

# Construction Module

## Overview

The **Construction** module is used to define contracts for installation activities that are performed by external contractors. This involves controlling and monitoring the contracts and installation tasks assigned to various external contractors, in order to enable plant start-up to take place on time. An installation task can be any activity or group of activities that would be applied to an instrument to make it operable.

Each entity (instrument tag, wiring scheme, and so forth) requires a specific set of activities. The module matches the various activities to each contractor by listing them according to categories (fields of operation). Each activity is defined as an **index**, which you can assign to specific entities when required.

You can track the status and progress of activities performed by creating index revisions, viewing and printing reports of each revision for a particular index.

For example, the following activities could be involved in the installation of electronic 2-wire transmitters:

- Mechanical implementation:
  - Instrument stand installation
  - Physical instrument installation
  - Impulse piping connection
- Electrical implementation:
  - Wiring of instruments to junction boxes
  - Wiring of instruments to marshalling racks
  - Wiring of instruments to control system
- Instrument implementation:
  - Calibration of instruments
  - Instrument wiring continuity check
  - Configuration of control system
  - Check of instrument operation
  - Loop checks
  - Control system operation check

Only on completion of all these activities can the instruments be fully commissioned and operated.

## Construction Flow of Activities

A typical flow of activities for installation consists of the following stages (the procedures for each stage are described in more detail in the relevant sections):

1. Populating the following supporting tables:
  - **Contractors**
  - **Contracts:** One or more contracts can be defined per contractor.
  - **Installation Index Categories:** SmartPlant Instrumentation provides three default installation index categories: Instrument, Mechanical, and Electrical. You can edit these if required, and you can also add up to two more categories of your own.
  - **Installation Indexes:** One or more installation indexes can be associated with each contract. Each installation index must belong to an installation category. Within each category, there is no limit to the number of installation indexes you can define.
2. Assigning the installation indexes to the required entities (instrument tags, panels, or cables) in the appropriate Construction Browser View).
3. Issuing reports. For each installation index, the following classes of reports can be viewed and printed:
  - **Working report:** Working (current) reports can be accessed from the Installation Index Manager or by selecting filtered data to display in the Browser and previewing the reports there.
  - **Formal report:** Reports related to formal issues can be accessed from the Installation Index Manager Archive.

In both classes, a complete report of the entities assigned to the installation index can be displayed, or where relevant, you can issue a change summary report showing the differences between the current situation or selected revision and the previous revision.
4. Retrieving archived reports.

## Construction Options

The procedures described in this section explain how to create, maintain, and use installation indexes for tracking the tasks performed by contractors.

### Construction - Example Scenario

Using the installation of electronic 2-wire transmitters as a basis, the following example shows the kind of data you would enter:

1. Define contractors in the 'Contractors' supporting table as follows:
  - a) Contractor for mechanical tasks.
  - b) Contractor for electrical tasks.
  - c) Contractor for instrument-related tasks.
2. Define one contract number per contractor in the 'Contracts' supporting table.
3. Define installation indexes in each installation category (using the default categories) as follows:
  - a) **Instrument category**
    - **I1:** Instrument calibration only.
    - **I2:** Instrument calibration and various checks.
  - b) **Electrical category**
    - **E1:** Wire to JB only.
    - **E2:** Wire to JB and MR.
    - **E3:** Wire to MR only.
    - **E4:** Wire to MR and CS.
    - **E5:** Wire to CS only.
  - c) **Mechanical category**
    - **M1:** Physical installation and connections.
    - **M2:** Connect impulse piping.
4. Assign the installation indexes to the required instrument tags (in the appropriate Construction Browser View), for example, the Instrument Installation Index View is displayed, and indexes I1, E2, and M1 are assigned to a number of flow transmitters.

5. Generate a formal issue for each installation index.
6. Change installation indexes that were wrongly assigned to one of the flow transmitters as follows:
  - I1 to I2.
  - E2 to E1.
7. Create working and formal reports for installation indexes I1, I2, E1, and E2 to show the current statuses of the installation indexes and their statuses prior to the above changes.
8. Generate the following new formal issues:
  - Revision for installation indexes I1 and I2.
  - Revision for installation indexes E1 and E2 (report for wires).

