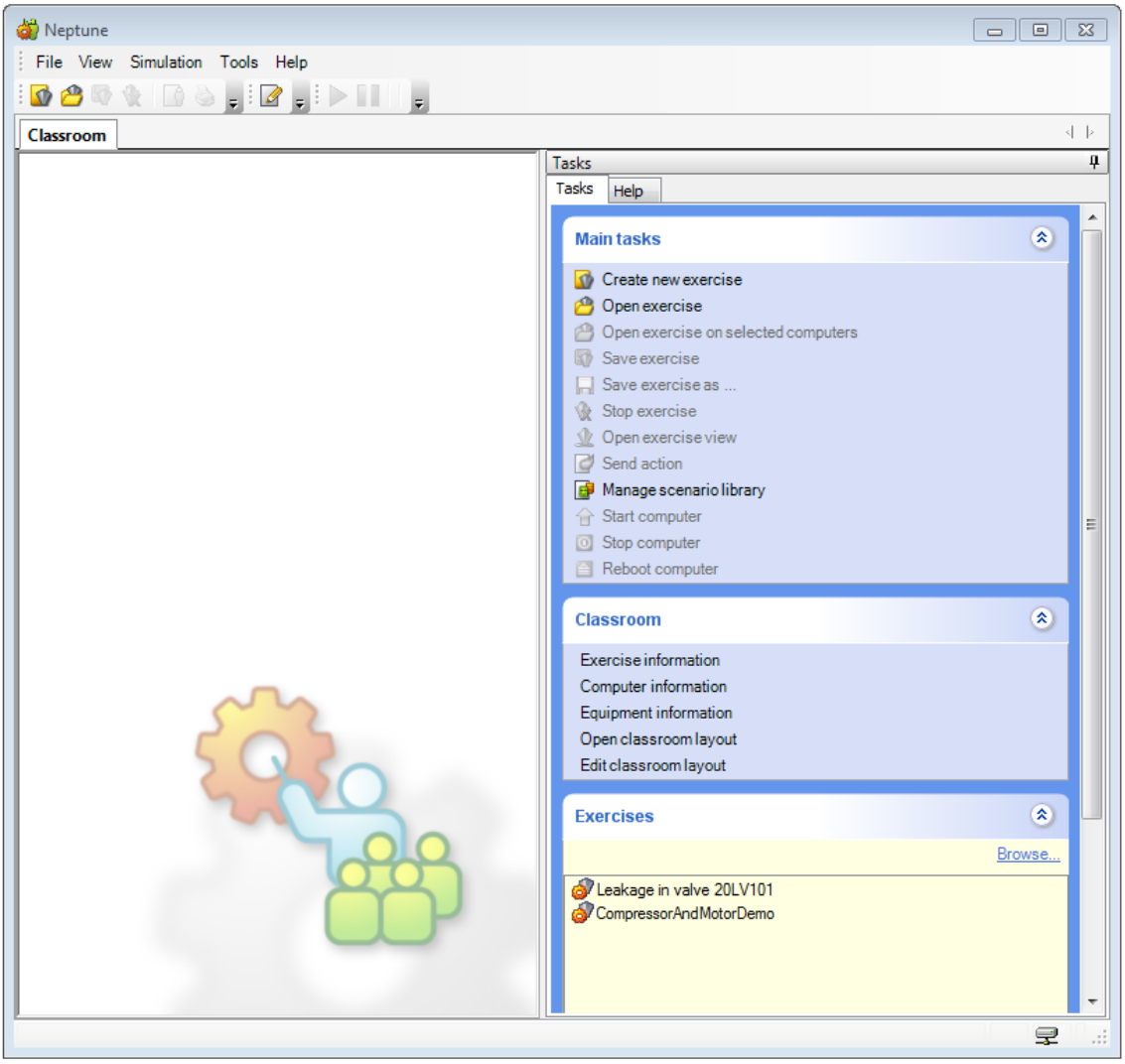
KONGSBERG

KONGSBERG Neptune®
Instructor System

Release 1.0.1



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The reader

This document is intended as a reference for the Neptune® user. It is based on the assumption that the user is familiar with dynamic process simulators, as well as oil and gas production systems.

Note

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Comments

To assist us in making improvements to the product and to this manual, we welcome comments and constructive criticism.

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Table of contents

Introduction 5
Purpose 5

1 CREATE A NEW EXERCISE 7

1.1 Create the exercise 7
1.2 Add the scenario module 9
1.3 Add triggers 10
1.4 Add an action 17
1.5 Add an assessment 18
1.6 Set the score limit 19
1.7 Run the exercise 20
1.8 Exercise score 21

2 START UP – LOAD AN EXERCISE 22

2.1 Load a model in K-Spice and start the simulation 22
2.2 Start the Neptune® Instructor System 24
2.3 Load an exercise in Neptune 26
2.4 Verify the connection between K-Spice and Neptune 28
2.5 Verify that the Neptune clock is controlled by K-Spice 30
2.6 Data transfer between K-Spice and Neptune 32

3 STOP AN EXERCISE 33

3.1 Normal stop of an exercise 33
3.2 Exercises not stopped properly 35

4 THE EXERCISE DIALOGS. 37

4.1 Triggers overview 37
4.2 Actions overview 40
4.3 Assessments overview 40
4.4 Exercise results 42
4.5 Set the score limit 44

5 TRIGGERS 45

5.1 Trigger overview 45
5.2 The ‘Fixed value’ input 48
5.3 The ‘Simulator value’ input 51
5.4 The ‘Trigger’ symbol 54
5.5 The ‘Equal to’ symbol 55
5.6 The ‘Greater than’ symbol 56
5.7 The ‘Less than’ symbol 57
5.8 The ‘AND’ symbol 58
5.9 The ‘OR’ symbol 59

5.10 The ‘NOT’ symbol 61
5.11 The ‘Timer’ symbol 62
5.12 The ‘Latch’ symbol 63
5.13 Copy a trigger 64
5.14 Remove a trigger 65
5.15 Delete a connection between two symbols 66
6 ACTIONS 67
6.1 Single On 67
6.2 Single On/Off 67
6.3 Ramping 68
6.4 Repeating 69
6.5 Sine 69
6.6 Random 70
6.7 Other settings 70
6.8 Special settings 71
6.9 Add an action 71
6.10 Remove an action 72
7 TROUBLE SHOOTING 73
7.1 An exercise was not stopped properly 73
7.2 Unable to connect 75
7.3 The Neptune clock is not synchronized with K-Spice 75

Introduction

Purpose

This manual will give the user a basic knowledge about how to use the Neptune® Instructor System as an operator assessment tool, together with the K-Spice® process simulator.

There are several approaches to operate and control the Neptune® Instructor System, depending on the intended purpose. The following information will provide some basic knowledge on deployment of the system for our simulator.

1 Create a new exercise

This chapter will configure a simple exercise and establish a basic understanding of how to create an exercise. Better and more detailed descriptions of the different building blocks used in creating exercises, will be found in the following chapters: *Triggers* on page 45and *Actions* on page 67 on page

1.1 Create the exercise

In this exercise the operator will train on how to react when a valve malfunction occurs.

1 In the upper right corner, you will find the **Main task** menu, select **Create new exercise**

2 Select the predefined K-Spice model name.

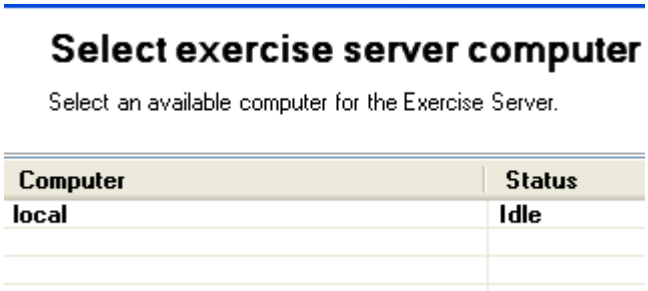
3 Give the exercise a name, such as *Topside Scrubber pressure control*. You need to type in a name, which should normally start with the project name if you use your Neptune Instructor System for more than one K-Spice project.

In the next section the scenario **Leakage in valve 20LV101** will be created. **Leakage in valve 20LV101** is a *scenario* in the **Topside Scrubber pressure control** *exercise.*

4 Click **Next**.

5 Select an available computer. Use the “local” computer to run the exercise on. It will be highlighted in blue.

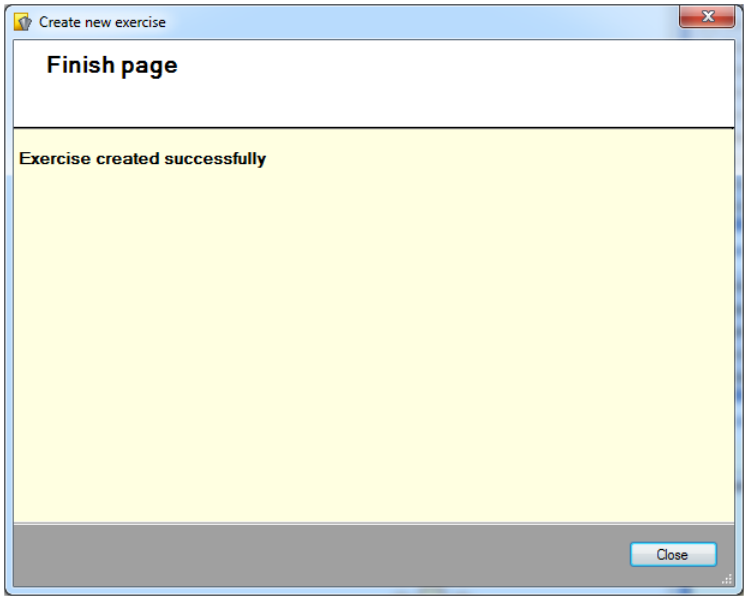
Figure 1 Select exercise computer



6 Click **Next**.

The dialog **Exercise created successfully** appears:

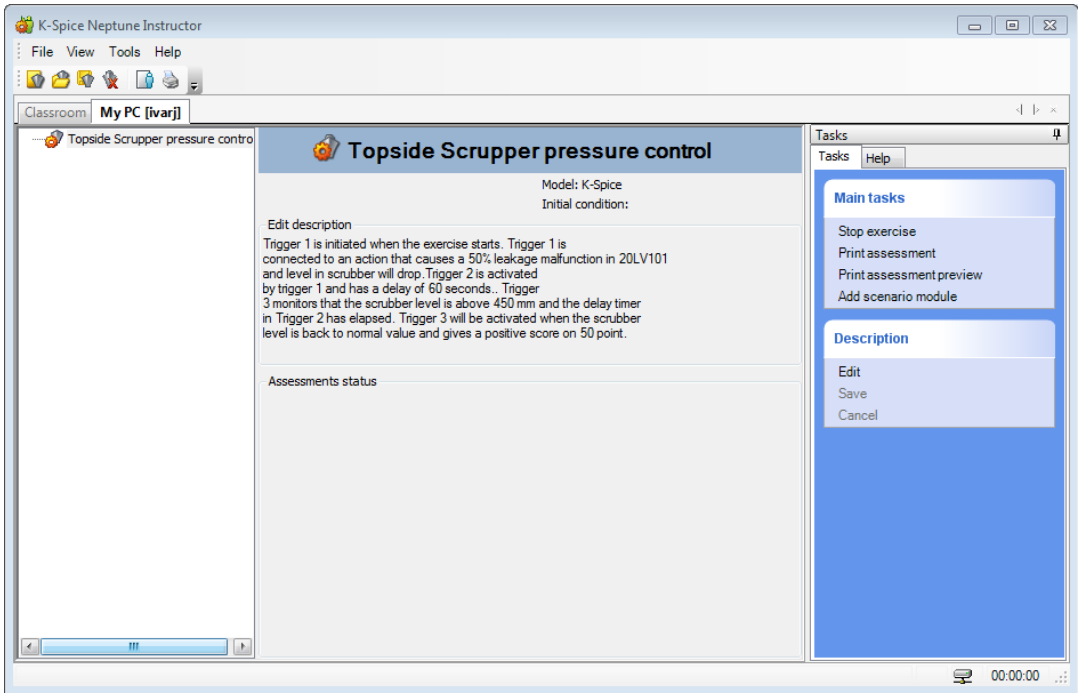
Figure 2 Finish page indicating exercise creation



7 **Close**.

8 The main Neptune system window appears:

Figure 3 An exercise loaded view



The main menu for Neptune Instructor System is available on the top left side. Located there are the **start**, **stop** and **save** options.

1.2 Add the scenario module

When the exercise is created, the next step is to add a scenario to the exercise.

Right-click on the exercise name on the top left, highlighted in blue in the figure above, and click on **Add scenario module** to configure your exercise:

1 Give name to the scenario module.

Leakage in valve 20LV101

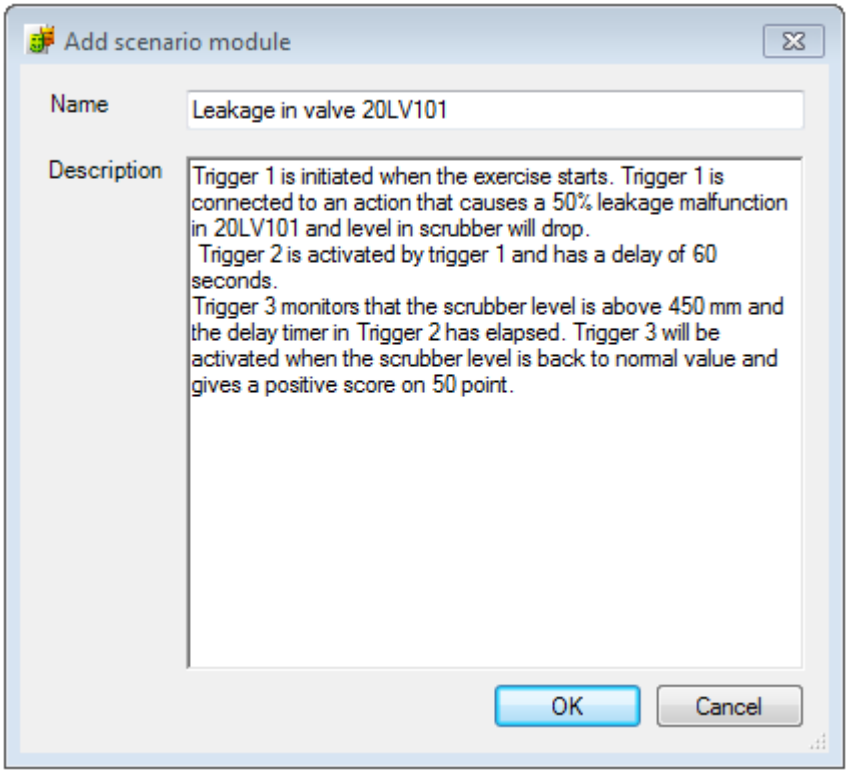
2 Describe your exercise.

Trigger 1 is initiated when the exercise starts. Trigger 1 is connected to an action that causes a 50% leakage malfunction in 20LV101 and level in scrubber will drop.

Trigger 2 is activated by trigger 1 and has a delay of 60 seconds..

Trigger 3 monitors that the scrubber level is above 450 mm and the delay timer in Trigger 2 has elapsed. Trigger 3 will be activated when the scrubber level is back to normal value and gives a positive score on 50 point.

Figure 4 Add scenario module dialog



3 **OK**.

1.3 Add triggers

Note

When the exercise skeleton exists, with an exercise and a scenario in it, the next step is to configure the scenario with conditions and actions. This is done with trigger symbols and connection lines. The different trigger symbols and their use are described in more detail in section: Trigger overview on page 45

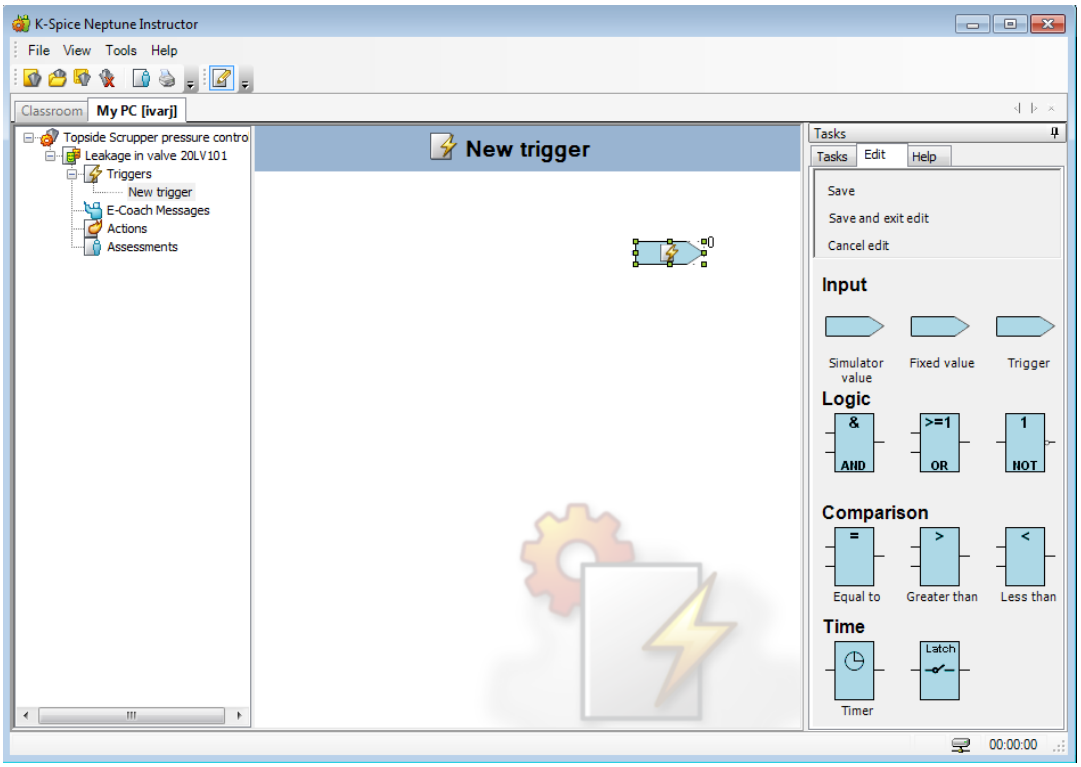
Trigger 1 Fixed value

1 Open the new scenario branch, **Leakage in valve 20LV101,**

2 Open the branch **Triggers** in the exercise treeview

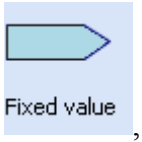
3 Right hand click on **Triggers** and **Add trigger**. The following window appears:

Figure 5 Add a new trigger



4 Rename the trigger from **New trigger** to *trigger 1*.

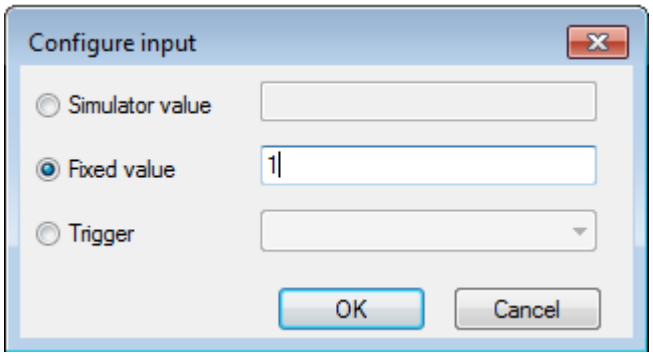
5 To get a chart of the symbols on the right hand side, if the chart is missing, right-click in the main work area and select **Go to edit mode**.

6 Select the fixed value symbol, 

, left-click on the symbol, hold and drag it to the trigger area, *to the left of the existing symbol* , and drop it.

7 Double-click on the symbol to open the **Configure input** dialog and change the fixed value input from 0 to 1. Click **OK.**

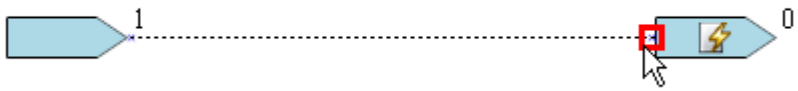
Figure 6 Configure input dialog



8 Connect the fixed value symbol to the trigger: Left-click (and hold) on the right hand side of the fixed value symbol and drag a line from the symbol to the trigger.

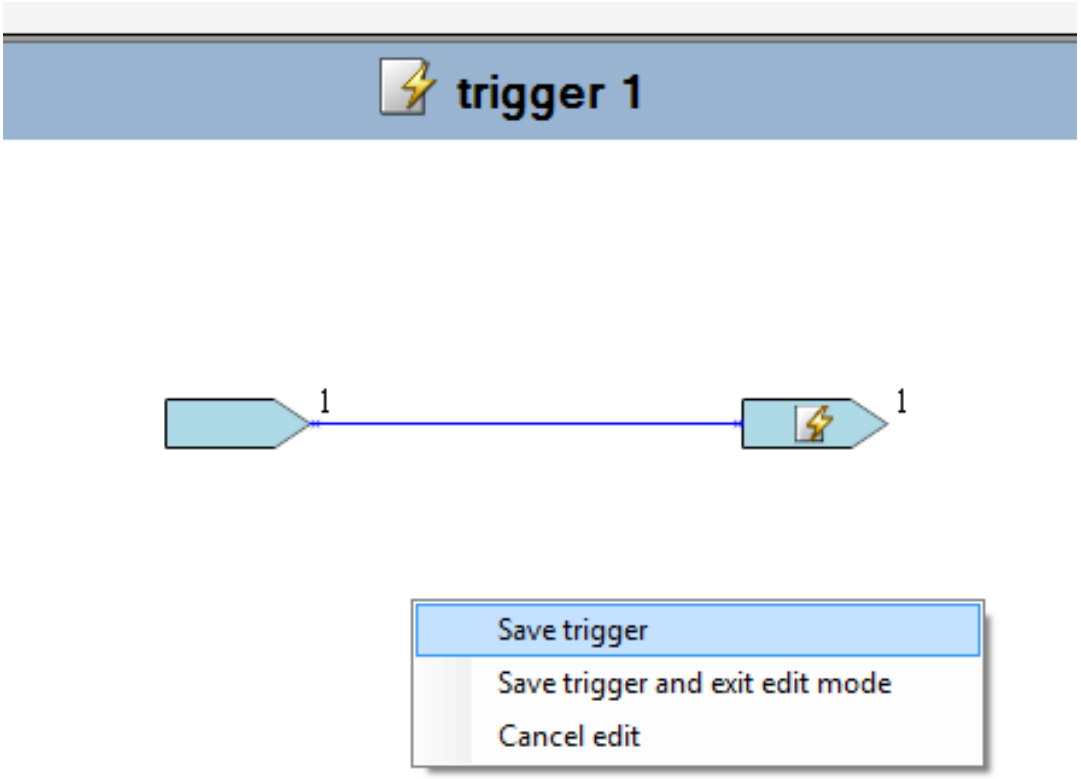
Figure 7 Click and hold

Figure 8 Connect to trigger



9 Right-click in the main work area and select **Save trigger**.

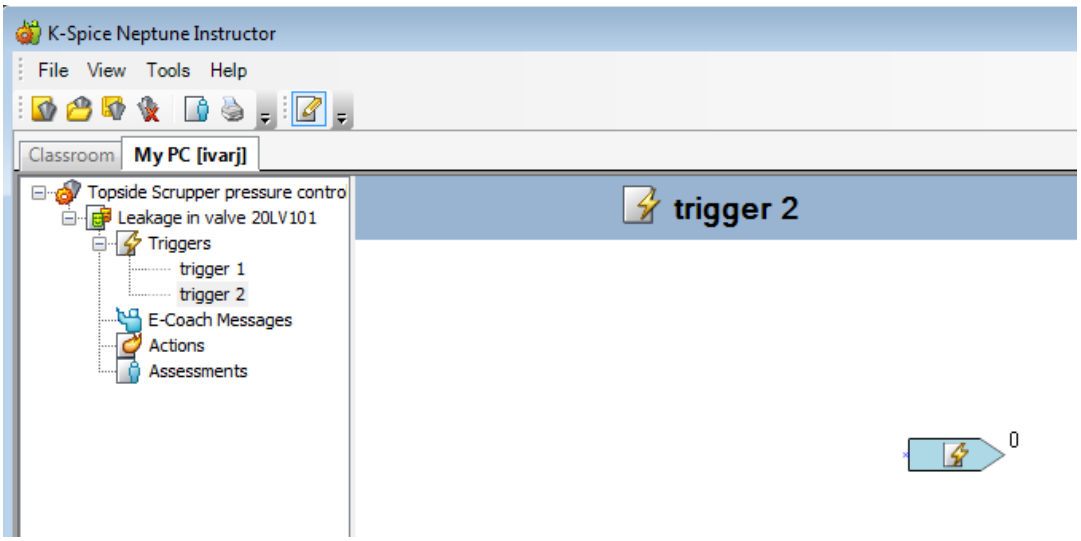
Figure 9 Save trigger



Trigger 2 Timer

1 Click on **Triggers->Add trigger**, to add another trigger. Name it: *trigger 2*.

Figure 10 Add trigger 2

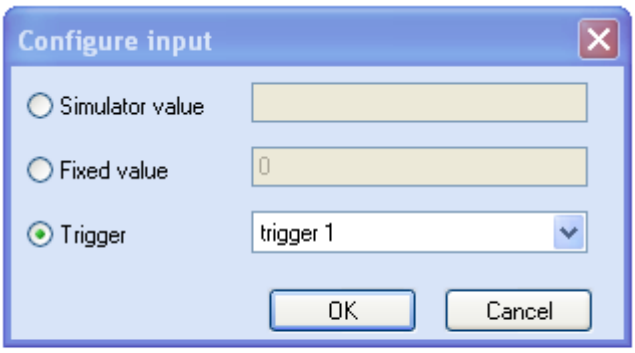


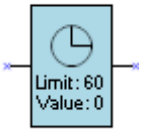
2 Select **Trigger** from the right hand side symbol menu. Left-click it, hold and drag the symbol to the trigger area and drop it.

