

Process Data Module

Overview

The [Process Data](#) module enables you to efficiently define process conditions for a particular instrument or line. These process conditions then become the reference point for the system. Process data for instruments relates to seven process functions: Flow, Temperature, Pressure, Level, Analyzer, Control Valve, and Relief Valve. The data - including the process units of measure - can be modified at any time when required.

Batch creation of process data sheets can be done by adapting existing instruments and lines using an interface that allows process characteristics to be simultaneously assigned to several instrument groups, thus ensuring system-wide integrity.

The [Process Data](#) module shares data with loop components that are associated with a given process. Data is also shared with the [Specifications](#), [Calculations](#), and [Instrument Index](#) modules, allowing all the data from these modules to be incorporated into generated reports.

Process Data Principles

SmartPlant Instrumentation enables you to store and manage process data for lines and instruments.

To view process data for instruments, enter the tag number directly when prompted, or use the search utility. To view lines, select the required line in the **Select Line** dialog box.

If instruments or lines have none or partial process data attached, you can do either of the following:

- Enter new data.
- Modify existing data (including automatic conversion of units as required).



Notes

- When the Workflow option is activated, only instrument tags marked **Process Data Required** are visible in process data sheets. For details regarding workflow implementation, see [Workflow](#).
- Saving process data modifications makes them accessible to other modules. When you generate a report that includes process data, you can set SmartPlant Instrumentation to prompt you that the relevant process data has been changed.
- You cannot generate process data sheets for virtual tags.

Starting the Process Data Module


This procedure explains how to start the process data module.



Note

- Before starting this module, check with the Domain Administrator to ensure that you have been granted appropriate access rights for the tasks you will carry out.

➤ To start the Process Data module

- In any main SmartPlant Instrumentation window, do one of the following:
 - On the module toolbar, click .
 - On the **Modules** menu, click [Process Data](#).

Opening an Instrument Tag in the Process Data Module


These procedures explain how to create, open, and define basic process data for an instrument tag in the [Process Data](#) module. Although you usually create tags in the [Instrument Index](#) module, the ability to create tags in the [Process Data](#) module allows for efficient creation of complex analyzers, for example.



Note

- To create stream and component tags for a complex analyzer, see [Defining a Complex Analyzer](#).

➤ To create an instrument tag in the Process Data module


1. In the **Process Data** window, on the module toolbar, click .
2. In the **Enter Tag Number** dialog box, type the name of the new tag number, and click **OK**.
3. 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**.
4. In the **Loop Name** dialog box, do one of the following:
 - Accept the displayed loop number and click **OK**.
 - Type the loop number that you need and click **OK**.
 - To create the tag number without a loop association, click **Cancel**.
5. In the **Tag Number Properties** dialog box, on the **General** tab, enter the appropriate values.



Note

- If you are creating a complex analyzer, do **NOT** at this point select a line from the **Line** list.
6. To enter power supply properties, see [Entering Power Supply Data for Panels and Instrument Tags](#).
 7. Click **OK**.

➤ **To open an instrument tag in the Process Data module**

1. On the module toolbar, click .
2. In the **Enter Tag Number** dialog box, do one of the following:
 - Type the required tag number.
 - Click **Find** to open the **Find Tag** dialog box and find a desired tag number.
3. Click **OK**.

➤ **To define basic process data for an instrument tag**

1. Do one of the following to open a tag in the [Process Data](#) module:
 - Create a tag.
 - Open a tag that you created previously.
2. In the **Process Data** dialog box, do the following:
 - a) Select a fluid state.
 - b) If you are creating an analyzer, do one of the following from the **Analyzer type** list:
 - To create a simple analyzer, select [simple](#).
 - To create a complex analyzer, select [complex](#).
 - c) Click **OK**.
3. If the **Complex Analyzer Tag Manager** dialog box opens, define the complex analyzer.

4. In the process data sheet for the tag that you opened, under **Line number**, select the line number to which the tag is connected.

**Notes**

- If you confirm the prompt to copy the line data, all relevant line properties and data are copied to the tag process data sheet that you are editing.
 - If you selected a line that you configured for a complex analyzer, SmartPlant Instrumentation copies the data from the **Line Component** table for that line into the **ANALYZER / COMPONENT PROPERTIES** section of the data sheet.
5. Enter the remaining process data as needed.
 6. If you are defining a complex analyzer, link analyzer stream component tags with line components.
 7. If you are defining a simple or a complex analyzer, in the **ANALYZER COMPONENT / PROPERTY** section, enter values and units of measure in the **Repeatability**, **Accuracy**, **Minimum detection limit**, and **Range** fields as needed.
 8. On the module toolbar, click

Editing Instrument Process Data


This procedure explains how to edit the process data associated with an instrument tag. You can edit instrument process data from the [Process Data](#) module or from the [Calculation](#) module.

➤ To edit instrument process data

1. Open the process data sheet for an instrument tag from either of the two modules:
 - [Process Data](#) module.
 - [Calculation](#) module.
2. In the **Process Data** window, modify the process data as needed in the following sections:
 - **GENERAL**
 - **PROPERTIES**
 - **ADDITIONAL PROPERTIES**
 - **ANALYZER COMPONENT/PROPERTY**
 - **ANALYZER COMPONENT/PROPERTY**
 - **BASE CONDITIONS**
 - **SIZING DATA**
 - **ALARM**
 - **API 2540 STANDARD**
 - **USER-DEFINED FIELDS**
 - **NOTE**



Notes

- If you are creating a multi-case tag, you can enter values for each case that you create.
 - If the Domain Administrator enabled the use of process data custom fields, the above sections can display such fields.
3. On the module toolbar, click  to save the values.

Fluid Definition

When opening a tag in a process data sheet, you are required to define the fluid for which a calculation will be carried out. You define the fluid by selecting the fluid state, entering the fluid name or selecting it from one of the two property databases, and setting the fluid phase.



Notes

- Note that if this is a new tag that you just created in the [Calculation](#) module, the **PROPERTIES** section of the window will be blank until you select the required Fluid State.
- The software does not support calculations for materials for which the state is solid/powder, nor for 2-phase flow.

