

Foundation Fieldbus and Profibus

SmartPlant Instrumentation supports the creation and maintenance of Foundation Fieldbus and Profibus systems.

Foundation Fieldbus Overview

Foundation Fieldbus technology has rapidly established itself as a viable process industry networking methodology. Of the different protocols available currently on the market, Foundation Fieldbus is the leading product in the process industry. The SmartPlant Instrumentation fieldbus solution is based on H1 Intrinsically Safe Low Speed, 31.25 kb/sec Fieldbus, and supports topologies such as star, trunk/drop, and daisy chain.

The software provides the following features for creating and managing Fieldbus projects:

- Fieldbus device tags, which you create in the [Instrument Index](#) module, include Fieldbus properties such as identification references, address, electrical properties, associated function blocks, and so forth.
- The **Fieldbus Segment Manager**, where you create and manage fieldbus segments, associate instruments with the appropriate segments, and create and manage virtual tags (multi-process variable instruments).
- Fieldbus connection apparatus, which you create in the [Wiring](#) module. You can quickly and easily create fieldbus junction boxes and device panels using the **Plug-and-Socket Box Wizard**. As you build segments, the software verifies that you are following basic connection rules. Later, you can generate reports to verify that you built the segments according to further connection rules, and according to the segment-wide parameter profiles that you applied to each segment.
- Segment wiring diagrams and Fieldbus Loop enhanced reports.



Note

- Note that whenever Fieldbus is mentioned in the subsequent topics of the documentation, we refer to Foundation Fieldbus.

Profibus Overview

SmartPlant Instrumentation supports Profibus technology which is based on a two-level bus hierarchy. Each DP bus can connect up to 32 addressable link hardware devices that link various types of input and output devices. Every link device has a unique node number. The DP link devices that you can connect to a DP bus can belong to one of the following types:

- Motor drive (connecting a VFD to a DP bus).
- PLC or DCS panel that connects a conventional I/O system of analog and discrete field devices to a DP bus.
- DP/PA type that connects a lower PA (Process Automation) bus along with its PA field devices to the DP bus (similar to Foundation Fieldbus segments).

**Note**

- Profibus PA segments and Profibus instruments have the same characteristics as Foundation Fieldbus segments and Foundation Fieldbus instruments.

Flow of Activities for Foundation Fieldbus Design

The following is a suggested flow of activities for Foundation Fieldbus design in SmartPlant Instrumentation. Note that you can carry out some of the procedures in a different order, depending on your preferences or requirements.

1. Set the basic definitions as follows:
 - a) **Define segment-wide parameter profiles for the current site** – Each parameter profile sets certain rules and limitations, such as maximum number of devices per segment and per spur, recommended spur cable lengths, and various electrical parameters. For details, see [Creating a Segment-Wide Parameter Profile](#).
 - b) **Define fieldbus instrument types** – Prior to creating new fieldbus tag numbers, you need to customize wiring reference entities and then define appropriate instrument type profiles in the [Instrument Index](#) module so that new tag numbers acquire fieldbus properties. This results in automatic assignment of the required properties to the new tag numbers. For details, see [Defining Fieldbus Instrument Type Profiles](#).
 - c) **Define a view in the Browser module** – In the [Browser](#) module, create a browser view with the required fields for the **Instruments** pane in the **Fieldbus Segment Manager**. This facilitates the assignment of tag numbers to segments. For details, see [Adding a New View](#).



Tip

- You may create multiple Browser views with different **Style**, **Sort** and **Filter** functions. For example, by using the filter function you may create independent views for each segment, so that only tags of that segment will be displayed in its corresponding view.
2. Create fieldbus device tags based on the instrument types that you defined, and edit the tag number properties as required, including function block properties. For details, see [Creating Foundation Fieldbus and Profibus Instruments](#).
 3. Now you are ready to create fieldbus segments, assign the appropriate tag numbers to their respective segments, and create the necessary virtual tags (virtual field devices) associated with field devices assigned to that particular function block. For details, see [Creating a New Segment](#).
 4. Design the wiring and termination equipment. If you are going to use the plug-and-socket connection system, run the **Plug-and-Socket Box Wizard** to create the plug-and-socket boxes that you need. For details, see [Plug-and-Socket Boxes](#).
 5. Add home-run cables and spurs. For details, see [Creating Home Run Cables and Creating Cables for Spurs](#).

6. Once you have created all the necessary cables and junction boxes, you are ready to make the connections. You can start by selecting the required cable from the **Cable** folder in the **Domain Explorer** to open the **Connection** window. For details, see [Connecting a Home-Run Cable to a Plug-and-Socket Box](#).
7. You then effect I/O assignment in the **Segment I/O Assignment** window. For details, see [Fieldbus I/O Assignment](#).
8. As you build the segments, and make connections and I/O assignments, the software verifies that you are following basic fieldbus rules. Later, you can generate reports to verify that you built the segments according to additional connection rules and according to the segment-wide parameter profiles that you applied to each segment. For details, see [Validation Overview](#).
9. You can generate an enhanced segment wiring drawing to view the completed segment. For details, see [Generating a Segment Wiring Report](#).
10. In the [Specifications](#) module you can associate tags with fieldbus forms to generate specifications. For details, see [Generating New Specifications](#).

**Note**

- If you encounter difficulty in activating a library form for fieldbus, you should restore the form. For details, see [Restoring Library Forms](#).
11. You can add function block custom fields to fieldbus specifications. For details, see [Adding Function Block Custom Fields to Fieldbus Specifications](#).
 12. You can also generate hook-up drawings in the same manner as for conventional instruments. For details, see [Hook-Ups Module](#).

Preliminary Definitions

Recommendations for Fieldbus Instrument Type Profile Definition

You need to define fieldbus instrument type profiles, so that fieldbus instruments that you create accurately acquire the necessary properties. Instrument tags that were created prior to a new instrument type definition or modification of an existing profile are not affected by new definitions.

When defining an instrument type profile for fieldbus tags, take note of the following:


- On the **General** tab, under **Specification**, select an appropriate fieldbus specification.
- Select **Include system I/O type**, and then from the list, select one of the following:
 - Foundation Fieldbus
 - Profibus DP
 - Profibus PA
- Associate function blocks with the instrument type profile.
- On the **Wiring and Control System** tab, select the appropriate reference device panel and reference cable.
- On the **Fieldbus** tab, select the **Include fieldbus** check box and set the default profile options for new fieldbus instruments as you require.

Creating a Segment-Wide Parameter Profile

Segment-wide parameter profiles allow you to define default settings for parameters that serve as design rules for the various Foundation Fieldbus and Profibus PA segments. These parameters influence fieldbus system functioning and performance in the following ways:

- If you exceed cable lengths, or hook too many devices to the same pair of wires, this can cause attenuation and reduction in the voltage reaching the instruments. These voltage drops can result in instrument malfunction and bandwidth problems.
- If you create a spur cable that is too long, the signal propagated along that spur cable can become attenuated and too weak for the DCS to read.
- If you create a segment whose total capacitance exceeds the maximum, you may reduce effective bandwidth.

➤ **To create a segment-wide parameter profile**

1. Start the [Wiring](#) module, and open the **Segment-Wide Parameter Profiles** dialog box in one of the following ways:
 - On the **Tables** menu, click **Segment-Wide Parameter Profiles**.
 - Open the **Fieldbus Segment Manager** and click .
2. In the **Segment-Wide Parameter Profiles** dialog box, click **New**.
3. In the **Segment-Wide Parameter Profiles Properties** dialog box, click the **General** tab, and do the following:

Field	Value
Name	Type a unique name for the profile.
Description	Type a description for the profile.

4. Select the profile as **Default**, or leave it unselected.



Note

- If selected, when you add a new segment, this profile will be the default setting associated with the new segment.

5. In the **Maximum number of devices** group box, do the following:

Field	Value
Per spur	Type the maximum number of tag numbers that can be connected with one spur.
Per segment	Type the maximum number of tag numbers that can be associated with one segment.
Per intrinsically safe (IS) segment	Type the maximum number of tag numbers that can be associated with one intrinsically safe segment.


6. In the **Maximum number of assigned function blocks** group box, do the following:

Per I/O card	Type the maximum number of function blocks that can be associated with one I/O card.
Per segment	Type the maximum number of function blocks that can be associated with one segment.

7. In the **Electrical parameters** group box, do the following:

Field	Value
Power supply	Type the available voltage source value, in volts.
Minimum receiver	Type the minimum receiver voltage value that can be read by a

voltage	DCS, in volts.
Allowable current per non IS segment	Type the maximum allowable value for the current consumption in the non-intrinsic safety segments, in milliamperes.
Allowable current per IS segment	Type the maximum allowable value for the current consumption in the intrinsic safety segments, in milliamperes.
Maximum capacitance	Type the maximum allowable segment capacitance in the unit of measure selected at right.

8. Click the **Cable Lengths** tab.
9. In the **Recommended spur cable lengths** group box, define the rules for spur cables connecting instruments to home-run cables. Do the following:
 - Select the required unit of measure (meters or feet).
 - In the **Number of devices per segment** columns, type the number of devices per segment for which you want to set the spur lengths.
 - In the **Number of devices per spur** columns, type the maximum allowable length of the spur cables for each definition.
 - You can click **New** to add a row, or **Delete** to delete the row marked by 
10. Click **OK** to confirm your creation of this profile and return to the **Segment-Wide Parameter Profiles** dialog box.



Note

- You can return to Step 3 to create an additional segment-wide parameter profile.
11. Click **OK** to close the **Segment-Wide Parameter Profiles** dialog box and return to the main window of the [Wiring](#) module.

Editing a Segment-Wide Parameter Profile


Segment-wide parameter profiles allow you to define default settings that serve as design rules for the various segments. SmartPlant Instrumentation validates your design according to these parameters. Use this procedure to modify an existing segment-wide parameter profile.



Caution

- Changing an existing segment-wide parameter profile, as described in this procedure, also changes the parameters of segments already associated with this profile. It is your responsibility to verify that this is what you want to do, and to run a segment validation report after the change.

➤ **To edit a segment-wide parameter profile**

1. Open the **Segment-Wide Parameter Profiles** dialog box in one of the following ways:
 - On the **Tables** menu, click **Segment-Wide Parameter Profiles**.
 - Open the **Fieldbus Segment Manager** and click .
2. In the **Segment-Wide Parameter Profiles** dialog box, click **Properties**.
3. In the **Segment-Wide Parameter Profile Properties** dialog box that opens, click the **General** tab, and do the following, as necessary:

Field	Value
Name	Edit the unique profile name
Description	Edit the profile description.

4. Select the profile as **Default**, or leave it unselected.



Note

- If selected, when you add a new segment, this profile will be the default setting associated with the new segment.
5. In the **Maximum number of devices** group box, do the following, as necessary:


Field	Value
Per spur	Edit the maximum number of tag numbers that can be connected with one spur.
Per segment	Edit the maximum number of tag numbers that can be associated with one segment.
Per intrinsically safe (IS) segment	Edit the maximum number of tag numbers that can be associated with one intrinsically safe segment.

6. In the **Maximum number of assigned function blocks** group box, do the following, as necessary:

Per I/O card	Edit the maximum number of function blocks that can be associated with one I/O card.
Per segment	Edit the maximum number of function blocks that can be associated with one segment.

