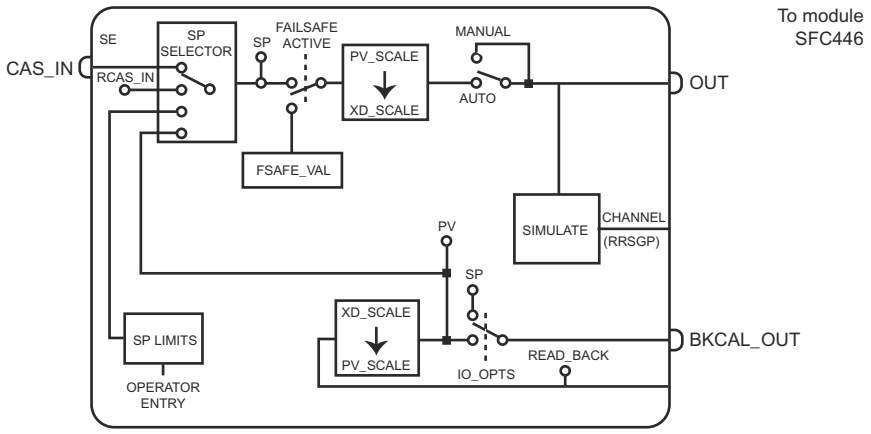


Fig. 5-7 Schematic diagram of Analog Output block

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 **CAS** from the drop-down menu if the block is part of an FF control loop otherwise Select **Auto**, click **End Edit** to confirm the selection
– Click **Close** to leave the dialog.

3 Set **CHANNEL** to the input connected to the block as defiined 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), see BA021S/04/en Chapter 3.5.1

- **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. 5-5: 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. 5-6: Voltage output of SFC446 module with DIP swich 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. 5-7: Voltage output of SFC446 module with DIP swich 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.

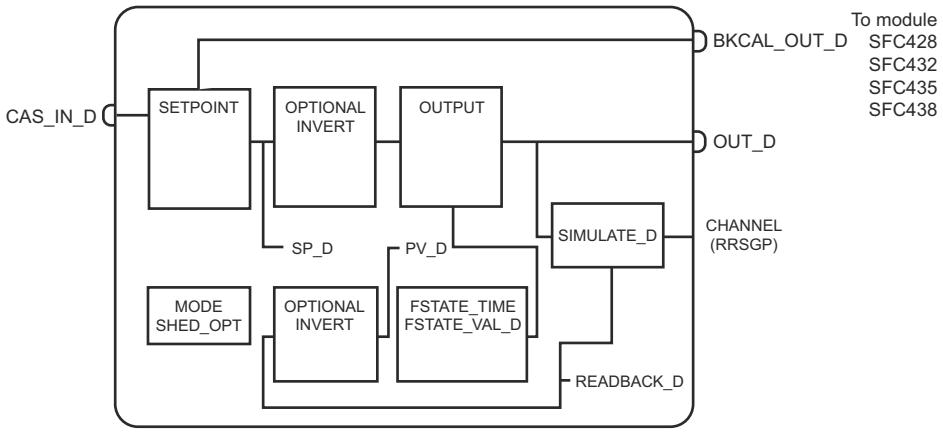


Fig. 5-8 Schematic diagram of the Discrete Output block

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 **CAS** from the drop-down menu if the block is part of an FF control loop otherwise Select **Auto**, click **End Edit** to confirm the selection
– Click **Close** to leave the dialog.

3 Set **CHANNEL** to the input connected to the block as defiined 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 no power is applied to the module.

OUT_D	Signal	NO Relay SFC428, SFC432, SFC438	NC Relay SFC435, SFC438
0	FALSE	Open	Closed
1	TRUE	Closed	Open

Tab. 5-8: 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.