3 Right-click on the trigger and select **Set input**. The **Configure input** dialog appears.

4 Right-click to configure the input to **trigger 1**.

Figure 11 Add trigger 1

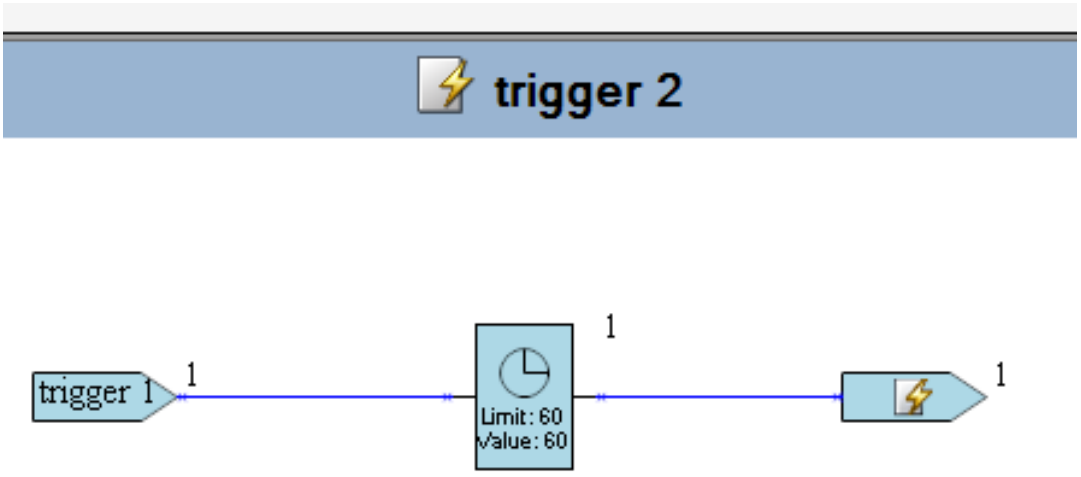


5 Add a timer, 

to create a 60 seconds delay. Left-click, hold and drag it to the trigger area and drop it.

6 Right-click and configure the timer for 1 minute.

Figure 12 Add a timer



7 Drag a line from the Fixed value symbol to the timer to the Trigger.

8 Left-click at the end of the value symbol and hold, move the line to the input of the Timer and release.

9 Draw a line from the Timer to the Trigger

10 Right-click in the main work area and select **Save trigger**.

Trigger 3 Simulator value

1 Click on **Triggers —>Add trigger** to add another trigger. Name it: *trigger 3*.

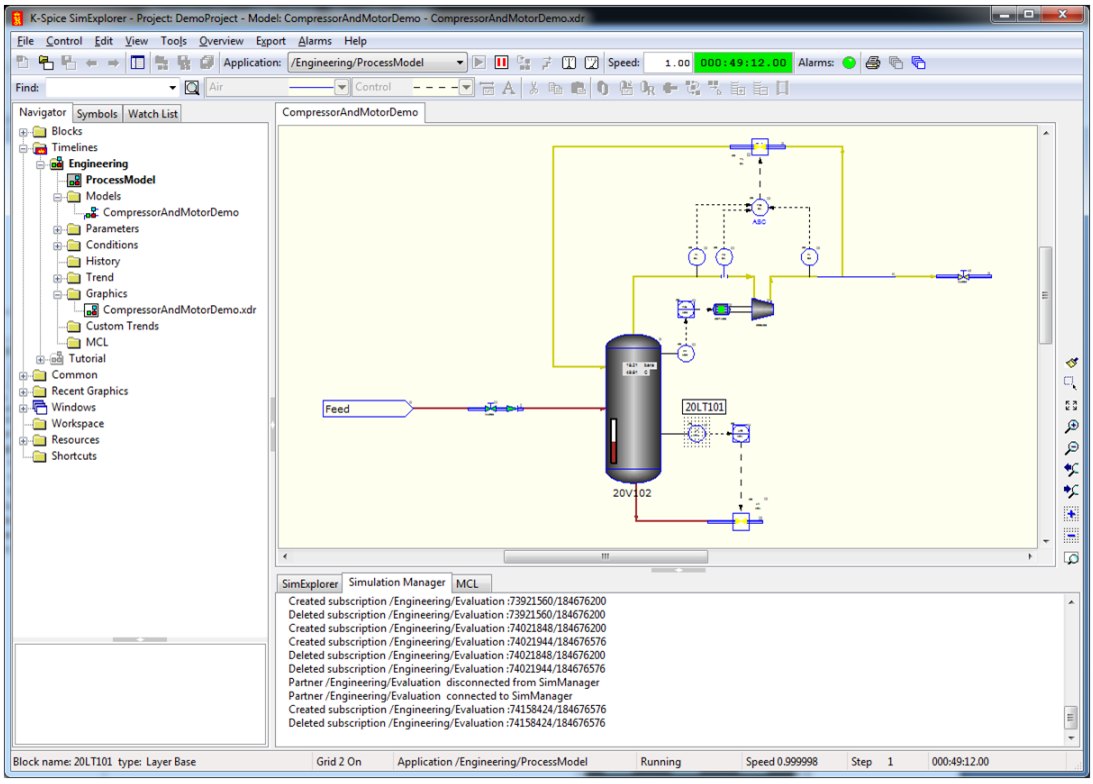
2 Select the **Simulator value** symbol from the menu. Left-click, hold and drag the symbol to the trigger area and drop it.

3 Select a **Fixed value** symbol from the menu. Left-click, hold and drag the symbol to the trigger area and drop it.

4 The Simulator value should be the K-Spice Level Transmitter value **20LT101: Value.**

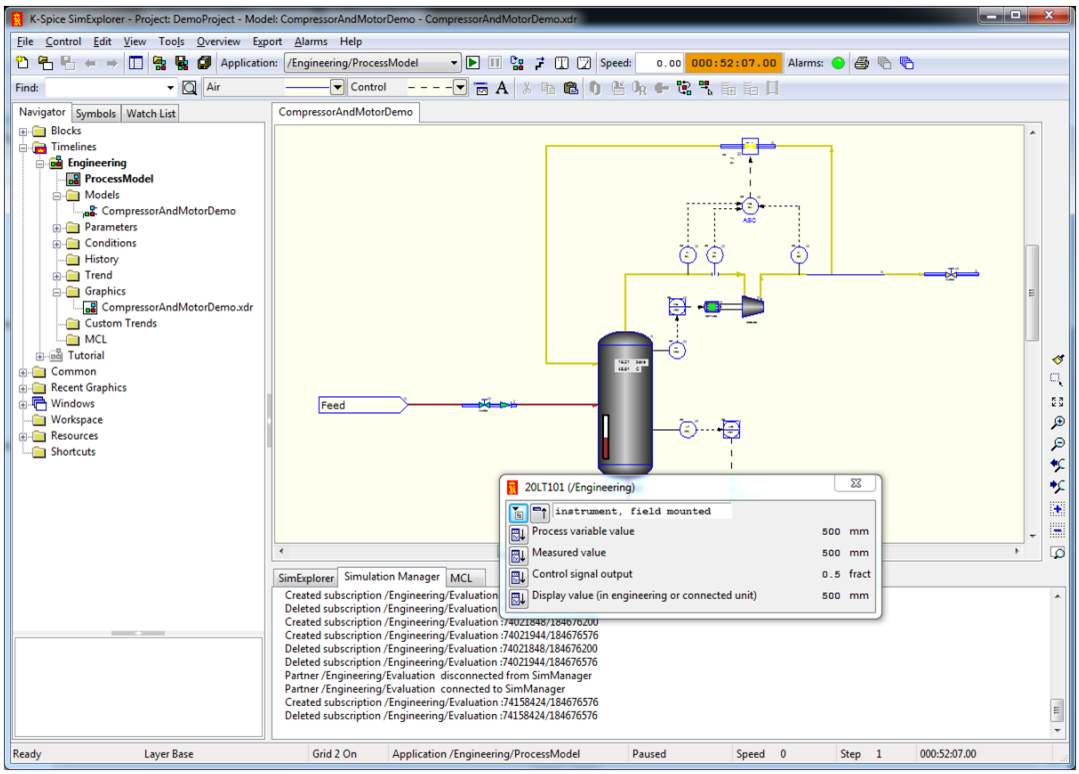
The input is pure text, so if you know exactly what to enter, you could type it in. The following steps will explain how you can copy and paste the string from a K-Spice dialog.

Figure 13 K-Spice process display



5 On the K-Spice process display, click on the **20LT101** transmitter to bring up the faceplate.

Figure 14 Transmitter Faceplate

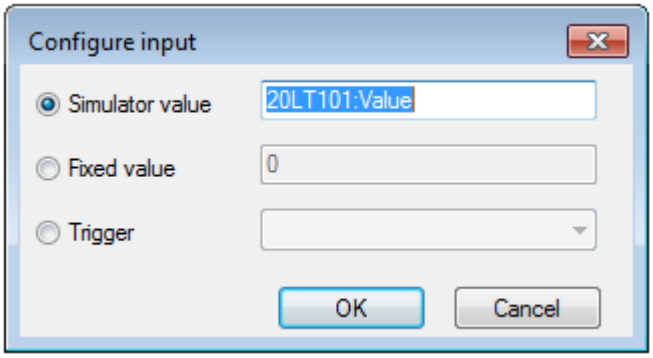


6 In K-Spice right-click on the displayed value of the **Process variable value** and choose the name of the data item by left-clicking on it.

7 In Neptune right-click on the symbol and select **Set input** to bring up the configuration dialog.

8 **Paste** the K-Spice value into the input name field of **Simulator value**:

Figure 15 Set Neptune Simulator value



9 The Fixed value should be a fixed value holding the low limit.

Right-click on the **Fixed value** symbol and select **Set input**, then set the input to *450* mm.

10 Use the logic symbol: > (Greater than).

11 Connect the two signals.

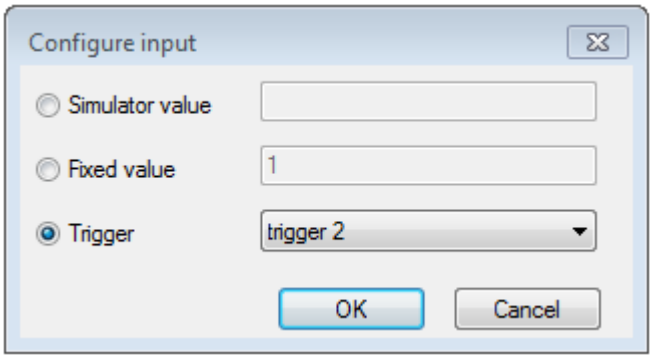
In some cases it can be necessary to increase the number of inputs or outputs (right-click on the symbol to do this step). A dialog appears while one changes the input gates from 2 to 5. Click **OK**. Outputs can be changed the same way.

12 Select **Trigger** from the right hand side symbol menu. Left-click it, hold and drag the symbol to the trigger area and drop it.

13 Right-click on the trigger and select **Set input**. The **Configure input** dialog appears.

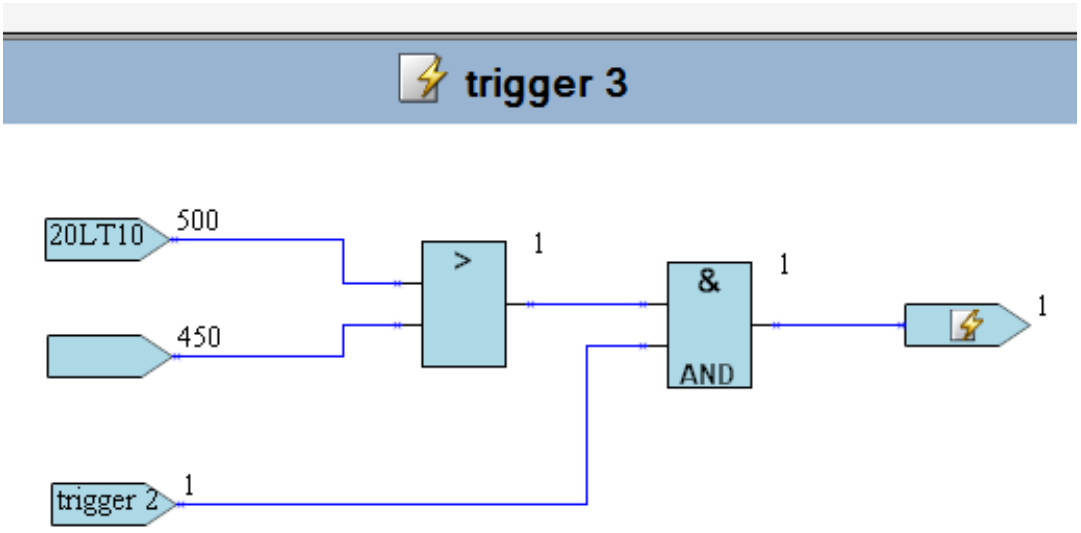
14 Right-click to configure the input to **trigger 2**.

Figure 16 Add trigger 2



15 Use the logicsymbol: & (AND). Connect the symbol with two inputs and one output.

Figure 17 Trigger 3



16 Right-click in the main work area and select **Save trigger**.

We now have the three triggers we need.

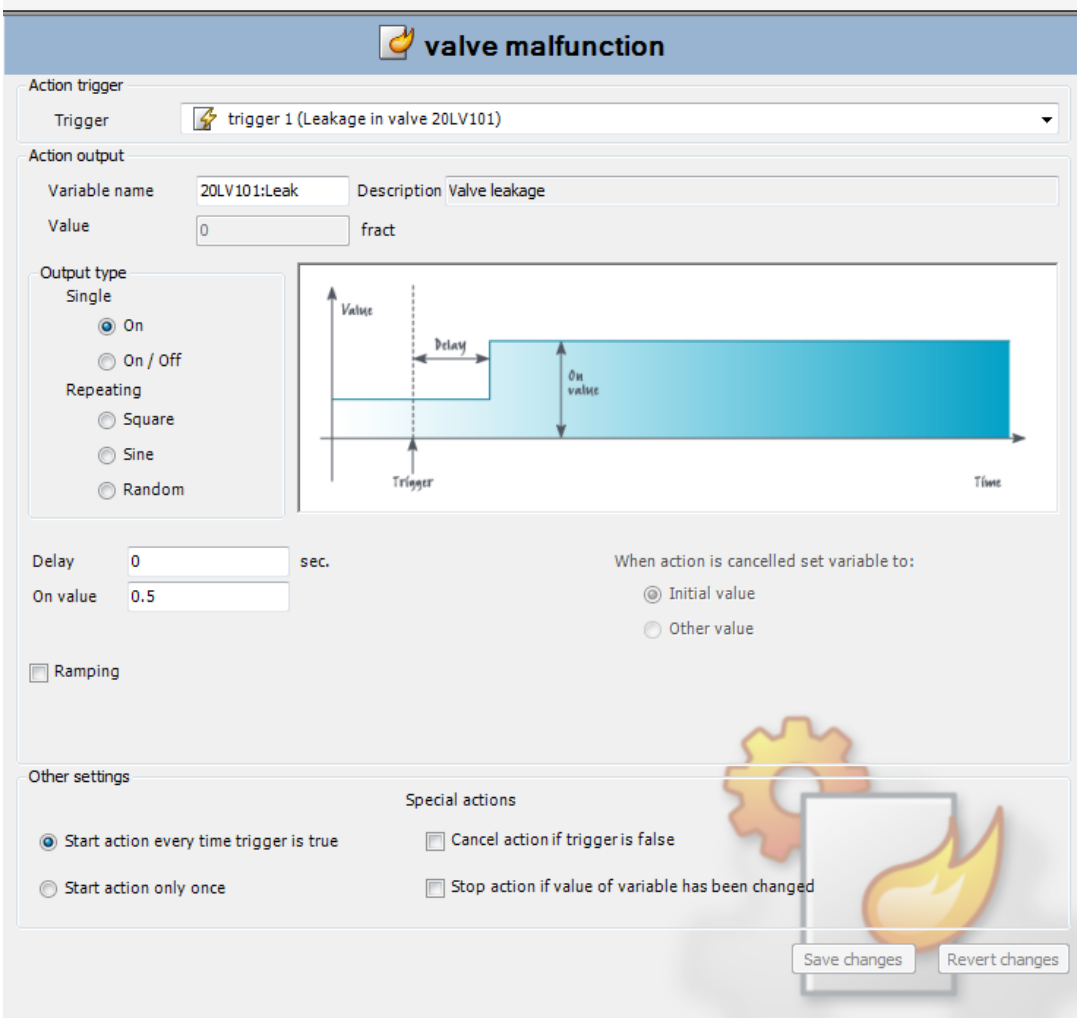
1.4 Add an action

To link an action to trigger 2, do the following:

1. Right hand click on **Actions**,

, located under the navigational tree on the **local** tab.
2. Name your new action *valve malfunction.*
3. Select **trigger 1** to be the action trigger. The action starts when the exercise starts.
4. Fill in the variable name: *20LV101: Leak* . Copy the text from the K-Spice valve dialog and paste it in.
5. Set the output type to *Single on* .
6. Set the **On value** to *0.5*. The action will turn on a 50% leak.

Figure 18 Action valve malfunction



7 **Save changes.**

1.5 Add an assessment

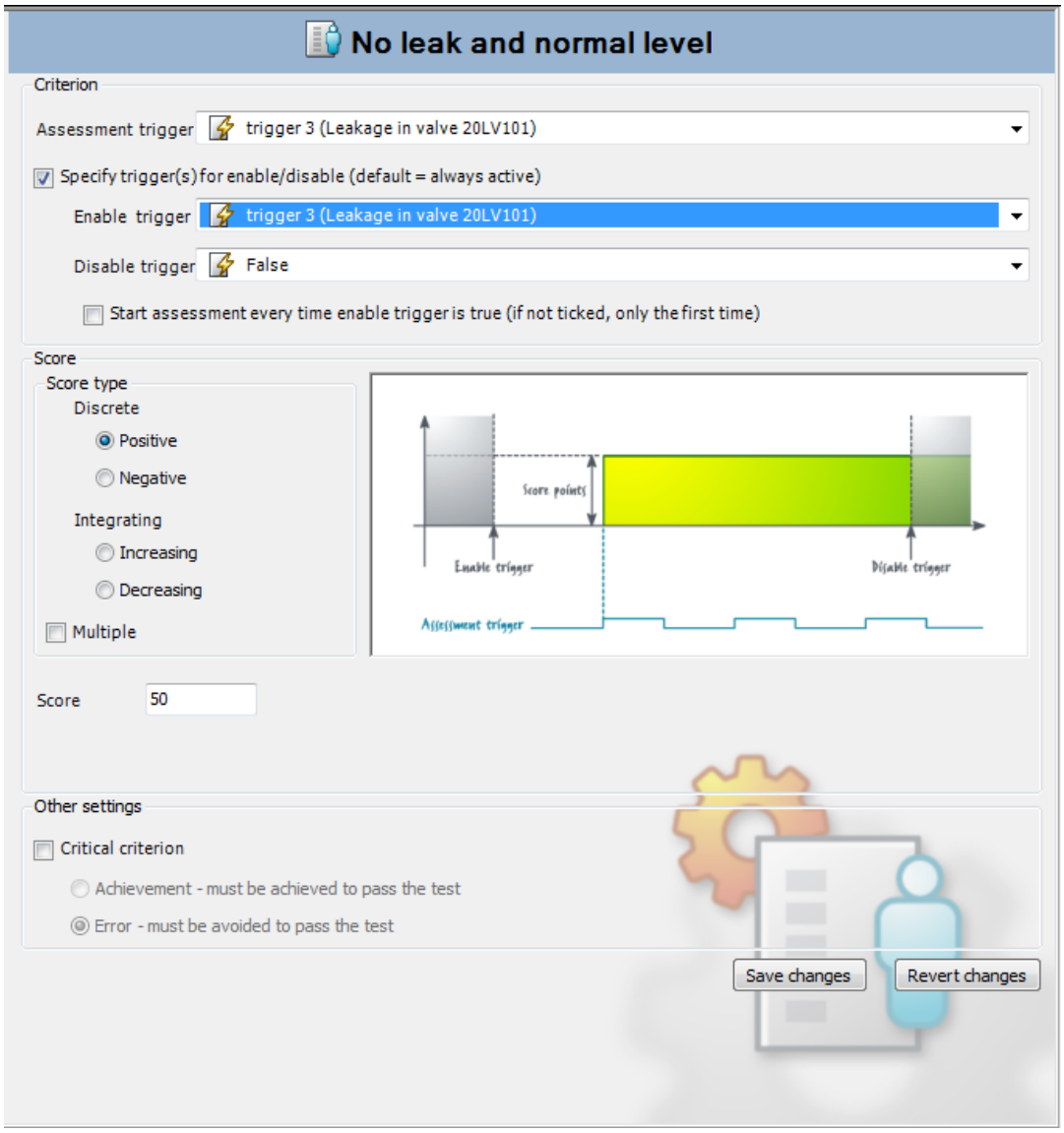
1 Select **Add assessment** from the **Assessments** branch, located under the navigational tree on the **local** tab.

2 Change the assessment name to *No leak and normal level*. This indicates that the assessment is linked to **trigger 3**, which is released when the operator has corrected the valve and the level is back to normal.

3 Select **trigger 3** as your **Assessment** trigger.

4 Enter a value for **Score**, for example: *50* points.

Figure 19 Assessment No leak and normal level



5 Save changes

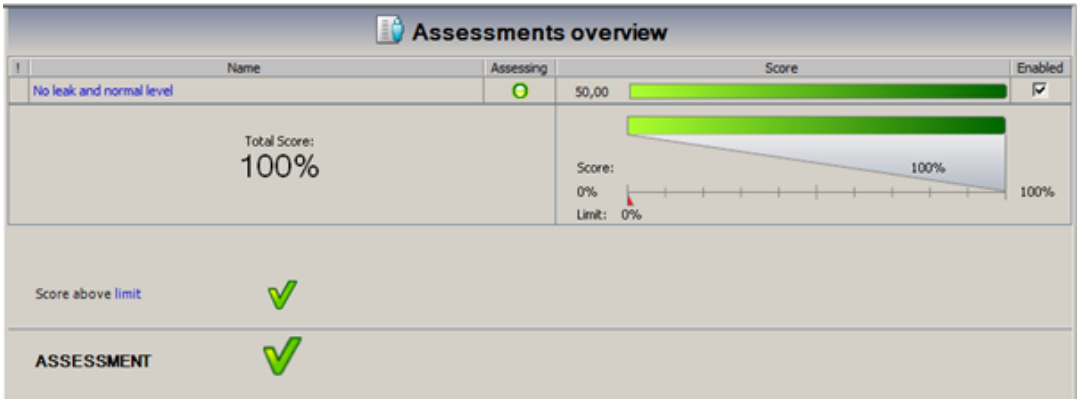
6 Stop exercise

The first assessment is ready. If the valve error is corrected and the level is restored, the operator will get 50 points.

1.6 Set the score limit

1 For the operator to pass the test he must get a score above a certain limit. Set the limit by left- clicking on the **Assessments** branch, located under the navigational tree on the local tab. The **Assessments overview** appears. Click on (score above) **limit**, highlighted in blue.

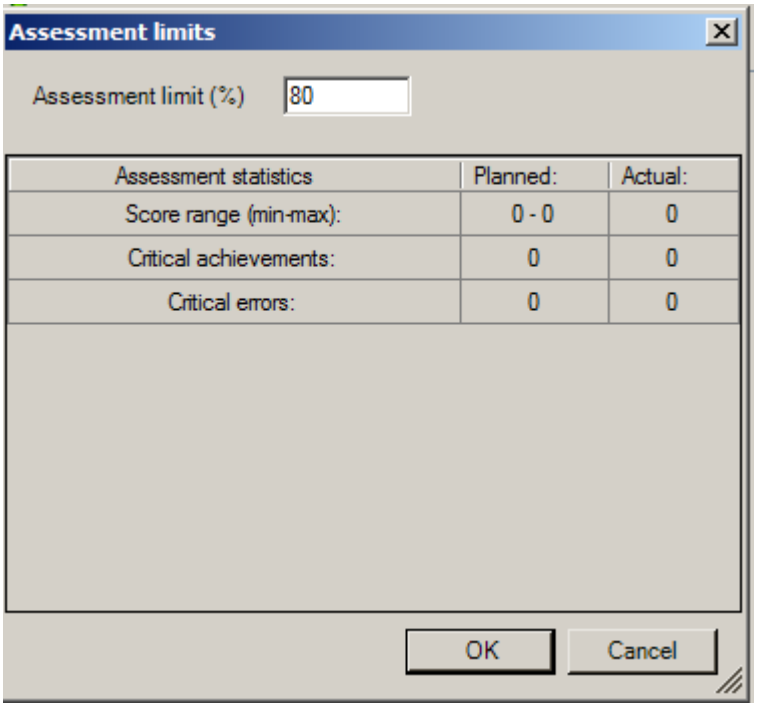
Figure 20 Assessment overview



2 The **Assessment limits** dialog will appear. Set the **Assessment limit (%).** For example; 80.

3 Click **OK.**

Figure 21 Assessments limit dialog



1.7 Run the exercise

1 *Pause* the K-Spice model.

2 Open dialogs in K-Spice and find 20LV101: Leak and 20LT101:Value.

3 In Neptune, verify that no exercise is running.

4 Open the **Topside Scrubber pressure control** exercise.

5 Click on **trigger 3**. This will open **trigger 3** in the main work area. The scrubber level and the other values are all 0.

6 *Run* the K-Spice model.

7 Verify that **trigger 3** is populated with the actual simulator values.

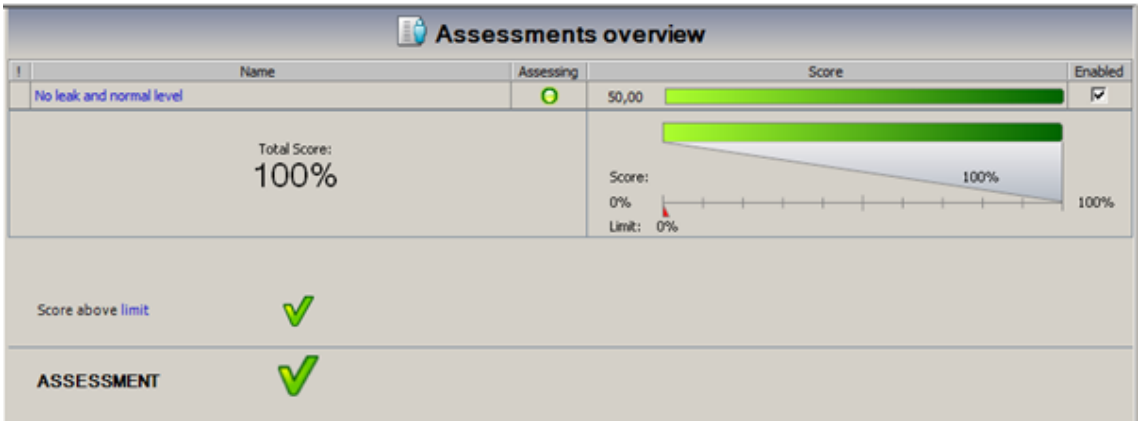
8 Observe that the level in the scrubber is decreasing.

9 Stop the leak. Observe that the level goes back to normal. Watch the logic and triggers in **trigger 3.**

1.8 Exercise score

This following figure is the Assessment overview dialog after the test run of the exercise.