7. In the **Electrical parameters** group box, do the following, as necessary:

Field	Value
Power supply	Edit the available voltage source value.
Minimum receiver voltage	Edit the minimum receiver voltage value that can be read by a DCS.
Allowable current per non IS segment	Edit the maximum allowable value for the current consumption in the non-intrinsic safety segments.
Allowable current per IS segment	Edit the maximum allowable value for the current consumption in the intrinsic safety segments.
Maximum capacitance	Edit the maximum segment capacitance in the UOM selected at right.

8. Click the **Cable Lengths** tab at the top of the dialog box.
9. In the **Recommended spur cable lengths** group box, edit the rules for spur cables connecting instruments to a home-run cable. Do the following, as necessary:
 - Select the required unit of measure (meters or feet).
 - In the **Number of devices per segment** columns, type the number of devices per segment for which you want to set the spur lengths.
 - In the **Number of devices per spur** columns, type the length of the spur cables for each definition.
 - Click **New** to add a row, or **Delete** to delete the row marked by .
10. Click **OK** to confirm changes in this profile and close the **Segment-Wide Parameter Profile Properties** dialog box.
11. Click **OK** to close the **Segment-Wide Parameter Profiles** dialog box and return to the main window of the [Wiring](#) module.

Spur Cable Lengths Example

The following example shows the rules that are set for the lengths of individual spur cables connecting a junction box to instruments in a variety of fieldbus topologies. For example, as shown in row 3, where 15 to 18 devices are associated per segment, and one instrument is associated per spur, the cable can be up to 60 meters long. If we allow 2 instruments per junction box (spur) with the same number of associated devices per segment, each cable can run up to 30 meters, and so forth.

Units: ☒ Meters ☐ Feet

Number of devices per segment	Number of devices per spur			
	1	2	3	4
1 — 12	120	90	60	30
13 — 14	90	60	30	1
15 — 18	60	30	1	1
19 — 24	30	1	1	1
25 — 32	1	1	1	1

In this example, the recommended spur cable lengths are:

- 120 meters for 1 to 12 devices per segment and one device per spur;
- 90 meters for 1 to 12 devices per segment and two devices per spur;
- 60 meters for 1 to 12 devices per segment and three devices per spur;
- 30 meters for 1 to 12 devices per segment and four devices per spur;
- 90 meters for 13 to 14 devices per segment and one device per spur; and so forth.

Function Blocks

Function blocks are software code objects that you use to implement field instrument process control strategy. SmartPlant Instrumentation provides a set of the most common function blocks, with properties defined by Fieldbus Foundation. You cannot delete these shipped function blocks or rename them, but you can modify their definitions if needed. You can also create user-defined function blocks, which you can modify and delete, as you need.

Function blocks are associated with a particular instrument type. This association then allows you to create new tag numbers that are automatically associated with that particular function block. You can associate multiple function blocks with a single instrument type. For example, a basic flow transmitter will have one AI (analog input) block associated with it. However, a similar instrument may be used to measure also pressure and temperature (required for gas flow compensation), and may be further equipped with one or more alarm functions. An AI function block is required for each additional process measurement and an AA (analog alarm) block for each alarm function. You can also associate existing instruments with function blocks, or modify associations as needed.



Note

- You cannot create virtual tags for an instrument that is not associated with at least one function block.

Creating and Editing User-Defined Function Blocks

You use this feature to add new user-defined function blocks, delete redundant ones, or modify the definition of existing user-defined function blocks. The function blocks that you define here are available for the current site.

You can define function blocks as multiple with or without execution time. Instruments can be associated with several function blocks of the same type if that function block is defined as **Multiple**. Using the **Execution Time** feature allows you to set the time for the function block execution. You set the number of function blocks and the execution time in the **Function Block – Instrument Type Association** dialog box.

You can create a virtual tag and associate it with an existing function block. Only one virtual tag can be associated with a function block.

➤ To define a function block

1. Start the [Instrument Index](#) module.
2. In the **Instrument Index Module** window, on the **Tables** menu, click **Function Blocks**.
3. In the **Function Blocks** dialog box, do one of the following:
 - To add a new function block, click **New**.
 - To modify the definition of a highlighted function block, click the field that you want to modify.
4. In the **Function Block** field, type the function block name.
5. In the **Description** field, type a short description as appropriate.
6. To define the function block as a multiple function block, select **Multiple**.



Note

- This will enable you to associate more than one copy of a given function block with an instrument type or with a specific instrument.
7. To enable entry of an execution time value, select **Execution Time**.
 8. Click **OK**.

Associating Function Blocks with Instrument Types

You use this option to associate function blocks with instrument types. When you create a fieldbus instrument tag, SmartPlant Instrumentation automatically assigns the function blocks associated with the instrument type that you select to the new tag.

Note that you can associate a function block with as many instrument types as required.

➤ **To associate function blocks with an instrument type**

1. Start the [Instrument Index](#) module.
2. In the **Instrument Index Module** window, on the **Tables** menu, click **Instrument Types**.
3. In the **Instrument Types** dialog box, select a process function type and an instrument type.
4. Click **Profile**.
5. In the **Instrument Type Profile** dialog box, on the **General** tab, make sure that the **Include system I/O type** check box is selected, and that you selected [Fieldbus](#) from the list below.
6. In the **Function Block – Instrument Type Association** dialog box, to assign a function block to an instrument type, do one of the following:
 - In the **Unassociated function blocks** data window, select the function block that you want to associate, and click **Associate**.
 - Drag the required function block from the **Unassociated function blocks** data window to the **Associated function blocks** data window.



Tip

- If the required function block is not available in the **Function Block – Instrument Type Association** dialog box, add or modify the function blocks in the **Function Blocks** dialog box.
7. If you customized a given function block in the **Function Blocks** dialog box, do the following as needed:
 - To set the maximum number of instruments that can be associated with the current function block, in the **Associated function blocks** data window, under **Multiple**, type the value.
 - To set the execution time, under **Execution Time**, type the time value (in milliseconds).
 8. Click **OK**.



Tips

- To define a fieldbus instrument type profile, see [Defining Fieldbus Instrument Type Profiles](#).
- You can also associate function blocks on the tag number level.

Creating Fieldbus Tags

Defining Fieldbus Instrument Type Profiles

You need to define fieldbus instrument type profiles, so that fieldbus instruments that you create accurately acquire the necessary properties. Instrument tags that were created prior to a new instrument type definition or modification of an existing profile are not affected by new definitions.

When defining an instrument type profile for fieldbus tags, take note of the following:

- On the **General** tab, under **Specification**, select an appropriate fieldbus specification.
- Select **Include system I/O type**, and then from the list, select one of the following:
 - Foundation Fieldbus
 - Profibus DP
 - Profibus PA
- Associate function blocks with the instrument type profile.
- On the **Wiring and Control System** tab, select the appropriate reference device panel and reference cable.
- On the **Fieldbus** tab, select the **Include fieldbus** check box and set the default profile options for new fieldbus instruments as you require.

➤ To define a fieldbus instrument type profile

1. In the **Instrument Index Module** window, on the **Tables** menu, click **Instrument Types**.
2. In the **Instrument Types** dialog box, from the **Process function** list, select the process function type.
3. Do one of the following:
 - Create a new instrument type.
 - In the data window, select an existing instrument type.
4. Click **Profile**.
5. In the **Instrument Type Profile** dialog box, click the **Fieldbus** tab.
6. On the **Fieldbus** tab, select the **Include fieldbus** check box.
7. Type a fieldbus tag name.
8. Type a fieldbus device address.
9. Type a device identification.

10. Type a DC consumption value in milliamperes.
11. Enter a capacitance setting and select the required unit of measure.
12. Enter a minimum transmit level value.
13. Set a default operating voltage value.
14. Select the **Backup link master** check box to set new fieldbus instruments as backup link masters.
15. Click the **Function Block** command button to associate function blocks with instrument types.

Creating Foundation Fieldbus and Profibus Instruments

The software allows you to create various types of instruments that can be associated with the Foundation Fieldbus or Profibus system in your plant. In other words, you can create instruments that are compatible with Foundation Fieldbus, Profibus DP, and Profibus PA segments.

You add new instruments in the [Instrument Index](#) module, exactly the same way that you create other tags. Once you define an instrument type for the new tag number and associate a function block with the new tag's instrument type, the new instrument automatically acquires all of the appropriate properties that you set for that tag number. You can then create virtual tags for this instrument.



Caution

- If you are creating entities that must be compatible with Emerson DeltaV, see the notes within the current procedure and Crucial Fields for the DeltaV Interface.

➤ To create a new fieldbus instrument

1. Press F7 to open in the **Domain Explorer**.
2. Expand the plant hierarchy to display the **Instruments** and **Loops** folders.
3. Do one of the following:
 - To create an instrument unassociated with a loop number, right-click the Instruments folder, point to **New** and then click **Instrument**.
 - To create an instrument that is associated with a specific loop number, expand the **Loops** folder, right-click a loop, and then on the shortcut menu, point to **New** and click **Instrument**.

**Tip**

- You can also create new fieldbus tag numbers from the **Fieldbus Segment Manager**: Right-click in the **Instruments** pane, and on the shortcut menu click **New Fieldbus Tag**. Continue as below.

4. In the **New Tag Number** dialog box, from the **Tag class** list select one of the following:
 - **Foundation Fieldbus** — an instrument that can be associated with a Foundation Fieldbus segment.
 - **Profibus DP** — an instrument that can be associated with a Profibus DP segment.
 - **Profibus PA** — an instrument that can be associated with a Profibus PA segment.
5. Under **Tag number**, type the name of the new tag number.

**Note**

- If you are working with the **Free** naming convention, select the **Select instrument type** check box to open a pop-up window that allows you to select the appropriate instrument type.
6. Click **OK**.
 7. If the **Select Instrument Type** dialog box opens (because there is more than one record for a given instrument type acronym), select the required instrument type and click **OK**.

**Notes**

- If the tag number does not correspond to an existing loop name, SmartPlant Instrumentation prompts you to enter a loop name based on the tag number you have entered. If the loop identifier already matches an existing loop, the software will automatically associate the new tag number with the loop.
- If the loop convention includes the loop function parameter, the prompt will always appear. In this case, you have to complete the loop number. If a profile exists for the selected instrument type, any new tags for that instrument type will be created with the selected reference entities.

- For Delta-V compatibility, you must select an instrument type that you associated with a DeltaV device type during the downloading process. To display the **Fieldbus Instrument Type Association** supporting table of associations that you built among DeltaV device types, instrument manufacturers, and SmartPlant Instrumentation instrument types, see [Downloading and Importing DeltaV Definitions](#).
8. In the **Loop Name** dialog box, do one of the following:
 - Type the loop number that the new tag is associated with.
 - Accept the displayed loop number.
 - Click **Cancel** to create the tag number without a loop association. Note that if a loop with the same name exists, the tag number is automatically associated with it, without creating a new loop.
 9. Click **OK** to create the loop number.
 10. In the **Loop Number Properties** dialog box, accept the loop number properties or modify them as you require and then click **OK**.
 11. In the **Tag Number Properties** dialog box, on the **General** tab, enter the tag number attributes that you require.

**Note**

- For Delta-V compatibility, make sure that the value that you select from the **Manufacturer** list is among the acceptable values for the instrument type that you selected for the current tag. For details, see [Downloading and Importing DeltaV Definitions](#).
12. On the **Fieldbus** tab, define the fieldbus properties for the new instrument as follows:
 - a) Type the fieldbus tag name.
 - b) Type the field device address if necessary.
 - c) Type the device ID if necessary.
 - d) If this tag functions as a backup link master for the segment, select **Backup link master**.
 - e) Type the manufacturer's fieldbus device revision number if necessary.