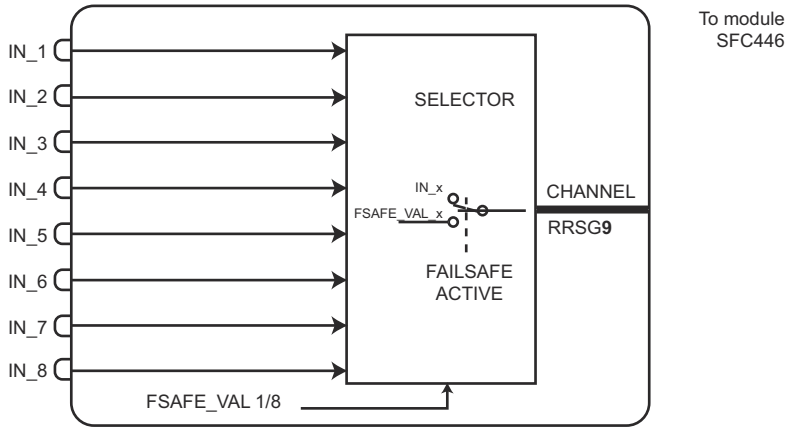


Fig. 5-9 Schematic diagram of the Multiple Analog Output block

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 defiined 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. 5-9: 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.

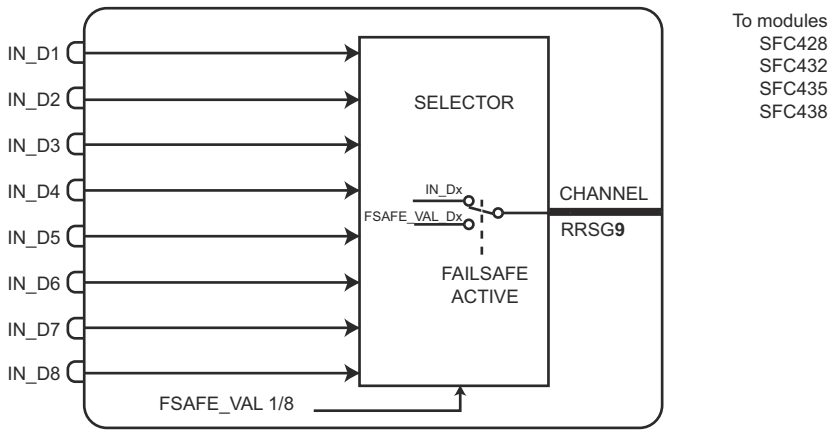


Fig. 5-10 Schematic diagram of Multiple Discrete Output block

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 defiined 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 no power is applied to the module.

OUT_D	Signal	NO Relay SFC428, SFC432, SFC438	NC Relay SFC435, SFC438
0	FALSE	Open	Closed
1	TRUE	Closed	Open

Tab. 5-10: 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: Local I/O Tutorial	Operating manual	BA032S/04/en	71095009
	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, Ladder Logic	Operating manual	BA038S/04/en	70101386
	Application Designer: IEC 61131 Tutorial, Structured Text*	Operating manual	BA056S/04/en	71060063
Function blocks	Function Block Manual	Operating manual	BA022S/04/en	56004886

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

6 Going On-line

6.1 Connecting the Field Controller to the subnet

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!

Note!

- The tools that setup the network use Ethernet services that may be blocked by Windows Firewall. Normally the firewall will be unblocked for the tools during installation, but it might be necessary to stop the firewall should they not function properly. If you are not sure how to stop the firewall, consult your system administrator.

In order to download the project, the host computer and Field Controllers must be allocated IP addresses in the same address range. It is possible to do this on the workbench before installation or after the Field Controller and other components have been physically installed in the Fieldbus network (subnet).

Although Field Controllers support DHCP, for industrial systems we recommend the use of fixed IP addresses, see Chapter 6.1.1 and 6.1.2. Before starting, check the following:

- **Internet Protocol TCP/IP** is installed on your computer
- You have administration rights for your computer
- You have an set of IP addresses that have been authorized by your IT department
- Any proxy server for your Internet Browser is disabled

The procedures described in this chapter are for Windows XP. For other Windows systems consult your system administrator.