Figure 22 Assessments overview



A printout of the assessment is available by clicking **Print assessment**:

Figure 23 Print assessment

Topside Scrubber pressure control

Student: ivarj
Computer: local
Performed on: 11:39 24. oktober 2012

Leakage in valve 20LV101	**100 % (passed)**
Summary	
Limit	0 %
Score above limit	Yes
Assessment name	Score
No leak and normal level	50

2 Start up – Load an exercise

The preparations necessary to run an exercise, will be described in this chapter. First K-Spice® simulator must be started with the actual model loaded. Then the Neptune® Instructor System must be started. When Neptune®loads an exercise, Neptune® logs on to K-Spice. When the connection between Neptune and K-Spice is established, the connection is used to send telegrams between Neptune to K-Spice. Details here *Data transfer between K-Spice and Neptune* on page 32

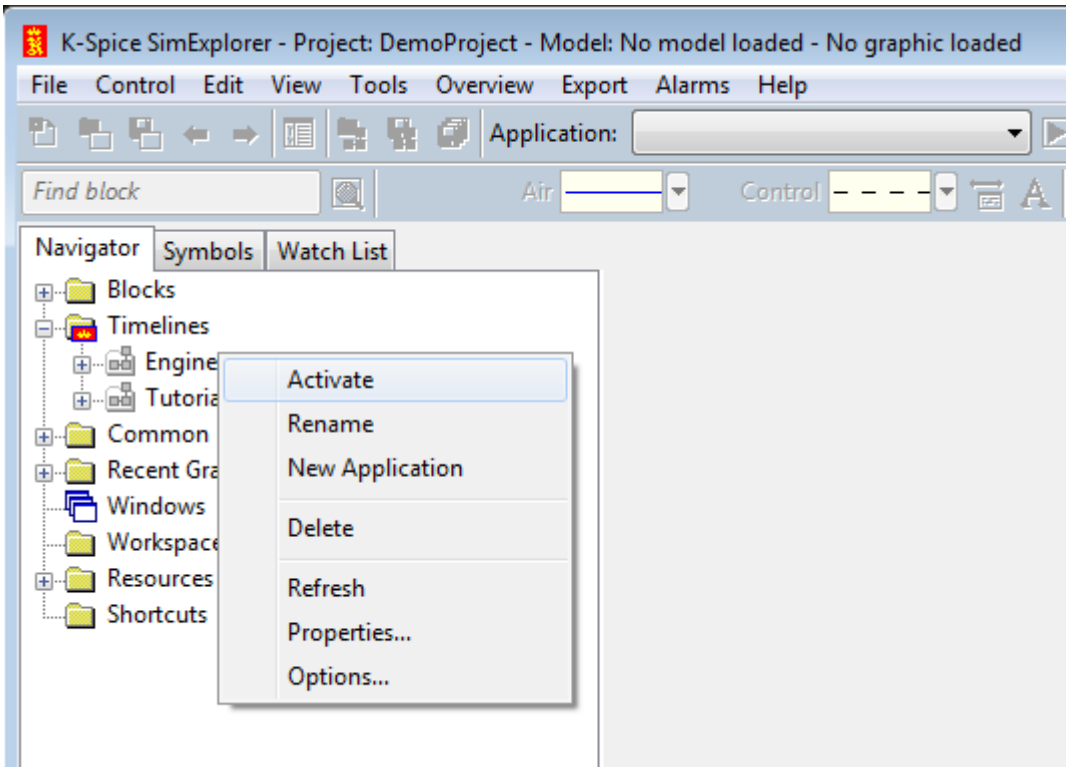
2.1 Load a model in K-Spice and start the simulation

1 Start K-Spice Simulation Manager

2 Start K-Spice SimExplorer

3 Activate the *Engineering* timeline

Figure 24 Activate the Engineering timeline

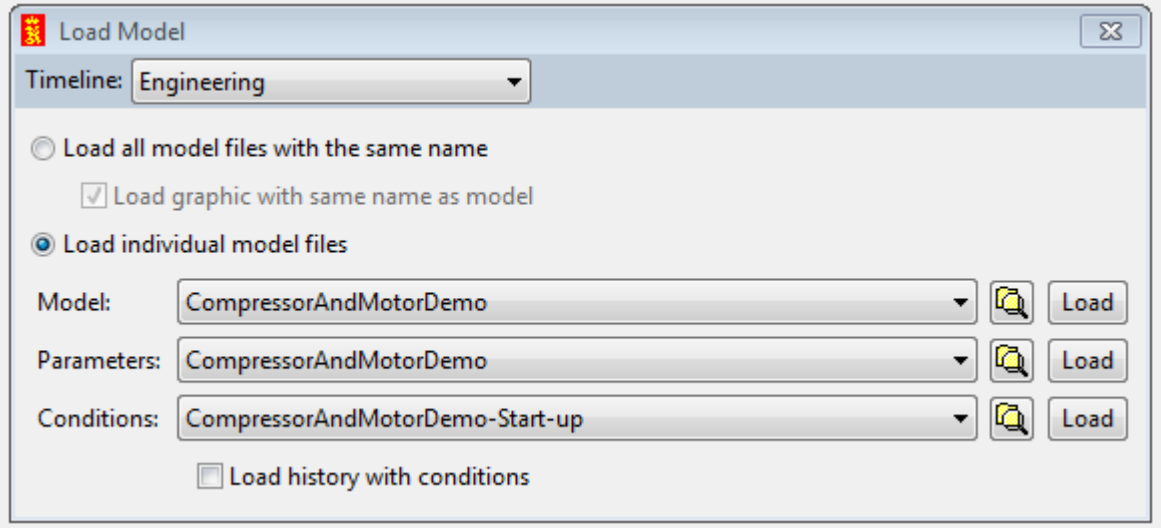


4 Load the **model** *CompressorAndMotorDemo*

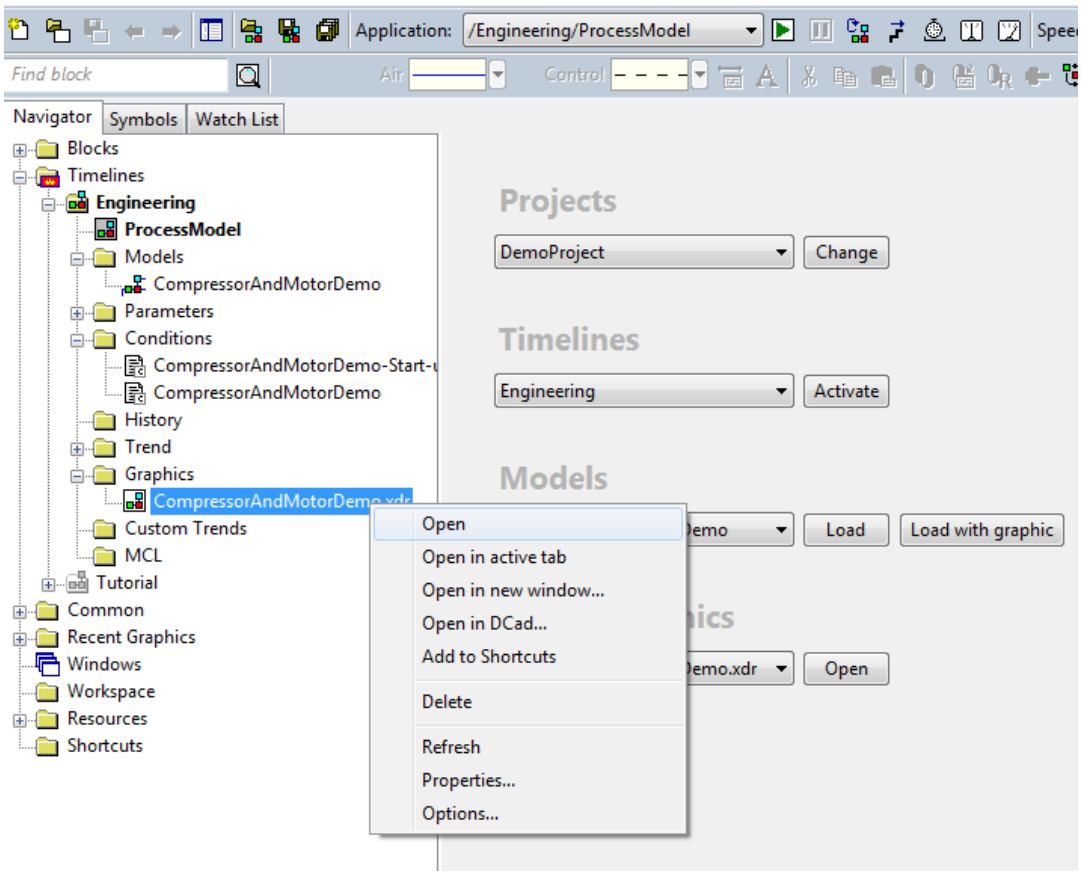
5 Load **parameters** *CompressorAndMotorDemo*

6 Load **conditions** *CompressorAndMotorDemo-**Start-up***

Figure 25 Load model with parameters and conditions in K-Spice



7 Open the *CompressorAndMotorDemo.xdr* graphic



8 Press the **Run** button in K-Spice

The simulation model CompressorAndMotor is running in K-Spice.

2.2 Start the Neptune® Instructor System

1 Click the instructor icon in the start menu, or start it from the entry in 'All programs' or start the program from the directory: C:\Program Files (x86)\Kongsberg\K-Spice\Koa\Kongsberg.Neptune.Instructor.exe with the start line parameter ownRM. Run as administrator. This will start the Neptune main program. When an exercise is opened from the Neptune main program, a new program, the Neptune server, will start.

Figure 26 Start menu

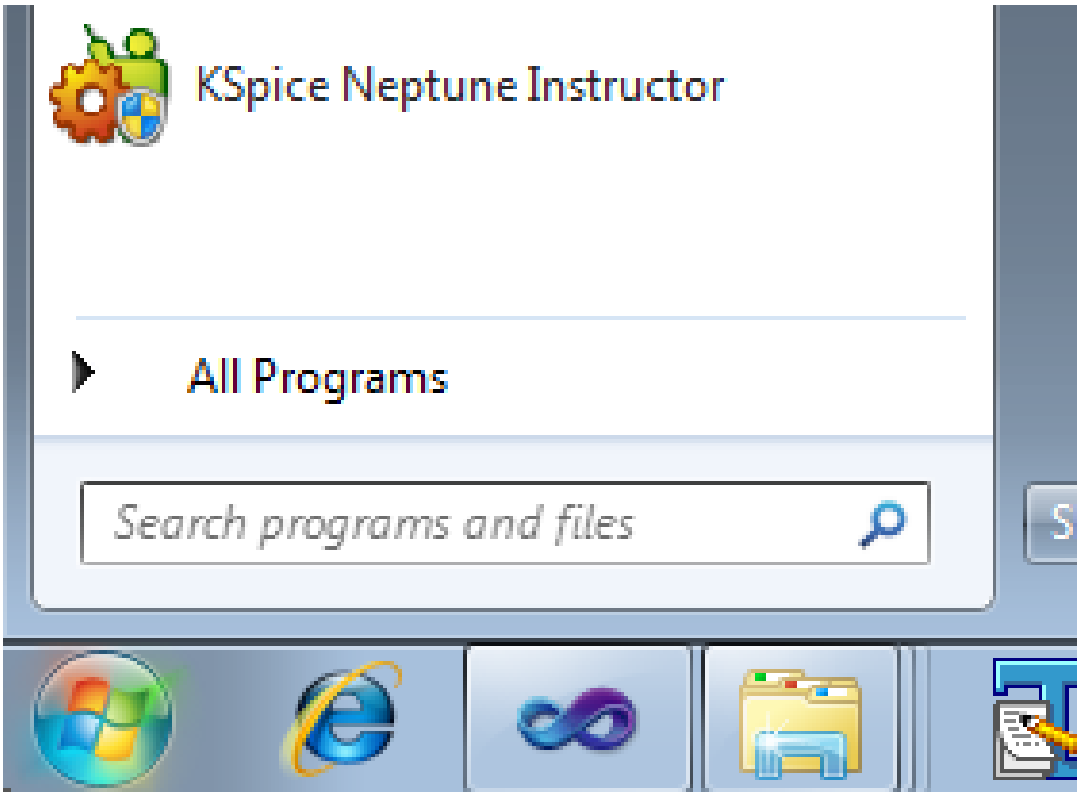
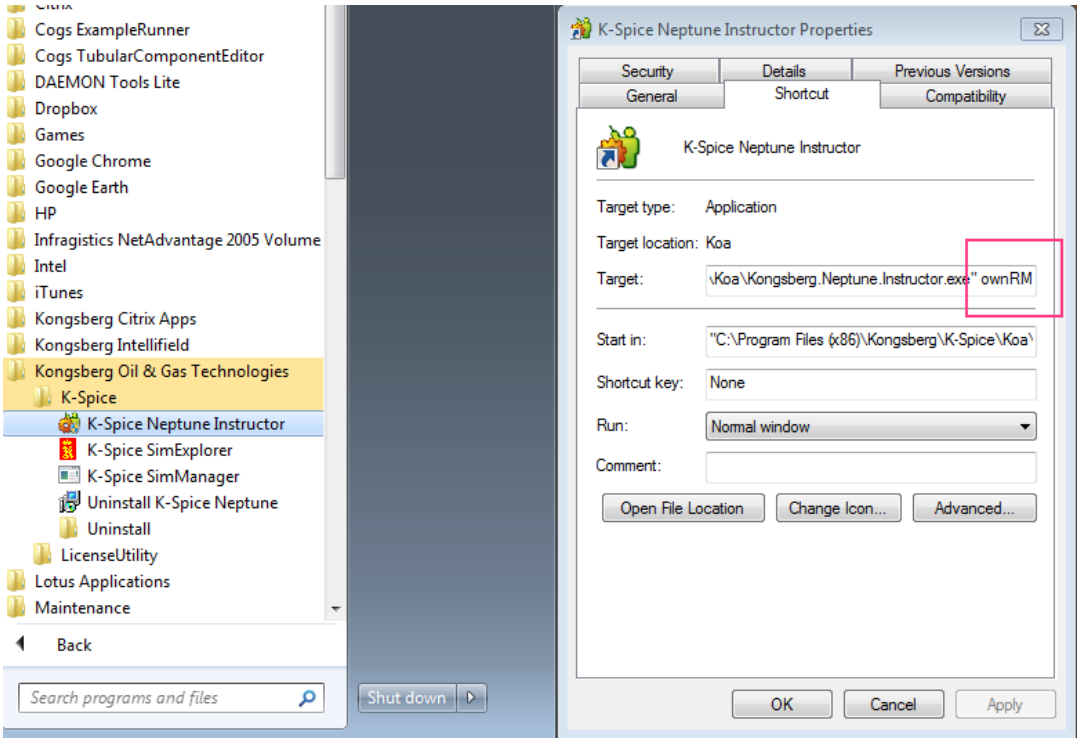


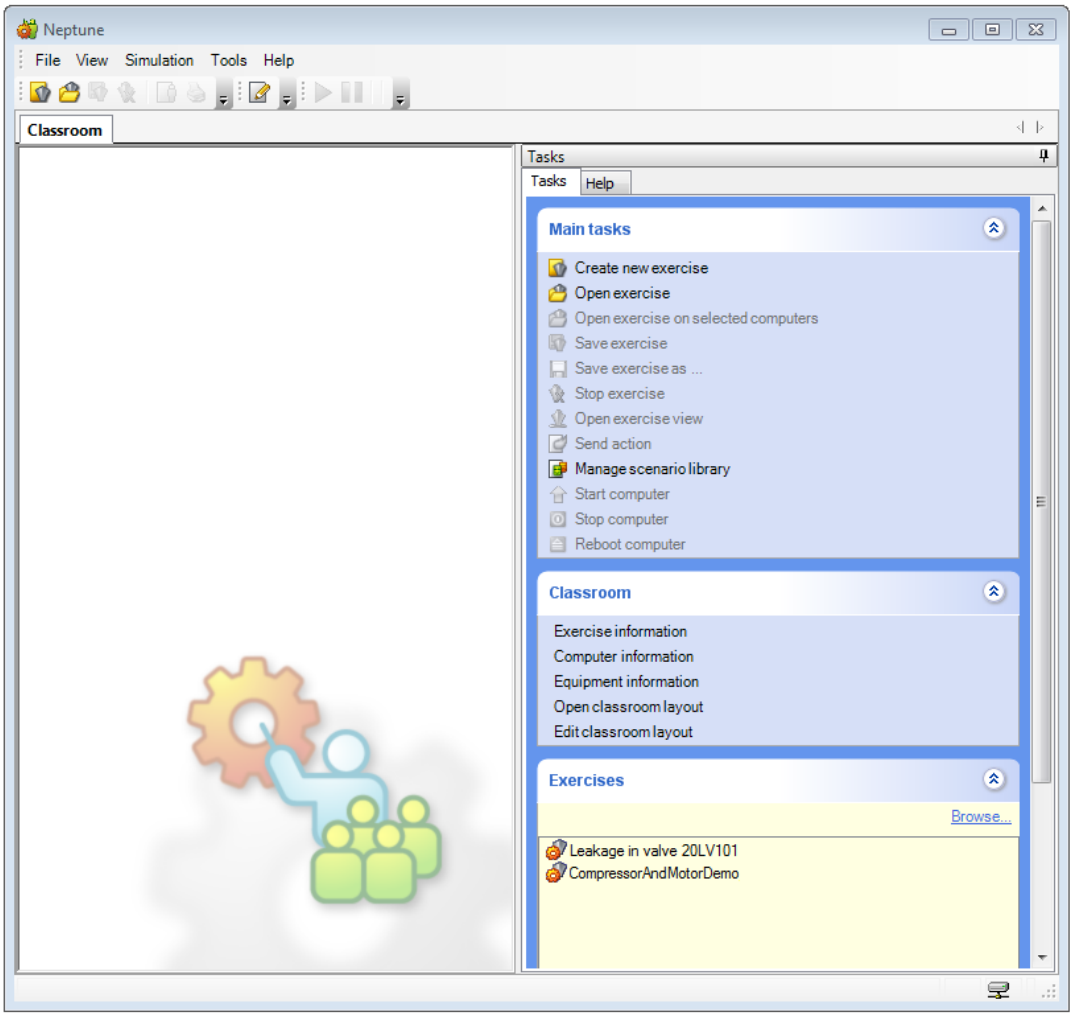
Figure 27 Start from All programs



2 Run as administrator

The Main window appears:

Figure 28 Neptune® Instructor System main window



2.3 Load an exercise in Neptune

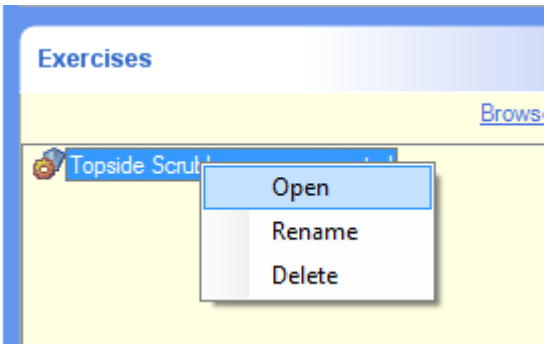
Note

There are requirements before loading an exercise. The K-Spice simulator must be started and the K-Spice model that corresponds to the exercise, must be loaded in K-Spice.

To load an exercise you can pick one from the exercise field.

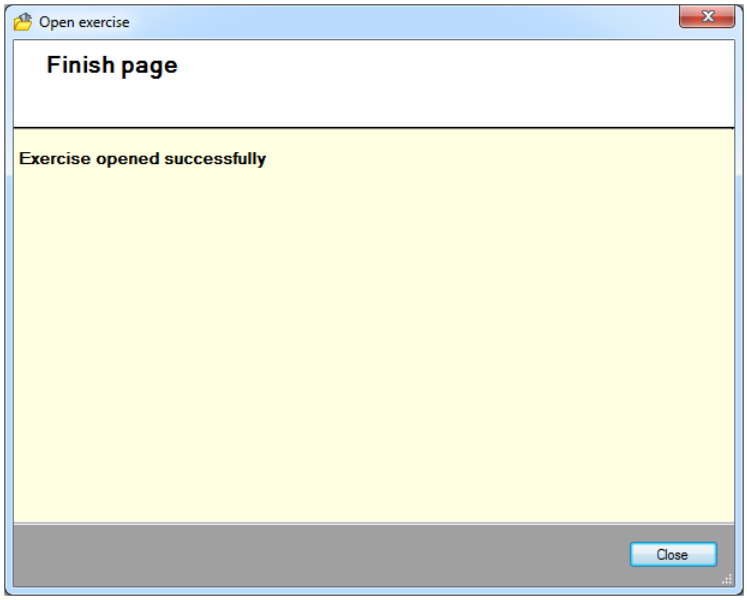
1 Double-click on the required exercise to run it. If there are no exercises on the menu, you can click the **Browse** option to find the exercise (check the local drive under: Neptune exercises-model name-exercises).

Figure 29 Selecting an exercise



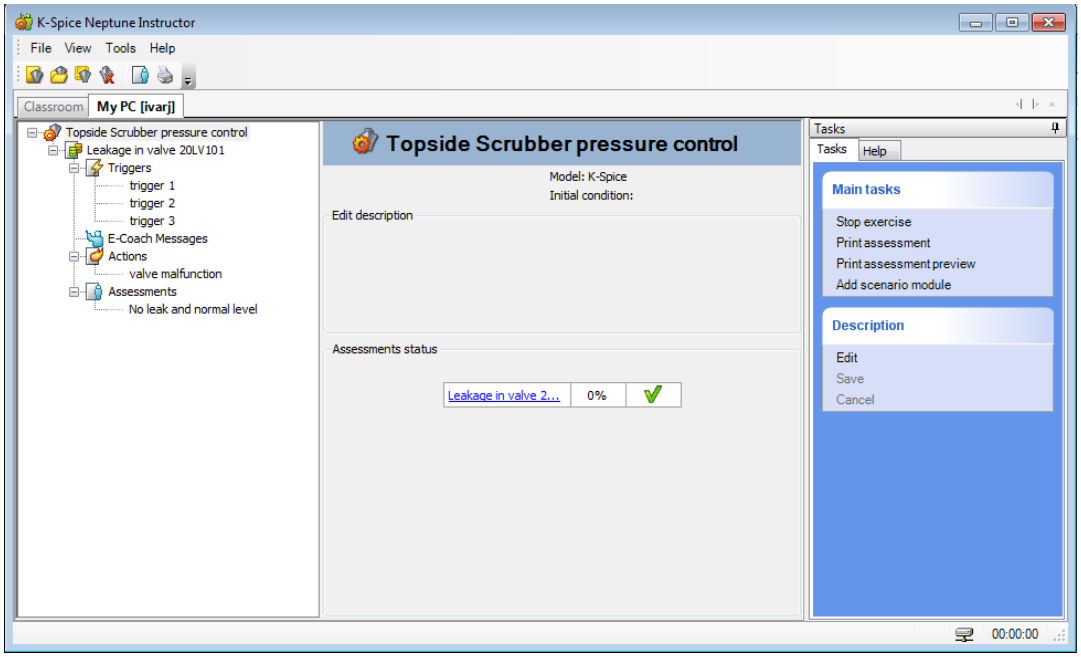
2 An exercise status dialog indicates that the exercise started successfully:

Figure 30 Exercise status dialog



3 **Close**. The exercise display will be loaded:

Figure 31 Loading an exercise to run



The exercise is running

2.4 Verify the connection between K-Spice and Neptune

When the exercise is loaded in Neptune, Neptune will send a logon request to the Simulation Manager.