**Notes**

- If your DeltaV interface preferences are set for fieldbus mode, the **Fieldbus device revision** field is a list, from which you must select a revision.
 - SmartPlant Instrumentation uses the values that you enter below to validate fieldbus segments.
- f) Type the DC current consumption of the current instrument, for example, **35 mA**.
- g) Type the capacitance and the capacitance unit of measure, for example **5 pF**.
- h) Type the minimum transmit level of the current instrument, for example, **2.5 volts**.
- i) Type the operating voltage range, for example, **9 – 35** volts.
13. To modify the function block association of the new instrument, do the following in the **Function blocks association** group box:

**Note**

- If your DeltaV interface preferences are set for fieldbus mode, your selection of manufacturer and of fieldbus device revision determine function block association for the current tag.
- a) Under **Unassociated function blocks**, select a function block that you want to associate with the instrument, and click **Associate**.

**Note**

- The following two options are available only if you enabled them in the **Function Blocks** dialog box.
- b) To change the number of copies of the function block, in the **Associated function blocks** data window, under **Multiple**, type the value.
- c) To set the execution time, under **Execution Time**, type the time value (in milliseconds).
14. To enter power supply properties, see [Entering Power Supply Data for Panels and Instrument Tags](#).
15. Click **OK**.

Associating a Function Block with an Instrument

This feature enables you to associate a function block with a particular instrument. You use this feature if for some reason, the current tag number has not been associated with any function block through the tag's instrument type or if you need to change some of the associations. Note that the association or any changes made to the association will affect the current tag number only.

➤ To associate a function block with an instrument

1. Create a Foundation Fieldbus or a Profibus tag number, or edit an existing one.
2. In the **Tag Number Properties** dialog box on the **Fieldbus** tab, do the following:
 - a) Under **Unassociated function blocks**, select the function block that you want to associate, and click **Associate**.



Note

- The following two options are available only if you enabled them in the **Function Blocks** dialog box.
 - b) To set the maximum number of instruments that can be associated with the current function block, in the **Associated function blocks** data window, under **Multiple**, type the value.
 - c) To set the execution time, under **Execution Time**, type the time value (in milliseconds).
3. Click **OK**.

Multi-Input Instrument Tags

Overview

Many modern fieldbus or conventional digital instruments support more than one input, for example, temperature transmitters and Bentley Nevada vibration monitors. SmartPlant Instrumentation supports the following configurations for instrument tags with multi-input device panels:

Creating a Multi-Input Instrument with Plug-and-Socket Connections for a Fieldbus Segment

Use this procedure to do the following:

- Create an instrument tag with plug-and-socket multi-input device panel — and the instrument tags that feed into it — for a fieldbus segment
- Bring the signals of the multi-input field device to the **Fieldbus Segment Manager**
- Assign the signals to fieldbus I/O card channels

➤ **To create a multi-input instrument with plug-and-socket connections for a fieldbus segment**

1. In the **Reference Explorer**, create reference panels for tags that feed into the multi-input device panel.
2. In the **Reference Explorer**, create a reference multi-input device panel with plug-and socket connections.
3. In the **Reference Explorer**, create reference device spur cables.



Notes

- Use the same connector type required for the device panels.
 - Set the male/female property for coupling with the device panels.
 - In the **Cable Properties** dialog box, under **Cable class**, select [Conventional](#).
4. In the [Instrument Index](#) module, create instrument type profiles for the following:
 - The multi-input plug-and-socket socket fieldbus instrument
 - The instruments that feed into the multi-input instrument



Notes

- For each instrument type, on the **Wiring and Control System** tab, select the reference device panel and reference cable that you created for each type.
- For the instrument type upon which you base the multi-input device panel, make sure that you do the following:
 - On the **General** tab of the **Instrument Type Profile** dialog box, under **System I/O type**, select [Fieldbus](#).
 - Make sure that you associate enough function blocks for the inputs.

5. In the [Instrument Index](#) module, create the following, based on the instrument types that you defined:
 - Create the instrument tags that feed into the multi-input instrument tag.
 - Create the multi-input instrument tag.

**Note**

- For the multi-input instrument tag, in the **New Tag Number** dialog box, make sure that under **Tag class** you select [Fieldbus](#).
6. In the **Domain Explorer**, right click the multi-input device panel that was created, and on the shortcut menu, point to **Actions** and then click **Connection**.
 7. In the **Plug-and-Socket Connection** window, do the following to connect the input device cables to the multi-input device panel.
 - a) In the **Domain Explorer**, expand the device cables that feed into the multi-input device panel.
 - b) Drag the appropriate cable connectors to the in-ports of the multi-input device.
 8. Do the following to route the multiplexed signal through a plug-and-socket junction box:
 - a) In the **Domain Explorer**, right click the junction box, and on the shortcut menu, point to **Actions** and click **Connection**.
 - b) In the **Plug-and-Socket Connection** window, in the **Domain Explorer**, expand the multi-input device cable.
 - c) Drag the appropriate cable connector to the desired in-port of the junction box.
 9. Do the following to associate the multi-input tag signal with the available function blocks in the target fieldbus segment:
 - a) In the **Wiring Module** window, on the **Actions** menu, click **Fieldbus Segment Manager**.
 - b) Drag the multi-input device tag from the **Instruments** pane to the target segment in the **Fieldbus Segments** pane.
 - c) In the **Fieldbus Segments** pane, right click the multi-input device tag, and on the shortcut menu, click **Multi-Input Device Tag Association**.
 - d) Drag each tag from the **Connected tags available for association** pane to the **Function Block – Tag Association** pane.
 - e) Click **Close** to return to the **Fieldbus Segment Manager**.
 10. Do the following to assign the demultiplexed signals to the segment I/O card:

- a) In the **Domain Explorer**, right-click the desired DCS, on the shortcut menu point to **Actions** and, click **I/O Assignment**.
- b) If the **I/O Assignment** dialog box opens, select **Segment I/O assignment**, and click **OK**.
- c) In the **Segment I/O Assignment** window, in the **Segment list** pane, select the desired segment.
- d) In the **I/O card details pane**, select the channel to which you want to assign the demultiplexed signals.
- e) On the **Actions** menu, click **Assign to a Channel**.

Creating a Multi-Input Device Panel with Terminal Connections for a Serial Interface Loop

Use this procedure to create a terminal connection multi-input device panel — and the instrument tags that feed into it — for a serial interface wiring loop. After you conclude this procedure, you can do the following:

- View the assignments of the source signals to I/O channels
- Generate an enhanced report for the wiring loop

➤ To create a multi-input instrument with terminal connections for a serial interface loop

1. In the **Reference Explorer**, create reference panels for instrument tags that feed into the multi-input device panel.
2. In the **Reference Explorer**, create a reference multi-input device panel with terminal connections.
3. In the **Reference Explorer**, create a reference device cable.



Notes

- In the **Cable Properties** dialog box, under **Cable class**, select [Conventional](#).
 - Do not create connectors for this reference cable.
4. In the [Instrument Index](#) module, create instrument type profiles for the following:
 - The multi-input terminal-connection instrument with serial interface device panel
 - The instrument tags that feed into the multi-input instrument

**Notes**

- For the multi-input instrument type, make sure that on the **General** tab of the **Instrument Type Profile** dialog box, under **System I/O type**, you select [Serial Interface](#).
 - For each instrument type, on the **Wiring and Control System** tab, select the reference device panel and reference cable that you created for each type.
5. In the [Instrument Index](#) module, create the following, based on the instrument types that you defined:
- Create the instrument tags that feed into the multi-input instrument.
 - Create the multi-input instrument tag.

**Note**

- For all of the tags, in the **New Tag Number** dialog box, make sure that under **Tag class** you select [Conventional](#).
6. In the **Domain Explorer**, right click the multi-input device panel that was created, and on the shortcut menu, click **Connection**.
7. In the **Connection** window, connect the input device cables to the multi-input device panel.
8. In the **Domain Explorer**, right-click the DCS panel to which you connect the output of the multi-input device panel, and then on the shortcut menu, point to **Actions** and click **Connection**.

**Note**

- Make sure that the system I/O type of the I/O card to which you connect the multi-input device is [SI](#).
9. In the **Connection** window, connect the output cable of the multi-input instrument to the DCS.
10. To view the I/O assignment of the signals, on the **Actions** menu, click **I/O Assignment**.

Creating a Multi-Input Instrument with Terminal Connections for a Fieldbus Segment

Use this procedure to do the following:

- Create an instrument tag with a multi-input terminal connection device panel, and the instrument tags that feed into it, for a fieldbus segment.
- Bring the input signals of the multi-input field device to the **Fieldbus Segment Manager**.
- Assign the signals to fieldbus I/O card channels.

➤ To create a multi-input instrument with terminal connections for a fieldbus segment

1. In the **Reference Explorer**, create reference panels for the instrument tags that feed into the multi-input device panel.
2. In the **Reference Explorer**, create a reference multi-input device panel with terminal connections.
3. In the **Reference Explorer**, create a reference device cable.



Note

- In the **Cable Properties** dialog box, under **Cable class**, select [Conventional](#).
4. In the [Instrument Index](#) module, create instrument type profiles for the following:
 - The terminal-connection multi-input fieldbus instrument.
 - The instruments that feed into the multi-input instrument.



Notes

- For each instrument type, on the **Wiring and Control System** tab, select the reference device panel and reference cable that you created for each type.
- For the instrument type upon which you base the multi-input instrument tag, make sure that you do the following:
 - On the **General** tab of the **Instrument Type Profile** dialog box, under **System I/O type**, select [Fieldbus](#).
 - Make sure that you associate enough function blocks for the inputs.

5. In the [Instrument Index](#) module, create the following, based on the instrument types that you defined:
 - Create the instrument tags that feed into the multi-input instrument tag.
 - Create the multi-input instrument tag.

**Note**

- For the multi-input instrument tag, in the **New Tag Number** dialog box, make sure that under **Tag class** you select [Fieldbus](#).
6. In the **Domain Explorer**, right click the multi-input device panel that was created, and on the shortcut menu, point to **Actions** and then click **Connection**.
 7. In the **Connection** window, connect the input device cables to the multi-input device panel.
 8. To route the multiplexed signal through a junction box, do the following:
 - a) In the **Domain Explorer**, right click the junction box, and on the shortcut menu, point to **Actions** and click **Connection**.
 - b) In the **Connection** window, connect the multi-input device cable to the junction box.
 9. Do the following to associate the multi-input tag signal with the available function blocks in the target fieldbus segment:
 - a) In the **Wiring Module** window, on the **Actions** menu, click **Fieldbus Segment Manager**.
 - b) Drag the multi-input device tag from the **Instruments** pane to the target segment in the **Fieldbus Segments** pane.
 - c) In the **Fieldbus Segments** pane, right click the multi-input device tag, and on the shortcut menu, click **Associate Multi-Input Device Tag**.
 - d) Drag each tag from the **Connected tags available for association** pane to the **Function Block – Tag Association** pane.
 - e) Click **Close** to return to the **Fieldbus Segment Manager**.
 10. Do the following to assign the demultiplexed signals to the segment I/O card:
 - a) In the **Domain Explorer**, right-click the desired DCS, and on the shortcut menu, point to **Actions** and then click **I/O Assignment**.
 - b) If the **I/O Assignment** dialog box opens, select **I/O assignment**, and click **OK**.
 - c) In the **I/O Assignment** window, in the **Segment list** pane, select the desired segment.