➤ To define the fluid

1. Open the process data sheet for an instrument tag from either of the two modules:
 - [Process Data](#) module
 - [Calculation](#) module
2. If you defined multiple process cases, from the **Case** list, select the case that you want to calculate.
3. In the **GENERAL** section of the process data sheet, from the **Fluid state** list, do one of the following:
 - Accept the fluid state that you set when you first opened the tag in the [Process Data](#) or [Calculation](#) module.
 - Select a different fluid state.

4. From the **Fluid name source** list, select one of the following options, which the software uses to calculate the item properties:
 - [Database](#) – activates the Property database after selecting the required fluid from the **Name** list. To learn how to use the Properties database, see [Calculating Physical Properties](#).
 - [API2540](#) – calculates liquid density at operating and base conditions in accordance with the API2540 standard. To learn how to use the **API 2540 Standard Properties** database, see [API 2540 Standard for Liquid Density Calculation](#).
 - [User-defined](#) – define the fluid properties according to your own standards.

**Note**


- If you selected [Solid/Powder](#) as the material state, the **Select from** list does not appear.
5. In the **Fluid name** box, enter the fluid name.
 6. From the **Fluid phase** list, select the required fluid phase.

Modifying Instrument Base Conditions

Use this procedure to modify base condition values when entering data for Control Valve, Relief Valve, or Flowmeter calculations, from the [Process Data](#) or [Calculation](#) modules.

➤ To modify base conditions for an instrument tag

1. Open the process data sheet for an instrument tag from either of the two modules:
 - [Process Data](#) module
 - [Calculation](#) module
2. Scroll to the **BASE CONDITIONS** section.
3. Select a base pressure unit of measure, and beside **Pressure** type the base pressure.
4. Select a temperature scale, and beside **Temperature**, type the base temperature.
5. According to the state that you selected under **Fluid**, select the required basic property, as follows:
 - If the state is solid/powder, do one of the following:
 - Select [Density @base](#), select a unit of measure, and type the density value.
 - Select [Specific Gravity @base](#), and type the specific gravity value.
 - If the state is liquid, do one of the following:
 - Select [Density @base](#), select a unit of measure, and type the density value.
 - Select [Specific Gravity @base](#), and type the specific gravity value.

- If the state is water, do one of the following:
 - Select **Density @base**, select a unit of measure, and type the density value.
 - Select **Specific Gravity @base**, and type the specific gravity value.
 - If the state is gas/vapor, do one of the following:
 - Select **Density @base**, select a unit of measure, and type the density value.
 - Select **Compressibility @base**, and type the compressibility value.
 - If the state is steam, beside **Compressibility @base**, type the required value.
6. To save your changes, on the module toolbar, click .

Copying Instrument Process Data from Another Instrument

This option allows you to copy instrument process data from any existing instrument to the currently selected instrument.

➤ To copy instrument process data from another instrument

1. Open the target process data sheet.
2. In the **Process Data** window, on the **Edit** menu, point to **Copy** and click **From Instrument**.
3. In the **Enter Tag Number** dialog box, do one of the following:
 - In the text box, type the source tag number.
 - To search for the source tag, click **Find**.



Note

- You can only copy data from a tag number of the same instrument type.
4. To select a source case other than the governing case, do the following:
 - a) Click **Change**.
 - b) In the **Select Case** dialog box, from the **Available cases** list, select the source case.
 - c) Click **OK**.
 5. In the **Enter Tag Number** dialog box, click **OK**.

Propagating Line Process Data to an Instrument Tag

These procedures allow you to propagate relevant process data from a line to the current tag. Before you perform either of these procedures, you can set a filter that limits the fields that you propagate.



Notes

- The current procedures propagate line process data to a single tag. To propagate line data to more than one tag, see [Batch Propagation of Line Data to Instrument Tags](#).
- Use the current procedures to propagate multi-case process data from a line to a tag, since the batch procedure propagates process data from the governing case only.

➤ To propagate process data from the current line to the current instrument

1. Open and edit the process data sheet for the instrument to which you want to propagate process data from a line.
2. On the **Edit** menu, point to **Copy** and then click **From Line**.

➤ To propagate process data from any line to the current instrument

1. Open and edit the process data sheet for the instrument to which you want to propagate process data from a line.
2. In the **GENERAL** section of process data sheet, from the **Line number** list, select the line from which you want to propagate the process data to the current tag.



Note

- SmartPlant Instrumentation automatically propagates the relevant process data from the line that you select to the current tag.

Batch Propagation of Line Data to Instrument Tags

This procedure allows you to propagate process data from a particular line to tags that you select. Before you perform this procedure, you can set a filter that limits the fields that you propagate.



Note

- This procedure propagates the governing case only. To propagate all cases from a given line to a given tag, see [Propagating Line Process Data to an Instrument Tag](#).

➤ To propagate line data to a batch of instrument tags

1. Do one of the following:
 - Open the **Process Data Module** window.
 - Open a process data sheet for a line.
2. On the **Actions** menu, click **Propagate Line Data**.
3. In the **Propagate Line Data** dialog box, from the **Line number** list, select the source line from which you want to propagate the data to the tags.
4. Select the target tags by doing one of the following:
 - To select a group of target tags, select one of the following options from the **Propagation method** list:
 - [Include all tags](#)
 - [Include all tag numbers with process data](#)
 - [Include all tag numbers without process data](#)
 - To select target tags individually, click **Find** to open the **Find Tag** dialog box, where you select the specific target tags.
5. In the **Propagate Line Data** dialog box, click **Propagate**.



Note

- The propagated results are shown in the **Processed tags** data window (a selected box in the **Done** column signifies successful processing of data).
6. Click **Close**.

Setting the Line-to-Tag Filter

This procedure enables you to set a process data line-to-tag filter. When you propagate process data from lines to instruments, only the selected properties are propagated. The current filter settings affect both of the following:

- Propagating Line Process Data to an Instrument Tag
- Batch Propagation of Line Data to Instrument Tags

➤ To select line properties

1. In the **Process Data Module** window, on the **Edit** menu, click **Select Line Properties for Copying**.
2. In the data window, clear the selection of fields that you do not want to copy from lines to tags.