Note

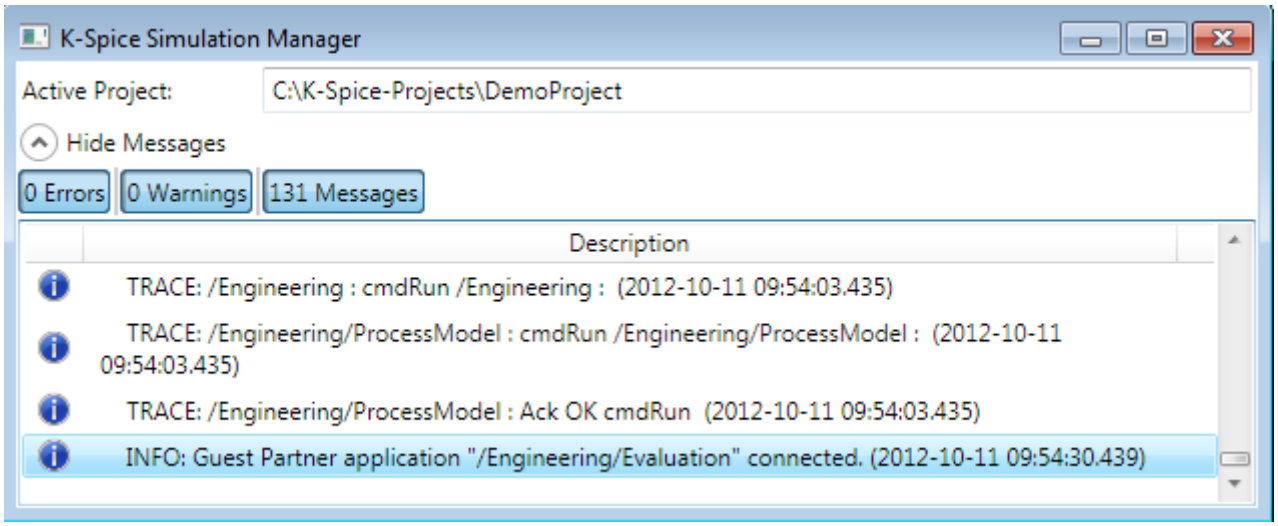
The Neptune program will identify itself at logon with the name ***Evaluation.***

Evaluation will be connected as an external link in the K-Spice simulator. The K-Spice simulator will open up for manipulations from **Evaluation**. Neptune will send telegrams to the K-Spice simulator, that will set data items in the simulator to new values. I.e. Neptune can set the data item **20LV101: Leak** in K-Spice to the value *0.1*

Verify that Neptune is accepted by the Simulation Manager

The K-Spice Simulation Manager console will identify the connection

Figure 32 K-Spice Simulation Manager with Evaluation logged on



Verify that Neptune is accepted as a link under the Engineering timeline

Right-hand click and **Refresh** in the Naviagator view in K-Spice SimExplorer. Observe the new entry **Evaluation** in parallel to the existing **ProcessModel**

Figure 33 Refresh in Navigator in K-Spice SimExplorer

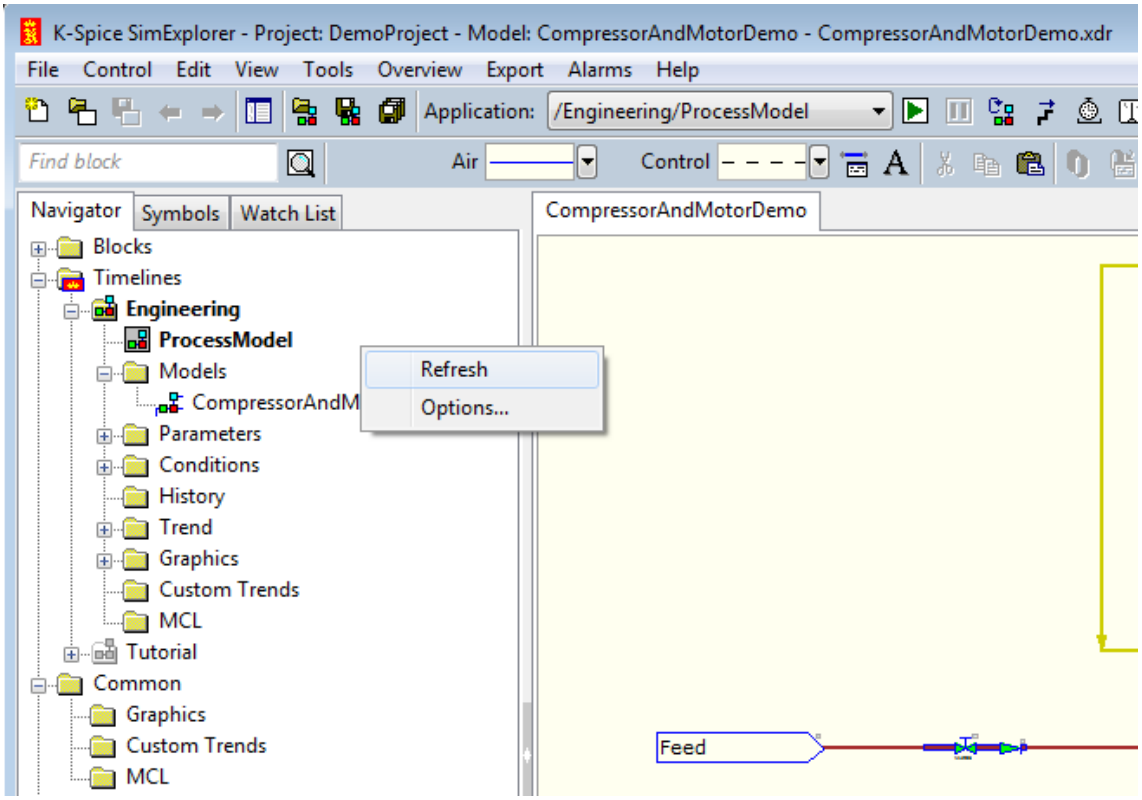
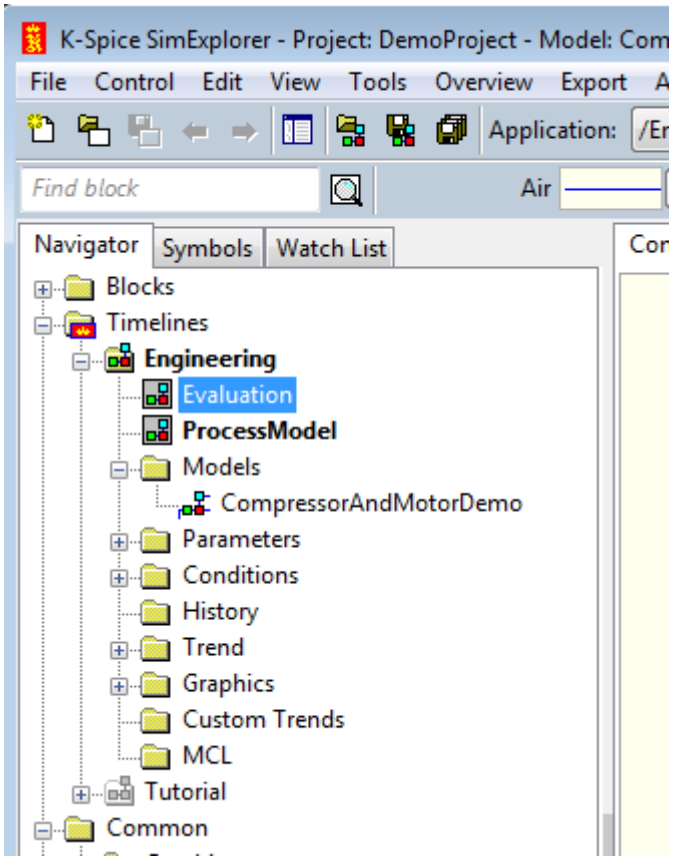


Figure 34 Neptune is accepted as a link with the name 'Evaluation' in K-Spice Navigator



2.5 Verify that the Neptune clock is controlled by K-Spice

The Neptune program is connected as a link. K-Spice sends clock tick telegrams to Neptune. For the exercises to run properly, the Neptune clock must follow the K-Spice clock. Plus minus a couple of seconds. See *The Neptune clock is not synchronized with K-Spice* on page 75

Figure 35 The K-Spice clock

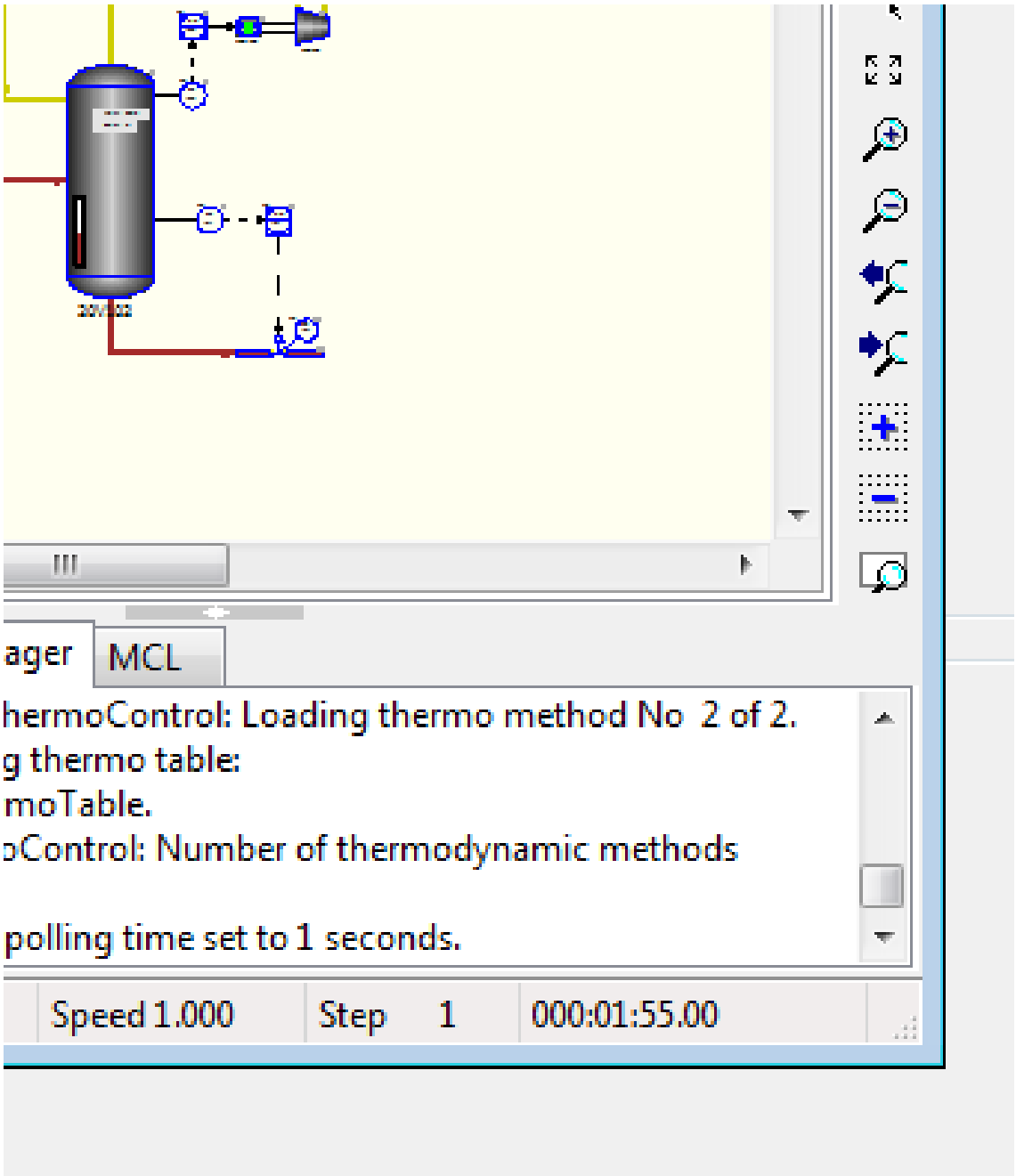
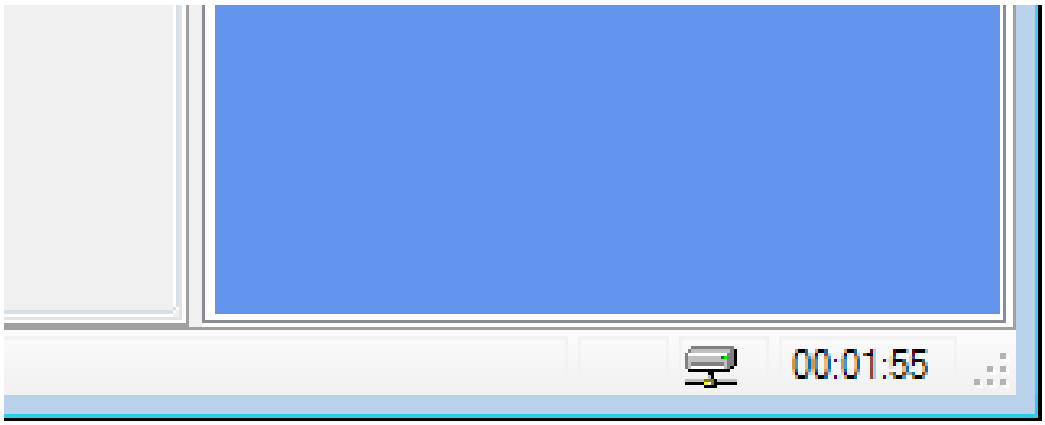


Figure 36 The Neptune clock



2.6 Data transfer between K-Spice and Neptune

Neptune® logs on to K-Spice

When an exercise is loaded in Neptune®, Neptune® logs on to K-Spice Simulation Manager. Socket to socket communication is established between the two programs. Two ways communication.

Neptune®requests simulator values from K-Spice

The first interaction between the is that Neptune® asks K-Spice is that Neptune asks K-Spice for the actual simulator values. The exercises in Neptune® will in this way display the actual K-Spice values.

Neptune® manipulates the simulator values in K-Spice

When the exercises are executed, the essence is that Neptune® sends telegrams to K-Spice that will set new values in the simulator. These new values will disturb the simulator proscess. The operator should react to the disturbance in the simulated process. Try and identify what is wrong and correct it.

Neptune® is controlled by the Simulation Manager in K-Spice.

Neptune® is connected as an external link in K-Spice. K-Spice takes control of the Neptune execution. Neptune pause and run is controlled from K-Spice

3 Stop an exercise

Note

It is important that you stop the exercise before you exit Neptune.

If the last Neptune session terminated with an exercise still running, you will have problems when you restart the program . See *An exercise was not stopped properly* on page 73

3.1 Normal stop of an exercise

Before you exit a Neptune session, save the exercise if you want to keep the changes you have made. Then stop the exercise. Then end the Neptune session

1 Click on the **File** menu located on the upper left corner on the toolbar and select **Save exercise.**

Figure 37 Save exercise

2 Click once more on **File** > **Stop exercise…**. The **Stop exercise** dialog appears.

Figure 38 Stop exercise

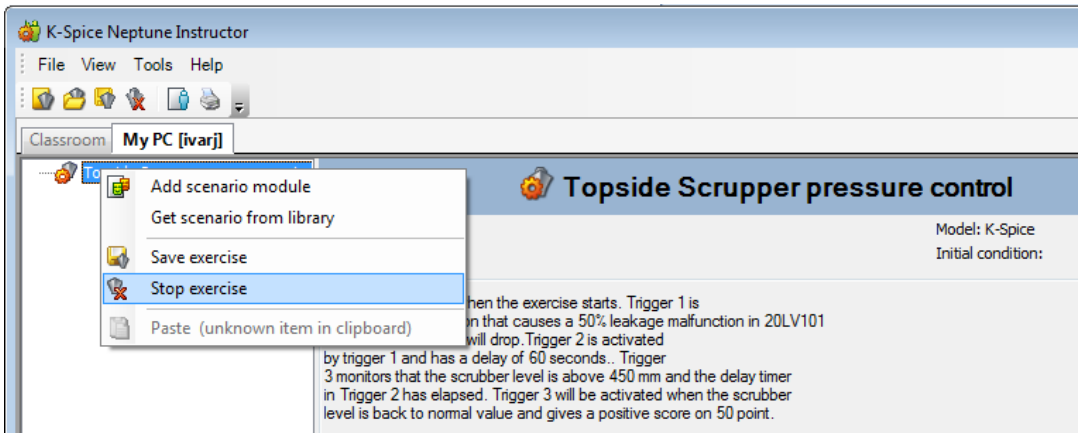
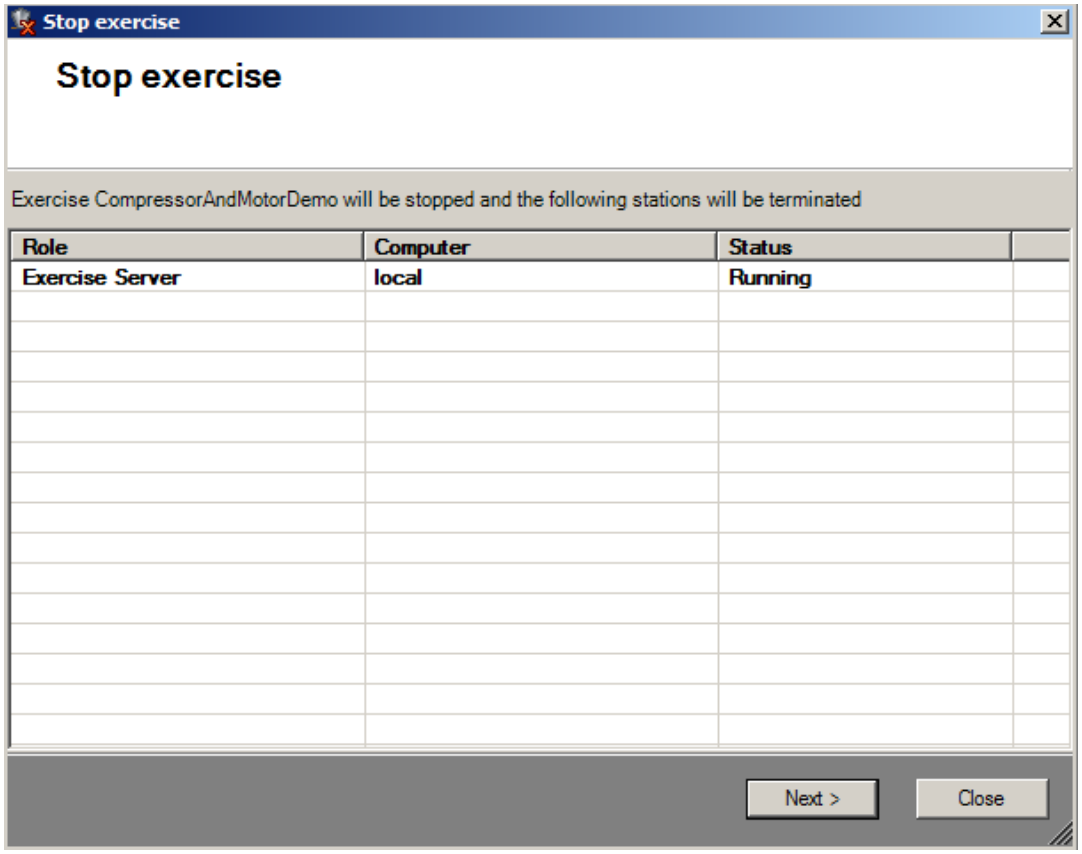
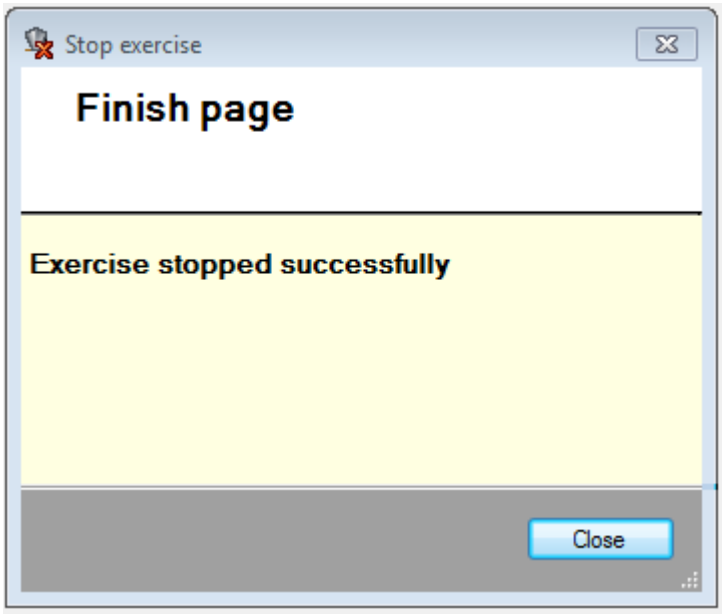


Figure 39 Stop Exercise Dialog



3 Click **Next.** An **Exercise stopped successfully** dialog appears.



4 Click **Close**

You can now exit Neptune®

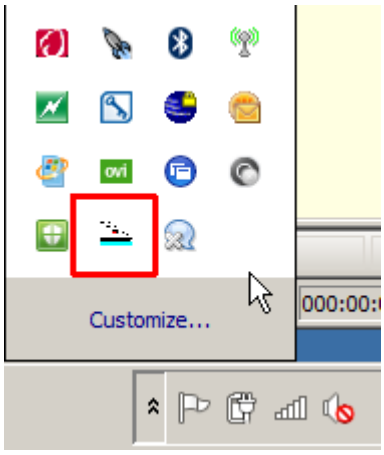
3.2 Exercises not stopped properly

Note

When reopening an exercise, make sure that the previous session was terminated properly. There should be no Neptune simulator icon

in the system tray. Refresh the area by moving the cursor over the symbol.

Figure 40 Neptune simulator icon



If the exercise was *not stopped* in the previous Neptune session, the Simulator icon is still in the system tray.

See *An exercise was not stopped properly* on page 73

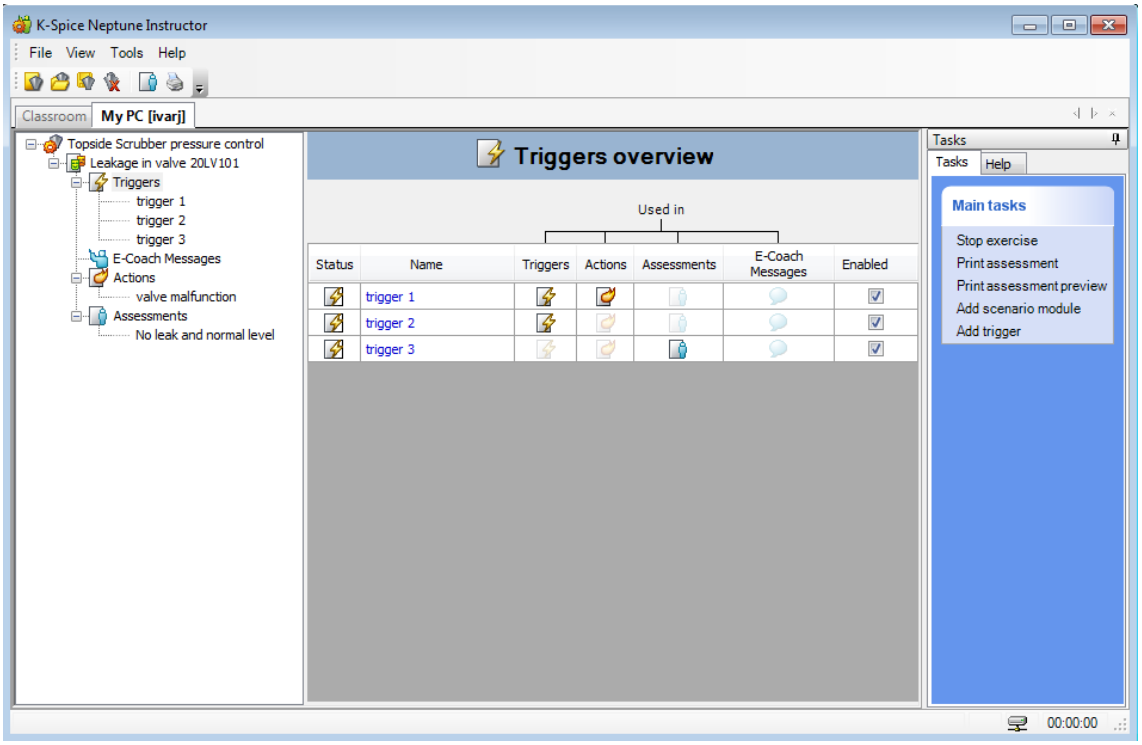
4 The exercise dialogs.

The Neptune session starts when K-Spice is up and running, and an exercise is loaded in Neptune. Details in *Run the exercise* on page 20 The present chapter presents the most important dialogs and tools used in Neptune exercises.

4.1 Triggers overview

Click on **Triggers** located under the **Start-up** branch. The **Triggers overview** will appear. Here you can see where the different triggers are used; in triggers, actions and/or in assessments. For example: *Start-up assess ON* is used in triggers and actions.

Figure 41 Ttriggers overview in exercise Topside Scrubber pressure control



By clicking on the assessment icon, the **Assessments using the trigger Start-up assess ON** dialog appears with a list of all the assessments using this specific trigger.

Figure 42 Assessment icon

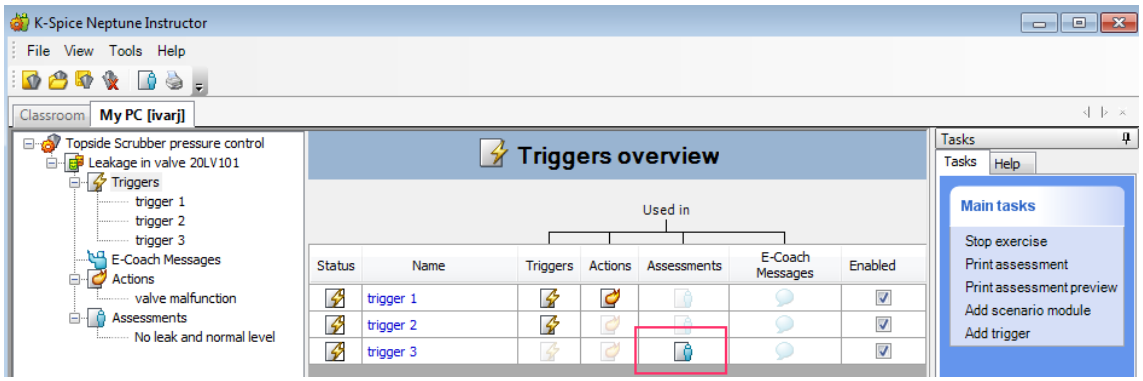
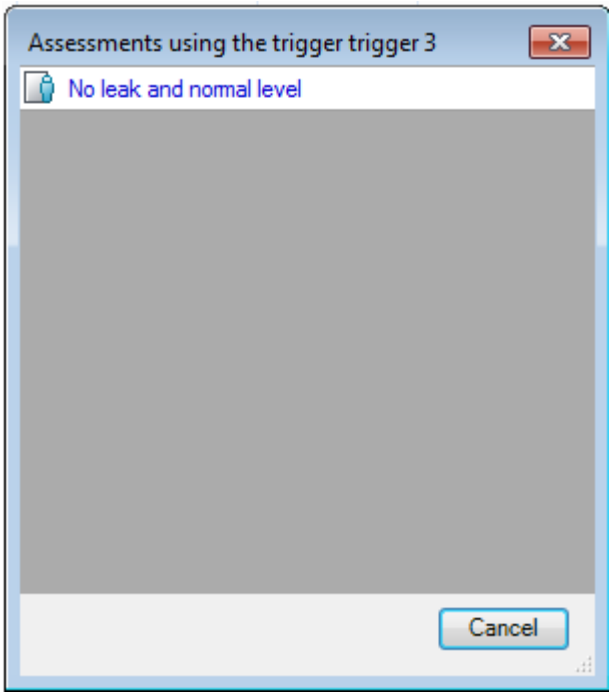
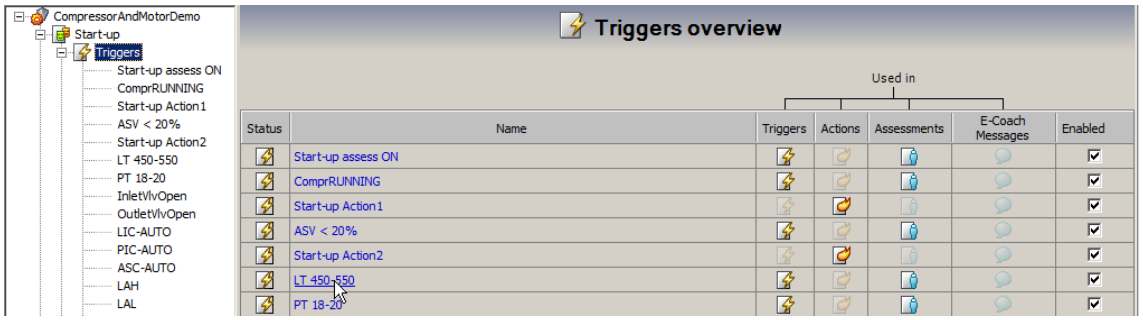


Figure 43 Assessments using the trigger Start-up ON dialog



You can also access the triggers by clicking on the trigger names (hyperlinks) in the **Trigger overiew**. Do this during the run, and you can observe the changes in the Simulator value. Below are the triggers in anoter exercise, CompressorAndMotorDemo

Figure 44 Triggers in the exercise CompressorAndMotorDemoduring a run



The two next figures are observed with a time difference of 1 minute.