Note!

- SFC162 and SFC173 Field Controllers are configured in exactly the same way.
- When the Field Controllers are physically connected together with the Host computer via Ethernet, HSE Network Setup will see the them irrespective of the IP address domain to which they belong

6.2 Network with fixed addresses

6.2.1 Setting the IP address of the host computer

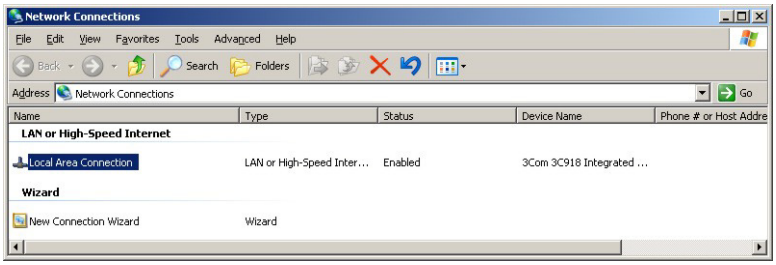
The Field Controllers are delivered with the default IP addresses:

- 192.168.164.100 for Field Controller SFC162
- 192.168.164.101 for Field Controller SFC173.

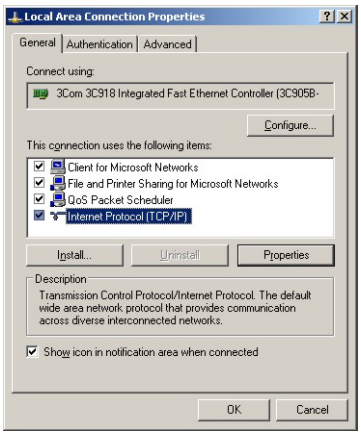
In order that the host computer can communicate with the Field Controller Web Server, it must be allocated an IP address in the same address domain, e.g. 192.168.164.200. If you are not sure how to do this, consult your network administrator.

Procedure

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



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

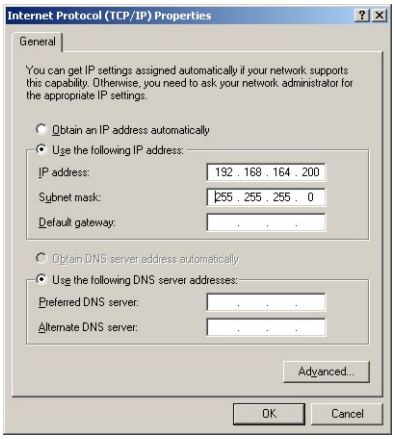


3 Using the left mouse button, double-click **Internet Protocol (TCP/IP)** or click once, then click **Properties**.

4 Note the original values of IP address and Subnet Mask of the computer to restore them if necessary at end of the operation.

5 Change the IP address and the Subnet Mask of the host computer to those required by the application. In the example, an address 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, close the other dialogs with **OK** and **Close**.

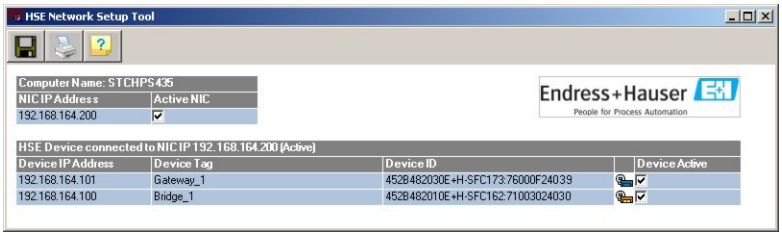
6.2.2 Setting the Field Controller IP address

Note!

■ It is recommended that Field Controllers of the same type are introduced one by one to the network.