Tip

- If you want to select a few fields only for copying, select and then clear the **Select all** check box to clear all the fields first.
3. Click **OK**.

Process Data for Differential Pressure Instruments

This feature enables you to define process data for differential pressure instruments.



Note

- After setting the default units of measure for the current unit in the **Units of Measure and Accuracy** dialog box, you can select the required default unit of measure for Differential Pressure (DP instrument).

➤ To define process data for a differential pressure instrument

1. Open the required pressure instrument process data sheet.
2. From the **Pressure type** list, select **Differential Pressure**.



Notes

- The **Pressure property** label changes to **Differential pressure**.
 - From the unit of measure flag lists throughout the process data sheet, you can select the **Differential** unit of measure flag.
3. Under **PROPERTIES** and **ADDITIONAL PROPERTIES**, enter the appropriate process data values.
 4. Under **ALARM**, define the alarm and trip settings as needed.

Deleting Instrument Process Data

This option enables you to delete instrument process data. Note that you cannot delete any tags in the [Process Data](#) module. Tag numbers are deleted in the [Instrument Index](#) module.



Caution

- The deletion process is **irreversible**. Once you have deleted the process data, you **cannot** restore it!

➤ To delete an instrument process data sheet

1. With the **Process Data Module** window open, on the **Edit** menu point to **Delete Process Data** and click **Instrument**.
2. In the **Enter Tag Number for Deletion** dialog box, do one of the following:
 - In the text box, type tag for which you want to delete process data.
 - To search for the tag, click **Find**.
3. Click **OK**.

Calculating Physical Properties

The Fluid Properties Database allows you to calculate the properties of the chosen material according to its pressure and temperature.

The calculated properties are:

For Liquid

Density and Specific Gravity

Vapor pressure

Viscosity

Liquid Heat Capacity

For Gas

Density and Specific Gravity

Compressibility

Viscosity

Specific Heat Ratio



Note

- This option is not available for materials where the state is solid/powder, nor for 2-phase flow.

➤ **To calculate the properties of a selected material**

1. Open the required process data sheet.
2. In the **Process Data** window, from the **Fluid name source** list, select [Database](#).
3. From the **Fluid** list, select the required fluid.
4. In the **PROPERTIES** section, enter the appropriate pressure and temperature values.



Notes



- SmartPlant Instrumentation calculates and displays changed values.
- SmartPlant Instrumentation utilizes the AIChE databank to calculate physical properties. However, AIChE data does not provide accurate calculation of density, compressibility, and specific gravity for ethylene and propylene at critical pressure and temperature. For this reason, the software implements the procedure described in William C. Reynolds, [SI](#), Department of Mechanical Engineering, Stanford University.
- To calculate liquid density, on the **Options** menu, click **Calculate Liquid Compressibility**.
- To calculate the steam properties, on the **Options** menu, click **Saturated Steam**.

Line Types

Adding a New Line Type

This option enables you to add a new line type to the **Line Type** list in the **Select Line** dialog box.



➤ To add a line type

1. In the **Process Data Module** window, on the module toolbar, click .
2. In the **Select Line** dialog box, next to the **Line Type** list, click .
3. In the **Line Types** dialog box, click **New**.
4. Type the new line type name and description in the appropriate fields.
5. Click **OK**.

Editing a Line Type

This procedure explains how to edit a line type.


➤ To edit a line type

1. In the **Process Data Module** window, on the module toolbar, click .
2. In the **Select Line** dialog box, beside the **Line type** list, click .
3. In the **Line Type** dialog box, make the necessary changes.
4. Click **OK**.

Changing the Line Type

This procedure explains how to change the line type for a specific line.



➤ To change the type of a selected line

1. In the **Process Data Module** window, on the module toolbar, click .
2. In the **Select Line** dialog box, do one of the following:
 - To display lines of all line types, select **Show all line types**.
 - From the **Line type** list, select the current line type of the desired line.
3. In the data window, select the desired line, and click **Change Type**.
4. Select the new line type and click **OK**.

Deleting a Line Type

This option enables you to delete a line type. You cannot delete a line type if it includes a record, i.e., if it is associated with a line.

➤ To delete a line type

1. In the **Process Data Module** window, on the module toolbar, click .
2. In the **Select Line** dialog box, next to the **Line Type** list, click .
3. In the data window, select the line type that you want to delete, and click **Delete**.
4. Click **OK**.



Note


- Line numbers cannot be deleted in the [Process Data](#) module — only process data. You can delete a line only in the [Instrument Index](#) module.

Line Process Data

Adding a New Line



Use this procedure to add a new line from the [Process Data](#) module.

➤ To add a new line

1. In the **Process Data Module** window, do one of the following:
 - On the process data toolbar, click .
 - On the **Edit** menu, point to **Open Process Data**, and click **Line**.
2. In the **Select Line** dialog box, from the **Line type** list, select a line type.




Note

- To create a new line type, click  beside the **Line type** list.
3. Click **New**.
 4. In the **Line Properties** dialog box, complete the data fields of the left column as follows:
 - a) In the **Line number** box, type the required value.
 - b) From the **P&ID** list, select the drawing associated with this line.
 - c) In the **Stream name** box, type the optional stream name.
 - d) From the **Pipe material** list, select the pipe material.
 - e) From the **Pipe spec** list, select the pipe spec, or click  to open a dialog box where you manage pipe specs.
 5. To complete the data fields of the right column, do one of the following:
 - If under **Pipe standard** you select [ANSI](#) or [DIN](#), this opens the **Pipe Data** dialog box. Select one of the predetermined sets of values, and click **OK** to transfer these values back to the **Line Properties** dialog box.
 - If under **Pipe standard** you select [Other](#), enter the remaining right column values manually.
 6. In the **Line Properties** dialog box, click **OK**.
 7. In the **Select Line** dialog box, click **OK**.
 8. If the **Process Data** dialog box opens, select a fluid state and click **OK**.
 9. In the **Process Data for Line** window, enter process data for the new line.
 10. On the **Actions** menu, click **Save Process Data**.

Modifying Line Properties

You can edit line data in either the [Process Data](#) or the [Instrument Index](#) modules. This procedure applies to the [Process Data](#) module.