**Note**

- Revisions are performed per installation index and per report, and so in this example, you would create a revision once all the changes for the particular installation index have been made for the appropriate instrument tags.
9. Change the electrical installation index for another flow transmitter from E2 to E3 and generate formal issues for both of these installation indexes (report for wires).
  10. Preview and print formal change summary reports from the revision archive for the last formal issue on installation indexes E2 and E3.

## Selecting and Viewing Current Installation Indexes

There are two locations from which you can view the installation indexes:

- In the **Installation Index Manager** dialog box, you can view a list of the indexes in each category by selecting the category from the **Index Category** field.
- In the **Installation Index Definition** dialog box, you can view a list of the indexes in each category, or from all the categories.

### ➤ To view the installation indexes in the 'Installation Index Definition' dialog box

1. On the **Tables** menu, click **Installation Index**.
2. In the **Installation Index Definition** dialog box, do one of the following:
  - To view the installation indexes in a particular category, from the **Index Category** list, select the required category.
  - To view the installation indexes in all categories, select **Show All Index Categories**.
3. When done, click **Cancel** to close the dialog box.

## Adding an Installation Index

Adding an installation index requires the following actions:

1. Create the contractors in the supporting table.
2. Create the contracts in the supporting table.
3. Ensure that at least one installation index category is active.
4. Create the installation index itself.

### ➤ To add an installation index

1. Define your contractors as follows:
  - a) On the **Tables** menu, click **Contractor**.
  - b) In the **Contractor Definition** dialog box, click **Insert**.
  - c) In the new line, enter a name (up to 20 characters) and a definition (up to 40 characters) in the appropriate fields.
  - d) Repeat steps b) and c) for each contractor you want to add.
  - e) Click **OK** to save your changes and close the **Contractor Definition** dialog box.
2. Define your contracts as follows:
  - a) On the **Tables** menu, click **Contract**.
  - b) In the **Contract Definition** dialog box, click **Insert**.  
A new line appears.
  - c) In the **Contractor Name** field, select a contractor from the list.
  - d) In the **Contract Number** field, enter a number for the contract.
  - e) Repeat steps b) through d) for each contract you want to add.
  - f) Click **OK** to save your changes and close the dialog box.
3. On the **Tables** menu, click **Category**.
4. In the **Index Category Definition** dialog box, check that the category definitions meet your requirements, otherwise do one of the following:
  - Create a new installation index category (for details, see [Adding an Installation Index Category](#)).
  - Edit an existing installation index category (for details, see [Editing an Installation Index Category](#)).

5. Create the installation index as follows:

- a) On the **Tables** menu, click **Installation Index**.
- b) In the **Installation Index Definition** dialog box, from the **Index Category** list, select a category.



**Note**

- Selection of an installation index category is a pre-requisite for defining an installation index. If no category is available in the list, you can create one by clicking the **Index Category** button to open the **Index Category Definition** dialog box. Select at least one of the check boxes: **Wiring Category** or **Instrument Category** for one or more of the installation index categories.

- c) Click **Insert**.



**Note**

- The category prefix is entered by default as the prefix for the Installation Index number.
- d) Enter the installation index number and description in the appropriate fields.



**Note**

- Installation Index numbers must be unique. If you do not modify the default, you will be prompted to keep it on saving.
- e) From the **Contract No.** list, select a contract.
  - f) Repeat steps c) through e) for each installation index you want to add.
  - g) Click **OK** to save your changes and close the dialog box.

## Adding an Installation Index Category

There are two user-definable installation index categories. This section explains how to create and use them.