1 Call HSE Network Setup:
Programs =>Endress+Hauser=>ControlCare=>Tools=>HSE Network Setup

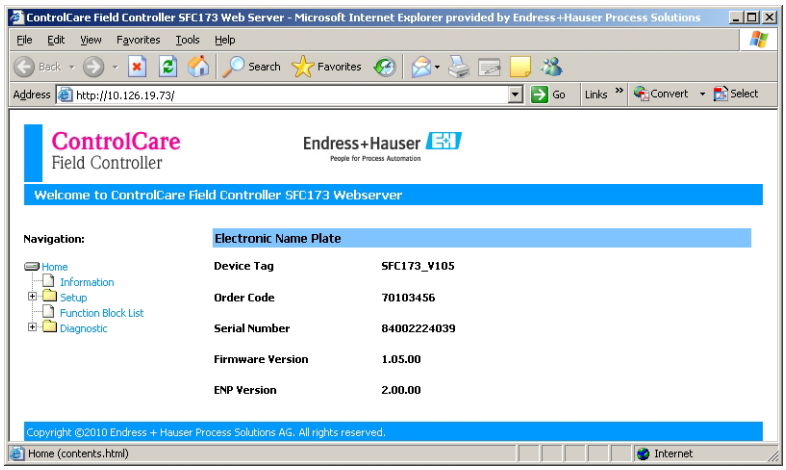
2 HSE Network Setup is launched and searches for Field Controllers in the Ethernet network.



– All Field Controllers in the network appear, irrespective of their IP domain.
If this is not the case:
– Check that the proxy server of your Internet Browser is switched off
– Check that the windows firewall is not blocking the program (switch off)
– Check all cables and switches
– If you find two or more Field Controllers with the same IP address, disconnect all but one from the network

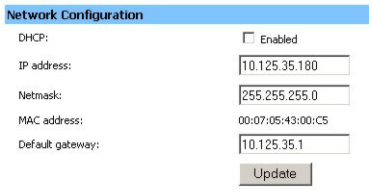
3 If your computer has more than on NIC card, select the one you want to use for communication with the Field Controllers by ticking "Active NIC" and Press .

4 Right-click on the Field Controller, the address of which is to be changed: the Field Controller Web Server opens



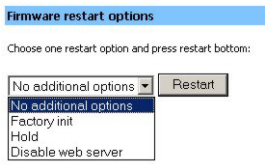
– The Web Server will only open if the host computer and the Field Controller have IP addresses in the same IP domain.

5 Expand the **Setup** node and click **Network**
– Enter User Name "pcps" and Password "pcps" to open the **Network Configuration** dialog



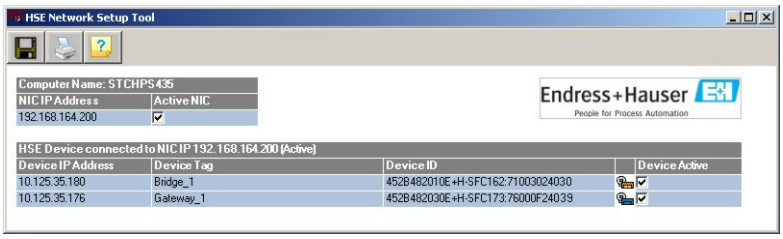
– Enter the required IP address, in our example 10.125.35.180
– Enter a netmask, normally 255.255.255.0
– If required, enter a default gateway, usually address xxx.xxx.xxx.1 in the selected domain

6 Press **Update** to change the IP address
– You are now asked to restart the Field Controller
– Select the **Restart** node

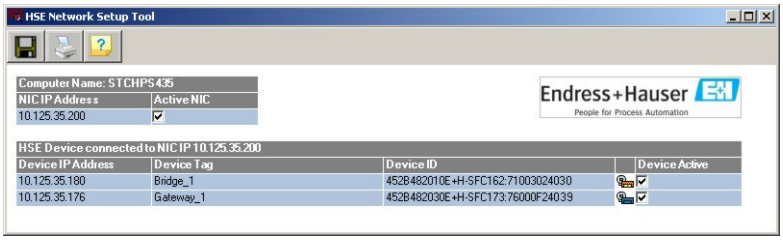


– Select "**No additional options**" from the drop-down menu and press **Restart**
– Close the Web Browser
– The Field Controller disappears from HSE Network Setup and reappears with the new IP address