➤ To modify line properties

1. In the **Process Data Module** window, do one of the following:
 - On the process data toolbar, click .
 - On the **Edit** menu, point to **Open Process Data** and click **Line**.
2. In the **Select Line** dialog box, select the row containing the line data you want to edit.
3. Click **Properties** to open the **Line Properties** dialog box.
4. Modify the appropriate values in the **Line Properties** dialog box as follows:
 - Edit the line number name.
 - Select another pipe material.
 - Select another pipe standard.
 - Select another pipe spec.
5. When done, click **OK** to return to the **Select Line** dialog box.

Viewing Line Process Data

This procedure allows you to view a line process data before editing it.

➤ To view line process data

1. In the **Process Data Module** window, on the module toolbar, click .
2. In the **Select Line** dialog box, select the required line type from the **Line type** list to filter the data screen. Select **All Line Types** check box to display all available lines.
3. Highlight the required line number and click **OK**.
4. If the **Process Data** dialog box opens, select a fluid state and click **OK**.
5. In the **Process Data for Line** window, click .

Editing Line Process Data - Selecting Pipe Standards

Use this procedure to edit the pipe and line properties section of the **Process Data for Line** window. There are parameters that you set directly, and others that you set from the **Pipe Data** dialog box.

- For all pipe standard options — **ANSI**, **DIN**, and **Other** — you edit the following parameters directly: pipe material, pipe spec, and wall thickness.
- If your current selection from the **Pipe Standard** list is **Other**, you can also edit **Line size** and its unit of measure, and **Line Int. diameter**
- If your current selection from the **Pipe standard** list is **ANSI** or **DIN**, SmartPlant Instrumentation allows you to set additional fields from the **Line Properties** dialog box that opens. If you closed this dialog box and want to reopen it, on the **Options** menu, click **Pipe Data**.
- The method and effects of changing the pipe standard, and the impact of these changes on the current parameters, are summarized in the table below:

Change	Action	Result
ANSI ↔ DIN:	Select ANSI or DIN	See the first and fourth notes.
ANSI / DIN to Other:	Select Other	See the second and third notes.
	Select ANSI or DIN	See the first and third notes.
Other to ANSI / DIN:		



Notes

- The **Pipe Data** dialog box opens for new parameter selections.
- If you change your **Pipe standard** selection from **ANSI** or **DIN** to **Other**, the parameter fields become editable.
- If you change from **ANSI** or **DIN** to **Other**, SmartPlant Instrumentation hides the **Line schedule** field. If you change from **Other** to **ANSI** or **DIN**, this field appears.
- If you change from **ANSI** to **DIN** or from **DIN** to **ANSI**, your selection in the **Pipe Data** dialog box changes all parameters except for pipe material and pipe spec.

Editing Line Process Data - Fluid

A fluid is a material characterized according to state, name, and phase.

- Fluid state:** Indicates whether the fluid is a generic liquid, water, a generic gas, steam, or solid/powder. Selecting the fluid opens the properties section with the appropriate parameters for selection.
- Fluid name:** When the **User-defined** option is selected from the list, you can type the name of the fluid in the text box.
- Fluid phase:** The phase indicates whether the fluid is single or 2-phase. This selection is for information only.

Copying Line Data from One Line to Another

This option allows to copy line data from a selected line to another line or to a group of lines. If you are creating a complex analyzer with multi-stream analysis for a given physical line, you need to create multiple virtual lines, each representing a stream. You can use this procedure to copy settings from one instance of such a line to the others.

➤ To copy line data from one line to another

1. In the **Process Data Module** window, on the **Actions** menu, click **Copy Line Data**.
2. Under **Source lines**, do one of the following from the **Line types** list:
 - Select [All Line Types](#).
 - Select a specific line type.
3. Under **Line number**, select the source line.
4. Under **Target lines**, do one of the following from the **Line types** list:
 - Select [All Line Types](#).
 - Select a specific line type.
5. In the data window, select the target lines.



Notes

- You can use the filter data field to locate a specific line. Type the name of the required line / P&ID / stream in the respective field and click the **Apply Filter** button. SmartPlant Instrumentation highlights the line you were looking for. Another possibility is to select the **As typed** check box and then type the line/P&ID/Stream name in the respective field. The data is filtered as you type.
 - You can sort the rows according to a column by double clicking the column's header.
6. Click **Copy** to copy the data to the selected target lines.

Deleting Line Process Data

This procedure enables you to delete process data for a given line.



Caution

- Before deleting process data, note that deleted process data cannot be restored.

➤ To delete line process data

1. With the **Process Data Module** window open, on the **Edit** menu, point to **Delete Process Data** and select **Line**.
2. In the **Select Line to Delete Process Data** dialog box, do one of the following to display in the data window those lines whose process data has been defined:
 - From the **Line type** list, select the required line type.
 - Select the **Show all line types** check box to display all the existing lines with process data.
3. Highlight the required line in the data window.
4. Click **OK**.

Line Fluid Velocity

SmartPlant Instrumentation calculates the line fluid velocity according to the line internal diameter and volumetric fluid flow at flow conditions.

If you enter fluid flow as mass or volumetric flow at standard / normal / base conditions, SmartPlant Instrumentation will calculate volumetric flow at flow conditions first (using density values) and then the line fluid velocity.



Note

- For flowmeters, fluid velocity at operating conditions is calculated automatically according to fluid flow and line internal diameter. If the mass flow value has been entered, density is required for fluid velocity calculation.

Multiple Process Data Cases

A given instrument or line is often used for more than one operating service. For example, a dual-fuel control system might use a single supply line and control valve to carry various fuels, gas or liquid. Each group of process data settings that you enter for a given instrument or line is called a case.



Note

- Each case has a separate drawing with its own revisions. Each drawing includes the case name as part of the drawing name.

In the [Process Data](#) or [Calculation](#) modules, use the following procedures to implement multiple process data cases:

- Creating Process Data Cases
- Setting a Governing Case
- Deleting a Process Data Case
- Managing the Cases Supporting Table

Creating Process Data Cases

Use these procedures to do the following:

- Enable cases for a tag or a line by assigning a case name to the current process data
- Add additional cases to the tag or the line, thus creating multiple cases




Note

- Case names that you assign to a given line or tag can be duplicates of names that you assign to cases in other lines and tags.