- d) In the **I/O card details pane**, select the channel to which you want to assign the demultiplexed signals.
- e) On the **Actions** menu, click **Assign to a Channel**.

Creating a Multi-Input Instrument with Plug-and-Socket Connections for a Serial Interface Loop

Use this procedure to create a plug-and-socket connection multi-input instrument tag — and the instrument tags that feed into it — for a serial interface wiring loop. After you conclude this procedure, you can do the following:

- View the assignments of the source signals to I/O channels
- Generate an enhanced report for the wiring loop

➤ To create a multi-input instrument with plug-and-socket connections for a serial interface loop

1. In the **Reference Explorer**, create reference panels for the instrument tags that feed into the multi-input device panel.
2. In the **Reference Explorer**, create a reference multi-input device panel with plug-and socket connections.
3. In the **Reference Explorer**, create the reference device cables that you will use when creating the two instrument types for device panels (multi-input and those that feed into the multi-input).



Notes

- For both types, in the **Cable Properties** dialog box, under **Cable class**, select [Conventional](#).
 - Use the same connector type required for the device panels.
 - Set the male/female property for coupling with the device panels.
 - For the instrument type that you will use with the multi-input device panel, create one connector only (for the device panel end). Leave the second end without a connector, for terminal connection to the DCS I/O card.
4. In the [Instrument Index](#) module, create instrument type profiles for the following:
 - The instrument with the plug-and-socket multi-input serial interface device panel
 - The instruments that feed into the multi-input device panel.

**Notes**

- For the instrument type upon which you base the multi-input instrument tag, make sure that on the **General** tab of the **Instrument Type Profile** dialog box, under **System I/O type**, you select [Serial Interface](#).
 - For each instrument type, on the **Wiring and Control System** tab, select the reference device panel and reference cable that you created for each type.
5. In the [Instrument Index](#) module, create the following, based on the instrument types that you defined:
- Create the instrument tags that feed into the multi-input instrument tag.
 - Create the multi-input instrument tag.

**Note**

- For the multi-input device panel tag, in the **New Tag Number** dialog box, make sure that under **Tag class** you select [Conventional](#).
6. In the **Domain Explorer**, right click the multi-input device panel that was created, and on the shortcut menu, point to **Actions** and click **Connection**.
7. In the **Plug-and-Socket Connection** window, do the following to connect the input device cables to the multi-input device panel.
- a) In the **Domain Explorer**, expand the device cables that feed into the multi-input device panel.
 - b) Drag the appropriate cable connectors to the in-ports of the multi-input device.
8. In the **Domain Explorer**, right-click the DCS panel to which you connect the output of the multi-input device panel, and on the shortcut menu, point to **Actions** and then click **Connection**.

**Note**

- Make sure that the system I/O type of the I/O card to which you connect the multi-input device is [SI](#).
9. In the **Connection** window, connect the output cable of the multi-input device panel to the DCS.
10. To view the I/O assignment of the signals, on the **Actions** menu, click **I/O Assignment**.

Creating a Multi-Input Device Panel for Terminal Connection

You use this procedure when doing either of the following:


- Creating a multi-input instrument tag with terminal connections for a fieldbus segment.
- Creating a multi-input instrument tag with terminal connections for a serial interface loop.

➤ To create a reference multi-input device panel for terminal connection

1. Do one of the following:
 - In the **Domain Explorer**, expand the **Panels by Category** folder.
 - In the **Reference Explorer**, expand the **Panels** folder.
2. Right-click the **Device Panels** folder and then on the shortcut menu, point to **New** and click **Multi-Input (Conventional)**.
3. In the **Plug-and-Socket Box** wizard, read the instructions carefully and then click **Next** to open the **Define the New Panel** page.
4. Under **Panel name**, type a unique device panel name.
5. Define the new panel by entering the panel type, manufacturer, model, area class, location, mounting, dimensions, and backplane as needed.
6. To define the device panel as intrinsically safe, select **Intrinsic safety**.
7. Click **Next**, and on the **Define the Plug-and-Socket Layout** page, enter the number of ports that you need on the left and on the right sides of the panel.
8. Click **Next**, and on the **Define the Ports** page, for each port that you created, type the name and select **In** or **Out**.



Note

- You must define one and only one out port.
9. Click **Next**, and on the **Define the Plug-and-Socket Box Connectors** page, for each connector, do the following:
 - a) From the **Connector type** list, select the required connector, or click  to open the **Connectors** dialog box.
 - b) From the **Male/female** list, define the connector as **Male** or **Female**.

**Note**

- If these settings are constant for all of the connectors in the panel, select **Apply to all** after you set the above.

10. Click **Next** and then click **Finish**.

**Note**

- You can delete the terminals that were created after completing the wizard only when you delete the multi-input device panel.

Creating a Plug-and-Socket Multi-Input Device Panel

You perform this procedure when doing either of the following:

- Creating a multi-input instrument tag with plug-and-socket connections for a fieldbus segment.
- Creating a multi-input instrument tag with plug-and-socket connections for a serial interface loop.

➤ To create a reference plug-and-socket multi-input device panel


1. Do one of the following:
 - In the **Domain Explorer**, expand the **Panels by Category** folder.
 - In the **Reference Explorer**, expand the **Panels** folder.
2. Right-click the **Device Panels** folder and then on the shortcut menu, point to **New** and click **Multi-Input (Plug-and Socket)**.
3. In the **Plug-and-Socket Box** wizard, read the instructions carefully and then click **Next** to open the **Define the New Panel** page.
4. Under **Panel name**, type a unique device panel name.
5. Define the new panel by entering the panel type, manufacturer, model, area class, location, mounting, dimensions, and backplane as needed.
6. To define the device panel as intrinsically safe, select **Intrinsic safety**.
7. Click **Next**, and on the **Define the Plug-and-Socket Layout** page, enter the number of ports that you need on the left and on the right sides of the panel.

8. Click **Next**, and on the **Define the Ports** page, for each port that you created, type the name and select **In** or **Out**.

**Note**

- You must define one and only one out port.

9. Click **Next**, and on the **Define the Plug-and-Socket Box Connectors** page, for each connector, do the following:

- a) From the **Connector type** list, select the required connector, or click  to open the **Connectors** dialog box.
- b) From the **Male/female** list, define the connector as **Male** or **Female**.

**Note**

- If these settings are constant for all of the connectors in the panel, select **Apply to all** after you set the above.

10. Click **Next** and then click **Finish**.

**Note**

- You can delete the terminals that were created after completing the wizard only when you delete the multi-input device panel.

Managing Segments

Working with the Fieldbus Segment Manager

The **Fieldbus Segment Manager** provides for the creation and management of fieldbus segments, association of instruments with the appropriate segments and the creation and management of virtual tags (multi-process variable instruments). You can also display and print a SmartPlant Segment Wiring Report.




The **Fieldbus Segment Manager** contains two panes - **Fieldbus Segments** and **Instruments**.

- The **Fieldbus Segments** pane displays all the segments, their associated tag numbers, and virtual tags. The fieldbus entities are arranged in a tree-like hierarchy that you can expand and collapse.
- The **Instruments** pane displays all the instruments that exist in your fieldbus system. The instrument attributes are displayed in various columns, such as **Tag Number**, **Loop Number**, **Service**, **Segment Name**, and so forth. The columns, their sequence, and row sorting in this pane depend on the Browser view currently selected in the **Browser Manager**. The default display is the [New Fieldbus Tag Number List](#) view in the **Browser Manager**.

Creating a New Segment

A Foundation Fieldbus segment is a group of devices physically connected by a single pair of wires to a host control device. This procedure explains how to add a new segment to your fieldbus system.

➤ To create a new fieldbus segment

1. In the **Wiring Module** window, on the **Actions** menu, click **Fieldbus Segment Manager**.
2. In the **Fieldbus Segments** pane, highlight  **Fieldbus**, and do one of the following:
 - Right-click  **Fieldbus** and on the shortcut menu, point to **New** and click **Foundation Fieldbus Segment**.
 - On the **Actions** menu, point to **New** and click **Foundation Fieldbus Segment**.
3. In the **Foundation Fieldbus Segment Properties** dialog box, under **Segment**, type a unique name for the new segment.
4. Select a profile from the **Segment-wide parameter profile** list. If necessary, click  to open the **Segment-Wide Parameter Profile** dialog box for the following options:

- Editing an existing segment-wide parameter profile.
 - Creating a new segment-wide parameter profile.
5. Do one of the following:
 - Select **Intrinsically safe** for this segment. SmartPlant Instrumentation warns you if any instruments currently associated with this segment are not intrinsically safe. The software also warns you if an instrument you try to associate with this segment in the future is not intrinsically safe.
 - Clear **Intrinsically safe**. SmartPlant Instrumentation warns you if any instruments currently associated with this segment are intrinsically safe. The software will also warn you if an instrument you try to associate with this segment in the future is intrinsically safe.
 6. Click **OK** to create the new segment.

Associating an Instrument with a Segment

Use the following procedure to associate a Foundation Fieldbus instrument with a segment.

➤ To associate a fieldbus tag number with a segment

1. Start the [Wiring](#) module.
2. On the **Actions** menu select **Fieldbus Segment Manager**.
3. In the **Fieldbus Segment Manager**, highlight the required tag number in the **Instruments** pane.
4. Drag the highlighted instrument to the required segment in the **Fieldbus Segments** pane.



Notes

- The associated instrument appears under the selected segment in the **Fieldbus Segments** pane.
- A fieldbus instrument can be associated only with one fieldbus segment. However, you can associate multiple tag numbers with a given fieldbus segment.

Dissociating an Instrument from a Segment

Use the following procedure to dissociate a Foundation Fieldbus instrument from a segment.

➤ To dissociate a fieldbus tag number from a segment

1. Start the [Wiring](#) module.
2. On the **Actions** menu, click **Fieldbus Segment Manager**.
3. In the **Fieldbus Segments** pane, highlight the required tag number and do one of the following:
 - Drag the highlighted instrument to the **Instruments** pane.
 - Right-click the highlighted instrument and on the shortcut menu, click **Dissociate Entity**.
 - On the **Actions** menu, click **Dissociate Entity**.



Tip

- The **Segment Name** field in the **Instruments** pane displays **** for dissociated instruments.

Changing Instrument / Segment Association

You can change the segment association of an instrument if needed.



Note

- You cannot change the segment association of a connected instrument before disconnecting its wiring.

➤ To change instrument / segment association


1. Start the [Wiring](#) module.
2. On the **Actions** menu click **Fieldbus Segment Manager**.
3. In the **Fieldbus Segments** pane, expand the appropriate segments.
4. Right-click the tag number that you want to reassign, and on the shortcut menu, click **Dissociate Entity**.

5. In the **Instruments** pane, select the dissociated tag and drag it to the target segment in the **Fieldbus Segments** pane.

Editing a Segment

A Foundation Fieldbus segment is a group of devices physically connected by a single pair of wires to a host control device. This procedure explains how to edit a fieldbus segment.