7 Repeat Steps 4 to 6 for all other Field Controllers, introducing them one by one to the network. The result might be as shown:



8 If you are using the host computer, now set its address to the same domain as the Field Controllers, otherwise reset the original address.
– Restart **HSE Network Setup**



– Tick all Field Controllers that are to appear in the HSE Live List associated with the computer's active NIC card.
– Press to save the configuration.
– You are now ready to download the project

6.3 Network with DHCP Server

Note!

- Although it is possible to use a DHCP assigned address with the Field Controller, we do not recommend its use in practice, as there is a risk that address may change on every power cycle.

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. This happens automatically when the Field Controller is switched on.

To use this method of addressing, your computer must have a DHCP server. In addition, the Field Controllers must be switched over to DHCP operation.

Procedure

1 Change the address of the host computer to the default address range for the Field Controllers as described in Chapter 6.2.1

2 Check that all Field Controllers are disconnected from the network.

3 Connect a controller

4 Follow the procedure described in Chapter 6.2.2
   – In the Network Configuration dialog, tick the DHCP box instead of entering an address
   – Update the configuration and restart the Field Controller
   – The Field Controller is automatically allocated an address

5 Repeat the Steps 2 to 4 for all other units in the subnet.

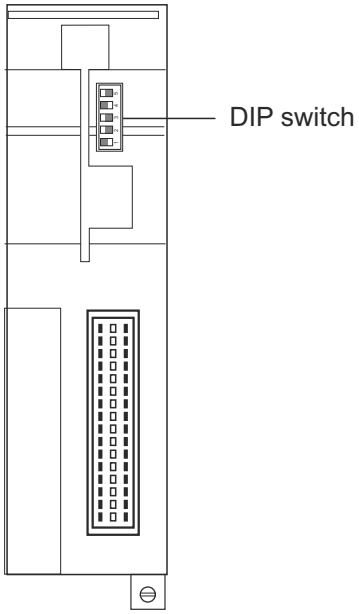
6 Change the host IP address to the one to be used in the industrial application

7 Start up the network anew, adding one Field Controller at a time to it.

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.

Note!

- The functions Reset, Factory Initialization and Hold can also be performed from the **Restart** node of the Field Controller Web Server, see Chapter 6.2.2, Step 6.

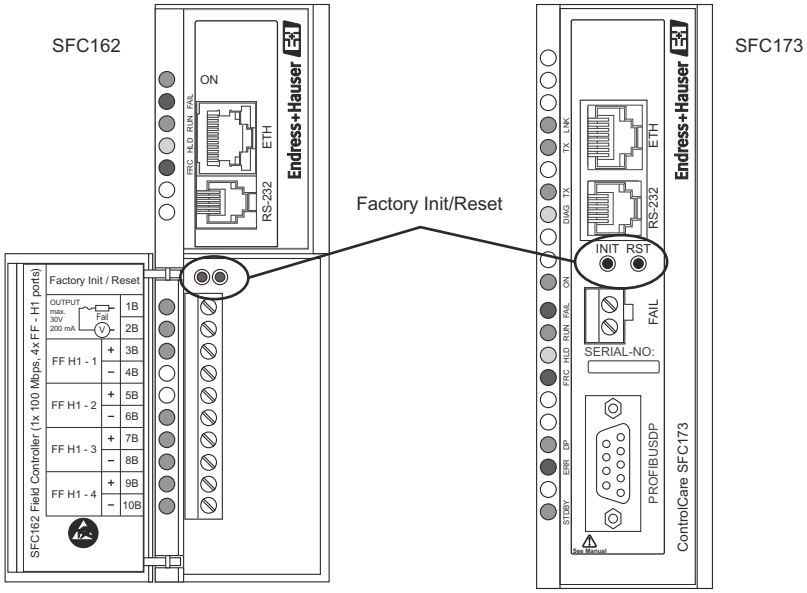


Fig. 7-1: Position of the Init and RESET pushbuttons on the Field Controllers

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	■ 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	■ 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	■ 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. ■ Use the **Reset** again to return to the execution mode (**RUN**).
Default IP Address	Sets default IP address	■ Keeping the left pushbutton pressed, click the right pushbutton 3 times ■ The default IP address is set, see Chapter 6.1.2