For either of these procedures, do one of the following:

- Open the process data sheet for an instrument tag from either of the two modules:
 - [Process Data](#) module
 - [Calculation](#) module
- Open a process data sheet for a line.

➤ To enable cases for the current tag or line

1. On the **Actions** menu, click **Enable Case**.
2. In the **Enable Case** dialog box, do one of the following to select a case name for the current data:
 - Select an existing case name from the **Available cases** list.
 - To create a new case name, click  to open a dialog box where you can create new case names.
3. Click **OK**.

➤ To add a case for the current tag or line

1. On the **Actions** menu, click **Add Case**.
2. In the **Add Case** dialog box, do one of the following to select a name for the new case:
 - Select an existing case name from the **Available cases** list.
 - To create a new case name, click  to open a dialog box where you can create new case names.
3. Click **OK**.
4. Enter and save process data for the case that you created.

Setting a Governing Case

A governing case is the set of process data values for a line or a tag that you select as the active case. If for a given line or a tag you create more than one case, SmartPlant Instrumentation requires that you select a governing case. If you define a single case, the software automatically sets it as the governing case.

Use this procedure to select a governing case for a line or a tag.



Note

- Once you have enabled cases for line or a tag, if there is only one case, SmartPlant Instrumentation automatically defines it as the governing case. If you subsequently enable additional cases, the first case still remains the governing case until you set a new governing case.

➤ To set a governing case

1. Do one of the following:
 - Open the process data sheet for an instrument tag from either of the two modules:
 - [Process Data](#) module
 - [Calculation](#) module
 - Open a process data sheet for a line.
2. In the **GENERAL** section of the process data sheet, from the **Case** list, select the case that you want to be the governing case.
3. On the **Actions** menu, click **Set as Governing**.

Managing the Cases Supporting Table

You use cases to enable multiple sets of process data for a given instrument or line. Use these procedures to create, edit and delete case names and their descriptions. You can manage the **Cases** supporting table from the [Process Data](#) module or the [Calculation](#) module.



Note

- Case names that you assign to a set of process data for a given line or tag can be duplicates of names that you assign to cases in other lines and tags.

➤ To manage the Cases supporting table

1. Do one of the following to open the **Cases** dialog box:
 - In the **Process Data Module** window, on the **Edit** menu, click **Cases**.
 - In the [Calculation](#) module, do the following:
 - a) Create a case for a given tag.
 - b) Do one of the following:
 - In the **Enable Case** dialog box, click
 - In the **Add Case** dialog box, click
2. To add a new case name, click **New**, and then type a unique case name and an optional description.
3. To edit an existing case name, click a value that you want to edit, and modify values as needed.
4. To delete a case name, select the record that you want to delete, and click **Delete**.



Note

- SmartPlant Instrumentation does not allow you to delete a case name that is currently used on any process data sheet.

Deleting a Process Data Case

Use this procedure to delete a process data case that you created for a line or a tag.



Caution

- Deletion of a case is irreversible.

➤ To delete a process data case

1. Do one of the following:
 - Open the process data sheet for an instrument tag from either of the two modules:
 - [Process Data](#) module
 - [Calculation](#) module
 - Open a process data sheet for a line.
2. On the **Actions** menu, click **Delete Case**.

Process Analyzers

Process analyzers measure physical or chemical properties of a process flow. SmartPlant Instrumentation supports two types of process analyzers — simple and complex.

Simple Analyzers

A simple analyzer measures one physical or chemical property of a process fluid at the point of measurement or fluid sampling.

To open a simple analyzer tag, see [Opening an Instrument Tag in the Process Data Module](#).

Complex Analyzers

A complex analyzer also measures physical and chemical properties of a process flow at the point of measurement or fluid sampling. However, you have the following elements of flexibility in a complex analyzer:

- You can create multiple stream tags.
- For each stream tag, you can create multiple component/property tags.

You can use the complex analyzer methodology even where only a single component / property is measured, if the data sheet information requires specifying the complete process fluid composition for all components.

Although the application determines whether you define some analyzers as simple or complex, gas chromatographs are by their nature complex. Even if you consider one stream only, in general you will want to utilize the ability of a gas chromatograph to analyze various components/properties in the stream.

For complex analyzers, see [Flow of Activities for Complex Analyzers](#).

Flow of Activities for Complex Analyzers

To implement a complex analyzer, for example a gas chromatograph, use the following flow of activities:

- Create the process line



Note

- For multi-stream analysis in a single physical line, create multiple virtual lines, each representing a stream.

Managing Line Component Tables

For each line that you defined for a complex analyzer tag, you need to create a line components table. This table lists the fluid components of this line, together with their minimum, normal, and maximum concentrations.

The **Line Components** table that you create individually for each line is based on a **Fluid Components** supporting table — which you also manage — that is available for all lines.

For both procedures, open a process data sheet for the line for which you want to create a **Line Components** table. For more information, see [Viewing Line Process Data](#).

➤ To manage the Fluid Components supporting table



Note

- You can also perform this procedure from the **Process Data** window.
1. On the **Edit** menu, click **Fluid Components**.
 2. To create a new fluid component, click **New**.
 3. Click a value that you want to edit and modify the value as needed.

➤ To create a Line Components table for the current line

1. On the **Edit** menu, click **Line Components**.
2. For each fluid component that you want to enable for the current line, do the following:
 - a) Click **New** to add a new row.
 - b) Under **Fluid Component**, select an available fluid component.
 - c) Under **Concentration Units**, accept the default **%** or select the unit of measure that you need.
 - d) Type values for minimum, normal, and maximum concentration.
3. Click **OK**.

Defining a Complex Analyzer

You use this procedure in the course of creating a complex analyzer tag (see [Opening an Instrument Tag in the Process Data Module](#)). Before you perform this procedure, do the following:

- Create the process lines
- Create a line component table for each line.
- Create an instrument type of process function 'Analyzer' for your complex analyzer.