Figure 45 The trigger LT 450–550 in exercise CompressorAndMotorDemo during a running exercise

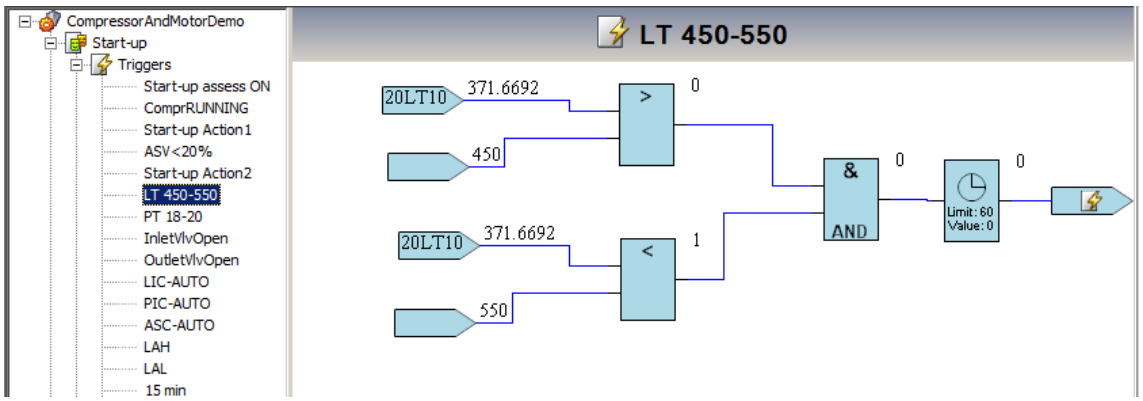
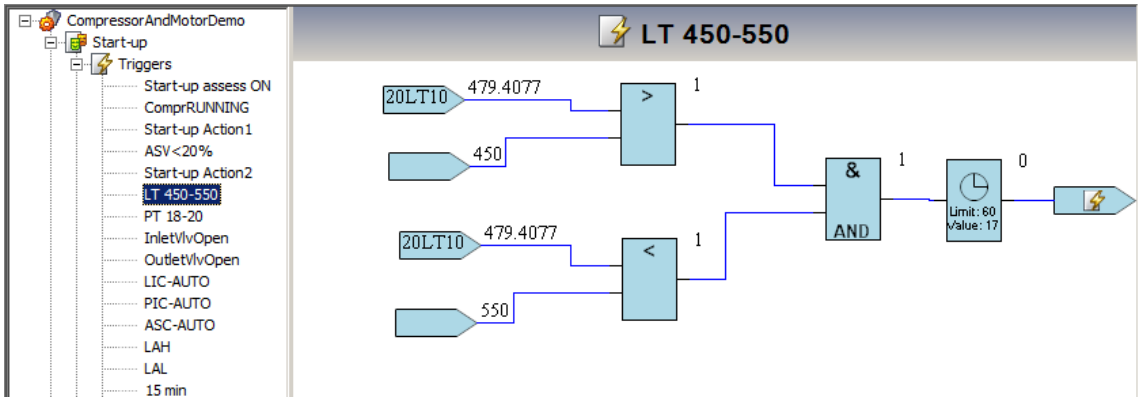


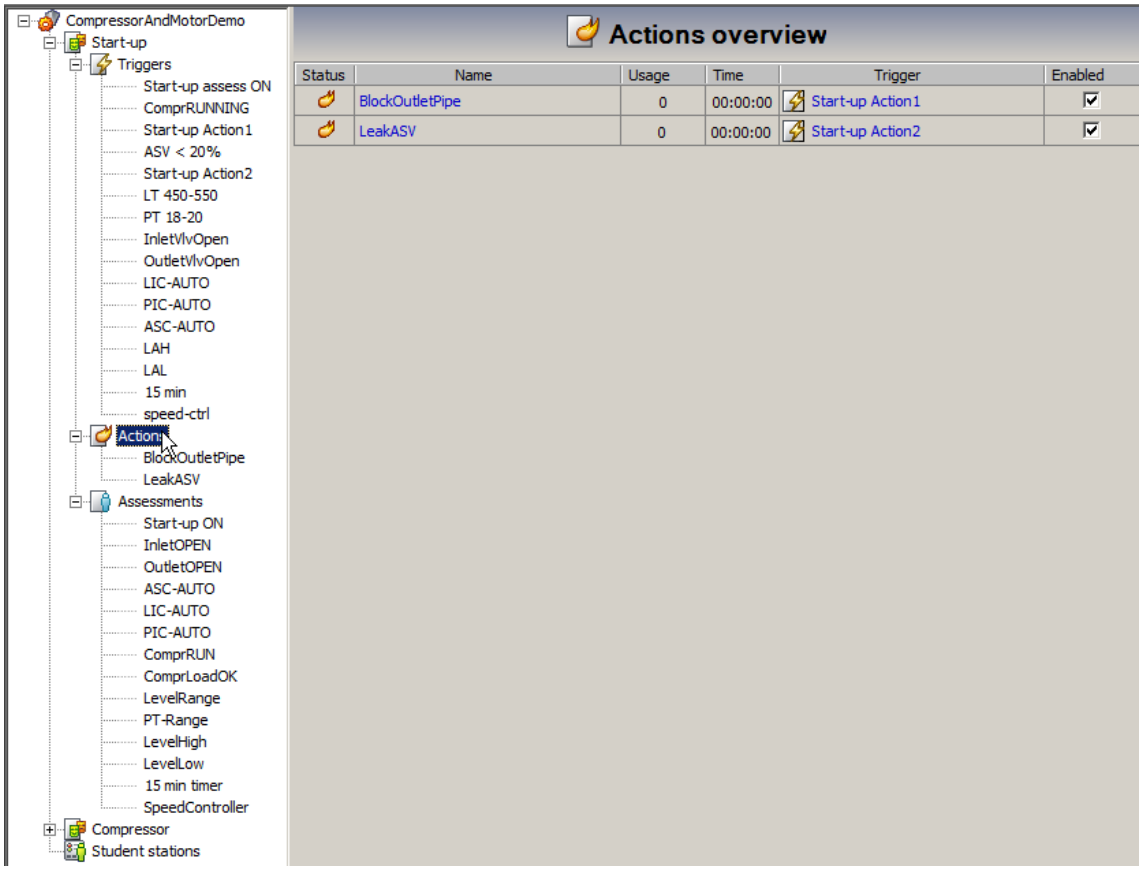
Figure 46 The trigger LT 450–550 in exercise CompressorAndMotorDemo one minute later



4.2 Actions overview

Click on **Actions** located under the **Start-up** branch. The **Actions overview** will appear. Here you can see which triggers are used in the different actions. For example: *BlockOutletPipe* uses the trigger *Start-up Action1*. Observe the details on the actions. For example: **Time** shows how long it took before the action was executed after running the exercise

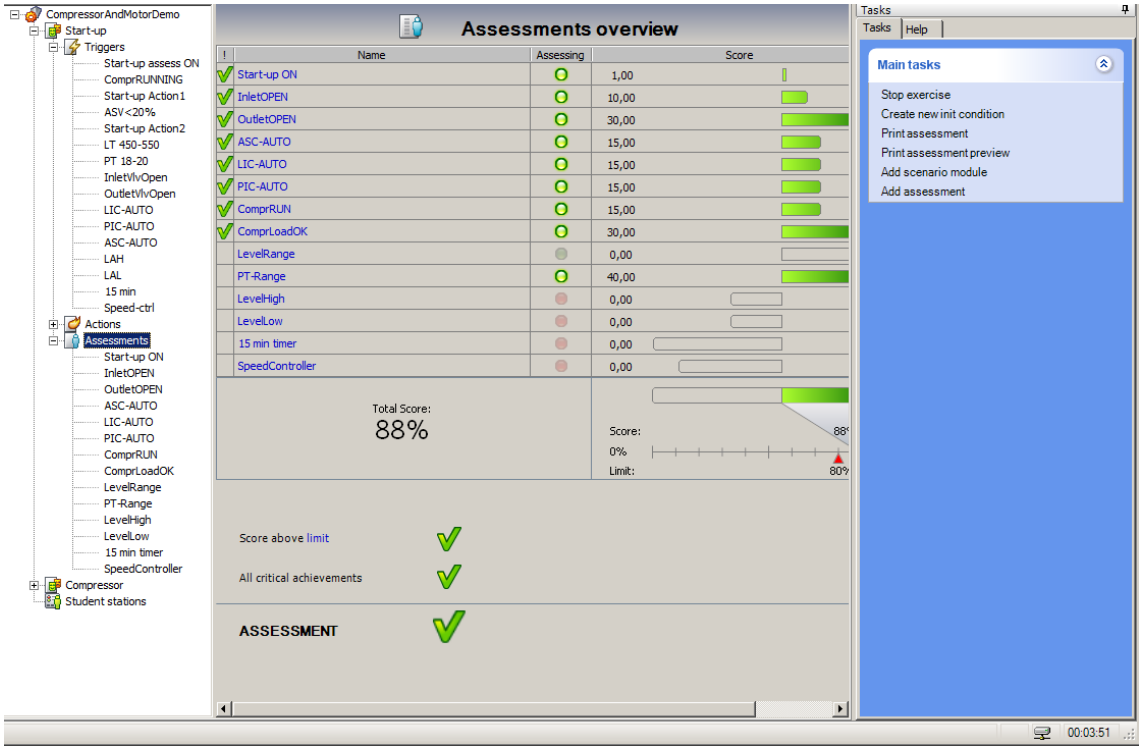
Figure 47 Actions overview in the exercise CompressorAndMotorDemo



4.3 Assessments overview

You can get see which trigger is activated so far by clicking on the **Assessments** header. To access an assessment, double-click on an assessment name (hyperlinked).

Figure 48 A still picture of the Assessments overview during a running exercise, CompressorAndMotorDemo



4.4 Exercise results

The below window shows an overview of an assessment after a test run of the exercise.

Figure 49 Assessments overview scenario 1 after a run in the exercise CompressorAndMotorDemo

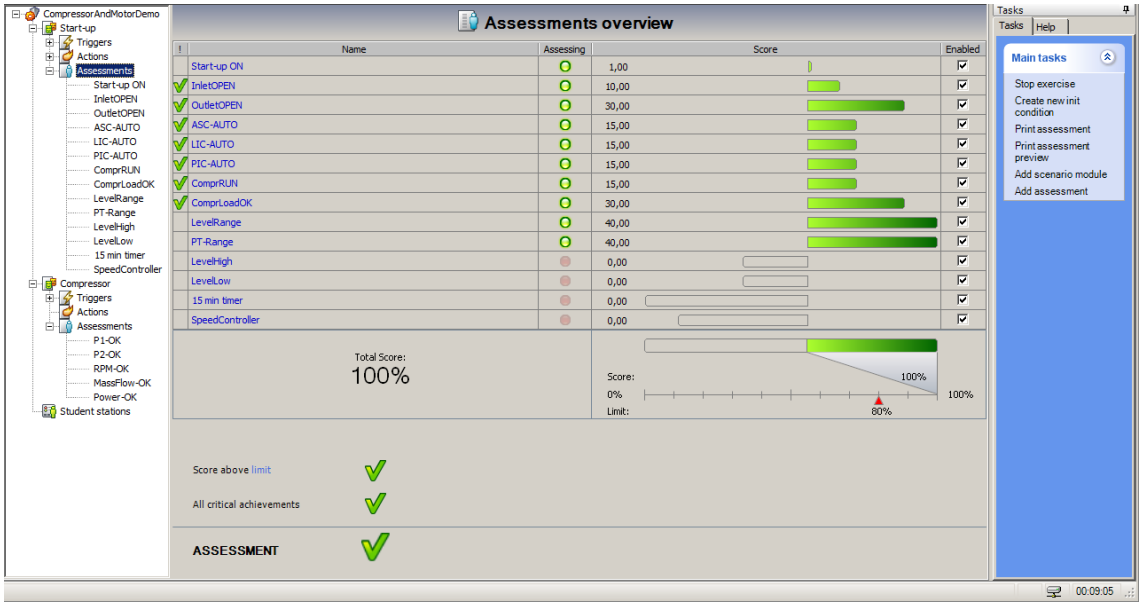
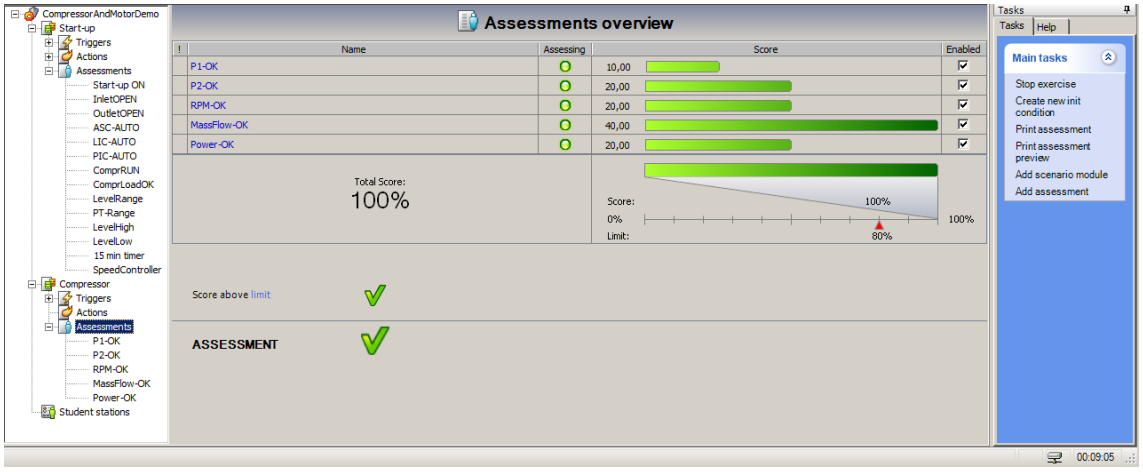


Figure 50 Assessments overview scenario 2 after a run



A printout of the assessment is available by clicking **Print assessment**.

Figure 51 Print assessment

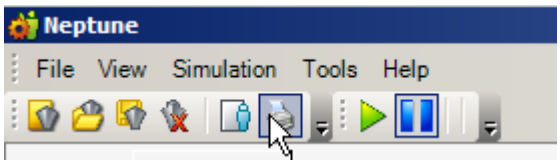


Figure 52 Operator assessment overview

CompressorAndMotorDemo

Student: ginah
Computer: local
Performed on: 16:35 6. august 2012

Start-up	**100 % (passed)**
Summary	
Limit	80 %
Score above limit	Yes
All critical achievements	Yes
Assessment name	Score
Start-up ON	1
InletOPEN	10
OutletOPEN	30
ASC-AUTO	15
LIC-AUTO	15
PIC-AUTO	15
ComprRUN	15
ComprLoadOK	30
LevelRange	40
PT-Range	40
LevelHigh	0
LevelLow	0
15 min timer	0
SpeedController	0

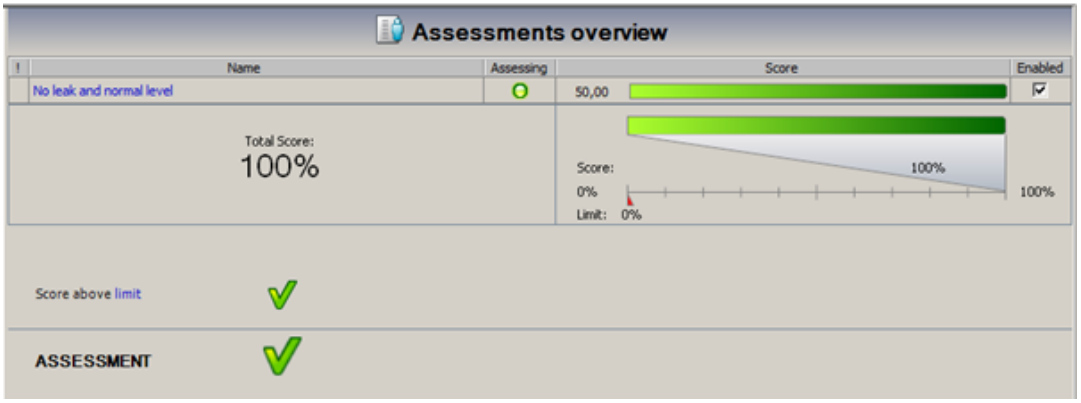
Compressor	**100 % (passed)**
Summary	
Limit	80 %
Score above limit	Yes
Assessment name	Score
P1-OK	10
P2-OK	20
RPM-OK	20
MassFlow-OK	40
Power-OK	20

4.5 Set the score limit

Set the score limit

1 For the operator to pass the test he must get a score above a certain limit. Set the limit by left- clicking on the **Assessments** branch, located under the navigational tree on the local tab. The **Assessments overview** appears. Click on (score above) **limit**, highlighted in blue.

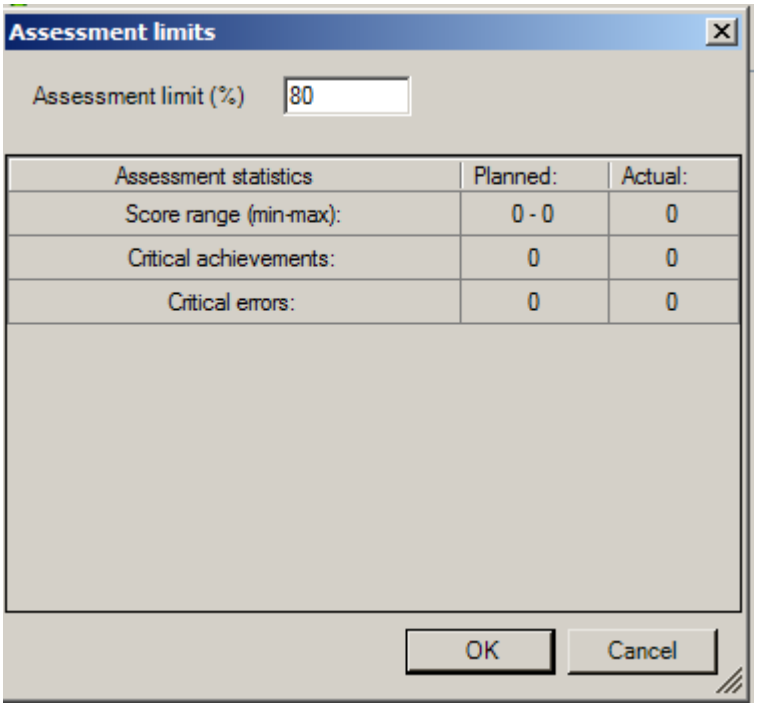
Figure 53 Assessment overview



2 The **Assessment limits** dialog will appear. Set the **Assessment limit (%).** For example; 80.

3 Click **OK.**

Figure 54 Assessments limit dialog



5 Triggers

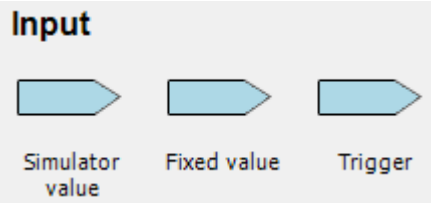
This chapter will go in detail into triggers, the main building blocks used in exercise creation. The exercise must exist. See the two sections *Create the exercise* on page 7 and *Add the scenario module* on page 9

The first section,'Trigger overview', lists the existing triggers and their symbols. The following sections describe the different triggers in detail.

5.1 Trigger overview

Input symbols: Fixed value, Simulator value, Trigger

Figure 55 Input menu



Location: Under the **Input** menu

Fixed value uses a value set by you. It can be used just to get a message in the beginning or to make something happen if a value is approaching a limit.

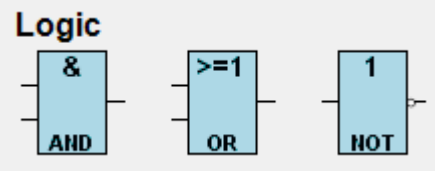
Simulator value uses a data item name from the K-Spice simulator. Example: pressure, valve position etc., in the format 20LV101: Leak, 20LT101:Value.

Trigger is used if the instructor wants a trigger to control another trigger.

Logic symbols: AND, OR, NOT, NOR, NAND, XOR, XNOR

Location: Some under the **Logic** menu and some in the **Configure logic operator** dialog

Figure 56 Logic menu

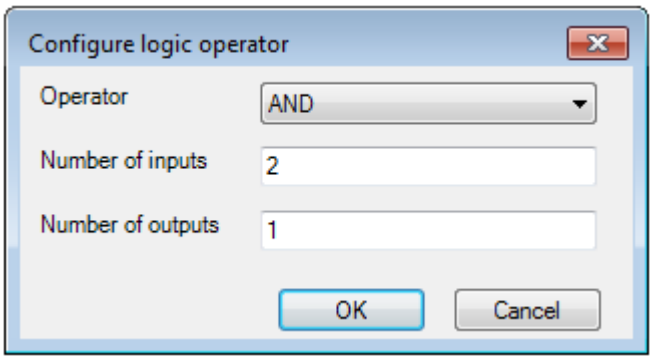


The **AND** symbol is used if the instructor wants more than one input to control the trigger.

The **OR** symbol is used if the instructor wants two or more inputs to be bigger, equal or fixed to control the trigger together.

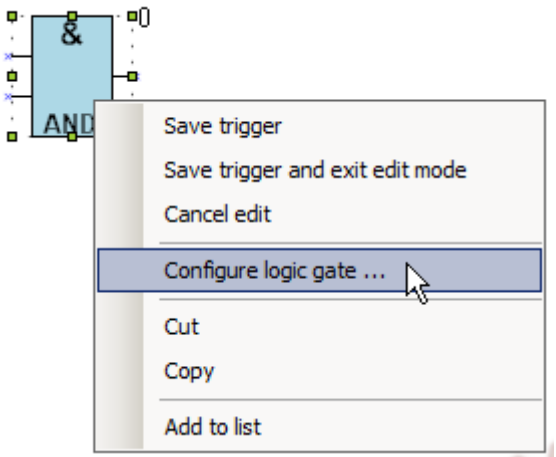
The **NOT** symbol is used if the instructor wants a negative input to activate the trigger (negation).

Figure 57 Configure logic operator dialog



To access the dialog: right-click on a logic symbol in the trigger area and select **Configure logic gate…**

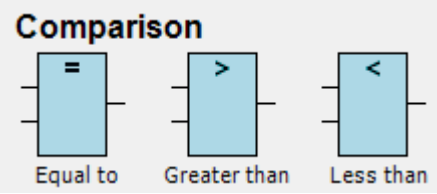
Figure 58 Configure logic gate



Comparison symbols: Equal to, Greater than, Less than, Less than or equal to, Not equal to.

Location: Some under the **Comparison** menu and some in the **Configure comparison operator** dialog.

Figure 59 Configure menu

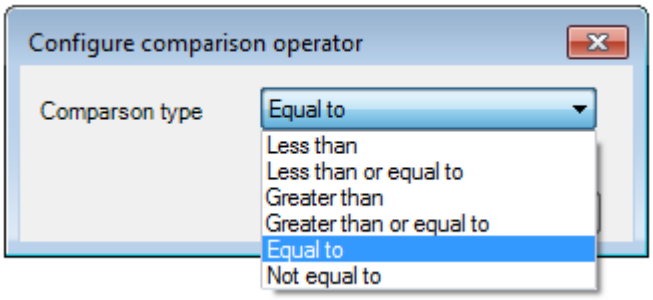


The **Equal to** symbol: if two or more values are equal to each other, it will activate the trigger.

The **Greater than** symbol: if the upper input is greater than the lower input, it will activate the trigger.

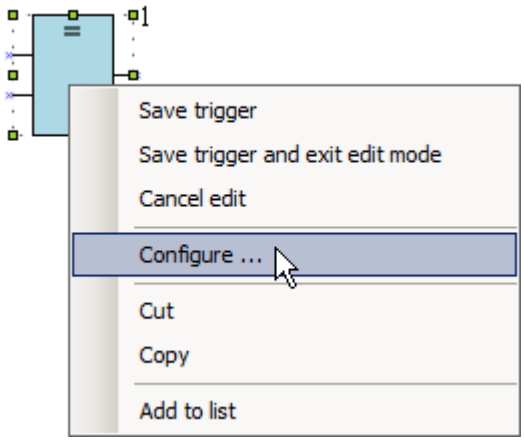
The **Less than** symbol: if the upper input is less than the lower input, it will activate the trigger.

Figure 60 Configure comparison operator dialog



To access the dialog: Right-click on a comparison symbol in the trigger area and select **Configure…**

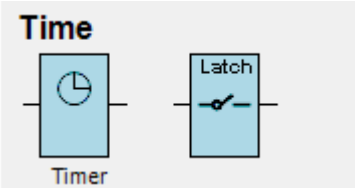
Figure 61 Configure



Time symbols: Timer, Latch.

Location: Under the **Time** menu.

Figure 62 Time menu



The **Timer** can be used to add a delay that the trigger activates.

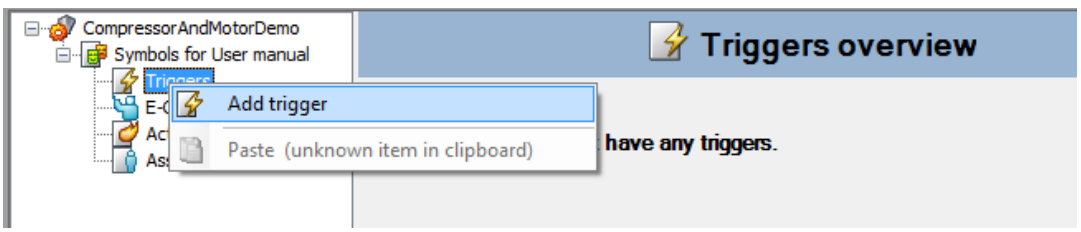
The **Latch** is created to keep the value permanent after first activation. It is made to keep the trigger active.