### ➤ To define a new installation index category

1. On the **Tables** menu, click **Category**.
2. In the **Index Category Definition** dialog box, select an empty row and click **Edit** to open that row for editing.
3. Enter a short code in the **Prefix** field (up to 5 characters) and type a name (up to 20 characters) in the **Name** field.
4. In order to make the new installation index category available in the **Installation Index Manager** window and in the header columns for the appropriate Browsers, select at least one of the check boxes:
  - **Wiring Category:** This makes Cable, Panel, and Wire reports available for all entities assigned to installation indexes in this category.
  - **Instrument Category:** This makes an Instrument report available for all entities assigned to installation indexes in this category.



#### Note

- Selection of both check boxes makes all four reports available.
5. Do one of the following:
    - Click **Save** to close the window and save the information you have entered.
    - Click **Close** to close the window without saving the information you entered. In this case, if you made any changes, you will be prompted whether to save them.



## Assigning Installation Indexes to Entities


You will remember that each installation index represents a particular activity performed by a particular contractor. For every entity (instrument tag, panel, cable, or wire), you can assign one installation index in each of the active categories. Since a contractor may perform the same activity on more than one entity, you can assign the same installation index in a given category to several entities of the same type, such as instrument tags. For example, you may want to assign the same electrical installation index to all the instrument tags whose process function is measuring pressure.

At this stage, it is assumed that you have defined all your installation indexes as described in the previous sections.

### ➤ To assign installation indexes


1. With the **Installation Index Manager** window open, select the required installation index category from the list.

The list of installation indexes for the selected category is displayed in the lower data window.

2. In the **Report for** field, select the required report (if more than one report is available for the selected category).
3. Do one of the following:
  - Click .
  - On the **Actions** menu, click **Open General Browser**.



#### Note

- The appropriate **Browser View** window opens for the report you selected. For example, if you selected the [Electrical Index](#), and you chose [Panels](#) in the **Report for** field, the Panel Terminations Report will be displayed. In the default category definition, the [Panels](#) report (as part of the [Wiring Category](#)) only appears in the [Electrical Index](#), and therefore only the **Electrical Index** column will appear in the Browser View. In this view, all the panels in the database are displayed.
4. In the **Electrical Index** column, select the required index from the list for each instrument tag as required.
  5. Do one of the following:
    - Close the window.
    - Click .
    - On the **Actions** menu, click **Refresh**.
  6. At the prompt, click **OK** to save the changes.

## Definitions in the Construction Module

In order to implement the installation, the activities must be defined. The following elements of the [Construction](#) module are involved in specifying the activities:

- **Installation Contractors:** The companies responsible for carrying out the different installation tasks.
- **Installation Contracts:** The documents used to specify the details and conditions for each task or group of tasks. One or more contracts can be defined for each contractor.
- **Installation Categories:** Each category can represent a discipline of operation (for example, three default categories of Installation Indexes are defined: Instrument, Electrical, and Mechanical).
- **Installation Indexes:** An installation index is an index number within an installation category associated with a specific installation task. Each task may consist of one or more activities.
- **Entities:** A SmartPlant Instrumentation entity is an object, which can be either an instrument tag, a panel, or a cable to which an installation index can be assigned. Within each category, only one index can be assigned to a particular entity.
- **Formal Issue (Revision):** A formal issue is a revision that is assigned to an installation report when the contract data is stable and is ready to be sent to the client for approval. The revision can then be used as a benchmark for monitoring any changes that may be made later.
- **Archive:** After creating a formal issue for an installation index, the report containing the details of that index are stored in the Installation Index Manager Archive. From there you can retrieve existing installation reports showing archived information, or reports of the changes that were made to the installation index since the previous revision.

## Deleting an Installation Index

When an installation index is no longer needed, you can delete it, provided it has not already been assigned to an entity in one of the Browser Views.

### ➤ To delete an installation index

1. On the **Tables** menu, click **Installation Index**.
2. In the **Installation Index Definition** dialog box, select the required installation index from the list by highlighting the appropriate row.
3. Click **Delete**.  
The installation index is deleted.
4. Repeat steps 2 and 3 for each installation index you want to edit.
5. Click **OK** to save your changes and close the dialog box.