➤ To define a complex analyzer

1. In the [Process Data](#) module, create the complex analyzer tag.
2. In the **Complex Analyzer Tag Manager** dialog box, do the following for each stream tag that you want to define:
 - a) To the right of the **Analyzer stream** list, click **Add**.
 - b) In the **Add Tag Number** dialog box, type the number of the stream tag that you want to create.
 - c) In the dialog boxes that open, define properties as needed.



Note

- Associate a line with the stream tag either in the **Tag Number Properties** dialog box or in the process data sheet for the given stream tag.
3. For each stream that you added to the **Analyzer stream** list, do the following to create component tags that correspond to every component of the stream:
 - a) To the right of **Analyzer component/property**, click **Add**.
 - b) In the **Add Tag Number** dialog box, type the number of the component tag that you want to create.
 - c) In the dialog boxes that open, define properties as needed.
 4. In the **Complex Analyzer Tag Manager** dialog box, click **OK**.

Linking Analyzer Stream Components with Line Components

Use this procedure to link analyzer component tags with line components. You must perform this procedure for every stream of a complex analyzer.

➤ To link analyzer stream components with line components

1. In the [Process Data](#) module, open the stream tag.
2. In the **GENERAL** section, from the **Line number** list, select the desired line.
3. In response to the prompt, click **Yes** to copy data from the line to the process data sheet.
4. In the **ANALYZER COMPONENT / PROPERTY** section, do the following for each tag in the **Analyzer/component** list:
 - a) Select the analyzer component tag.
 - b) From the **Line component** list, select the fluid component that you want to link with the analyzer component tag.
 - c) Enter values and units of measure in the **Repeatability**, **Accuracy**, **Minimum detection limit**, and **Range** fields as needed.
 - d) On the **Actions** menu, click **Save Process Data**.

Generating a Specification for a Complex Analyzer

Use this procedure to generate a specification for a complex analyzer.



Notes

- For an explanation of process analyzers in SmartPlant Instrumentation, see [Process Analyzers](#).
- You can also generate specifications for each stream of a complex analyzer.
- You can also use this procedure to generate a specification for a simple analyzer.

➤ **To generate a specification for a complex analyzer**

1. Make sure that you have a specification form appropriate for an analyzer.



Note

- The library form #77 is an example of a form designed for an analyzer. If this form is not displayed in the **Select Specification Form** dialog box, see [Restoring Library Forms](#).

2. To generate the specification, see [Generating New Specifications](#).



Note

- In the **New Specification** dialog box, select **Create new single tag specification**.

Generating a Specification for an Analyzer Stream

To generate a specification for an analyzer stream, you need a special type of multi-tag specification, which functions as follows:

- You generate a multi-tag specification, with the stream tag as the master tag.
- You then add the component tags associated with this stream to the multi-tag specification.
- Fields that relate to the stream are displayed on the common page or pages.
- The fields that vary — the component names and values — are displayed on the multi-tag list tab.

➤ To generate an analyzer stream specification

1. Make sure that you have a multi-tag format based on an analyzer stream form.



Notes

- The library form #78 is an example of a form designed for an analyzer stream. If this form is not displayed in the **Select Specification Form** dialog box, see [Restoring Library Forms](#).
 - To create a format based on such a form, see [Creating a Multi-Tag Specification Format](#).
2. Based on such a format, generate a multi-tag specification for the stream.
 3. Do the following to add component tags belonging to the given stream to the specification that you created.
 - a) Click the **Multi-Tag List** tab.
 - b) On the **Actions** menu, click **Add Tag**.
 - c) In the **Add Tag Number** dialog box, click **Find**.
 - d) In the **Find Tag** dialog box, click **Find** to display all of the component tags defined for the current stream.
 - e) Do one of the following under **Search results**:
 - To select all of the component tags, select the **Select all** check box.
 - Select the component tags that you want to include.
 - f) Click **OK**.
 4. On the **Actions** menu, click **Save**.

Supplementary Service Operations

Adding an Insulation Type

You can add a new insulation type if the required one is not available in the **Insulation** list of the **ADDITIONAL LINE PROPERTIES** section of the **Process Data for Line** window.

➤ To add a new insulation type

1. In the **Process Data Module** window, on the **Edit** menu, click **Insulation Types**.
2. In the **Insulation Types** dialog box, click **New** to add a new data line, where you type the new insulation type name and description.
3. Click **OK**.

Entering and Editing a Pipe or Orifice Material

This option enables you to enter additional pipe and orifice materials as well as modify the existing ones. You can select the required ANSI group and enter or modify the linear expansion coefficients. It is possible to define linear expansion coefficients in different ways:

- One linear expansion coefficient for all temperatures.
- One linear expansion coefficient with a limitation on the minimum temperature (Tmin) or maximum temperature (Tmax).
- Two linear expansion coefficients and border temperature. This option allows you to use the first linear expansion coefficient for temperatures lower than the border temperature and the second linear expansion coefficient for temperatures higher than the border temperature.
- Two linear expansion coefficients, border temperature, and minimum/maximum temperature. This option allows you to use the first linear expansion coefficient for temperatures between minimum and border temperature and the second linear expansion coefficient for temperature between border and maximum temperature.



Note

- This option is also available in the [Calculation](#) module.

➤ **To edit or enter additional pipe/orifice materials**



1. In any **Process Data** module window, on the **Edit** menu, click **Pipe/Orifice Material**.
2. In the data window, click fields that you want to edit, and type or select the required values from the lists.
3. To enter a new material, click **New**, and then type or select the required value from the respective lists.
4. To delete a material, select the required data row and click **Delete**.
5. Click **OK** to apply changes and close this dialog box.

Defining or Modifying Pipe Specs

Pipe spec is a specification that defines various process conditions for a specific pipe.

Use this procedure to define a pipe spec to the **Pipe Specs** supporting table from the **Process Data** module, or to modify properties of an existing pipe spec.

➤ **To create a new pipe spec or modify an existing one**

1. In the **Process Data Module** window, click  to open the **Select Line** dialog box.
2. From the **Line type** list, select a line type.
3. Click **New** to open the **Line Properties** dialog box.
4. Beside the **Pipe spec** list, click  to open the **Pipe Specs** dialog box.
5. Do one of the following:
 - To create a new pipe spec, click **New** and type entries in the **Pipe Spec** and **Description** boxes.
 - To edit an existing pipe spec, click a field in a highlighted row and modify the existing entry as needed.