7.3 Updating the firmware

7.3.1 Downloading the firmware to the controller

You can check the firmware version of your Field Controller by opening the **ENP** node of its Web Server or viewing the **FIRMWARE_REVISION** parameter in the Online Characterization dialog.

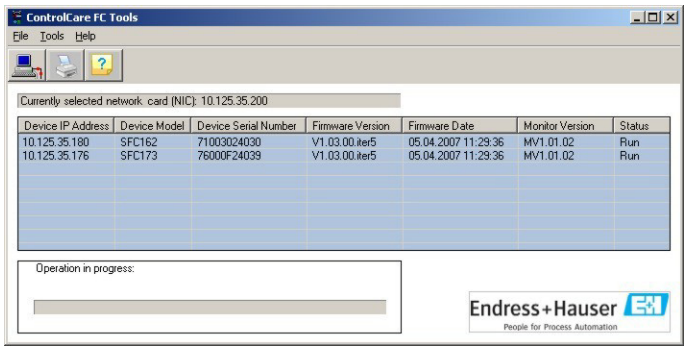
Warning!

- 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.
- New firmware is supplied with every update of Application Designer and is located in the folder **Endress+Hauser => ControlCare => Tools => HSE**.

Firmware update

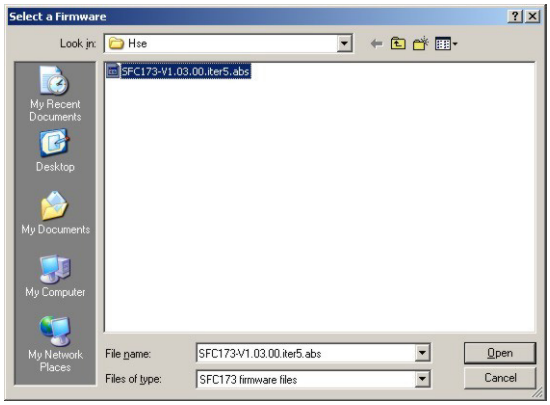
1 Call FC Tools by clicking
Programs =>Endress+Hauser=>ControlCare=>Tools=>FC Tools

2 FC Tools opens and searches for all Field Controllers on the network:



– Either double-click on the Field Controller row or select the row and press  .

3 The **Select a Firmware** dialog appears:



– If necessary, browse to folder in which firmware file is to be found
– Enter name of file: a double-click on the file located in look in fills this property
– Press **Open** to imports the selected configuration and start download
– The dialog closes and returns to FC Tools

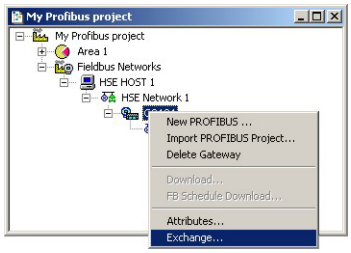
4 The progress of the download is shown in the "Operation in progress" field
– When the download is successfully completed, the Firmware Version field changes

7.3.2 Updating the firmware in the project

After a change in firmware in the controller, the project must be updated and download again using the Application Designer version corresponding to the firmware.