## Editing an Installation Index

There may be occasions where you will want to update or change an installation index definition. Editing an installation index may involve changes to the name, description, or contract for the index. After editing an index name, the new name will appear in the appropriate index field in the Browser Views for instrument tags where the original index was assigned.

### ➤ To edit an installation index

1. On the **Tables** menu, click **Installation Index**.
2. In the **Installation Index Definition** dialog box, select the required installation index from the list by highlighting the appropriate row.
3. Click **Edit**.
4. Edit the data in the appropriate fields (**Number**, **Description**, and **Contract No.**) as required.



#### Note

- Installation Index numbers must be unique.
5. Repeat steps 2 through 4 for each installation index you want to edit.
  6. Click **OK** to save your changes and close the dialog box.

## Editing an Installation Index Category

You may only edit installation index categories that do not have any indexes assigned to them.

### ➤ To edit an existing installation index category

1. On the **Tables** menu, click **Category**.  
The **Index Category Definition** dialog box opens.
2. Select the row you where you want to edit the information and click **Edit** to open that row for editing.
3. Edit the code in the **Prefix** field (up to 5 characters) and **Name** fields if required (you can enter a name of up to 20 characters in the **Name** field).
4. Do one of the following:
  - To make the new installation index category available in the **Installation Index Manager** window and in the header columns for the appropriate Browsers, select at least one of the check boxes:
    - **Wiring Category**: This makes Cable, Panel, and Wire reports available for all entities assigned to installation indexes in this category.
    - **Instrument Category**: This makes an Instrument report available for all entities assigned to installation indexes in this category.



### Notes

- Selection of both check boxes makes all four reports available.
  - To exclude the new installation index category from the lists in the **Installation Index Manager** window and in the header columns for the appropriate Browsers, clear all the check boxes.
5. Do one of the following:
    - Click **Save** to close the window and save the information you have entered.
    - Click **Close** to close the window without saving the information you entered. In this case, if you made any changes, you will be prompted whether to save them.

## Generating Reports


You can display and print a report for each installation index revision you create. Two types of report are available: a general report showing details of all the entities in the selected revision, and a change report showing only the differences between the current revision and the previous one.

### ➤ To generate reports for an installation index revision

1. Follow steps 1-3 in Viewing and Editing Archives to display the required installation index revisions.
2. In the row with the revision for which you want to print the report(s), select either or both of the check boxes in the following columns:
  - **Report:** to display the general report for the revision.
  - **Change Report:** to display the change report with the differences between the current and previous revisions.



#### Note

- You may only print reports for one revision at a time.
3. Do one of the following:
    - Click .
    - On the **Actions** menu, click **Print Report**.
- The **Print Preview** window opens and displays the selected report(s).

## Installation Index Category Definitions

All new installation indexes that are defined must belong to an installation index category. There are three default categories (editable) that are provided as standard: Instrument, Electrical, and Mechanical, and you have the option to add two further installation index categories if required.

## Maintaining a Revision Archive

When you create a new revision for an installation index in the [Construction](#) module, a view-only archive copy is made of the information contained in the installation index reports. This information is stored even after the reports themselves have been deleted.

The revision archive data can be saved in the database or in a file, depending on the setting selected in the [Administration](#) module. See [Administration Module](#), Construction Revision Archiving Options for details.




### Notes

- If you select to save your previous revisions in a file, make sure that:
- The path to the appropriate file is added to your environment path parameter (see your Windows User Guide to learn about defining paths in your environment).
- If the revision file is shared by a number of users via a local network connection, make sure that the resource (hard disk, floppy drive, and so forth) on which that file is located is appropriately shared (users should have both read and write access rights to the revision files).
- Identical drive mapping is used for all the appropriate workstations to indicate the location of the PSR files.

## Construction Module Revisions


The revision feature is used to keep track of the changes made to an installation index. It is important and useful to have a chronological description of the changes, dates of change, and a list of persons who approved them. Using this feature, you can add revisions in the **Installation Index Manager** window.