5.2 The 'Fixed value' input

The 'Fixed value' symbol:

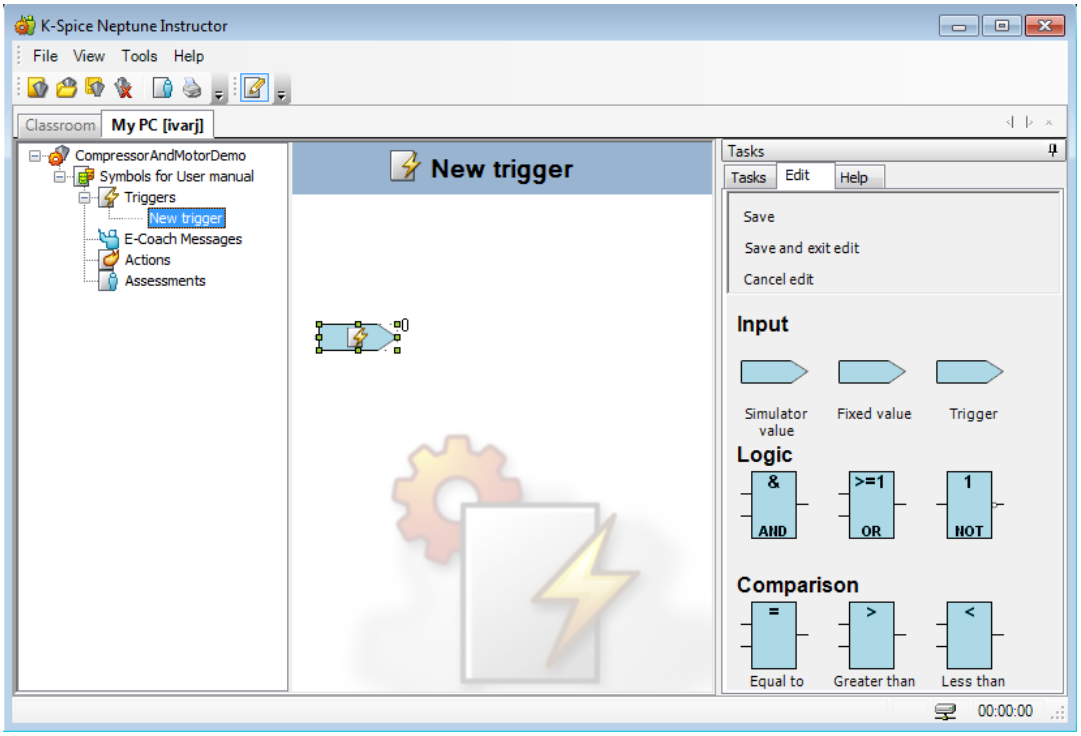
1 Open the new scenario branch, then right-click on **Triggers**.

Figure 63 Add a new trigger



2 Select **Add trigger** to add a trigger. The following window appears:

Figure 64 New trigger

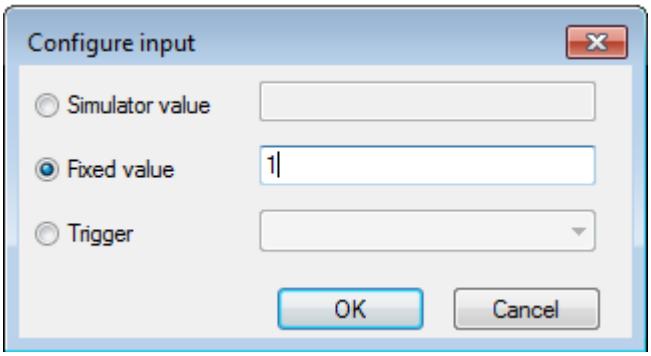


3 Rename the trigger from **New trigger** to for example *Fixed value.*

4 Select the **symbol Fixed value** from the menu. Left-click, hold and drag the symbol to the trigger area, to the left of the existing symbol, and drop it.

5 Double-click on the symbol to open the **Configure input** dialog and change the fixed value input from 0 to 1. Click **OK.**

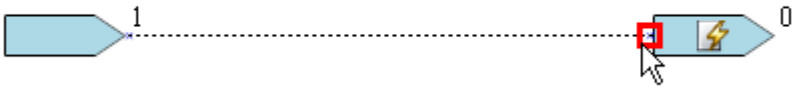
Figure 65 Configure input dialog



6 Connect the fixed value symbol to the trigger: Left-click (and hold) on the left hand side of the fixed value symbol and drag a line from the symbol to the trigger.

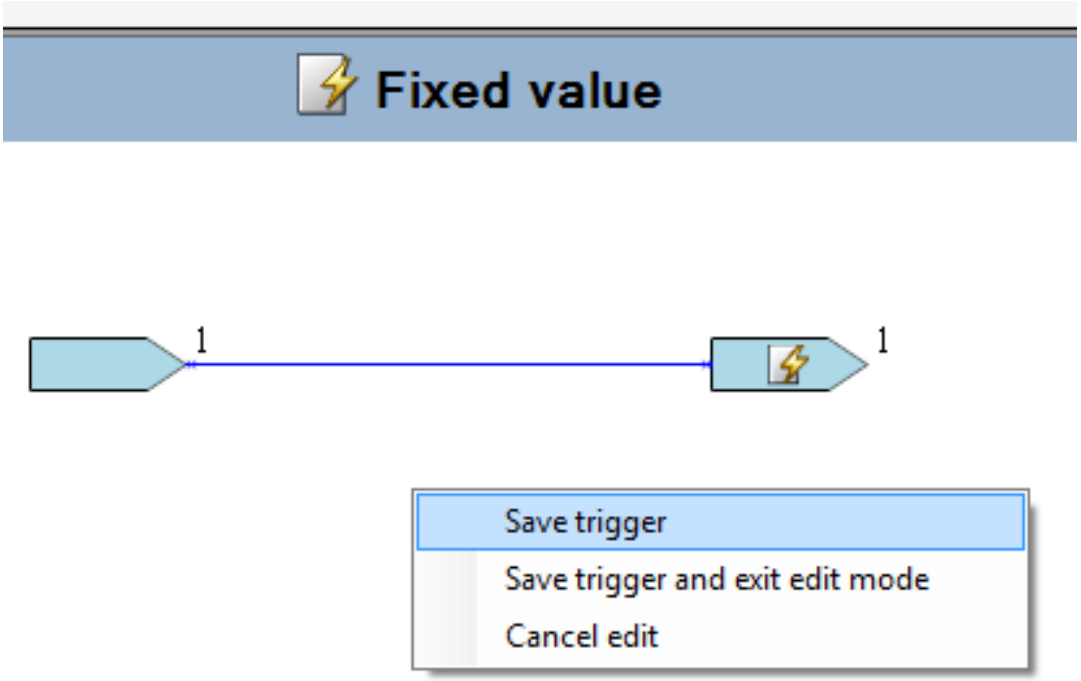
Figure 66 Click and hold

Figure 67 Connect to trigger



7 Right-click in the main work area and select **Save trigger**.

Figure 68 Save trigger and exit edit mode



5.3 The ‘Simulator value’ input

The ‘Simulator value’ symbol:

1 Right-click on the **Trigger** branch and select **Add trigger**, to add another trigger. Name it, for example *Simulator value.*

2 Select the symbol **Simulator value** from the menu. Left-click, hold and drag the symbol to the trigger area and drop it.

The simulator value could be the asynchronous machine speed: *20M108:MachineON.*

3 Right-click on the symbol and select **Set input…** to bring up the **Configure input** dialog.

Figure 69 Set Input in Neptune

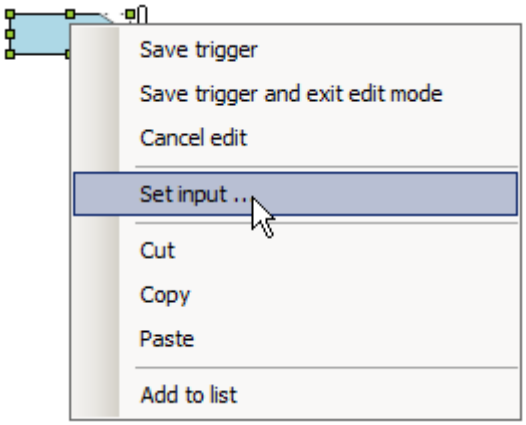
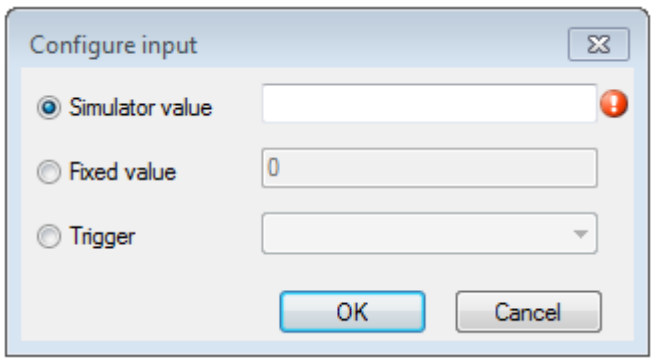
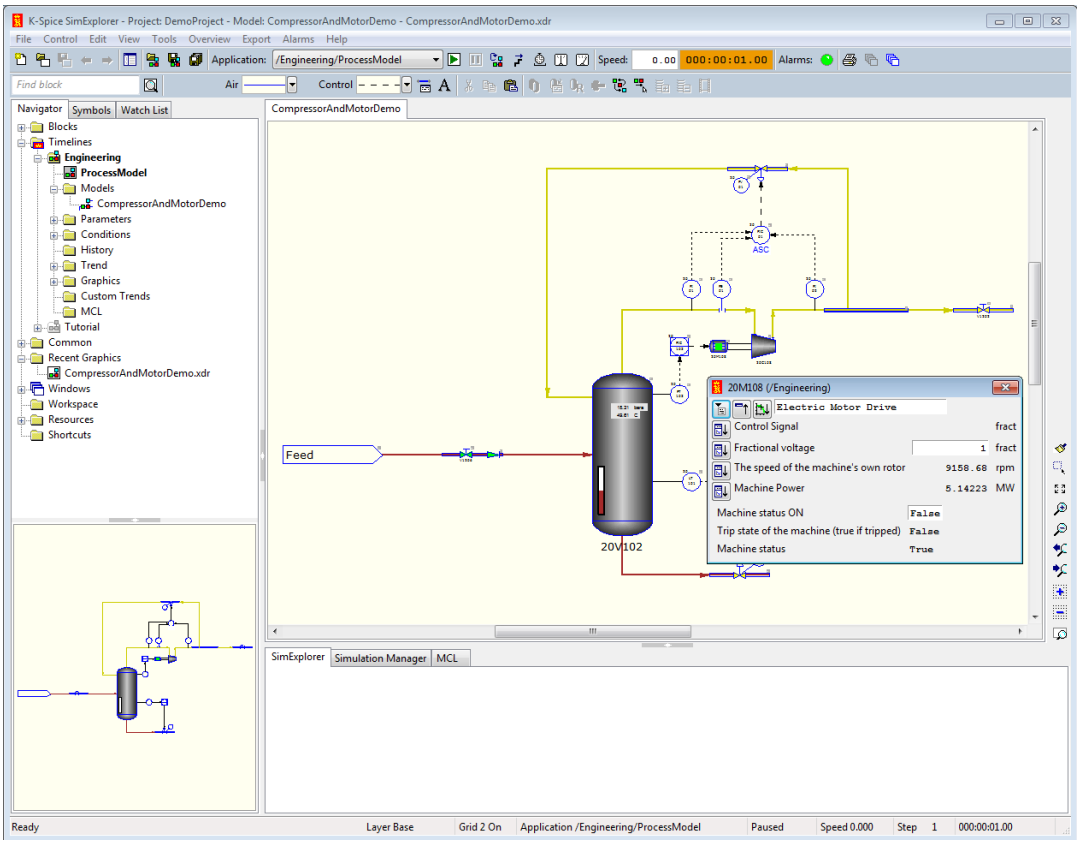


Figure 70 Configure simulator value



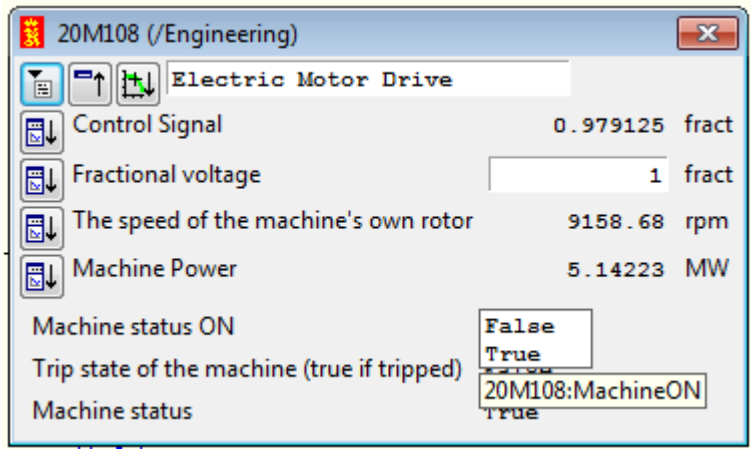
4 In the K-Spice main window, left-click on the **20M108** motor to bring up the faceplate.

Figure 71 Asynchrone machine dialog in K-Spice



5 Right-click on the displayed value of **Machine status ON** and copy the name *by left-clicking on it*.

Figure 72 The Electric motor dialog in K-Spice



6 In *Neptune,* Paste the name into the input name field of **Simulator value** by right-clicking on the **Simulator input** field and selecting **Paste**

Figure 73 Paste the name in Neptune

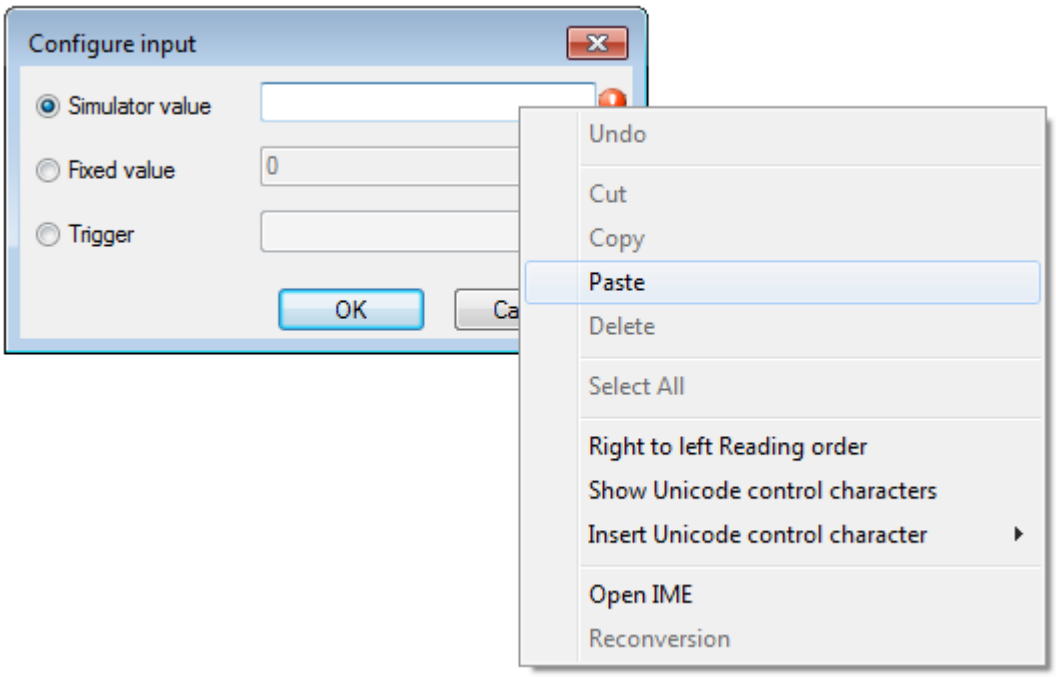
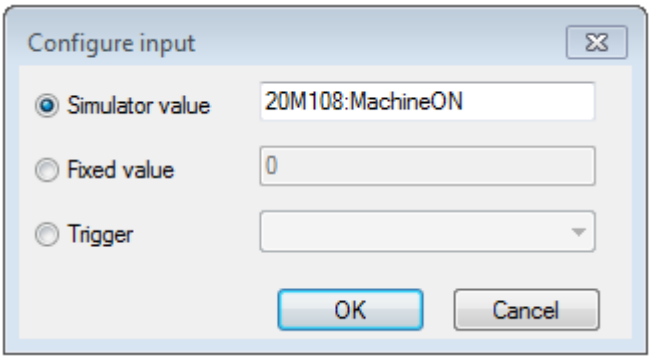


Figure 74 The simulator value

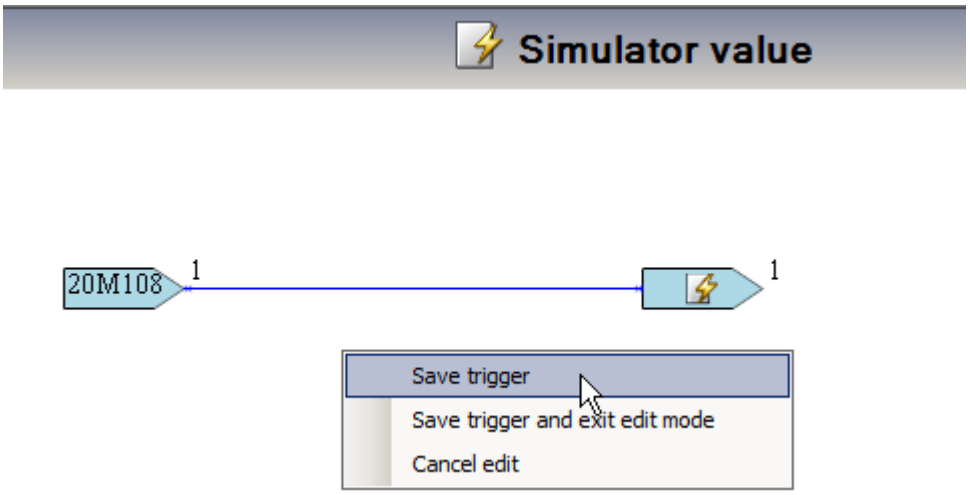


7 Click **OK**

8 Connect the two symbols

9 Right click on the trigger area and select **Save trigger.**

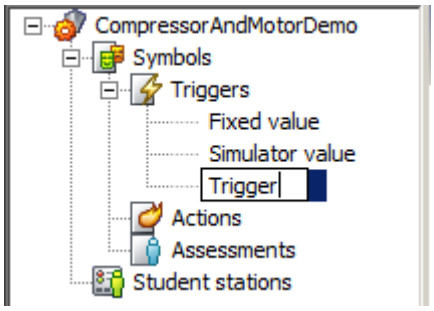
Figure 75 Save trigger



5.4 The 'Trigger' symbol

1 Right-click on the **Trigger** branch and select **Add trigger**, to add another trigger. Name it for example: *Trigger*

Figure 76 Add Trigger

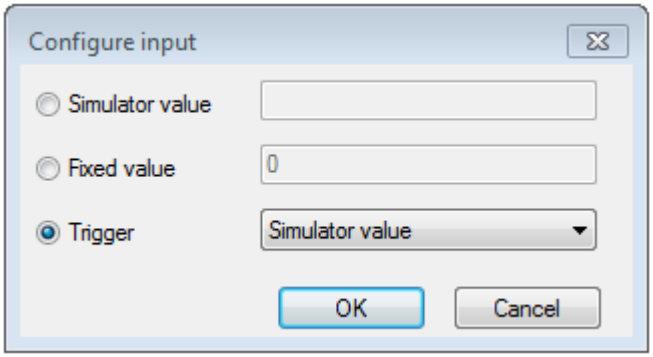


2 Select symbol **Trigger** from the input menu. Left-click it, hold and drag the symbol to the trigger area and drop it.

3 Right-click on the trigger and select **Set input**. The **Configure input** dialog appears.

4 Set the input. For example: **Simulator value.**

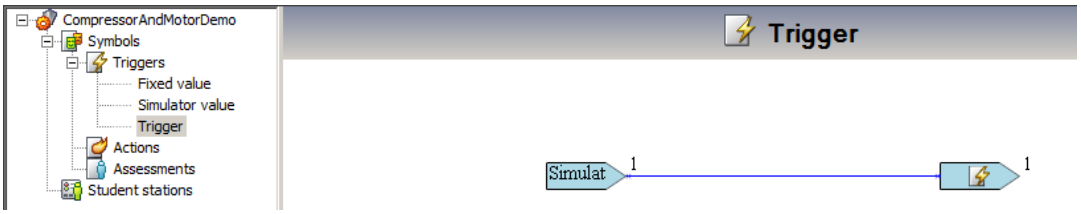
Figure 77 Configure Trigger



5 Connect the two triggers. Right-click on the trigger area and select.

6 **Save trigger**.

Figure 78 Trigger Trigger



5.5 The 'Equal to' symbol

1 Right-click on the **Trigger** branch and select **Add trigger**, to add another trigger. Name it for example: *Equal to.*

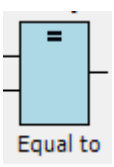
2 Select the symbol **Simulator value** from the menu. Left-click, hold and drag the symbol to the trigger area and drop it.

3 Select the **Fixed value** symbol from the menu. Left-click, hold and drag the symbol to the trigger area and drop it.

4 Set the simulator value to for example *20M108:MachineON,* Detailed description *The 'Simulator value' input* on page 51

5 Set the fixed value to for example 1.

6 Select the symbol = (Equal to),

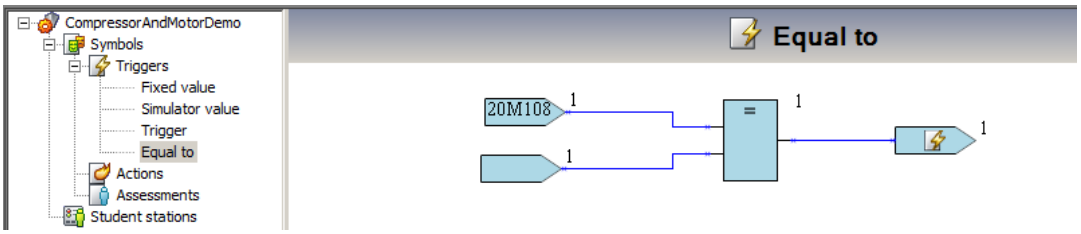


from the **Comparison** menu. Left-click, hold and drag the symbol to the trigger area and drop it. Use the comparison to connect the two signals to the trigger

by dragging a line from the each signal to the comparison symbol and from the comparison symbol to the trigger.

7 **Save trigger.**

Figure 79 Trigger Equal to



5.6 The 'Greater than' symbol

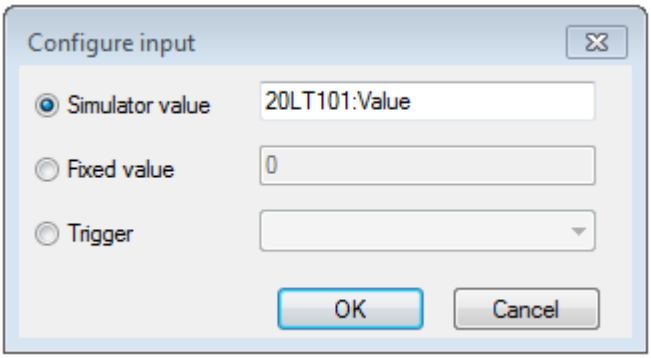
1 Right-click on the **Trigger** branch and select **Add trigger**, to add another trigger. Name it for example: *Greater than.*

2 Select the synbol **Simulator value** from the menu. Left-click, hold and drag the symbol to the trigger area and drop it.

3 Select the **Fixed value** symbol from the menu. Left-click, hold and drag the symbol to the trigger area and drop it.

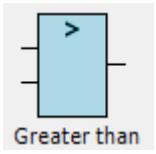
4 The simulator value could be the transmitter level *20LT101:Value*. Paste the value of the **Process variable value** from the Field Transmitter faceplate into the input name field of **Simulator value** . Detailed description *The 'Simulator value' input* on page 51

Figure 80 Simulator value



5 Set the fixed value; for example *450*

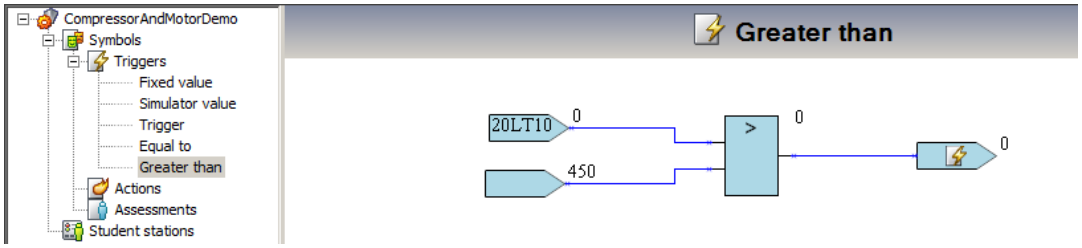
6 Select the symbol > (Greater than),



from the menu. Left-click, hold and drag the symbol to the trigger area and drop it. Use the comparison to connect the two signals to the trigger by dragging a line from the each signal to the comparison symbol and from the comparison symbol to the trigger

7 **Save trigger.**

Figure 81 Trigger Greater than



5.7 The 'Less than' symbol

1 Right-click on the **Trigger** branch and select **Add trigger**, to add another trigger. Name it for example: *Less than.*

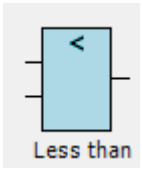
2 Select the **Simulator value** symbol from the menu. Left-click, hold and drag the symbol to the trigger area and drop it.

3 Select the **Fixed value** symbol from the menu. Left-click, hold and drag the symbol to the trigger area and drop it.

4 The simulator value could be the transmitter level **20LT101:Value**. Paste the value of the **Process variable value** from the K-Spice Field Transmitter faceplate into the input name field of **Simulator value**. Detailed description *The 'Simulator value' input* on page 51

5 Set the **Fixed value**, for example *550*

6 Select the symbol < (Less than),

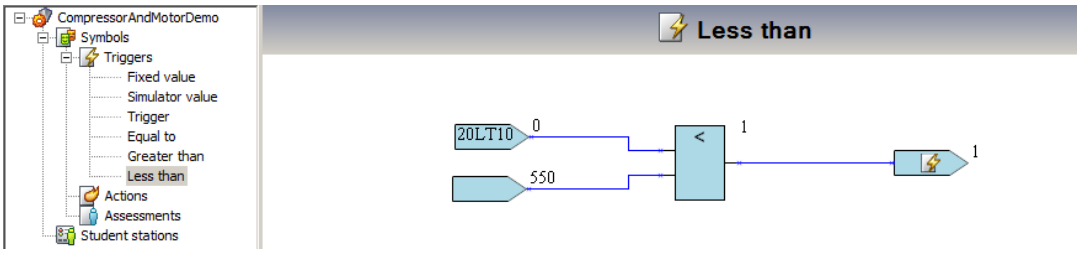


from the menu. Left-click, hold and drag the symbol to the trigger area and drop it.

7 Connect the two signals to the trigger by dragging a line from the each signal to the comparison symbol and from the comparison symbol to the trigger.

