



AUCOTEC
Create Synergy – Connect Processes

Engineering Base

Piping

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1 General Information

Using the piping design, you can easily create and edit pipelines and networks. The assistant can only be used for sheets of the smart diagram type **P&I Diagram**.

A pipeline network can be composed of the following objects:

- Beginning and end of the pipeline: The beginning or the end of a pipeline network is either defined by **pipeline breaker** shapes or by process / fluid devices with the Boolean attribute **Pipe Destination** set.
- Pipelines: Pipelines may be subdivided into segments by means of **pipeline segment breaker** shapes if the segments are to be designed differently (e.g. Cross section, material, ...).
- Devices that are built into the pipeline.

The flow direction of a pipeline network is defined by the connected pins. In the **Flow Direction** attribute of a pin, you can define the values **In**, **Out** and **Unspecified**. The flow direction of a pipeline is indicated in the graphics by an arrow. Within a pipeline network, the values of the **Flow Direction** attribute are checked at the connected pins.

If all pins either contain the value **In** or **Out**, an error is shown at all connected pins.

In the piping design, the specifications of the **Rule Based Design** are also taken into account. The network is checked to see whether the specifications made are met. If this is not the case, these errors are marked in the graphics and an entry is created in the conflict list.

In the piping design, editing the graphics takes precedence. Manual entries in the pipeline attributes may be overwritten.

If a pipeline is created on a connection to which a flow stream or a potential/substance is allocated, the connected pins of the type Process/Fluid are associated with the flow stream or the potential/substance. If a conflict is identified, an entry is created in the conflict list.

1.1 Prerequisites

You have to activate the piping in the project properties **General/Engineering/Piping**. You can edit the standard configuration by clicking **Configuration**.

1.2 Important Terms

Pipeline (CID 381, TID 2150)

Object of the type pipeline. These objects are saved in the project in the Equipment folder.

A multiple representation, including a representation on different sheets, is possible.

Pipeline flag

The pipeline symbol that is placed onto a connection. For each pipeline, at least one pipeline flag must exist on a sheet; otherwise, the pipe destinations cannot be determined by the add-in.

Pipe destination

There are two alternatives to define devices as a pipe destination:

- In the piping configuration
- Marking the Boolean attribute **Pipe Destination** at the device. This setting takes precedence over the settings of the piping configuration.

If a network is separated by a pipe destination, this device is a pipe destination for both involved pipelines.

Pipeline segment (CID 382, TID 2200)

Object of the type pipeline segment. Segments are saved in the project below a pipeline. Pipeline segments are automatically created if a pipeline segment breaker is placed onto a pipeline.

Manually created pipeline segments which are not represented on the sheet are not taken into account.

Pipeline segments are only available on one sheet. If you are working across several sheets, you have to complete the cross-reference shape (for the page break) using a segment breaker. Otherwise, a conflict is displayed.

Pipeline segment breaker

- A pipeline segment breaker separates a pipeline into two pipeline segments.
- The segments are automatically created below the pipeline.

Pipeline breaker

A pipeline breaker separates two pipelines from each other.

Inline devices

Devices which are associated with a pipeline network and located between pipe destinations and segment breakers. Inline devices are no pipe destinations and no pipe connectors. They may potentially be treated separately and associated with the segment or aggregated thereunder.

Cross-reference shape

Cross-reference shapes are placed onto a pipeline if the pipeline ends on one sheet and continues on another sheet.

Cross-reference shapes separate segments if there is at least one segment breaker placed on the pipeline.

Network

All objects that belong to a pipeline or a pipeline segment. A network ends at the following symbols:

- Pipe destination
- Segment breaker
- Pipe breaker
- Cross-reference shape

Only pins of the **Process/Fluid** type are supported. All other pins are ignored.

1.3 Representation of Conflicts

If any errors occur in the network, they are marked with a  in the graphics, and an entry is created in the conflict list.

If several conflicts occur at one object, it cannot be clearly derived from the mark in the graphics where exactly the conflict occurred. The conflict list provides you with further information on the errors.

You can have the **Conflict List** displayed in the graphics via **EB Tools/Conflict List**.

In the Engineering Base Help, you will find further information about the conflict list.

1.3.1 Pipeline Flags

- **Pipeline flag is marked** if two or several pipelines are not unambiguously separated from each other.
- **Association of the cross-reference shape is marked** if a pipeline flag is set on a pipeline that continues onto a second sheet by means of a cross-reference shape and that has no pipeline flag on that second sheet.