Deleting Pipe Specs



Use this procedure to delete a pipe spec from the **Pipe Specs** supporting table.



Note

- You cannot delete a pipe spec that is currently assigned to lines. First edit the lines to which the pipe spec that you want to delete is assigned.

➤ To delete a pipe spec

1. In the **Process Data Module** window, click  to open the **Select Line** dialog box.
2. From the **Line type** list, select a line type.
3. Click **New** to open the **Line Properties** dialog box.
4. Beside the **Pipe spec** list, click  to open the **Pipe Specs** dialog box.
5. Select the pipe spec that you want to delete, and click **Delete**.
6. Repeat the previous step for each pipe spec that you want to delete.

API 2540 Standard for Liquid Density Calculation

This feature enables you to calculate liquid density at operating and base conditions in accordance with the API 2540 standard. You can select one of the five product groups:

- Crude Oils and JP 4.
- Jet Fuels, Kerosenes, and Solvents.
- Gasolines and Naphthenes.
- Lubricating Oils.
- Diesel Oil, Heating Oils, and Fuel Oils.

➤ **To calculate liquid density according to the API 2540 standard**

1. Open the process data sheet for an instrument tag from either of the two modules:
 - [Process Data](#) module
 - [Calculation](#) module
2. In the process data sheet, make sure that the **Liquid** fluid state is selected.
3. Select the **API 2540** option from the **Fluid name source** list.
4. Select the required product group from the **Fluid name** list.
5. In the **API 2540 STANDARD** section, select one of the following:
 - Density at reference temperature.
 - Specific gravity at reference temperature.
 - °API settings for: minimum/normal/maximum
6. Enter the required values in the appropriate fields according to the selected option.
7. If you selected **Density at reference temperature** or **Specific gravity at reference temperature**, do one of the following:
 - Type the reference temperature value in the **Reference temperature** field.
 - Click **Default** to enter the default reference temperature.
8. Click **Calculate Density** to calculate the density.



Note

- The calculated values for Density and Specific Gravity are entered in the Properties @Minimum, @Normal, and @Maximum fields.

Setting the Default Units of Measure

This option enables you to set the required default units of measure for the currently active <unit>. The units of measure and accuracy will appear on the process data or calculation sheets and the specification forms of the selected tags. Remember that you have to set default units of measure and accuracy separately for **each** <unit> in the <plant>.

➤ **To set the default units of measure**

1. In the main **Process Data** window, on the **File** menu, click **Units of Measure and Accuracy**.
2. For each required parameter, select from the appropriate lists:
 - a) The level of accuracy.
 - b) The unit of measure, if applicable.
3. Type the appropriate default values for Ambient Temperature, Base Temperature, Barometric Pressure, and Base Pressure.
4. Click **OK**.

Converting Engineering Units of Measure Automatically

Three steps convert one engineering unit to another: first, click on the designated **Units** field drop-down list. Then, select the new unit of measure. Finish by choosing the new unit of measure. After the calculations are over, the results are displayed in the property record item fields.



Note

- When converting from one engineering unit to another, the data value changes in accordance with the new engineering unit.

➤ To convert engineering units automatically

1. With a process data sheet open, on the **Options** menu, click **Automatic Unit Conversion**.
2. Click in the **Units** field of the engineering units you want to convert and select the new engineering unit of measure.




Note

- If you convert to Volumetric Flow engineering units, a dialog box opens where you specify the measuring condition.
3. Select a condition, and click **OK** to display the results.



Note

- If you convert to engineering units other than Volumetric Flow, results are directly displayed in the property record item fields.
4. When finished, click  to save the changes.

Copying Default Units of Measure from Another <Unit>

You can define the default units of measure and accuracy by copying the definitions from another existing unit. You can then make any required modification. This shortens the process of setting new default units of measure.

➤ To copy default units of measure from another unit

1. In the **Units of Measure and Accuracy** dialog box, click **Copy From**.
2. In the **Open** dialog box, navigate to the source <unit> from which you want to copy the default data.
3. Click **OK** to copy the default unit of measure settings.

Importing Process Data Files

This procedure allows you to import back into SmartPlant Instrumentation process data sheets that you edited in the [External Editor](#). These files must be in .ipd (SmartPlant Instrumentation Process Data) format, and can contain process data for more than one tag.



Note

- Use this procedure to import back into SmartPlant Instrumentation process data for a tag that already exists in your SmartPlant Instrumentation database.

➤ To import process data files

1. In the **Process Data Module** window, on the **Actions** menu, click **External Process Data**.
2. Under **Action**, click **Import**.
3. Click **Open**, navigate to the file from which you want to import, and then click **Open**.
4. In the **External Process Data** dialog box, under **Search results**, select the tags that you want to import, and click **Apply** or **OK**.



Note

- The software only displays tags that already exist in your SmartPlant Instrumentation database.

Exporting Process Data Files

This procedure allows you to export process data sheets in .ipd (SmartPlant Instrumentation process data) format. This format allows you to include multiple tags in a single file, and is compatible with IEE ([External Editor](#)). In this way, you can allow an external party (contractor, engineering company, and so forth) to modify your process data outside of SmartPlant Instrumentation. These files can then be imported back into SmartPlant Instrumentation for further processing.



Note

- For information on installing and sharing [External Editor \(IEE\)](#), see [External Editor \(IEE\) Installation Guide](#).

➤ To export process data files

1. In the **Process Data Module** window, on the **Actions** menu, click **External Process Data**.
2. Under **Action**, click **Export**.
3. Click **Find**, and in the **Find Tag** dialog box, under **Search parameters**, from the **Process function** list, select a process function and click **Find**.
4. Under **Search results**, select the tags that you want to export, and click **OK**.
5. In the **External Process Data** dialog box, under **Search results**, select the tags that you want to export, and click **Apply** or **OK**.
6. In the dialog box that opens, navigate to the folder to which you want to export, type a filename, and click **OK**.