8 **Save trigger**

Figure 82 Trigger Less than



5.8 The 'AND' symbol

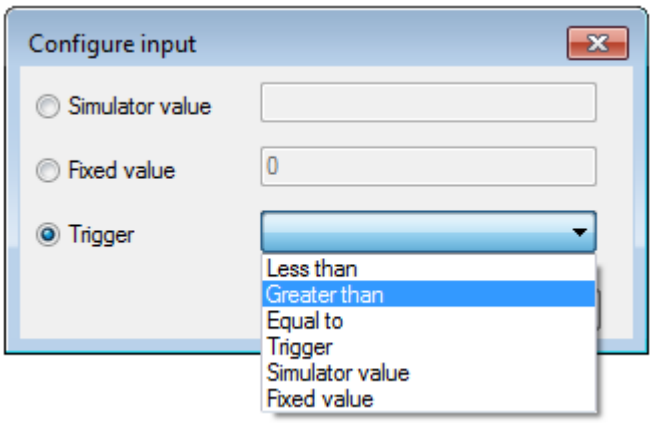
1 Right-click on the **Trigger** branch and select **Add trigger**, to add another trigger. Name it for example: *AND*

2 Select **Trigger** from the input menu. Left-click it, hold and drag the symbol to the trigger area and drop it.

3 Right-click on the trigger and select **Set input**. The **Configure input** dialog appears.

4 Set the input, for example: ***Greater than.***

Figure 83 Configure input greater than

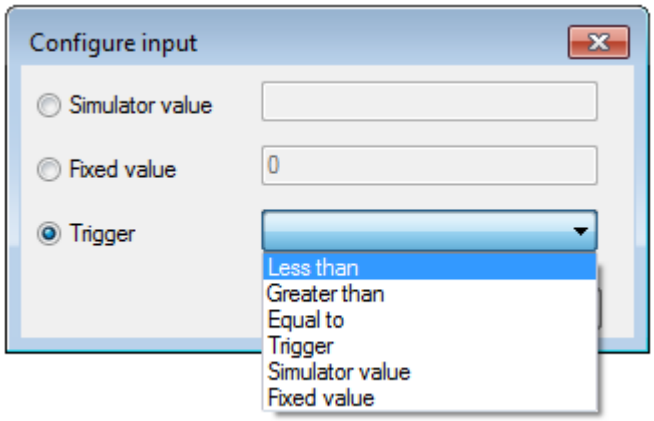


5 Select another **Trigger** from the input menu. Left-click it, hold and drag the symbol to the trigger area and drop it.

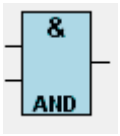
6 Right-click on the trigger and select **Set input**. The **Configure input** dialog appears.

7 Set the input. For example: ***Less than*** .

Figure 84 Configure input Less than



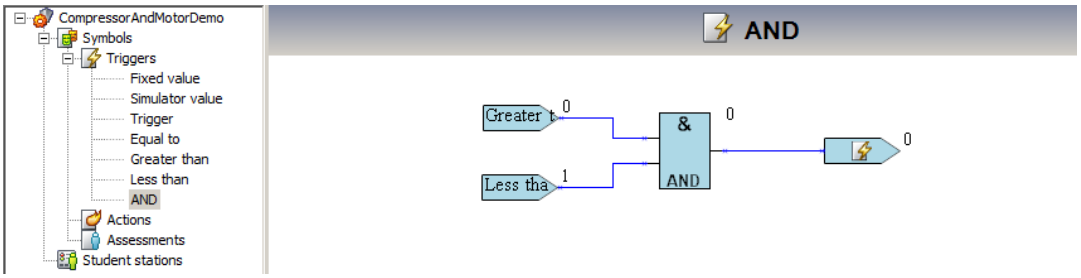
8 Select the symbol **&** (AND),



from the **Logic** menu. Left-click, hold and drag the symbol to the trigger area and drop it. Use the logic to connect the two signals to the trigger by dragging a line from the each signal to the logic symbol and from the logic symbol to the trigger.

9 **Save trigger.**

Figure 85 Trigger AND



5.9 The 'OR' symbol

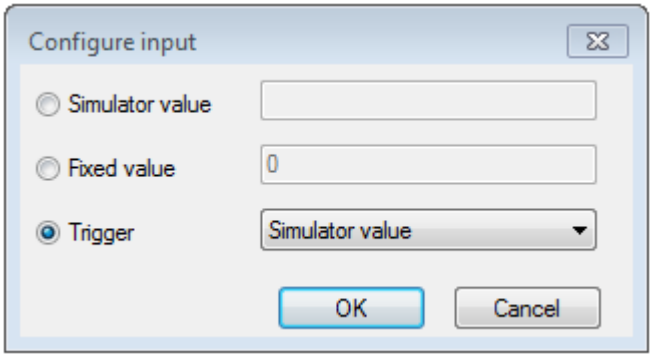
1 Right-click on the **Trigger** branch and select **Add trigger**, to add another trigger. Name it for example: *OR*.

2 Select **the symbol Trigger** from the input menu. Left-click it, hold and drag the symbol to the trigger area and drop it.

3 Right-click on the trigger and select **Set input**. The **Configure input** dialog appears.

4 Set the input. For example: *Simulator value*.

Figure 86 Configure input Simulator value

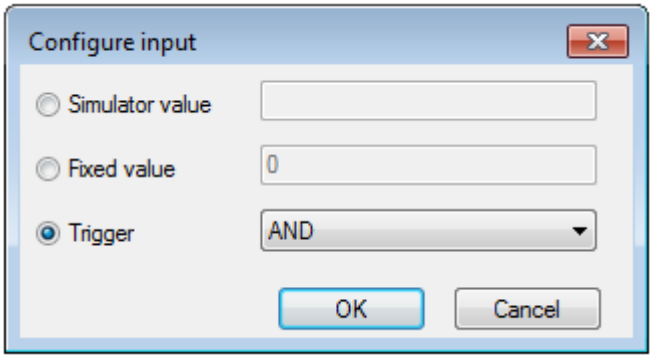


5 Select another **Trigger** from the input menu. Left-click it, hold and drag the symbol to the trigger area and drop it.

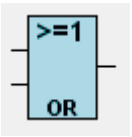
6 Right-click on the trigger and select **Set input**. The **Configure input** dialog appears.

7 Set the input. For example: *AND*

Figure 87 Configure input AND



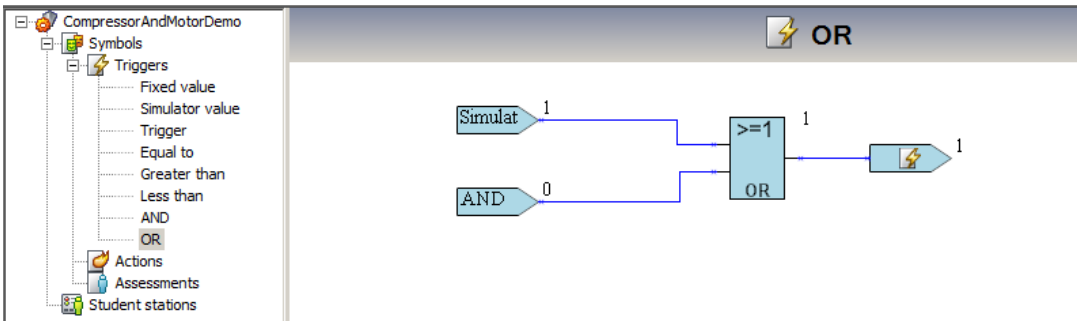
8 Select the symbol : **>=1** (OR),



from the **Logic** menu. Left-click, hold and drag the symbol to the trigger area and drop it. Use the logic to connect the two signals to the trigger by dragging a line from the each signal to the logic symbol and from the logic symbol to the trigger.

9 **Save trigger**

Figure 88 Trigger OR



5.10 The 'NOT' symbol

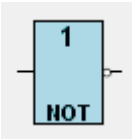
1 Right-click on the **Trigger** branch and select **Add trigger**, to add another trigger. Name it for example: *NOT.*

2 Select **Trigger** from the input menu. Left-click it, hold and drag the symbol to the trigger area and drop it.

3 Right-click on the trigger and select **Set input**. The **Configure input** dialog appears.

4 Set the input. For example: *Simulator value.* See detailed description in *The 'Simulator value' input* on page 51

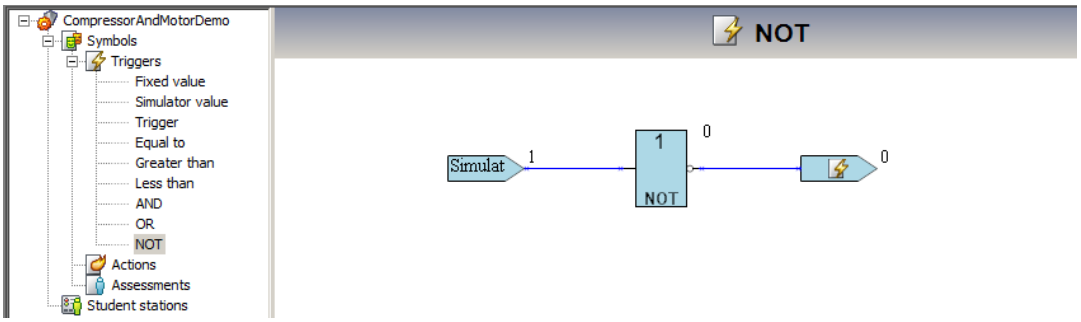
5 Select the symbol **1**(NOT),



from the **Logic** menu. Left-click, hold and drag the symbol to the trigger area and drop it. Connect the logic to the signal and to the trigger by dragging a line from the signal to the logic symbol and from the logic symbol to the trigger.

6 **Save trigger.**

Figure 89 Trigger NOT



5.11 The 'Timer' symbol

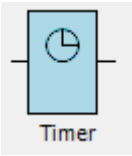
1 Right-click on the **Trigger** branch and select **Add trigger**, to add another trigger. Name it for example: *Timer*.

2 Select **Trigger** from the input menu. Left-click it, hold and drag the symbol to the trigger area and drop it.

3 Right-click on the trigger and select **Set input**. The **Configure input** dialog appears.

4 Set the input. For example: *AND*. See a detailed description in *The 'Simulator value' input* on page 51

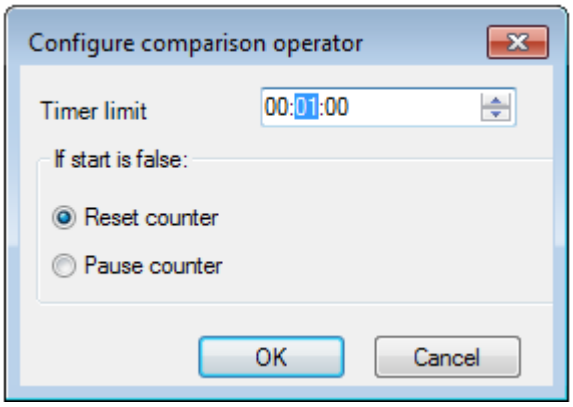
5 Select the symbol **Timer**



from the **Time** menu. Left-click, hold and drag the symbol to the trigger area and drop it.

6 Right-click on the symbol and select **Configure timer…** Set the timer to *60 seconds* (1 min.).

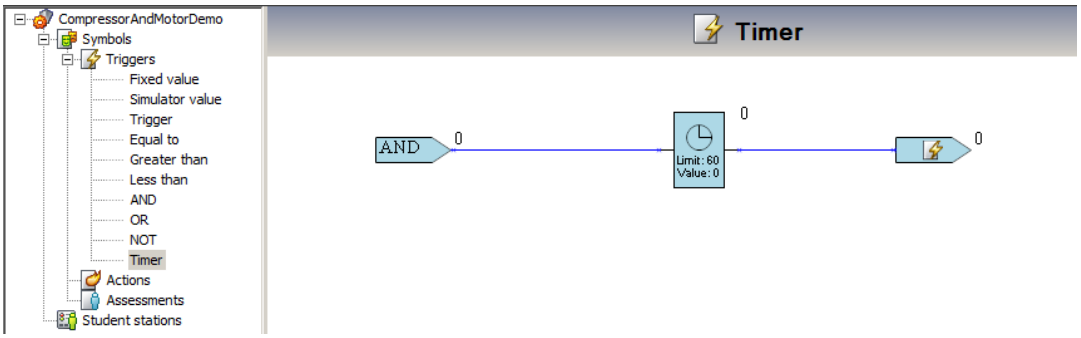
Figure 90 Configure the timer



7 Connect the symbol to the signal and to the trigger by dragging a line from the signal to the time symbol and from the time symbol to the trigger

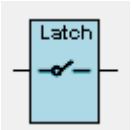
8 **Save trigger.**

Figure 91 Trigger Timer



5.12 The 'Latch' symbol

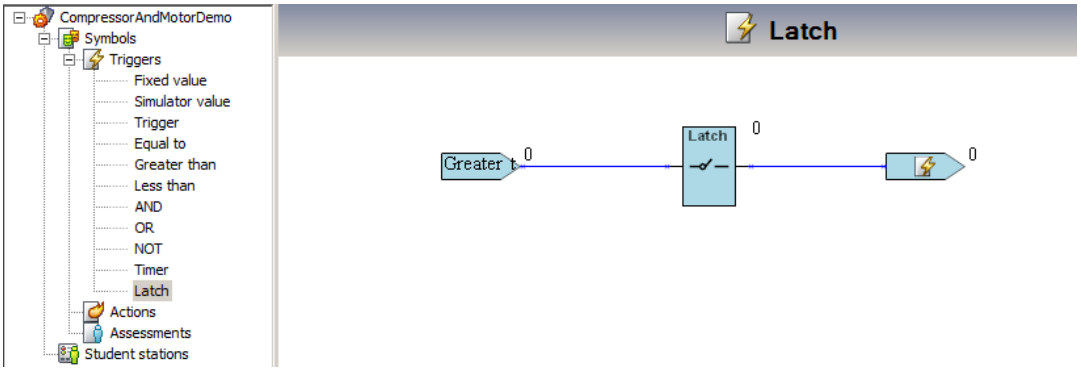
1. Right-click on the **Trigger** branch and select **Add trigger**, to add another trigger. Name it for example: *Latch*..
2. Select **Trigger** from the input menu. Left-click it, hold and drag the symbol to the trigger area and drop it.
3. Right-click on the trigger and select **Set input**. The **Configure input** dialog appears.
4. Set the input. For example: ***Greater than.*** See *The 'Greater than' symbol* on page 56
5. Select the symbol: **Latch**,



from the **Time** menu. Left-click, hold and drag the symbol to the trigger area and drop it. Connect the time symbol to the signal and to the trigger by dragging a line from the signal to the time symbol and from the time symbol to the trigger.

6. **Save trigger.**

Figure 92 Trigger Latch

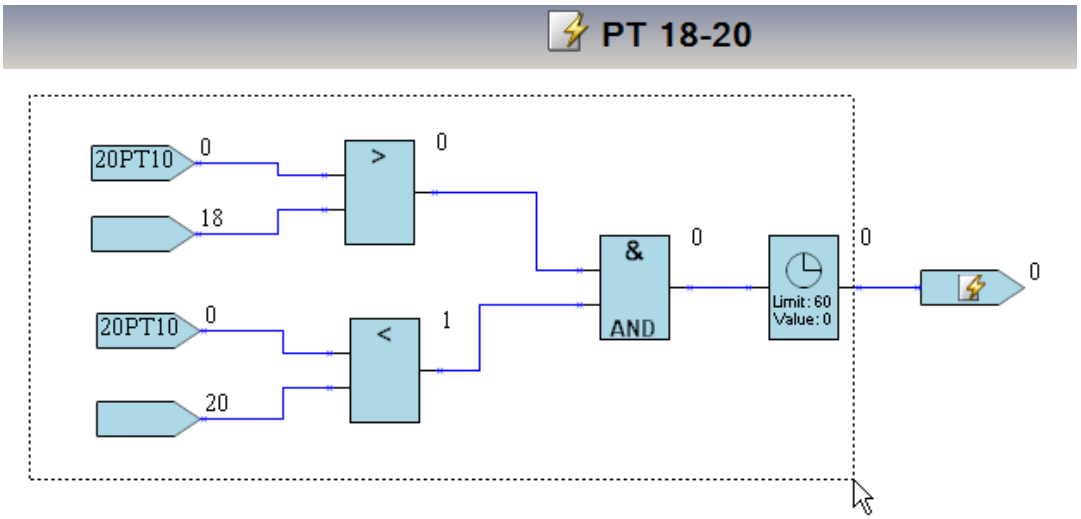


5.13 Copy a trigger

1 Right click on the trigger area of the trigger you want to copy. Select **Go to edit mode.**

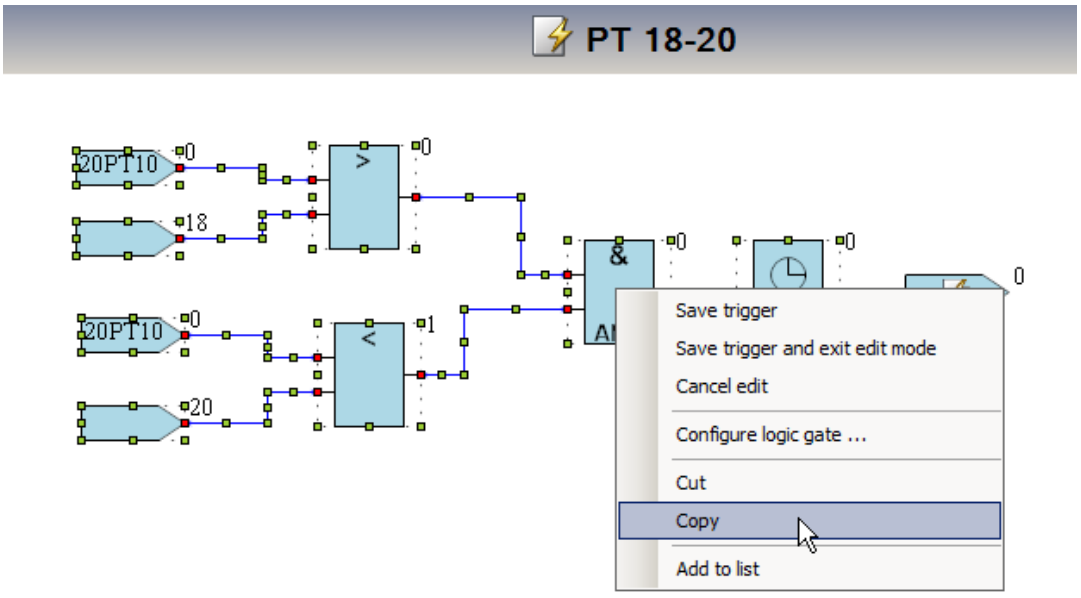
2 Mark the section you want to copy by left-clicking and dragging the pointer over the area

Figure 93 Mark the wanted section



3 Release the left mouse button and right-click on the marked part and select **Copy.**

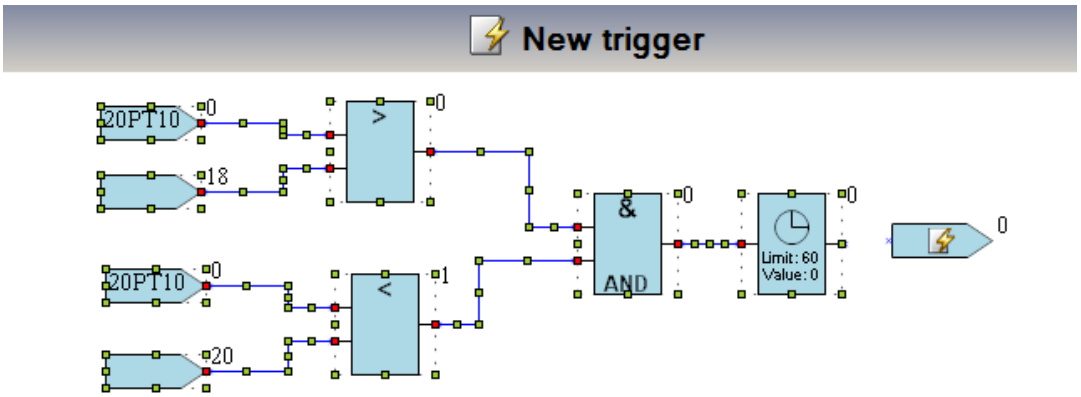
Figure 94 Copy the section



4 Right-click on the **Trigger** branch and select **Add trigger**, to add another trigger.

5 Right-click on the trigger area and select **Paste.**

Figure 95 Pasted trigger



You can move the whole trigger in one piece when it is marked.

6 Connect the copied part to the new trigger.

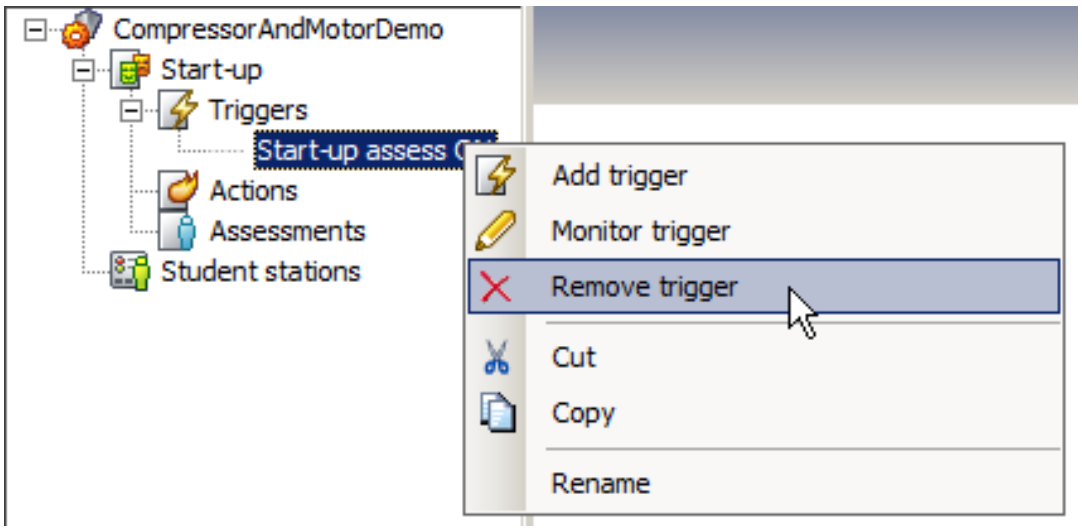
7 **Save trigger**

5.14 Remove a trigger

1 Right-click on the unwanted trigger

2 Select **Remove trigger.**

Figure 96 Remove trigger



5.15 Delete a connection between two symbols

1 Mark the connection by left-clicking on the connecting line.

Figure 97 Mark the connecting line

2 Press **Delete** on your keyboard.

Figure 98 Unconnected symbols

6 Actions

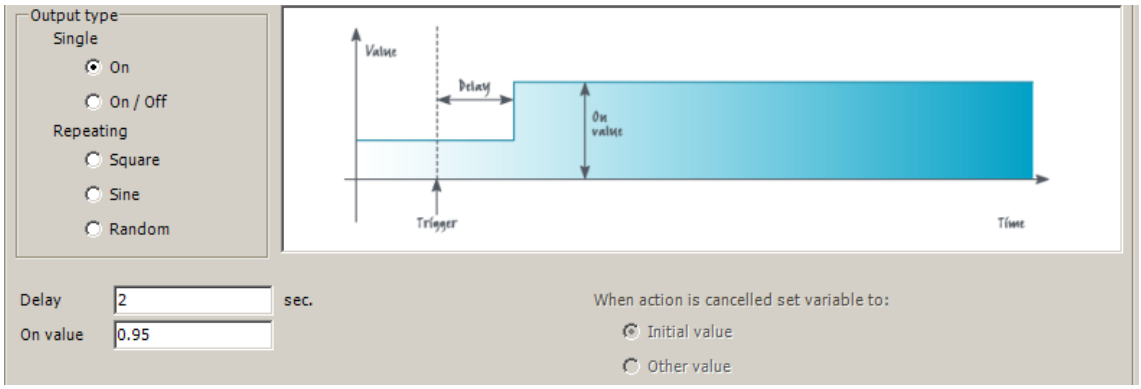
This chapter will go more in detail into actions, important building blocks used in exercise creation. The exercise must exist. See the two sections *Create the exercise* on page 7 and *Add the scenario module* on page 9

6.1 Single On

Constant value

Sets the value to *0,95* (**On value**) after a two seconds delay. The value is constant until the operator changes the value.

Figure 99 Single On

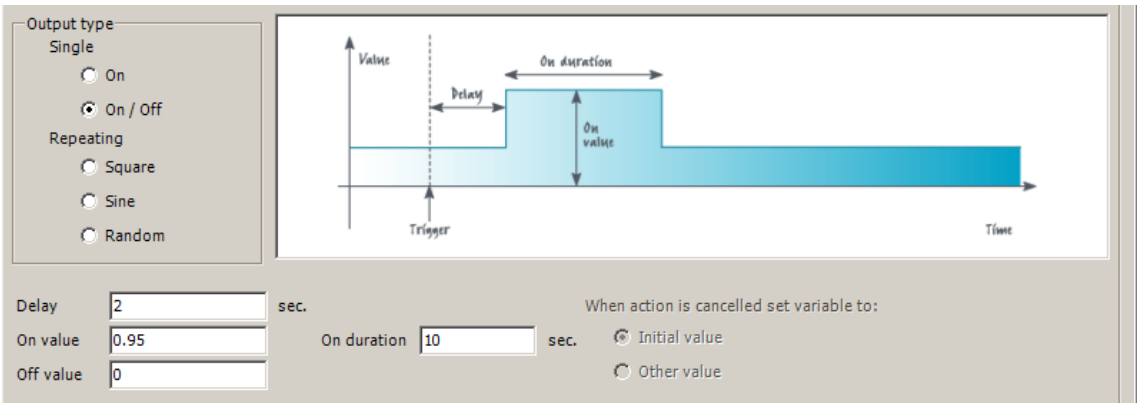


6.2 Single On/Off

Steps up to a new value, and steps back after duration seconds.

Sets the value to *0,95* (**On value**) after a *2 seconds* delay. The value is constant for *10 seconds* (**On duration**) then the value goes back to zero (**Off value**).

Figure 100 Single On/Off

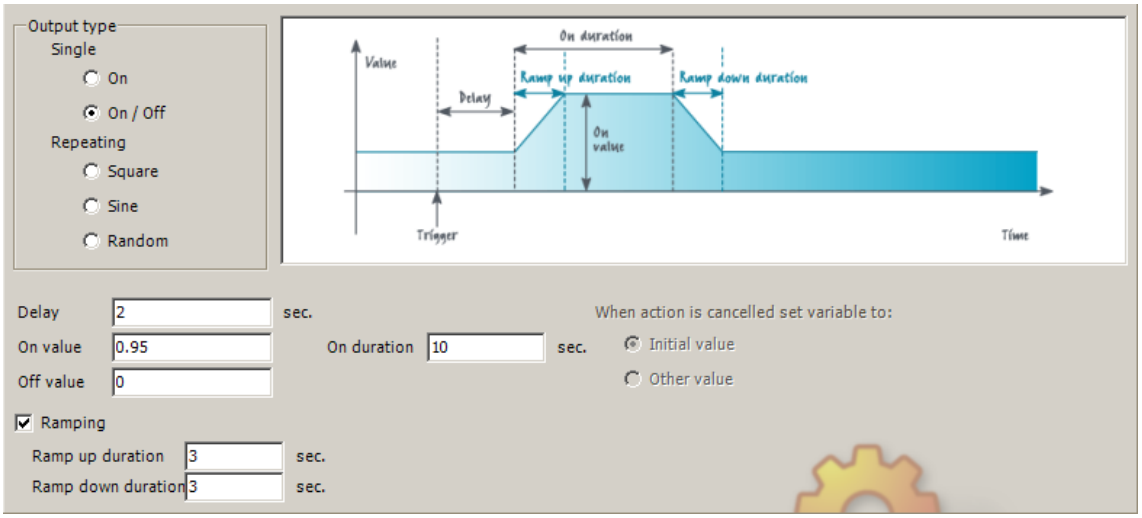


6.3 Ramping

Gradually increasing/ decreasing the value.