1.3.2 Cross-Reference Shapes

Cross-reference shape is marked

- if you design using segments and there is no segment breaker or pipeline breaker placed before the cross-reference shape (for the transition to sheet 2).
- if you design using segments and there is no segment breaker placed in the network behind the cross-reference shape after the page break.
- if it is placed in a network that has a segment breaker on sheet 1 and only a cross-reference shape and a pipeline without a segment breaker or an associated object on sheet 2.
- if it has no counter target, i.e. if there is no cross-reference shape placed on the next sheet.

1.3.3 Segment Breaker

Segment breaker is marked

- if both sides of the segment breaker are located in the same network (short circuit).
- if two or several segments are not unambiguously separated from each other.

1.3.4 Flow Direction

Pin is highlighted

if all connected pins in a pipeline have the same flow direction.

2 Activating the Piping

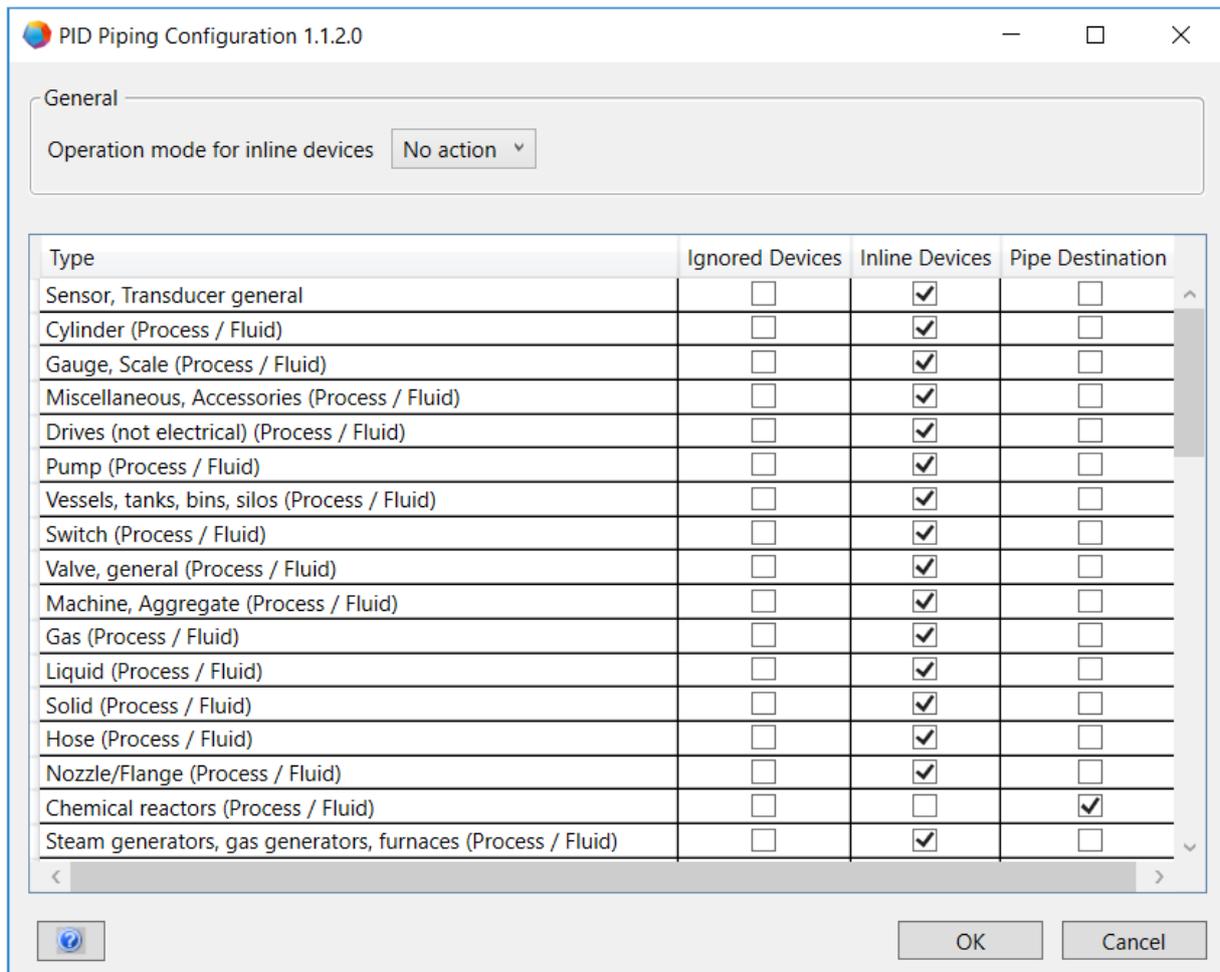
On enabling the add-in, the current configuration is loaded initially.

