FMU import

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What is FMI?

FMI, also known as a Functional Mock-up Interface, is a tool independent open-source standard that supports both model exchange and co-simulation of dynamic models in a standardized format. The modeling tool supports FMI versions 1.0 and 2.0.

What is FMU?

A component that implements FMI is called FMU (Functional Mock-up Unit). It stores a simulation model that adheres to the FMI standard. To be more specific, the FMU file contains an XML description file and implementation in a binary form.

FMU import

The FMU Import Options dialog enables users to customize the FMU file import into the model. For instance, you can specify whether parameters from the FMU file should be imported as ports or value properties. Additionally, you can change the name of the Block (the FMU model name is used by default) and automatically attach the file to the project upon import.

The FMU Import Options dialog has the following options:

| Option name | Description |
|-------------------------------|---|
| Direction | The direction of the port: In or Out. Inputs and Outputs are selected to be imported as ports by default. |
| Name | The name of the property/parameter. |
| Туре | The type of the property, for example, value property. |
| Description | The textual description of the property. |
| As Port | Click to select whether properties should be represented as Flow or Proxy ports. Select None to import the selected properties as value properties. |
| Interface Block | Click to select a compatible interface Block or create a new one. <new> is selected by default.</new> |
| Redefine | Click to redefine inherited value or part properties. |
| C Select All | Click to select all listed properties at once. |
| C Select None | Click to deselect all listed properties at once. |
| Attach file to the project | If the checkbox next to Attach file to the project is selected, the imported FMU file is automatically attached to the model. |
| Block name: WaterTank.Control | The name of the Block created in the model upon import. By default, the name of the FMU model is used, but you can set the one you like. |

1. In the top-left corner of the modeling tool, click **File** > **Import From** > **FMU File**.

| File | |
|---|---|
| 🗅 New Project | Ctrl+Shift+N |
| i Open Project | Ctrl+O |
| Save Project | Ctrl+S |
| Save Project As | |
| Close Project | |
| Close All Projects | |
| Migrate Legacy DDL Models | |
| Open Element from URL | |
| Model Execution & Integration | |
| Use Project | > |
| Import From | > |
| Export To | > |
| Convert To | > |
| Share Packages | |
| Save as Image | |
| Print | Ctrl+P |
| Print Preview | |
| Print Options | |
| Project Properties | |
| Switch Projects | > |
| ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ |
| | |

2. Select the FMU file on your file system and click **Open**.

| 🔀 Import | | × |
|--------------|--|---|
| Look in: | 🗄 Documents 🗸 🤌 📂 🛄 🗸 | |
| Recent Items | Custom Office Templates OneNote Notebooks Outlook Files WaterTank_SingleWaterTank.fmu | |
| Desktop | | |
| Documents | | |
| This PC | | |
| Network | File name: WaterTank_SingleWaterTank.fmu Open Files of type: *.fmu Cancel | 2 |

3. In the FMU Import Options dialog, specify which properties from the FMU file should be imported into your model as values and ports. Click OK.

| | | | | | | | | | 1 | | |
|------------------------------------|-------|------------------|------------------------|--------|-------------|-------------|-----------------|---|---------------------|-------------------------------|----------------|
| Block name: WaterTank.SingleWaterT | | | | | | | | | | | |
| # | TT | Direction | Name | Туре | Description | As Port | Interface Block | | | | |
| 1 | | | level | 🔽 Real | | Flow Port 🗸 | None | | valvecontrol : Real | eblocks efmus | L level : Real |
| 2 | | n | valvecontrol | 💟 Real | | None | None | | | WaterTank.SingleWaterTank | |
| 3 | | N/A | valve_outflow_int | 👿 Real | | Flow Port | None | | | values | |
| 4 | | N/A | volume | V Real | | Proxy Port | None | | | der(valve_outflow_int) : Real | |
| 5 | | N/A | der(valve_outflow_int) | V Real | | None | None | | | | 1 |
| 6 | | N/A | der(volume) | 💟 Real | | None | None | | | | |
| 7 | | N/A | drain_p_e | 🔽 Real | | None | None | ~ | | | |
| < | | | | | | | > | | | | |
| | ttach | file to the proj | ject | | | | | | | | |
| | | | | | | | OK Cancel | I | | | |

Dragging and dropping FMU on diagram

Alternatively, you can import the FMU model by dragging and dropping the selected FMU file directly onto the Block Definition (BDD) and/or Internal Block (IBD) diagrams.