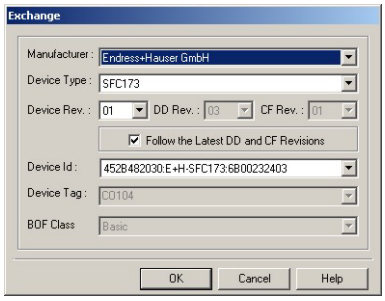
Project update

1 Open the project in Application Designer and select the bridge or gateway to be updated



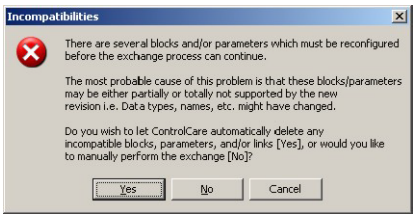
– Right-click on the node and select **Exchange...**

2 The **Exchange** dialog for the bridge or gateway appears



– Open the **Device Rev** menu and select the highest revision
– Press **OK** to confirm the change and close the dialog.

3 The **Incompatibilities** dialog may now appear



– Press **OK** to automatically update all links
– Close the successful exchange dialog by pressing **OK**.

4 Press  to go on-line

– Right-click on the **Plant** node (very top of the project tree) and select **Export Tags...**
– Right-click on the **HSE Network** node and select **Download**
– In the **Download** dialog, press **Start**
– When the download is successfully completed close the dialog box.

7.4 Trouble-shooting tables

7.4.1 Field Controller

	Problem	Remedy
1	**HSE Network Setup/FC Tools** does not find any Field Controller	■ Disable the Windows firewall (normally a message appears ask whether you should unblock the program) ■ Disable the proxy server for your Internet browser ■ Check that you are using the correct Ethernet cables, see ETH LINK below ■ Check that all Ethernet switches are powered up ■ Check that 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.
2	Field Controller appears intermittently in **FC Tools**	Host and Field Controller are in different subnets. ■ Normal behaviour, but for firmware download both host and Field Controller must be in the same subnet
3	**HSE Network Setup/FC Tools** does not show all the Field Controllers that are in the network	There is probably an IP address conflict in the network. ■ Disconnect all the Field Controllers except one from the from the sub-network ■ If necessary, change its IP address ■ Now reconnect the other Field Controllers one after the other, if necessary changing their IP addresses
4	**Field Controller Web Server** does not open	No Ethernet connection ■ Disable the Windows firewall ■ Disable the proxy server for your Internet browse ■ Wrong subnet IP address Host and Field Controller must be in same subnet ■ Wrong subnet mask Host and Field Controller must have same subnet mask
5	**Firmware** begins to execute but after a certain time it stops	It might be a configuration problem. ■ Use the **Factory Init** procedure and configure the Field Controller again. ■ If the problem persists, see the relevant chapter in Operating Instructions BA035S/04/en, Field Controller, Commissioning and Configuration
6	**HOLD** LED remains lit	If the **HOLD** LED remains lit after the Field Controller has been turned on, the firmware may be invalid. ■ Update the firmware, see the relevant chapter in Operating Instructions BA035S/04/en, Field Controller, Commissioning and Configuration
7	**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: ■ SFC954 - Cable Standard. To be used in a network between the Field Controller and a Switch/Hub. (preferred configuration) ■ SFC955 - Crossed Cable (Cross). To be used point to point between a PC and the Field Controller (some PCs/laptops may have problems with crossed cable)
8	**FRC** LED is flashing (Force)	Field Controller is powered up for the first time ■ Battery is not switched on (see BA021S/04/en, p50) Field Controller is in reset mode ■ Complete the **RESET** procedure Field Controller is in normal operation ■ Battery is flat: – No problem if controller remains powered up – If power is switched off, the project will be lost and must be downloaded again from Application Designer on repowering
9	**ERR** LED lit (SFC173)	At least one slave is not delivering cyclic data – Slave not connected to Profibus – Slave not switched on – Slave not correctly configured (PROFIBUS Configurator)