### ➤ To add new installation index revisions

1. With the **Installation Index Manager** window open, select the required installation index category from the list.  
  
The list of installation indexes for the selected category is displayed in the lower data window.
2. In the **Report for** field, select the required report (if more than one report is available for the selected category).
3. Do one of the following:
  - Click .
  - On the **Actions** menu, click **Revision**.
4. 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.
5. Click **New** to add new revision data.
  6. Add 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.
  7. When done, click **OK**.



## Viewing and Editing Archives

Once you generate revisions for the installation indexes, the revision information is added to the archive, and you can retrieve it when required. You can filter archived indexes according to various criteria (contractor, contract, date ranges, and so forth). On retrieval of an archived index, you can edit its revision information and print reports.

### ➤ To view an archived installation index

1. Do one of the following:
  - Click .
  - On the **Actions** menu, click **Installation Index Manager Archive**.
2. In the upper part of the window, select the required criteria to filter the retrieved installation indexes, from the following options:
  - a) In the **Index Category** field, select to specify a particular installation index category for filtering the retrieved archived indexes.
  - b) In the **Report for** field, select the required report (if more than one report is available for the selected category).
  - c) To specify installation indexes belonging to a particular contract, select the required contract in the **Contract No.** field, or leave the field blank to retrieve archived indexes that match the other selection criteria for all the contracts.
  - d) To specify a particular installation index, select that index in the **Index Name** field, or leave the field blank to all archived indexes that match the other selection criteria.
  - e) To specify installation indexes belonging to a particular contractor, select the required contractor in the **Contractor Name** field, or leave the field blank to retrieve archived indexes that match the other selection criteria for all the contractors.
  - f) Select one of the following options:
    - **Revision:** to specify a particular revision number for retrieval. If you do not specify a revision number, all relevant revisions will be retrieved.
    - **From Date / To Date:** to specify a range of dates for revisions. If you do not change the defaults (**From Date:** 00/00/00, **To Date:** <today's date>), all installation index revisions generated up to and including the current date will be retrieved.

3. Do one of the following:

- Click .
- On the **Actions** menu, click **Search**.

The installation index revisions are retrieved according to the specified selection criteria.

4. If required, edit a revision as follows:

- a) Select a revision from the retrieved list.
- b) Do one of the following:

- Click .
- On the **Actions** menu, click **Revision**.



#### Note

- When you open the **Revision** dialog box from the archive, you can only edit existing revisions; you may not create new ones.

- c) Edit the revision data as required in the appropriate data fields.
- d) When done, click **OK**

You are returned to the **Installation Index Manager Archive** window.

5. To return to the current **Installation Index Manager** window, do one of the following:

- Click .
- On the **Actions** menu, click **Working Installation Index Manager**.

## Viewing and Modifying Assigned Installation Indexes

After assigning an installation index to an instrument tag, you can open a filtered browser view based on the currently selected index in the **Installation Index Manager** window. The filtered list enables you to view and modify with ease those entities (instrument tags, panels, cables, or wires) that already have a particular index assigned to them.



### Note

- If you change the electrical index in one of the report views — tag, panel, or cable — SmartPlant Instrumentation updates the electrical index of all the relevant entities.

### ➤ To modify assigned installation indexes

1. With the 'Installation Index Manager' screen open, select the required installation index category from the list.




### Note


- The list of installation indexes for the selected category is displayed in the lower data grid.
2. In the **Report for** field, select the required report (if more than one report is available for the selected category).



### Note

- Where several reports are available for a particular installation index, the revision data displayed in the lower data window will depend on the report you select. Thus for the same installation index, different reports may show different revisions.
3. In the lower data window, select the required installation index from the list.
  4. Do one of the following:
    - Click .
    - On the **Actions** menu, click **Open Filtered Browser**.

The appropriate **Browser View** window opens for the report you selected, for example, the Panel Terminations Report. All panels in the database that are linked to the selected installation index are displayed.

5. In an **Index** column, modify the index selection as required.
6. Do one of the following:
  - Close the window.
  - Click .
  - On the **Actions** menu, click **Refresh**.
7. At the prompt, click **OK** to save the changes.