To activate the piping for a project

1. In the **Engineering Base Explorer**, select the project. On the shortcut menu, click **Properties**.
2. Expand the **Engineering** folder, then click **Piping**.
3. Mark the option **Activate Piping**.
4. Click the **Configuration** button to edit the configuration specifications according to your requirements.
5. Make the changes of your choice in the configuration and click **OK** to save the settings.

Editing the Configuration

In the **PID Piping Configuration** dialog, you can make the settings to define how the different device types are to be treated in the pipe system.

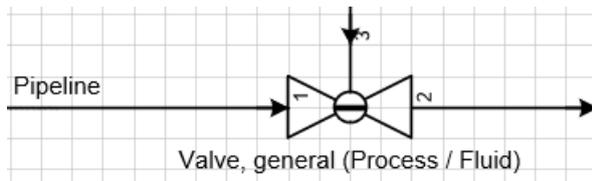


The General section

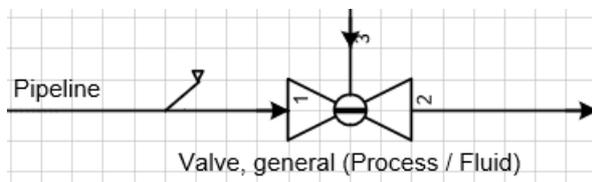
Define the operating mode for inline devices by selecting the mode of your choice in the selection dialog. The operating mode defines where the devices are stored in the Explorer.

The respective behavior is illustrated in the following two examples:

Example1: Pipeline with an inline device (Valve, general):



Example 2: Pipeline (consisting of two pipeline segments) with an inline device (Valve, general):



Operating mode for inline devices	Description
No action	Inline devices are neither moved nor linked. Example 1: <input checked="" type="checkbox"/> Valve, general (Process / Fluid) <input type="checkbox"/> Pipeline <input checked="" type="checkbox"/> Process / Fluid Example 2: <input checked="" type="checkbox"/> Valve, general (Process / Fluid) <input type="checkbox"/> Pipeline <input checked="" type="checkbox"/> Process / Fluid <input type="checkbox"/> Unspecified Pipeline Segment <input type="checkbox"/> Unspecified Pipeline Segment
Aggregate to pipe	Identified inline devices are automatically moved below the pipe or segment as soon as these pipes or segments are available. Example 1: <input type="checkbox"/> Pipeline <input checked="" type="checkbox"/> Process / Fluid <input checked="" type="checkbox"/> Valve, general (Process / Fluid)

	<p>Example 2:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Pipeline <input checked="" type="checkbox"/> Process / Fluid <input checked="" type="checkbox"/> Unspecified Pipeline Segment <input checked="" type="checkbox"/> Unspecified Pipeline Segment <input checked="" type="checkbox"/> Valve, general (Process / Fluid) <p>A confirmation prompt is issued before the action is carried out.</p>
Associate to pipe	<p>Identified inline devices are associated with the pipe or segment as soon as these pipes or segments are available.</p> <p>Example 1:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Valve, general (Process / Fluid) <input type="checkbox"/> Pipeline <input checked="" type="checkbox"/> Process / Fluid <input checked="" type="checkbox"/> Valve, general (Process / Fluid) <p>Example 2:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Valve, general (Process / Fluid) <input type="checkbox"/> Pipeline <input checked="" type="checkbox"/> Process / Fluid <input checked="" type="checkbox"/> Unspecified Pipeline Segment <input checked="" type="checkbox"/> Unspecified Pipeline Segment <input checked="" type="checkbox"/> Valve, general (Process / Fluid)

Table of device types

In the table of device types, you can specify how the available device types are to be treated in the piping design.

To do so, mark the check box in the respective column. A device type can only be allocated to one group of devices.

Column	Handling
Ignored Devices	Devices of this type are not taken into account.
Inline Devices	Devices of this type belong to the pipe; they are no pipe destinations and no pipe connectors.
Pipe Destinations	Devices of this type are treated as pipe destinations.

You can define further rules for the piping design via the **Rule Based Design** that can be activated and configured via **Project Properties/General/Engineering**.