➤ To edit a fieldbus segment

1. In the **Wiring** module, open the **Fieldbus Segment Manager**.
2. Highlight a segment, and open the **Segment Properties** dialog box by doing one of the following:
 - Right-click the highlighted segment, and on the shortcut menu, click **Segment Properties**.
 - On the **Actions** menu, click **Segment Properties**.
3. In the **Segment** box of the **Segment Properties** dialog box, edit the segment name as needed.
4. In the **Segment-wide parameter profile** list, accept the current profile, or select a different profile. If necessary, click  to open the **Segment-Wide Parameter Profiles** dialog box, where you have the following options:
 - Editing an existing profile.
 - Creating a new segment-wide parameter profile.
5. Do one of the following:
 - Select **Intrinsically safe** for this segment. SmartPlant Instrumentation warns you if any instruments currently associated with this segment are not intrinsically safe. SmartPlant Instrumentation also warns you if an instrument you try to associate with this segment in the future is not intrinsically safe.
 - Clear **Intrinsically safe**. SmartPlant Instrumentation warns you if any instruments currently associated with this segment are intrinsically safe. The software also warns you if an instrument you try to associate with this segment in the future is intrinsically safe.
6. Click **OK**.

Deleting a Segment

Use the following procedure to delete a fieldbus segment. Note that all associated instruments will become dissociated if you delete the segment. Moreover, all the virtual tags in that segment will be deleted automatically.




➤ To delete a segment


1. Start the [Wiring](#) module.
2. On the **Actions** menu, click **Fieldbus Segment Manager**.
3. In the **Fieldbus Segments** pane, expand the appropriate segments.
4. Select the segment you want to delete, and do one of the following:
 - On the **Actions** menu, click **Delete**.
 - Right-click the segment and on the shortcut menu, click **Delete Segment**.
 - Click .
5. Click **Yes** to confirm the segment deletion.

Adding a Virtual Tag to an Instrument

Virtual tags are signals created internally in field devices. These signals can be secondary process measured variables that are measured by the same physical instrument where these signals originated. After assigning a tag number to a segment, you can add the required virtual tags to an instrument that has been associated with a function block. If this association does not exist for a particular tag number, no virtual tag can be created.

➤ To add a virtual tag to an instrument

1. Start the [Wiring](#) module.
2. On the **Actions** menu, click **Fieldbus Segment Manager**.
3. In the **Fieldbus Segments** pane, expand the appropriate segment  to display the associated instruments.
4. Select the required function block  under the highlighted tag number  and do one of the following:
 - On the **Actions** menu, click **New Virtual Tag**.
 - Right-click the selected function block and select **New Virtual Tag**.

5. In the **Add Tag Number** dialog box, type the new virtual tag number and click **OK**.
6. In the **Loop Name** dialog box, accept the displayed loop number or type another one as required and then click **OK**.
7. In the **Tag Number** dialog box, if needed, modify any tag number attributes that are accessible for editing and click **Save**.
8. Click **Close** to return to the **Fieldbus Segment Manager**.
9. To view the new virtual tag, expand the view of the tag number in the **Fieldbus Segments** pane where you will see the new virtual tag .

**Tip**

- Virtual tags are also displayed in the **Browse** window in [the Instrument Index](#) module.


Selecting a Different Instrument View in the Segment Manager

This option allows you to change the current view in the **Instruments** pane of the **Fieldbus Segment Manager**. The view — the available fields — depends on the current view in the Fieldbus Tag Number List Browser. All the Fieldbus Tag Number List Browser Views that you define become available for selection in the **Fieldbus Segment Manager** and you can switch freely among them.

➤ To select an instrument view in the Fieldbus Segment Manager

1. Predefine the required Fieldbus Tag Number List Browser views in the **Browser Manager**.

**Note**

- These views belong to the Instrument Index Browser Group.
2. In the **Fieldbus Segment Manager**, do one of the following:
 - On the **Actions** menu, click **Change View**.
 - Click .
 3. In the **Select Segment View** dialog box, select the required view and click **OK**.

Fieldbus Cables

Creating Home-Run Cables

The creation of fieldbus home-run cables is similar to the creation of regular cables.

➤ To create a home-run cable

1. Do one of the following:
 - Press F7 to open the **Domain Explorer**.
 - In the [Wiring](#) module, on the **View** menu, click **Wiring Explorer**.
2. Right-click the **Cables** folder and then on the shortcut menu, point to **New** and click **Cable**.
3. In the **Cable Configuration** dialog box, do one of the following:
 - From the **Cable configuration** list, select an appropriate cable configuration (for example, [Fieldbus cable](#)).
 - Define a new cable configuration.
4. Click **Create**.
5. In the **Cable Properties** dialog box, under **Cable**, type a unique name.
6. Complete the creation of the home-run cable using the general procedure for creating a new cable.

Creating Cables for Spurs

Spurs can be cables with regular terminations or cables with connectors. Note the following:

- When you create a spur cable, make sure that in the **Cable Properties** dialog box, under **Cable class** you select [Conventional](#). Do not select [Fieldbus home-run](#).
- Make sure that in the **Reference Explorer**, you create a reference spur cable for fieldbus device panels.

Fieldbus Panels

Plug-and-Socket Boxes

You need plug-and-socket boxes to connect Foundation Fieldbus instruments to a spur or a home-run cable that has a plug-and-socket connection.

SmartPlant Instrumentation supports active plug-and-socket junction boxes, that is, plug-and-socket junction boxes that require power supply. You can define the current consumption, open circuit voltage, and short-circuit protection for an active plug-and-socket junction box. When generating a segment validation report, the software takes these values into account when calculating the total segment current consumption and voltage drop for a particular segment.

You use the **Plug-and-Socket Box Wizard** to create the required plug-and-socket boxes or reconfigure the existing ones.

Plug-and-socket boxes can be device panels or junction boxes.

Creating a Plug-and-Socket Device Panel


Use the following procedure to create a new plug-and-socket device panel.

➤ To create a plug-and-socket device panel

1. Do one of the following:
 - Press F7 to open the **Domain Explorer**.
 - In the **Wiring** module, on the **View** menu, click **Wiring Explorer**.
2. Do one of the following:
 - Double-click the **Panels by Location** folder, right-click a location and then on the shortcut menu point to **New** and click **Device Panel (Plug-and-Socket)**.
 - Double-click the **Panels by Category** folder, right-click the **Device Panels** folder and then on the shortcut menu point to **New** and click **Device Panel (Plug-and-Socket)**.
3. In the **Plug-and-Socket Box** wizard, follow all the instructions carefully and then click **Next** until you complete the wizard.



Tips

- You can click  next to a list arrow to access the appropriate supporting table. This allows you to add, edit, or delete drop-down list items.
- When defining the plug-and-socket box connectors, under **Connector type definition display**, SmartPlant Instrumentation displays the

connector sequence, the appropriate pin number, and the pin polarities according to the configuration of the connector than you selected.

Creating a Plug-and-Socket Junction Box


Use the following procedure to create a new plug-and-socket junction box.

➤ To create a plug-and-socket junction box

1. Do one of the following:
 - Press F7 to open the **Domain Explorer**.
 - In the **Wiring** module, on the **View** menu, click **Wiring Explorer**.
2. Do one of the following:
 - Double-click the **Panels by Location** folder, right-click a location and then on the shortcut menu point to **New** and click **Junction Box (Plug-and-Socket)**.
 - Double-click the **Panels by Category** folder, right-click the **Junction Boxes** folder and then on the shortcut menu point to **New** and click **Junction Box (Plug-and-Socket)**.
3. In the **Plug-and-Socket Box** wizard, follow all the instructions carefully and then click **Next** until you complete the wizard.



Tips

- You can click  next to a list arrow to access the appropriate supporting table. This allows you to add, edit, or delete drop-down list items.
- When defining the plug-and-socket box connectors, under **Connector type definition display**, SmartPlant Instrumentation displays the connector sequence, the appropriate pin number, and the pin polarities according to the configuration of the connector than you selected.

Modifying the Properties of a Plug-and-Socket Junction Box

Use the following procedure to modify certain properties of an existing plug-and-socket junction box, such as type, manufacturer, model, and layout.


**Note**

- The software does not allow you to modify port and connector configurations of an existing plug-and-socket junction box.

➤ To modify the properties of a plug-and-socket junction box

1. Do one of the following:
 - Press F7 to open the **Domain Explorer**.
 - In the **Wiring** module, on the **View** menu, click **Wiring Explorer**.
2. Do one of the following:
 - Double-click the **Panels by Location** folder, navigate to a panel, and then on the shortcut menu click **Properties**.
 - Double-click the **Panels by Category** folder, right-click the **Junction Boxes** folder and then on the shortcut menu click **Properties**.
3. In the **Plug-and-Socket Box** wizard, follow all the instructions carefully and then click **Next** until you complete the wizard.

**Tips**

- You can click  next to a list arrow to access the appropriate supporting table. This allows you to add, edit, or delete drop-down list items.
- When defining the plug-and-socket box connectors, under **Connector type definition display**, SmartPlant Instrumentation displays the connector sequence, the appropriate pin number, and the pin polarities according to the configuration of the connector than you selected.

Modifying the Properties of a Plug-and-Socket Device Panel

Use the following procedure to modify certain properties of an existing plug-and-socket device panel, such as type, manufacturer, model, and connectors.

**Note**


- The software does not allow you to modify port and connector configurations of an existing plug-and-socket device panel.

➤ **To modify the properties of a plug-and-socket device panel**

1. Do one of the following:
 - Press F7 to open the **Domain Explorer**.
 - In the **Wiring** module, on the **View** menu, click **Wiring Explorer**.
2. Do one of the following:
 - Double-click the **Panels by Location** folder, navigate to a panel, and then on the shortcut menu click **Properties**.
 - Double-click the **Panels by Category** folder, right-click the **Device Panels** folder and then on the shortcut menu click **Properties**.
3. In the **Plug-and-Socket Box** wizard, follow all the instructions carefully and then click **Next** until you complete the wizard.



Tips

- You can click  next to a list arrow to access the appropriate supporting table. This allows you to add, edit, or delete drop-down list items.
- When defining the plug-and-socket box connectors, under **Connector type definition display**, SmartPlant Instrumentation displays the connector sequence, the appropriate pin number, and the pin polarities according to the configuration of the connector than you selected.

Creating a Fieldbus-Compatible Terminal Strip

The following procedure deals with the creation of a terminal strip that is compatible with your fieldbus system. You need to create a fieldbus-compatible terminal strip under an I/O card in the **Domain Explorer** so that you can effect I/O assignment.

➤ **To create a fieldbus-compatible terminal strip**

1. In the **Domain Explorer**, navigate to the I/O card under which you are going to create the new terminal strip.
2. Right-click the selected I/O card and then on the shortcut menu, point to **New** and click **Terminal Strip**.
3. In the **Strip Terminal Configuration** dialog box, from the **Configuration name** list, select **Fieldbus strip**.



Caution

- Make sure that after you make this selection, the **Fieldbus** check box is also selected.

**Note**

- You can also define a new strip terminal configuration if the one that you need is not available from the list. For details, see, [Defining a Fieldbus Strip Terminal Configuration](#).

4. Click **Create**.
5. In the **Terminal Strip Properties** dialog box, define the terminal strip properties as needed and click **OK**.

Defining a Fieldbus Strip Terminal Configuration

The following procedure explains how to define a strip terminal configuration compatible with fieldbus.