7.4.2 Application Designer

	Problem	Remedy
1	Field Controller does not appear in HSE live list	No connection to Field Controller ■ See Remedies for Items 1, 2 and 4, Chapter 7.4.1 ■ Field Controller is on HOLD, set it to RUN mode ■ IP address is not configured correctly, use PING to check
2	Field Controller appears but always stays grey in HSE Live List	No connection to Field Controller ■ Check that host and Field Controller are in same subnet
3	Red cross appears on the Field Controller	No communication with Field Controller ■ No Ethernet connection with Field Controller, check connection, IP address etc, see above ■ No Device ID set in the Field Controller (Attributes)
4	Red cross appears on Fieldbus/Profibus	No communication with fieldbus/Profibus ■ No communicaton with Field Controller, see above ■ Fieldbus/Profibus not connected to controller ■ DP bus parameter mismatch (Profibus)
5	Red cross appears on field device	No communication with fieldbus device ■ No communicaton with Field Controller, see above ■ No communicaton with fieldbus/Profibus, see above ■ No Device ID set (Attributes) ■ Tag not assigned (Assign Tag) ■ DP address is not unique (Profibus) ■ DP address at device not the same as that configured in PROFIBUS configurator (Profibus)
6	A device does not appear in the live list	Communication error ■ The device is not powered up ■ The project has been updated but no download has been made yet
7	Configuration will not download	You have either a communication problem or the configuration is not complete ■ Check that you are on-line - press the On-line button ■ Check that your computer is in the same address subnet ■ 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) ■ Try "Update" from the Field Controller node (SFC162 only, takes several minutes) and download again
8	PROFIBUS configuration will not download	You have either a communication problem or the configuration is not complete ■ Try downloading from HSE Network node, see above, if this does not work, check points below ■ Configuration mismatch between PROFIBUS Configurator and Application Designer – Have PROFIBUS device blocks been deleted? – If so, reconfigure project in PROFIBUS Configurator
9	Parameter appears red in the on-line control strategy	The parameter has a bad status ■ 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 ■ Check that the tags were exported (Export Tags)
10	FB links do not work	Project not downloaded correctly, e.g. partial download when bridge has HSE links ■ Repeat full download from the HSE Network node

7.4.3 PROFIBUS Configurator

	Problem	Remedy
1	Error message on trying to leave the configuration dialog	Configuration not correct ■ Device name has spaces instead of underscores
2	How are the cyclic I/O data configured?	■ For Endress+Hauser devices each parameter has a fixed position in the configuration list, see the manuals. If you want to see Parameters 1 and 5 only, for example, free spaces/empty modules must be appended at slots 2, 3 and 4. ■ For other devices, see operators instructions
3	What baudrates are supported?	The SFC173 Field Controller supports all baudrates with the exception of 31.25 kBit
4	What baudrate should I use?	Only baudrates supported by all devices can be used: ■ For a P+F SK1 coupler = 93.75kbit/s ■ For a Siemens coupler = 45.45 kbit/s ■ For a P+F or Siemens link, check what baudrates are supported by all DP devices
5	Where do I set the device baudrates?	Only PROFIBUS DP devices must be set ■ Most PROFIBUS DP slaves sense the baudrate and do not need to be set up ■ For others, check the manufacturer's instructions
6	What bus parameters should I use?	Use the parameters recommended by the coupler/link manufacturer or those in this manual ■ For the P+F SK2, the parameters are automatically set according to the rate selected in the Configurator ■ For the P+F SK1 use the ones in the PROFIBUS tutorial BA036S/04/en
7	Can I go on-line in PROFIBUS Configurator?	Yes. ■ Select the appropriate menu, enter the IP address of the Field Controller and generate a live list Beware of timeout: if there is no activity after 2 min: – **Select Settings => Device Assignment...** – **Driver Select** (if TCP/IP driver) – Select requested IP address – Press **OK**
8	Can I change a bus address in the PROFIBUS configurator?	Yes. ■ You can go online and change a bus address by selecting the device followed by the the appropriate menu and typing in the old, then the new address ■ The device must support software address setting ■ Software address setting must be enabled ■ The address must be unique to the bus
9	A device does not appear in the live list	Communication error ■ Another device has the same address ■ The device is not powered up ■ Device does not support autosense of baudrate – Set correct baudrate

For your notes

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