After a *2 seconds* delay set the value to *0,95* by increasing it over a period of *3 seconds* (**Ramp up duration**). The value is unchanged for *10 seconds*. and then decreased over a period of *3 seconds* (**Ramp down duration**) to end up at *0.*

Figure 101 Ramping

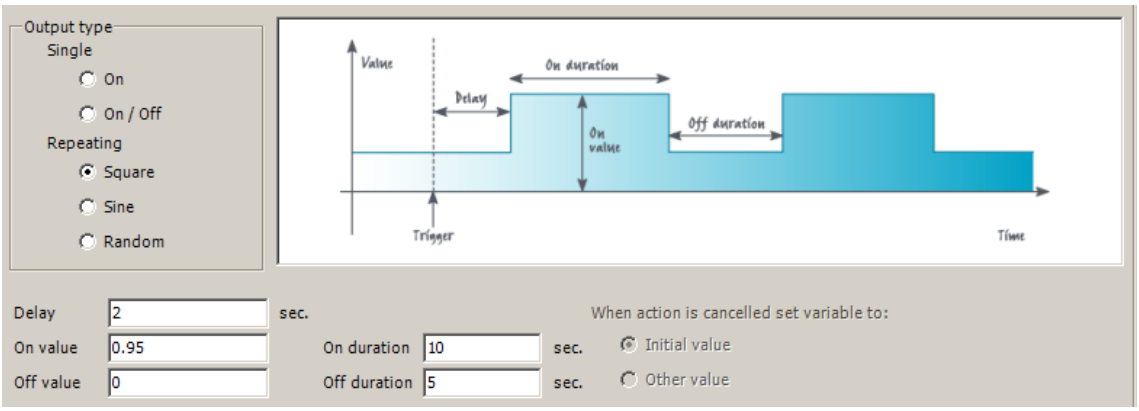


6.4 Repeating

This is a repeated version of Single On/Off.

After a 2 seconds delay the value goes repeatedly from zero (**Off value**) to 0,95(**On value**) with a cycle of 15 seconds. 10 seconds on (**On duration**) and 5 seconds off (**Off duration**).

Figure 102 Repeating square steps

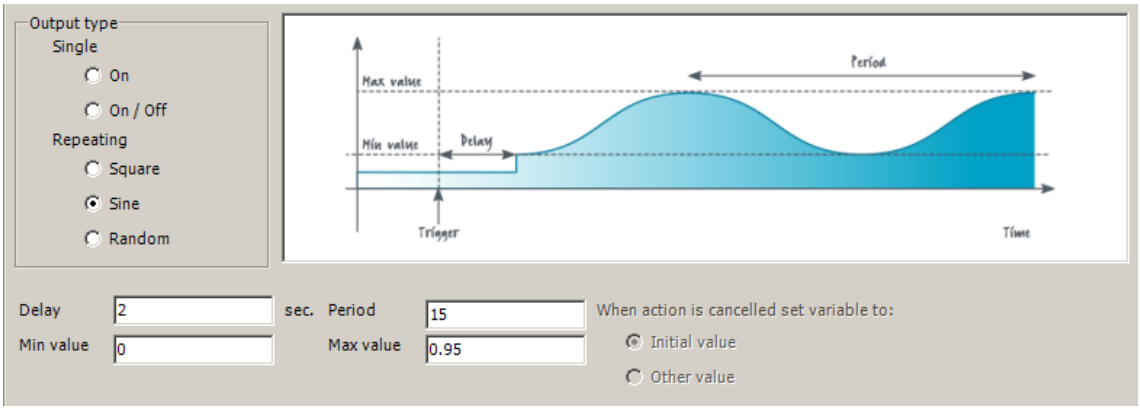


6.5 Sine

The change of value follows a sine curve

After a delay of *2 seconds* the value follows the sine curve with a maximum of *0,95* and a minimum of *0*. The value changes periodically (with *15 seconds* between the maximums) until the operator changes the value.

Figure 103 Sine

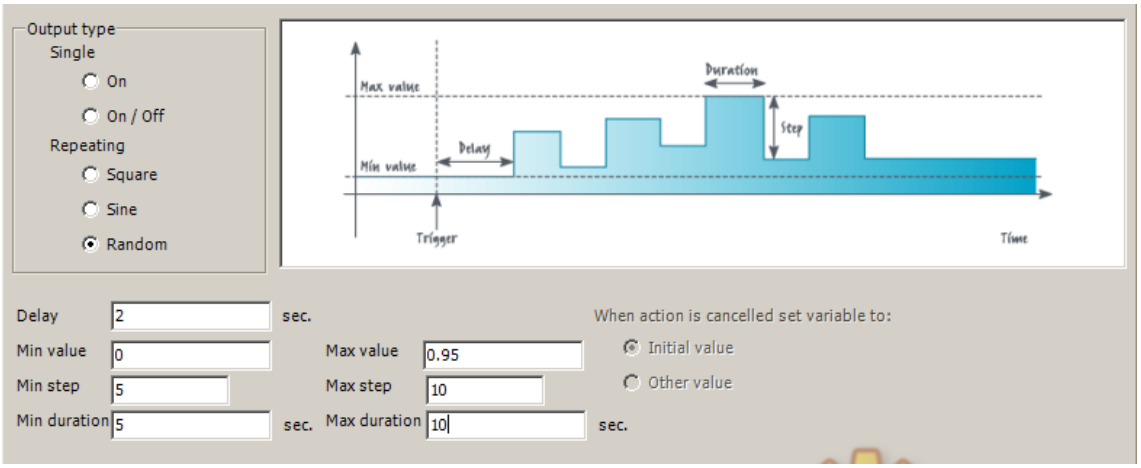


6.6 Random

The value follows a random pattern that changes each time the action is triggered.

Figure 94 shows that after a 2 seconds delay the value will vary between 0 and 0,95 and the value will change 5-10 times. Each value will be constant for 5-10 seconds

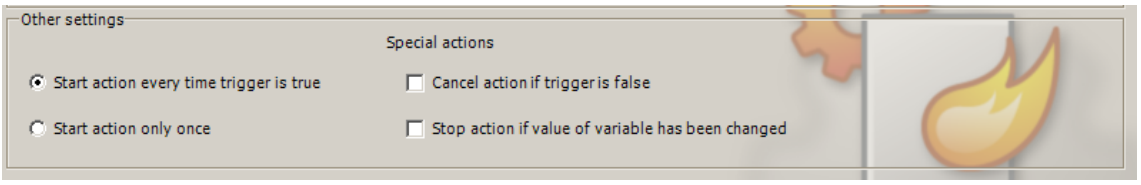
Figure 104 Random



6.7 Other settings

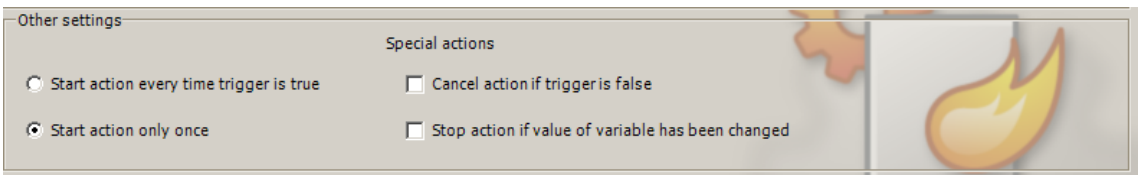
The action starts *every time* the action trigger is true

Figure 105 Start action trigger every time trigger is true



The action starts only *the first time* the action trigger is true

Figure 106 Start action trigger only once

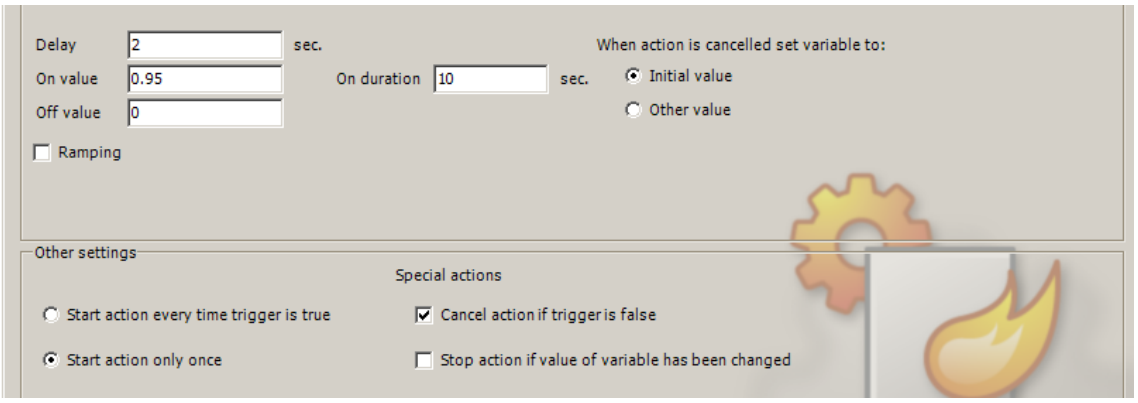


6.8 Special settings

Cancel action if trigger is false.

If the compressor is turned off the plugging stops. The value is the set to the initial value.

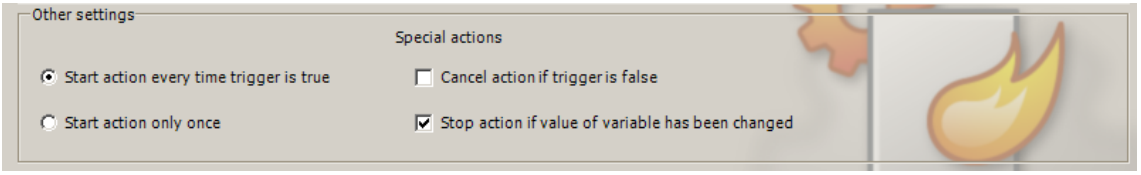
Figure 107 Cancel action if trigger is false



Stop action if value of variable has been changed.

If the plugging has been set to 0, the trigger will stop even though the compressor is still running.

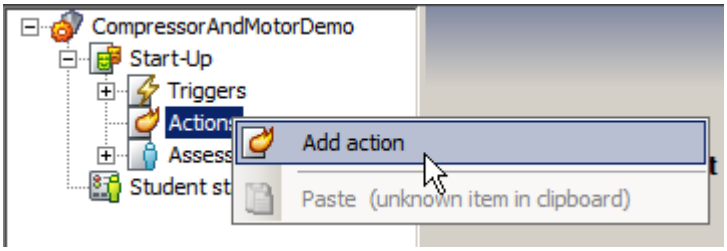
Figure 108 Stop action if value of variable has been changed



6.9 Add an action

1 Right click on **Actions**, located under the navigational tree on the **local** tab and choose **Add action.**

Figure 109 Add an action



2 Name your new action

3 Select your action trigger.

4 Set the **variable name.** The text should be pasted in the field from the instructor panel.

5 Set **Action output.** See section **Single On/Off** and the following sections.

6 Set **Other settings**. See Section **Other settings**

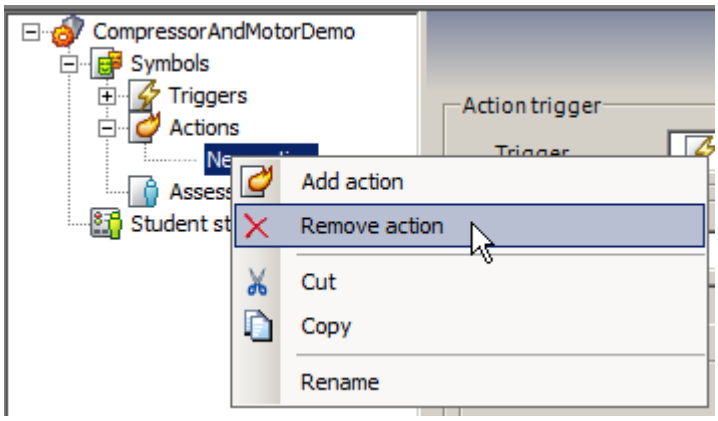
7 **Save changes**

6.10 Remove an action

1 Right click on the name of the unwanted action, located under the navigational tree on the **local** tab.

2 Select **Remove action.**

Figure 110 Remove action



7 Trouble shooting

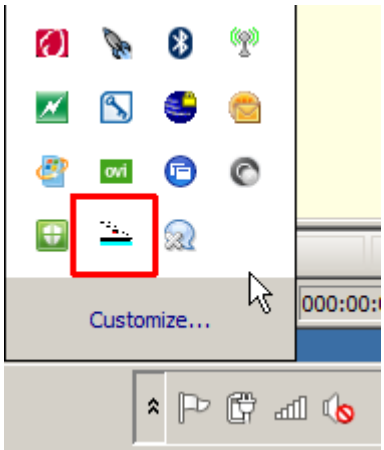
7.1 An exercise was not stopped properly

If there is an open exercise, the exercise should be stopped before a Neptune session is ended.

When the Neptune system is running, there are two Neptune resource servers running and the Neptune main program. Exiting the Neptune main program, will normally close the two servers. This could fail. If there was an open exercise running, and the previous Neptune session was not terminated properly, you can see a Neptune simulator icon

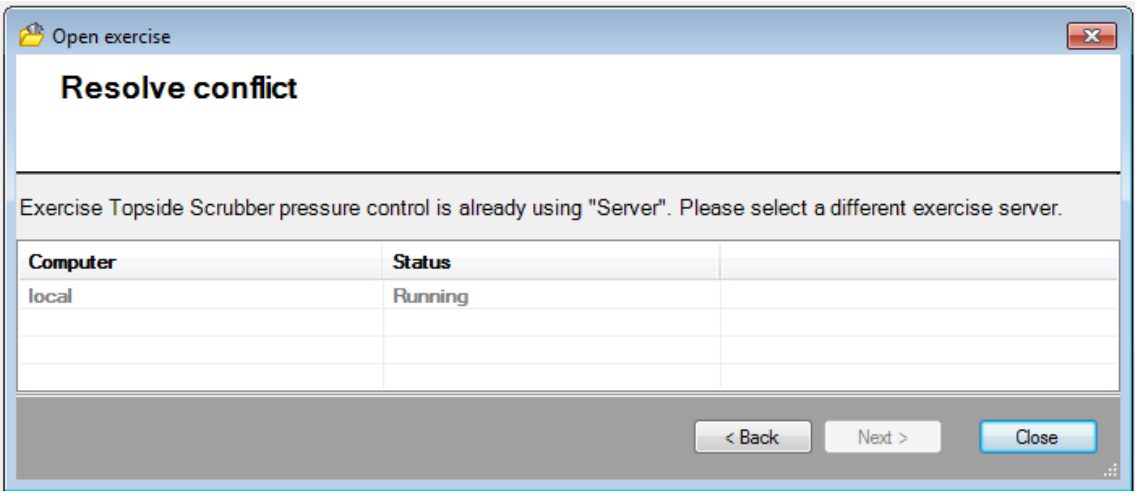
in the system tray. To be sure to have an updated picture, refresh the area by moving the cursor over the symbol.

Figure 111 Neptune simulator icon



In this situation, you can start the next Neptune session. But you will not be able to open an exercise. You will get the **Resolve conflict** dialog.

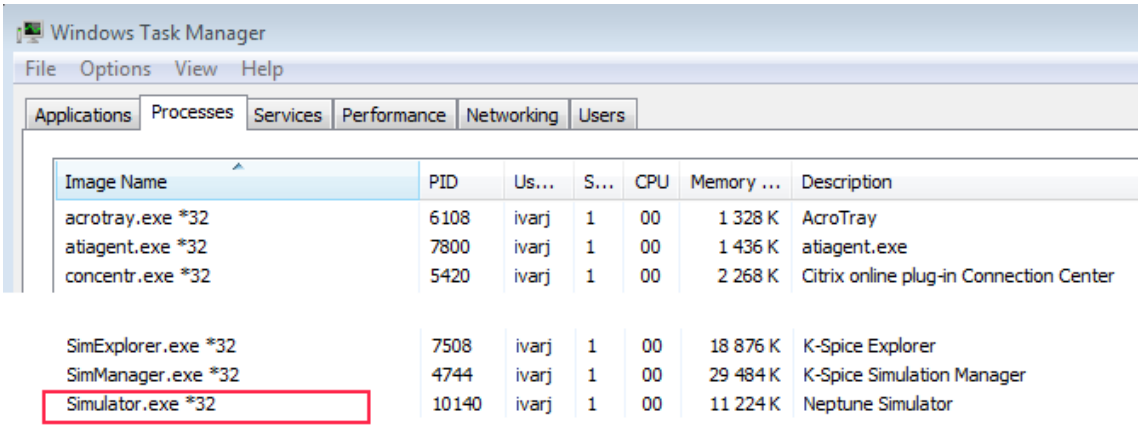
Figure 112 Try to open an exercise when the exercise in the last session was not stopped.



To get out of this situation, you must stop the Neptune Resource Manager server.

Open the Task Manager and end the process named Simulator.exe.

Figure 113 Task Manager with a Neptune Resource server running.



When the Neptune server is stopped, there should not be any Neptune icon in the system tray.

You can start the Neptune system again, following the normal procedure.

Note

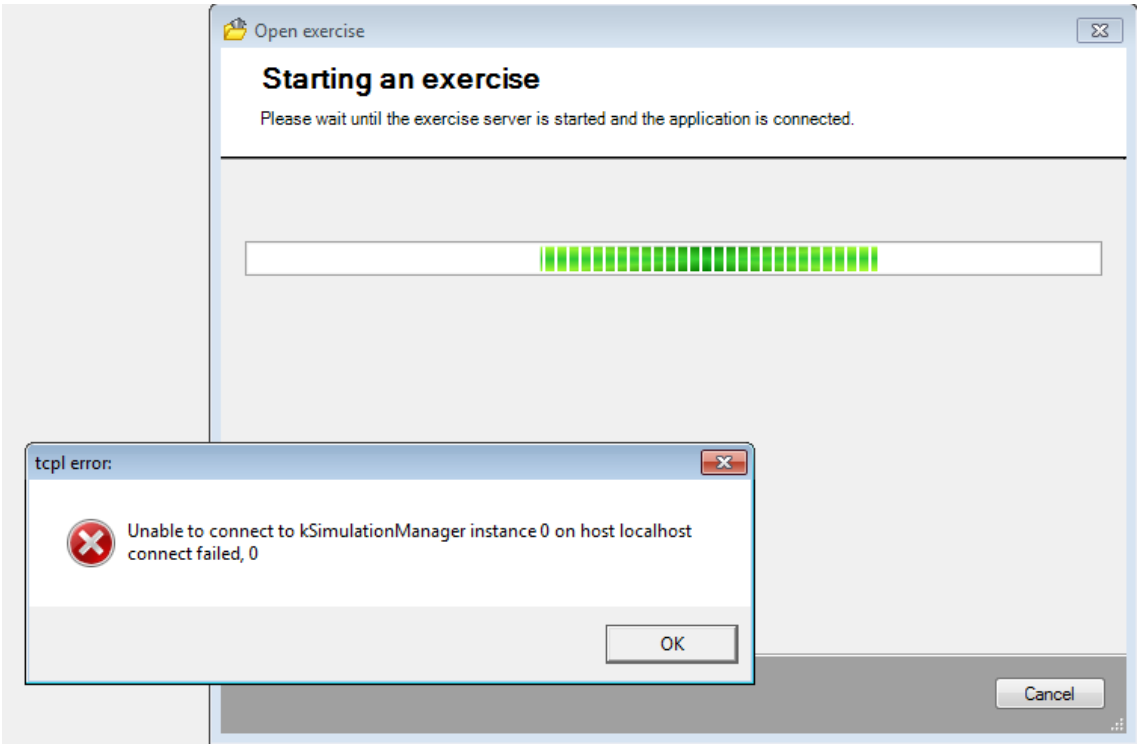
When an exercise is stopped, Simulator.exe should not be running. If it is running, stop it in the Task Manager as described here.

7.2 Unable to connect

A K-Spice simulation must be loaded and started, before an exercise can be opened.

The Neptune program interacts with the simulation. Loading an exercise will initiate the connection. See *Load a model in K-Spice and start the simulation* on page 22

Figure 114 No K-Spice running



7.3 The Neptune clock is not synchronized with K-Spice

When an exercise is running, the Neptune clock should follow the K-Spice clock.

Neptune is connected to the K-Spice system as a link, and K-Spice takes control over the Neptune time steps. If K-Spice is running faster than speed 1.0, it may take some time for Neptune to catch up with K-Spice. Neptune should follow K-Spice, plus minus a couple of seconds. If things are not right, try the following: deactivate and activate the K-Spice timeline. Exit and start Neptune. Close and open the Neptune exercise. Run K-Spice at speed 1.00.

Figure 115 The K-Spice clock

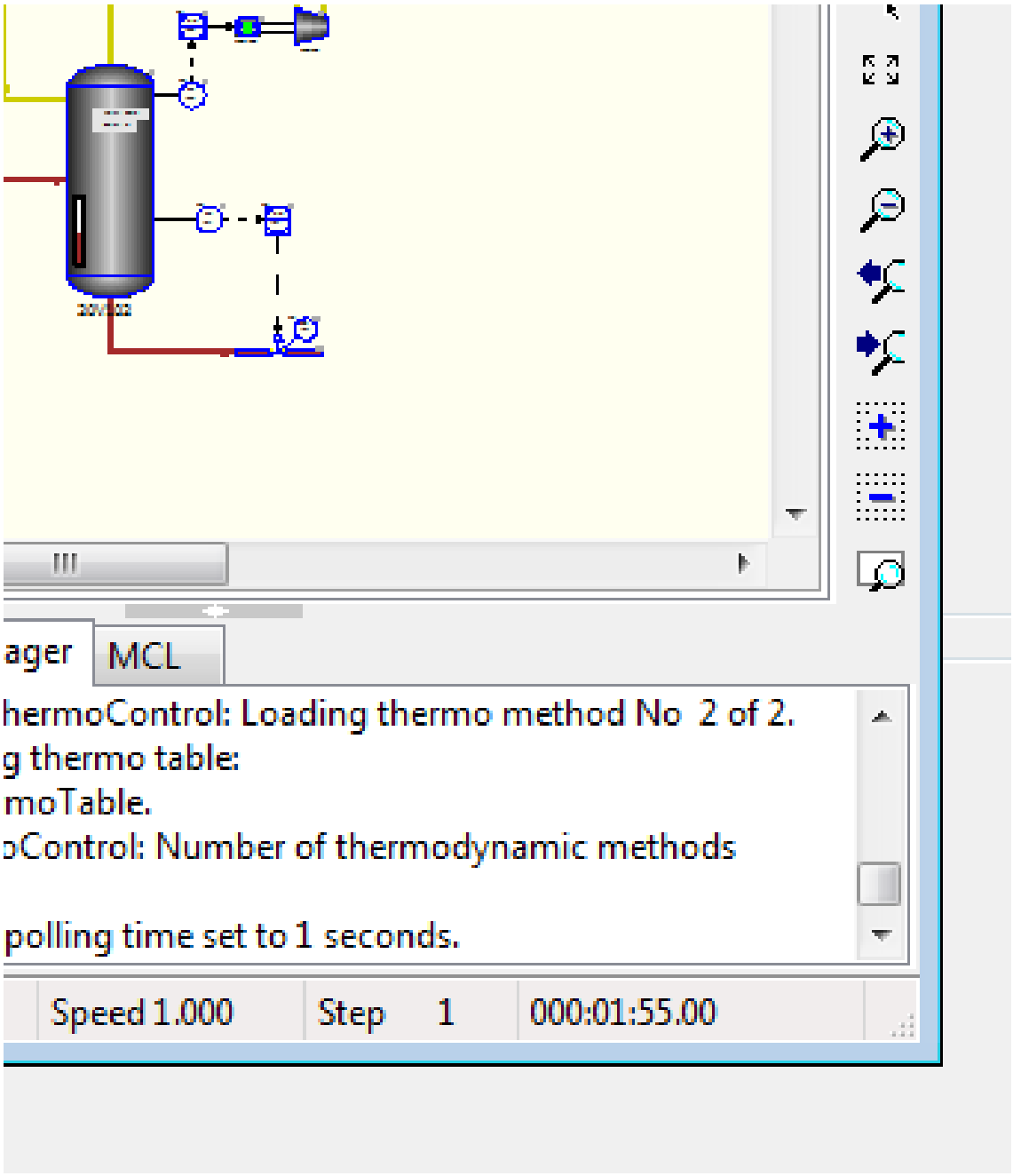
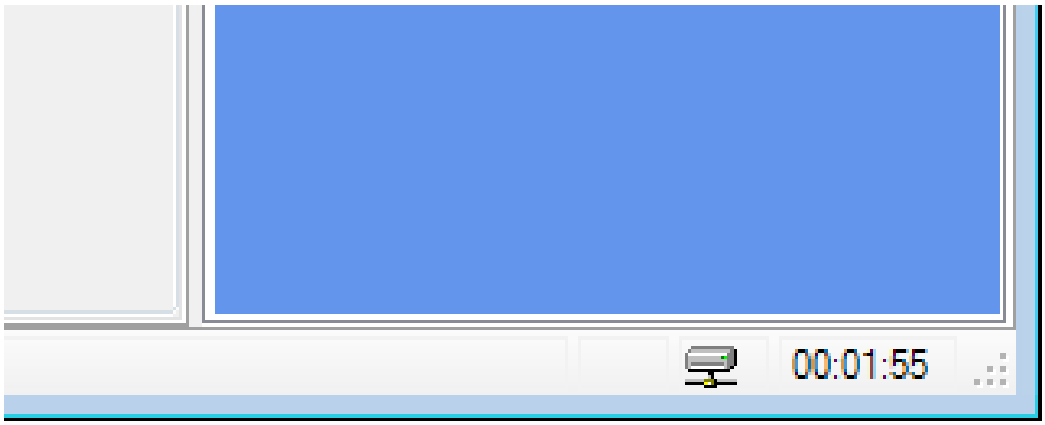


Figure 116 The Neptune clock



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