➤ To define a fieldbus strip terminal configuration

1. In the **Domain Explorer**, right-click an I/O card.
2. On the shortcut menu, point to **New** and then click **Terminal Strip**.
3. In the **Strip Terminal Configuration** dialog box, click **New**.
4. In the **Terminals in Pattern** dialog box, enter the required number of terminals in the pattern and click **OK**.
5. In the **Strip configuration name** field, type the name of the new terminal configuration.
6. In the **Description** field, type a brief description of the new configuration if needed.
7. In the **Total number of terminals** field, enter the total number of terminals required in the terminal strip or I/O card.
8. Select the first terminal from the **First terminal** list.
9. In the **Number of terminals per segment** field, enter the required number of terminals per segment. This option is only available for strips in a DCS or a PLC.
10. In the **First segment number** field, enter the first segment number. This option is only available for strips in a DCS or a PLC.
11. In the **Strip Terminal Numbering** section, type a prefix in the **Prefix** field if required.

12. Select the **Incremented** check box if you want the terminal number to be incremented within the pattern.
13. Select the **Numbered** check box if you want the number of the terminal to appear between the prefix and the suffix.
14. Type a suffix if required.
15. Click **Save**.

**Note**

- Now you are ready to create an I/O card based on this new configuration.

Terminators and Fieldbus Bricks

Terminators

Terminators are used to terminate and provide impedance compensation at a segment end. Two terminators are needed for each segment — one on the power supply side (beginning of the segment) and the other on its other end.

There are two types of terminators — internal terminators (in relation to a terminating block) or external (fitted on as a separate accessory).

You can create internal or external terminators as required, whether it is a terminal apparatus strip or a plug-and-socket termination block.

You create internal terminators using the configuration tools when creating plug-and-socket boxes or termination blocks. External terminators are added to the termination block (an apparatus or a plug-and-socket box) during the wiring design phase.

Creating an External Terminator in a Plug-and-Socket Box

This feature enables you to create an external terminator in an existing plug-and-socket box.

➤ To create an external terminator in a plug-and-socket box

1. In the **Domain Explorer** navigate to the required plug-and-socket box.
2. Right-click the plug-and-socket box that you selected and then on the shortcut menu, point to **Actions** and click **Connection**.
3. In the **Plug-and-Socket Box Connection** window, right-click the required port and on the shortcut menu, click **New Terminator**.
4. In the **Plug-and-Socket Box Terminator** dialog box, make sure the correct port is displayed in the **Port** drop-down list. Select the required port if needed.
5. Click **Create** to add the new terminator and close the dialog box.



Note

- You can now associate this terminator with a segment. Right-click the selected terminator and on the shortcut menu, click **Associate Segment**.

Creating an External Terminator on a Terminal Strip

You can place an external terminator on a terminal in an apparatus or a conventional terminal strip, i.e., a junction box, marshaling rack, and so forth.

➤ To create an external terminator on a terminal strip

1. In the **Domain Explorer** navigate to the required panel.
2. Right-click the panel that you selected and then on the shortcut menu, point to **Actions** and click **Connection**.
3. In the **Connection** window, make sure that the required strip is selected in the **Strip** drop-down list.
4. Right-click the required terminal and on the shortcut menu, click **New Terminator**.
5. In the **New Terminator** dialog box, make sure the correct first terminal is displayed in the **First terminal** drop-down list. Select the required first terminal if needed.
6. Select the required terminal side.
7. Enter the required number of terminals that you want to terminate.
8. Click **Create** to add the new terminator and close the dialog box.

The new terminator appears in pink next to the selected terminal. You can now associate the terminal with a segment.

Moving an External Terminator to Another Port in a Plug-and-Socket Box

Usually, an external terminator is added when you create a plug-and-socket box. You can disconnect a terminator or move it to another port in a plug-and-socket box if required.

➤ To move a terminator to another port in a plug-and-socket box

1. In the **Domain Explorer** navigate to the required plug-and-socket box.
2. Right-click the plug-and-socket box that you selected and then on the shortcut menu, point to **Actions** and click **Connection**.
3. Right-click the terminated port and on the shortcut menu, click **Disconnect Selected Entities**.
4. Right-click the required port and on the shortcut menu, click **New Terminator**.
5. In the **Plug-and-Socket Box Terminator** dialog box, make sure the correct port is displayed in the **Port** drop-down list. Select the required port if needed.

6. Click **Create** to add the new terminator and close the dialog box.

You can now associate this terminator with a segment.

Creating an Internal Terminator

Internal terminators are usually added when creating plug-and-socket boxes and termination blocks. You can also add an internal terminator to an existing plug-and-socket box or termination block if it hasn't been done during the creation process. If a plug-and-socket box does not contain an internal terminator, edit the required box in the **Plug-and-Socket Box** wizard. For information on how to add an internal terminator to a new plug-and-socket box, see [Plug-and-Socket Boxes](#).

➤ To add an internal terminator

1. In the **Domain Explorer** navigate to the required plug-and-socket box.
2. Right-click the plug-and-socket box that you selected and then on the shortcut menu, click **Properties**.
3. In the **Plug-and-Socket Box** wizard, click **Next** twice till you open the **Modify the Plug-and-Socket Layout** page in the **Plug-and-Socket Box** wizard.
4. Select the **Internal Terminator** check box and click **Next**.
5. Continue configuring the plug-and-socket box as needed. (See [Plug-and-Socket Boxes](#) for details.)

Associating a Terminator in a Plug-and-Socket Box

This option enables you to associate an external terminator with an existing segment where the terminator is located in a plug-and-socket box.

➤ To associate a terminator with a segment

1. In the **Domain Explorer** navigate to the required plug-and-socket box.
2. Right-click the plug-and-socket box that you selected and then on the shortcut menu, point to **Actions** and click **Connection**.
3. In the **Plug-and-Socket Box Connection** window, click the required connected home-run cable to select it.
4. Right-click the highlighted home-run cable and on the shortcut menu, click **Associate Segment** to open the **Segment Association** dialog box.
5. From the **Associate segment** drop-down list, select the segment with which you want to associate the current terminator.

**Tip**

- If the required segment is not available in the **Associate segment** list, select the Include all segments option button in the **Segment filter** group box.

6. Click **OK** to make the association.

Associating Terminators with Segments

After creating an external terminator, you need to associate it with an existing segment.

As external terminators can be located in either plug-and-socket boxes or conventional terminal strips, the association procedure is different depending on whether the terminator you want to associate is in a terminal strip or a plug-and-socket box.

Associating a Segment with a Terminator on a Terminal Strip

This option enables you to associate a segment with an external terminator that has been placed on a terminal in a conventional terminal strip, i.e., not a plug-and-socket box.

➤ To associate an external terminator with a segment

1. In the **Domain Explorer** expand the required panel.
2. Right-click the appropriate fieldbus strip and then on the shortcut menu, point to **Actions** and click **Connection**.
3. In the **Connection** window, make sure that the required strip is selected in the **Strip** drop-down list.
4. Right-click the required terminator and on the shortcut menu, click **Associate Segment** to open **Terminator - Segment Association** dialog box.
5. From the **Associate segment** list, select the segment with which you want to associate the current terminator.

**Tip**

- If the required segment is not available in the **Associate segment** list, select the Include all segments option button in the **Segment filter** group box.

6. Click **OK** to make the association.

Fieldbus Bricks: An Overview

When designing your Foundation Fieldbus or Profibus system, you need to create a Fieldbus brick assembly. A Fieldbus brick assembly is a composite object that consists of a wiring equipment entity (Fieldbus brick) and an apparatus group. An apparatus group constitutes an apparatus strip (that is, a terminal strip) with a number of apparatuses created according to a selected apparatus configuration.

When creating a Fieldbus brick, you can define power supply requirements and current consumption. Adding an apparatus to a Fieldbus brick, entails the definition of an apparatus configuration and the number of apparatuses that you need. Note that the power supply requirements and current consumption values are common to all the existing apparatuses belonging to the apparatus group that exists under a Fieldbus brick. Therefore, changing an electric property values affect all the apparatuses that exist under a Fieldbus brick. For more details about wiring equipment and apparatuses, see [Wiring Equipment: An Overview](#).

When generating a segment validation report, the software takes into account the Fieldbus brick electric properties and validates the total current of a segment.

We suggest that first you create your equipment in the **Reference Explorer** so that you have as many typical configurations as possible. Then, you can copy these typical configurations to the **Domain Explorer** and this way create numerous Fieldbus bricks on the fly.


Creating Fieldbus Brick Assemblies

The following procedure explains how to create a Fieldbus brick assembly. A Fieldbus brick assembly is a composite object that consists of a wiring equipment entity (Fieldbus brick) and a number of apparatuses. When creating a Fieldbus brick, you can define power supply requirements and current consumption. Note that if there are several apparatuses under a Fieldbus brick, the power supply requirements and current consumption values are common to all the existing apparatuses belonging to that Fieldbus brick. Therefore, changing an electric property values affect all the apparatuses that exist under a Fieldbus brick.

When adding an apparatus to a Fieldbus brick, you can define the apparatus configuration and the number of apparatuses that you need. For more details about wiring equipment and apparatuses, see [Wiring Equipment: An Overview](#).

We recommend that first you create your Fieldbus bricks in the **Reference Explorer** so that you have as many typical configurations as possible. Then, you can copy these typical configurations to the **Domain Explorer** and this way create numerous Fieldbus bricks on the fly.

➤ **To create a fieldbus brick assembly**

1. Press F8 to open the **Reference Explorer**.
2. Double-click the **Panels** folder, and navigate to a panel.
3. Right-click a panel and then on the shortcut menu, point to **New** and click **Wiring Equipment**.
4. In the **New Wiring Equipment** dialog box, from the **Category** list, select [Fieldbus brick](#).
5. Under **Name**, type the name of the new fieldbus brick and click **OK**.
6. In the **Wiring Equipment Properties - Fieldbus Brick** dialog box, on the **General** tab, type the name of the new fieldbus brick.
7. Select the **Double width** check box if the fieldbus brick occupies a double width slot or position.
8. In the **Details** group box do the following as you require:
 - a) Type a description.
 - b) Select a type, model, and manufacturer. If the required value is not available on the list, click  to define a new one.
 - c) Enter a sequence if you need to define the card sequence.
9. Click the **Category Properties** tab to enter the power supply requirement and current consumption values for the reference Fieldbus brick.



Tip

- Fieldbus brick is a wiring equipment category that is shipped with SmartPlant Instrumentation. You cannot delete or rename any of the category properties that have been shipped with the software. However, you can add user-defined properties which you can rename or delete as you wish. For details, see [Adding User-Defined Wiring Equipment Category Properties](#).
10. Click the **Associated Symbols** tab to associate a symbol for this entity. The software will use this symbol in the Enhanced Report Utility. For details, see [Associating Symbols](#).
 11. Click **OK** to accept your settings and close the dialog box.
 12. In the **Reference Explorer**, right-click the new Fieldbus brick, then on the shortcut menu, point to **New** and click **Apparatus**.
 13. In the **Apparatus** dialog box, select the required configuration from the **Configuration name** list. Make sure that this configuration is compatible with Fieldbus and that the **Fieldbus apparatus** check box is selected.

**Note**

- If you do not have an appropriate configuration, create one.

14. Enter the number of apparatuses that you require.

15. Click **Create**.

**Note**

- SmartPlant Instrumentation automatically assigns sequential position numbers to each apparatus. You can edit them later if required. For details, see [Editing Apparatus Terminal Properties](#).

16. In the **Terminal Strip Properties** dialog box, define the new apparatus strip as required and click **OK**.

17. Click **Close** in the **Apparatus** dialog box.

**Note**


- The new apparatus appears in the **Reference Explorer** under the current Fieldbus brick.