To import the FMU file into the model using BDD/IBD

- 1. Locate the FMU file on your file system.
- 2. Do either:
 - Drag and drop the file from your file system onto the BDD diagram. A Block with the applied «FMU» stereotype is created in the model after customizing FMU import via the FMU Import Options dialog.



• Drag and drop the file from your file system onto the IBD diagram. A Part property is created in the model after customizing FMU import via the **FMU Import Options** dialog.



Dragging and dropping FMU on existing Block

You can drag and drop the FMU file directly onto the Block as implementation as well. Once the FMU file is dropped, the FMU Import Options dialog that allows redefining value and part properties of the Block opens.

| # | | Direction | Name | Туре | Description | As Port | Interface Block | Redefine | | |
|----------------------------|-----------|-----------|-----------------------|--------|-------------|-----------|-----------------|-------------------------------|-------|---------------|
| 1 | \square | out | level | V Real | | Flow Port | None | | ^ | |
| 2 | | in | valvecontrol | V Real | | Flow Port | None | | | |
| 3 | | N/A | valve_outflow_int | V Real | | None | None | | | |
| 4 | \square | N/A | volume | 🛛 Real | | None | None | <unspecified> 💽</unspecified> | | |
| 5 | \square | N/A | der(valve_outflow_int | V Real | | None | None | Q -Search by Name | | |
| 6 | | N/A | der(volume) | V Real | | None | None | | | 1 match found |
| 7 | | N/A | drain_p_e | V Real | | None | None | <unspecified></unspecified> | | |
| 8 | | N/A | fs_inflow | V Real | | None | None | flowRate : Real : | = 0.2 | N |
| 9 | | N/A | tank_p_f | V Real | | None | None | | | 15 |
| Attach file to the project | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

Redefining properties using FMU Import Options dialog

In this case, a new Block is created as a subtype of the existing Block together with the Generalization relationship.



In/Out properties in the FMU Import Options dialog are by default imported into the model as ports of a Flow type.

Updating existing FMU Block

An existing FMU Block can be updated by dragging and dropping a FMU file directly on it. This is useful in those cases when there is a need to quickly import properties that were, initially, left out.

To update a FMU Block

- 1. Locate the FMU file on your file system.
- 2. Drag and drop it on the shape of your FMU Block.
- 3. In the opened FMU Import Options dialog, select the properties to update the FMU Block with.
- 4. Click OK.



Dragging and dropping FMU on the existing FMU Block

Alternatively, you can update the FMU Block directly from the shortcut menu.

To update a FMU Block from the shortcut menu

1. Right-click the Simulink Block.

2. Select Tools > Update from FMU file from the shortcut menu.



3. In the opened FMU Import Options dialog, select the properties to update the FMU Block with.

| # | | Direction | Name | Type | Description | As Port | Interface Block | Redefine | | | |
|----------------------------|--------------|-----------|----------------------|--------|-------------|---------|-----------------|----------|--|--|--|
| 1 | | N/A | valve_outflow_int | V Real | | None | None | | | | |
| 2 | \checkmark | N/A | volume | 🛛 Real | | None | None | | | | |
| 3 | \checkmark | N/A | der(valve_outflow_in | 🛛 Real | | None | None | | | | |
| 4 | | N/A | der(volume) | 🛛 Real | | None | None | | | | |
| 5 | | N/A | drain_p_e | V Real | | None | None | | | | |
| 6 | | N/A | fs_inflow | V Real | | None | None | | | | |
| 7 | | N/A | tank_p_f | V Real | | None | None | | | | |
| 8 | | N/A | valve_outflow | V Real | | None | None | | | | |
| Attach file to the project | | | | | | | | | | | |

Already imported properties are grayed out and cannot be edited in the FMU Import Options dialog.

It he Attach file to the project is checked in the FMU Import Options dialog, a previous version of the attached file is replaced with a new one upon

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|    | mp <b>of</b> t.            | N/A          | valve_powerOut_e | V Real |  | None      | None |    |        |    |  |
|----|----------------------------|--------------|------------------|--------|--|-----------|------|----|--------|----|--|
| С  | 27                         | <b>∠</b> out | level            | 🛛 Real |  | Flow Port | None |    |        |    |  |
| Ū  | 28                         | <b>⊡</b> in  | valvecontrol     | 🛛 Real |  | Flow Port | None |    |        | Υ. |  |
| Th | h 🤇                        |              |                  |        |  |           |      |    |        |    |  |
| Re | Attach file to the project |              |                  |        |  |           |      |    |        |    |  |
|    |                            |              |                  |        |  |           | [    | OK | Cancel |    |  |

<sup>4.</sup> Click OK.