Process Data Reports and Revisions

SmartPlant Instrumentation generates process data reports by utilizing eight pre-defined report templates with which the data of a SmartPlant Instrumentation item is associated (one for line, and seven for instruments). A SmartPlant Instrumentation item may be an Instrument or a Line. This is done through the association of a SmartPlant Instrumentation item, (and its process function - if it is an instrument) to its pre-defined template.

Each report is made up of a number of sections depending on the process function. For example: General, Quality of Fluid, Operating Data, Instrument Data, Properties @ Flow, Alarm and Trip Settings (for example, pressure & temperature instruments), a Notes field, and Internal and External Revision fields.

Generating a Process Data Report for One Instrument or Line






You can generate a process data report from an open process data sheet for the current instrument or line only.



Note

- If you are generating a report for a multi-case instrument tag, this option prints the current case.

➤ To generate a process data report for the current instrument or line

1. Do one of the following:
 - Open a process data sheet for an instrument.
 - Open a process data sheet for a line.
2. On the **Actions** menu, click **Report**.
3. If you open a print preview, do any of the following:
 - Click  to select a pre-set magnification, or enter a customized one to fit your needs.
 - Click  to print the report, or  to print all available reports. Selecting the **Printer Setup** option from the **File** menu will allow you to select the default printer.
 - Click  to save the report as an external file.
 - Click  to create or edit local revisions and drawing numbers.

Generating Line Reports

This option allows you to generate process data reports for more than one line and case.

➤ To generate line reports

1. In the **Process Data Module** window, on the **Reports** menu, point to **Line**, and do one of the following:
 - To print one process line per page, click **Single Line**.
 - To print three process lines per page, click **Three Lines**.



Note

- For lines that are multi-case, this option prints the governing case.
-
2. In the **Select Line for Report** dialog box, do one of the following:
 - Select a line type from the **Line Type** list.
 - Select the **Show all line types** check box.
 3. Select the lines you want to include in the report.
 4. Click **OK**.

Generating Instrument Reports

This option allows you to generate process data reports for more than one instrument and case.

➤ To generate instrument reports

1. Start the [Process Data](#) module.
2. In the **Process Data Module** window, on the **Reports** menu, point to **Instrument**, and do one of the following:
 - To print one tag per page, click **Single Tag**.
 - To print three tags per page, click **Three Tag**.



Note

- For tags that are multi-case, this option prints the governing case.
3. In the **Find Tag** dialog box search for the tag number according to the criteria you specify, or click **Find** for a list that you can choose from.
 4. Select the tags to include in the report.



Note

- For multi-case tags, select each case that you want to include in the report.
5. Click **OK**.


Viewing and Editing Process Data Revisions

You use revisions to keep track of the changes made to your process data. It is important and useful to have a chronological description of the changes, dates of change, and a list of persons who approved them. You can add, edit, and delete revisions. The [Process Data](#) module shares the following two types of revisions with the rest of SmartPlant Instrumentation: local revisions and global revisions. There is an additional type of revision available only in the [Process Data](#) module, which is an external revision.

Working with External Revisions

Use this procedure to add, edit, or delete external revisions in the [Process Data](#) module.

➤ To work with external process data revisions

1. In the **Process Data Module** window, do one of the following:
 - Click .
 - On the **Actions** menu, click **External Revisions**.
2. In the **Revisions** dialog box, select one of the revision numbering methods (use P0, P1, P2... for preliminary revisions or 0, 1, 2 /A, B, C, and so forth for normal serial revisions).



Note

- When you first select a revision numbering method, several options are available to you, including preliminary revisions (designated by **P0**, **P1**, **P2**...). Once you select one of the other revision methods, you will not be able to return to the preliminary revision method and this option will be disabled.
3. Click **New** to add a new revision or click in a data field to update existing revision data in that field.
 4. Add or edit the revision data in the appropriate data fields.



Note

- The **By** data field contains the current user's initials by default, if previously defined by the SmartPlant Instrumentation System Administrator. You can also edit this field if required.
5. To delete revisions, do the following:
 - a) Select the revision you want to delete.
 - b) Click **Delete**.



Tip

- As a time saver and a forget-me-not precaution, take advantage of using a default Revision method. The software automatically adds a new line with the next logical character and date each time you click **New** after you select the initial method.
6. When done, click **OK**.

Viewing Process Data History

SmartPlant Instrumentation can indicate process data changes by comparing current data with the data stored in the audit trail repository for the date range that you specify. You can choose any or all of the following modes of emphasis:

- You can set a color to emphasize changes on the screen.
- You can set a shade of gray to emphasize the changed data in printed reports and their previews.
- You can set bold and italic font style for emphasis on the screen and in print.



Note


- History indication is available only if the System Administrator has activated the audit trail functionality. When the audit trail functionality is activated, each time that you save data after making changes, the data is recorded in the audit trail repository.


➤ To view process data history

1. In the [Process Data](#) module, open the required tag.
2. On the **Options** menu, click **History Options**.
3. Select the date range for data history comparison, by doing one of the following:
 - In the **From** and **To** data fields, type the appropriate dates.
 - Select the appropriate dates using the spinner.



Note

- To set the **To** data field value as today's date, click **Today**.
4. To set a font style to emphasize changes on the screen and in print, do one or both of the following:
 - Select **Bold**.
 - Select **Italic**.
 5. To change the color used to display changes on the screen:
 - a) Beside the **Highlight color for display** box, click .
 - b) In the **Color** dialog box, choose the color that you require.
 - c) Click **OK** to save your new color settings and return to the **History Options** dialog box.

6. To change the shade of gray used to emphasize the changed data in printed reports and their previews:
 - a) Beside the **Grayscale for printing** box, click .
 - b) In the **Grayscale** dialog box, slide the bar to the required position.
 - c) Click **OK** to save your new grayscale setting and return to the **History Options** dialog box.
7. Click **OK** to save your current history options and close the **History Options** dialog box.
8. On the **Options** menu, click **Mark Changes** to mark changes in the current process data sheet for the dates that you specified in the **History Options** dialog box. Clear the check box to clear all history indications in the current process data sheet.

**Note**

- To refresh the history indication in an open process data sheet, on the **Options** menu, clear **Mark Changes** and then select the option again.