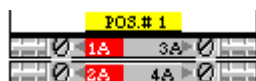
18. Drag the new Fieldbus brick to a panel in the **Domain Explorer**.

**Note**

- The software copies the Fieldbus brick assembly that includes the Fieldbus brick and the apparatus.

19. In the **Terminal Strip Properties** dialog box, rename the Fieldbus brick, modify the other properties as you require, and then click **OK**.

20. Connect the apparatus to the appropriate cables. Select the apparatus strip you want to connect and click . The **Connection** window opens displaying the apparatus terminals in yellow:





Configuring a Fieldbus Apparatus

To create a Fieldbus brick assembly, you must have a predefined apparatus group configuration. An apparatus group constitutes an apparatus strip (that is, a terminal strip) with a number of apparatuses created according to a selected apparatus configuration. When defining an apparatus configuration, you define the apparatus profile (name, description, manufacturer, and model), the number of apparatuses, the apparatus terminal configuration, and the position numbering.

➤ To configure a fieldbus brick

1. Do one of the following:
 - Press F7 to open the **Domain Explorer** or F8 to open the **Reference Explorer**.
 - In the **Wiring** module, on the **View** menu, click **Wiring Explorer**.
2. Do one of the following:
 - In the **Domain Explorer**, double-click the **Panels by Location** folder, and navigate to a panel.
 - In the **Domain Explorer**, double-click the **Panels by Category** folder, and navigate to a panel.
 - In the **Reference Explorer**, double-click the **Panels** folder, and select a panel.
3. Right-click a panel to which you want to add a fieldbus termination block and then on the shortcut menu, point to **New** and click **Apparatus**.
4. In the **Apparatus** dialog box, click **New**.
5. In the **Apparatus profile** group box, do the following:
 - a) In the **Configuration name** field, type the name of the new apparatus configuration.
 - b) Select the **Fieldbus apparatus** check box.
 - c) In the **Apparatus numbering** group box, type the position name in the **Prefix** field if required. Position names can be 15-character long. This name will appear in the **Domain Explorer** within the new strip (only the first four characters), in the **Connection** window, and in the appropriate reports.
 - d) Select the **Numbered** check box to number the positions.
 - e) Select the **Internal terminator** check box if you need to add an internal terminator on the new termination block.
 - f) In the **Description** field, type a short description for the new configuration.

- g) From the **Manufacturer** list, select the appropriate termination block manufacturer. If the required value is not available, click  next to the list arrow to add or edit values for this list.
 - h) From the **Model** list, select the appropriate termination block model. If the required value is not available, click  next to the list arrow to add or edit values for this list.
 - i) Use the **Number of apparatuses** spinner or type the required number of termination blocks to be added. This way you can have a block of more than one apparatuses. This number will be displayed by default when adding a new termination block to a strip.
6. In the **Apparatus configuration** group box, define the termination block configuration as follows:
- a) From the **Orientation** list, select the required terminal orientation:
 - **L&R** — a termination block that has two sides: input and output (that is, left and right).
 - **L** — a termination block that has wires on the left side only.
 - **R** — a termination block that has wires on the right side only.
 - b) From the **Function** list, select the required function of the termination block: [HomeRunIn](#), [HomeRunOut](#), or [Spur](#).
 - c) Click in the **Channel** text box and type the appropriate channel number.
 - d) From the **Polarity** list, select the required polarity.
 - e) Click in the **Terminal Numbering** text box and type the terminal name.
 - f) Under **Terminal Color and Numbering**, type the terminal number or name and select the required terminal color for both left and right terminals.
 - g) Repeat steps b) through f) for the other terminals if appropriate.
 - h) Click **Add Terminal** to add another terminal to this apparatus configuration if needed and then repeat steps a) through d).
 - i) Click **Delete Terminal** if you need to delete a selected terminal from the current configuration.
7. Click **Save** and then **Close**.

**Note**

- You can now add the required termination block as needed.

Connection and Association

Connecting a Home-Run Cable to a Plug-and-Socket Box

After creating the required plug-and-socket boxes and home-run cables with connectors, you can start making the required connections.

➤ To connect a home-run cable to a plug-and-socket box

1. Do one of the following:
 - Press F7 to open the **Domain Explorer**.
 - In the **Wiring** module, on the **View** menu, click **Wiring Explorer**.
2. Expand the **Cables** folder and select a home-run cable.
3. Right-click the cable you selected and then on the shortcut menu, point to **Actions** and click **Connection**.
4. In the **Plug-and-Socket Box Connection** window, do the following:



Caution

- Make sure that the cable connector matches the port type on the plug-and-socket box.
- a) In the **Domain Explorer**, expand the fieldbus cable that you want to connect to the current plug-and-socket box.
 - b) Drag the connectors to their ports in the current plug-and-socket box.
5. In the **Cable Connection Options** dialog box, select the cable end that you want to connect and click **OK**.
 6. Repeat the above to connect other cables as needed.



Note

- To disconnect a home-run cable from the current plug-and-socket box, highlight the cable that you want to disconnect and click

Associating Segments with Home-Run Cables

You can associate a segment with home-run cable after connecting the required home-run cable to either a plug-and-socket box or any other fieldbus strip.

As home-run cables can be connected to either plug-and-socket boxes or any conventional panels, the association procedure is different depending on whether the home-run cable you want to associate is connected to a conventional panel or a plug-and-socket box.

Caution

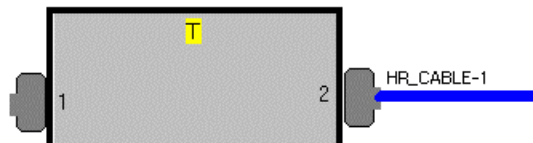
- A termination block or a plug-and-socket box can be connected only to one home-run IN cable and one home-run OUT cable.

Associating a Segment with a Home-Run Cable Connected to a Plug-and-Socket Box

Use the following procedure to associate a segment with a home-run cable connected to a plug-and-socket box.

➤ To associate a segment with a home-run cable connected to a plug-and-socket box

1. In the **Domain Explorer** navigate to the required plug-and-socket box.
2. Right-click the plug-and-socket box that you selected and then on the shortcut menu, point to **Actions** and click **Connection**.
3. In the **Plug-and-Socket Box Connection** window, click the required connected home-run cable to select it. For example:



4. Right-click the highlighted home-run cable and on the shortcut menu, click **Associate Segment** to open **Segment Association** dialog box.
5. From the **Associate segment** list, select the segment with which you want to associate the current home-run cable.

Tip

- If the required segment is not available in the **Associate segment** list, select the **Include all segments** option button in the **Segment filter** group box.

6. Click **OK** to make the association.

**Tip**

- The name of segment you just associated is propagated along the entire home-run cable.

Associating a Segment with a Home-Run Cable Connected to a Termination Block

You can associate segment with a home-run cable connected to a termination block in a conventional panel, i.e., not a plug-and-socket box.

➤ To associate a segment with a home-run cable connected to a termination block

1. In the **Domain Explorer** navigate to the required plug-and-socket box.
2. Right-click the plug-and-socket box that you selected and then on the shortcut menu, point to **Actions** and click **Connection**.
3. In the **Connection** window, make sure that the required strip is selected in the **Strip** list then click the required connected set that belongs to a home-run cable.
4. Right-click the highlighted set and on the shortcut menu, click **Associate Segment** to open the **Segment Association** dialog box.

**Note**

- Note that the segment association is done with a selected set of the current cable.
5. From the **Associate segment** list, select the segment with which you want to associate the current home-run cable.

**Tip**

- If the required segment is not available in the **Associate segment** drop-down list, select the **Include all segments** option button in the **Segment filter** group box.
6. Click **OK** to make the association.

**Tip**

- The name of segment you just associated is propagated along the entire home-run cable.

Fieldbus I/O Cards and I/O Assignment

Creating a Fieldbus I/O Card


Use this procedure to add fieldbus I/O cards to any wiring panel.




Note

- You can assign fieldbus segments only to fieldbus I/O cards that you create in DCS or PLC panels.

➤ To create a fieldbus I/O card

1. In the **Domain Explorer**, right-click a DCS or PLC panel where you want to create the new fieldbus I/O card.
2. On the shortcut menu, point to **New** and then click **Wiring Equipment**.
3. In the **New Wiring Equipment** dialog box, under **Category**, select **I/O card**.
4. In the **Wiring Equipment Properties - I/O Card** dialog box, on the **General** tab, do one of the following to name the new I/O card:
 - Select the **Apply naming convention** check box selected if you want the software to name the new card automatically according to the naming conventions that are set for this type of equipment in the [Administration](#) module. For more information, see [SmartPlant Instrumentation Administration Help, Domain Administration > Naming Conventions](#).
 - Clear the **Apply naming convention** check box and under **Name**, type the name of the new card. Note that if you do not clear the **Apply naming convention** check box, the software will ignore the name that you type under **Name**.
5. Select the **Double width** check box if the card occupies a double width slot or position.
6. In the **Details** group box do the following as you require:
 - a) Type a description.
 - b) Select an I/O card type, model, and manufacturer. If the required value is not available on the list, click  to define a new one.
 - c) Enter a sequence if you need to define the card sequence.
7. Click the **Control System** tab.

8. In the **Control system details** group box, under **System I/O type**, select one of the following system I/O types to determine the actual function of the new I/O card:
 - [Fieldbus](#)
 - [Profibus DP](#)
 - [Profibus PA](#)
9. Under **Module**, type the software address that this card is assigned to. This field header is panel manufacturer-specific. Selecting a different manufacturer when editing the panel displays the headings used by that panel manufacturer.
10. From the **Controller/Processor** list, select the I/O card controller. If the required controller is not available on the list, click  to define a new one.
11. Click the **Category Properties** tab.
12. Revise and modify category property values as you require. Click the value for each property and modify it as needed.

**Tip**

- A category property is a wiring equipment category property that you can define yourself. For details, see [Adding User-Defined Wiring Equipment Category Properties](#).
13. Click the **Associated Symbols** tab to associate a symbol for this entity. The software will use this symbol in the Enhanced Report Utility. For details, see [Associating Symbols](#).
 14. Click **OK** to accept your settings and close the dialog box.

Fieldbus I/O Assignment




Use this procedure to define I/O assignment for fieldbus I/O cards.

➤ To define fieldbus I/O assignment

1. In the **Domain Explorer**, select the DCS and PLC panels that contain fieldbus I/O cards for which you want to effect I/O assignment.
2. Right-click the panel that you selected, and on the shortcut menu, point to **Actions** and then click **I/O Assignment**.
3. In the **Segment I/O Assignment** window, under **I/O card details**, do the following for each I/O card for which you want to effect I/O assignment.
 - a) Under **I/O card**, select the required I/O card.
 - b) For each segment for which you want to effect I/O assignment, drag it from the **Segments** data window to the appropriate channel in the data window of the **I/O card details** pane.
4. To cancel fieldbus I/O assignment for a given segment, drag it from the data window of the **I/O card details** pane back to the **Segments** data window.



Notes

- To rename a selected control system tag, click , and in the dialog box that opens, edit the tag.
- To view input/output information for the current I/O card, click .
- To generate an I/O Tag Assignment report, click .

Fieldbus Validation and Reports

Validation Overview

SmartPlant Instrumentation validates that you design fieldbus segments according to basic connection rules and according to parameters that you set for a given segment:

On-the-Fly Connection Validations

Upon attempting to connect, the software verifies that:

- An instrument to be connected is not associated with another segment.
- A home-run cable to be connected is not already connected to another segment.
- You are not associating or wiring a non-intrinsically-safe instrument to an intrinsically safe segment. In this case, SmartPlant Instrumentation will warn, but allow.

Segment-Report Validations

You perform other validations by running a report from the **Fieldbus Segment Manager**. SmartPlant Instrumentation notifies you in the report of a failed validation in the following cases:

- There are fieldbus tags that are associated with a segment but not wired.
- There are fieldbus tags that have wiring, but are not yet connected to a segment.
- There is a connection discontinuity between the field and a DCS or an I/O terminal strip.
- The number of instruments in a segment exceeds the maximum specified for that segment.
- The number of devices on a given spur exceeds the segment-wide parameter profile.
- A spur length exceeds the maximum set for that spur.
- Total cable length exceeds the maximum you defined for the segment profile.
- There are less than two terminators in a segment.
- Actual voltage at instrument terminals is below the minimum operating voltage.
- Total segment current consumption exceeds the maximum specified value.
- Total capacitance exceeds segment maximum specified capacitance.

**Notes**

- To define a cable type that supports fieldbus validation, make sure that in the **Cable Type Properties** dialog box, you enter the required values for capacitance, capacitance UOM (unit of measure), cable resistance, cable resistance UOM, length UOM, and maximum fieldbus length.
- To define an instrument tag that supports fieldbus validation, make sure that in the **Tag Number** dialog box you enter valid information under **Fieldbus Tag Number Properties**.
- SmartPlant Instrumentation validation supports basic fieldbus networks consisting of a single segment with no parallel branches and no repeaters.

Generating a Validation Report for One Segment

This procedure shows you how to generate a validation report for one fieldbus segment. Such a report allows you to verify that you created this segment according to general connection rules and the specific segment-wide parameter profile associated with each section.

**Note**

- SmartPlant Instrumentation will formulate this type of report in the unit of measure set on the **Cable Lengths** tab of the **Segment-Wide Parameter Profile Properties** dialog box.




➤ To generate a validation report for one segment

1. In the [Wiring](#) module, open the **Fieldbus Segment Manager**.
2. Highlight a segment, and do one of the following:
 - Right-click on a segment, and on the shortcut menu, click **Segment Validation Report**.
 - On the **Actions** menu, click **Segment Validation Report**.

Generating a Validation Report for Multiple Segments

This procedure shows you how to generate a validation report for one or more fieldbus segments. Such a report allows you to verify that you created fieldbus segments according to general connection rules and the specific segment-wide parameter profile associated with each segment. For more information, see [Validation Overview](#).

➤ To generate a fieldbus segment validation report

1. In the [Wiring](#) module, open the **Fieldbus Segment Manager**.
2. Open the **Segment Validation Report** dialog box by doing one of the following:
 - Click  on the [Wiring](#) module toolbar.
 - Highlight  in the **Fieldbus Segments** pane. Right-click this icon, or the word **Fieldbus** to its right, and on the shortcut menu, click **Multiple Validation Reports**.
 - Highlight  in the **Fieldbus Segments** pane. On the **Actions** menu select **Multiple Validation Reports**.
3. Select at least one segment.



Notes

- You can select non-consecutive segments by pressing the Ctrl key while clicking additional segments.
 - Select **Select all** to include all segments in the validation report.
4. Under **Unit of measure for the report**, select [Feet](#) or [Meters](#).
 5. Click **Print**.

Generating a Segment Wiring Report

Use this procedure to display an enhanced report for a fieldbus segment.



Notes

- You must install the Enhanced Report Utility on your local machine to be able to generate the communication line report. For details, see [Enhanced Report Utility Installation Guide](#).
- You can also generate detailed enhanced reports for loops within a fieldbus segment.

➤ To generate a segment wiring report

1. Start the [Wiring](#) module.
2. In the **Fieldbus Segment Manager**, select the desired segment.
3. Do one of the following
 - On the **Actions** menu, click **Enhanced Segment Wiring**.
 - Right-click the required segment and on the shortcut menu, click **Enhanced Segment Wiring**.
4. At the print preview prompt, do one of the following:
 - Click **Yes** to open the print preview of the generated report. Choose this option if you want to modify or annotate the report.
 - Click **No** to start printing the report without displaying its print preview.



Notes

- In the **General** tab folder of the **Preferences** dialog box, you can set SmartPlant Instrumentation to display a print preview always, never or with your approval.
- If you select not to preview a report, and you are using Acrobat Distiller as your default printer, make sure that Distiller is configured enable report generation without prompting for the output file location. To do this, open the Distiller **Preferences** dialog box and under **Output Options**, clear the check boxes **Ask for PDF file destination** and **Ask to replace existing PDF file**.

Generating a Fieldbus Loop Report

You can generate a fieldbus loop report for any fieldbus tag in a segment. The report displays the tag and all of its wiring connections in the loop.

➤ To generate a fieldbus loop report

1. Start the [Wiring](#) module.
2. In the **Fieldbus Segment Manager**, select a tag in the desired segment.
3. Do one of the following
 - On the **Actions** menu, click **Enhanced Fieldbus Loop**.
 - Right-click the required segment and on the shortcut menu, click **Enhanced Fieldbus Loop**.
4. At the print preview prompt, do one of the following:
 - Click **Yes** to open the print preview of the generated report. Choose this option if you want to modify or annotate the report.
 - Click **No** to start printing the report without displaying its print preview.



Notes

- On the **General** page of the **Preferences** dialog box, you can set the software to display a print preview always, never or with your approval.
- If you select not to preview a report, and you are using Acrobat Distiller as your default printer, make sure that Distiller is configured to enable report generation without prompting for the output file location. To do this, open the Distiller **Preferences** dialog box and under **Output Options**, clear the check boxes **Ask for PDF file destination** and **Ask to replace existing PDF file**.

Profibus Definitions

Flow of Activities for Profibus Design

The following is a suggested flow of activities for Profibus design in SmartPlant Instrumentation. Note that the basic definitions and the creation of Profibus PA instruments are the same as for Foundation Fieldbus.

1. Set the basic definitions as follows:
 - a) **Define Profibus instrument types** – Prior to creating new Profibus tag numbers, you need to customize wiring reference entities and then define appropriate instrument type profiles in the [Instrument Index](#) module so that new tag numbers acquire Profibus properties. This results in automatic assignment of the required properties to the new tag numbers. For details, see [Defining Fieldbus Instrument Type Profiles](#).
 - b) **Define a view in the Browser module** – In the [Browser](#) module, create a browser view with the required fields for the **Instruments** pane in the **Fieldbus Segment Manager**. This facilitates the assignment of tag numbers to segments. For details, see [Adding a New View](#).




Tip

- You may create multiple Browser views with different **Style**, **Sort** and **Filter** functions. For example, by using the filter function you may create independent views for each segment, so that only tags of that segment will be displayed in its corresponding view.
2. Create Profibus device tags based on the instrument types that you defined, and edit the tag number properties as required. For details, see [Creating Foundation Fieldbus and Profibus Instruments](#).
 3. Create the required DP segments. See [Creating a Profibus DP Segment](#).
 4. Create PA segments. See [Creating a Profibus PA Segment](#).
 5. Create Profibus PA instruments. See [Creating Foundation Fieldbus and Profibus Instruments](#).
 6. Associate the PA instruments with PA segments.
 7. Create PLC or DCS panels that can be assigned to a DP segment.
 8. Associate the PLC or DCS panels with DP segments.
 9. Create DP devices with their connected I/Os (using multi-input devices). For example, create a motor drive and insert it in an MCC cabinet.
 10. Associate the DP motor drives with DP segments.
 11. Effect the DP segment I/O assignment.
 12. Generate a Profibus segment map.

Creating a Profibus DP Segment

You need to create a DP bus prior to creating PA segments or any instruments that are associated with Profibus. The following procedure explains how to create a DP bus.



➤ To create a Profibus DP segment

1. In the **Wiring** module, click  to open the **Fieldbus Segment Manager**.
2. In the **Fieldbus Segments** pane, right-click **Fieldbus**, point to **New** and click **Profibus DP Segment**.
3. In the **Profibus DP Segment Properties** dialog box, type the segment name and click **OK**.

Creating a Profibus PA Segment

The following procedure explains how to create a Profibus PA segment. Note that you can create a Profibus PA segment only if you already have an existing DP bus.

➤ To create a Profibus PA segment

1. In the **Wiring** module, click  to open the **Fieldbus Segment Manager**.
2. In the **Fieldbus Segments** pane, expand the **Fieldbus** hierarchy to display the existing Profibus DP segments.
3. Right-click a DP segment and then on the shortcut menu, point to **New** and click **Profibus PA Segment**.
4. In the **Profibus PA Segment Properties** dialog box, type the segment name.
5. Select a segment-wide parameter profile if needed. You can click  to define a new segment-wide parameter profile if you need one.
6. Select the **Intrinsically safe** check box if you want to define the new segment as intrinsically safe.
7. Click **OK**.

Associating Profibus PA Instruments with PA Segments

The following procedure outlines the steps required to associate PA instruments with a PA segment. Note that an instrument can be associated with one segment only.

➤ To associate PA instruments with a PA segment

1. In the **Fieldbus Segment Manager**, select one or more PA instruments in the **Instruments** pane.
2. Drag the instruments you selected to a PA segment in the **Fieldbus Segments** pane.




Note

- To dissociate an instrument from a PA segment, right-click an instrument in the **Fieldbus Segment** pane, then on the shortcut menu, click **Dissociate Entity**.

Associating Profibus DP Devices with a DP Segment

This procedure explains how to associate a Profibus DP device, for example a motor drive, with a DP segment.

➤ To associate a Profibus DP device with a DP segment

1. In the **Fieldbus Segment Manager**, do one of the following to open the **Profibus DP Instruments** pop-up window.
 - On the **Actions** menu, click **Profibus DP Instruments**.
 - click  on the Fieldbus Segment Manager toolbar.
2. In the **Profibus DP Instruments** pop-up window, select an instrument and drag it to a DP segment.



Note

- To dissociate an instrument from a DP segment, right-click an instrument in the **Fieldbus Segment** pane, then on the shortcut menu, click **Dissociate Entity**.

Creating a DP-Compatible PLC or DCS Panel

You can connect several different types of devices to a DP segment. As DP segments are Ethernet buses, you can connect PLC or DCS panels to a DP segment via a special I/O card.


You create a PLC or DCS panel compatible with a DP segment exactly the same way you create any other PLC or DCS panel. While creating such a panel, make sure that you select the **Enable DP Profibus** check box so that you can associate this panel with a DP Profibus segment.

For details, see [Creating PLC Panels](#).

Associating PLC or DCS Panels with a DP Segment

The following procedure explains how to associate a PLC or a DCS panel with a DP segment.

➤ To associate a PLC or a DCS panel with a DP segment

1. In the **Fieldbus Segment Manager**, do one of the following to open the **Profibus DP PLC/DCS Panels** pop-up window.
 - On the **Actions** menu, click **Profibus DP Panels**.
 - click  on the Fieldbus Segment Manager toolbar.
2. In the **Profibus DP PLC/DCS Panels** pop-up window, select a panel and drag it to a DP segment.



Note

- To dissociate a PLC or DCS panel from a DP segment, right-click a panel in the **Fieldbus Segment** pane, then on the shortcut menu, click **Dissociate Entity**.