Human-Machine Interface – Siemens SIMATIC

Original Operating Instructions

Process Automation

User Guide



Festo Didactic
en
590101

Process Automation

Human-Machine Interface – Siemens SIMATIC

Original Operating Instructions

User Guide

590101

Order no.: 590101 (Printed version) 591547 (Electronic version)
First Edition 2016/03
Revision level: 2026/10

By the staff of Festo Didactic

© Festo Didactic Ltée/Ltd, Quebec, Canada 2016
Internet: www.festo.com
e-mail: services.didactic@festo.com

Printed in Canada
All rights reserved
ISBN 978-2-89747-632-8 (Printed version)
ISBN 978-2-89747-631-1 (Electronic version)
Legal Deposit - Bibliothèque et Archives nationales du Québec, 2016
Legal Deposit - Library and Archives Canada, 2016

The purchaser receives a single, non-exclusive, perpetual right of use, limited geographically to the purchaser's site as described below.

The purchaser may use this publication to train its staff at the purchaser's site. The purchaser may also use portions of the copyrighted material as the basis for its own training documentation for that purpose, provided the source is acknowledged. Copies may be made only as necessary for this permitted use.

For schools, technical colleges, training centers, and universities, this right of use also includes use for teaching purposes by students and trainees at the purchaser's site.

In all cases, this right of use excludes the right to publish the copyrighted material or make it available on an intranet, the Internet, a learning management system (LMS), a database such as Moodle, or any other system that allows access by multiple users, including users outside the purchaser's site.

Any rights beyond those granted above, including reproduction, copying, adaptation, translation, microfilming, transmission, storage, or processing in electronic systems, in whole or in part, require the prior consent of Festo Didactic.

The information in this document is subject to change without notice and does not constitute a commitment by Festo Didactic. The Festo materials described in this document are provided under a license agreement or nondisclosure agreement.

Festo Didactic acknowledges that the product names mentioned in this document are trademarks or registered trademarks of their respective owners.

All other trademarks are the property of their respective owners. Other trademarks and trade names may be used in this document to refer to the entities that own them or to their products. Festo Didactic claims no proprietary interest in trademarks or trade names other than its own.

Table of Contents

Course Preliminaries **3**

Exercise 1 - Getting Started **9**

Prerequisites 9
The need for graphic terminals 9
Hardware and software components 9
SIMATIC HMI 9
Starting the HMI 10
Using the interface on a personal computer 10

Exercise 2 - Familiarization with the Interface **13**

Home screen 13
Control loop configuration 14
Inputs and outputs 15
Loop setup 16
Nonlinear function 17
Loop digital output 17
Process variable alarm 17
Managing control loops 18
Process visualization 19
Accessing PLC inputs and outputs 23
Digital inputs and outputs 23
Analog I/O 24
Split range 25
AC drive control 26
Alarms 27
Data logging 28

Exercise 3 - On-Off Control **29**

Connecting the PLC to the process loop 29
HMI configuration for on-off control 29
Running on-off control 30

Exercise 4 - PID Control **31**

Connecting the PLC to the process loop 31
HMI configuration for PID control 31
Tuning the control loop 32

Exercise 5 - Cascade Control **33**

Connecting the PLC to the process loop 33
HMI configuration for cascade control 33
Tuning the control loops 35
Tuning the slave loops 35
Tuning the master loop 36

Exercise 6 - Process Device Manager **37**

Managing devices 37
Accessing a preconfigured device 38
Adding a device 41
Removing or reassigning a device 42

Appendix A - Setting Up Siemens Equipment **43**

Starting the HMI for the first time 43
Connecting the equipment 44

© Festo Didactic

© Festo Didactic

Course Preliminaries

About this user guide

This user guide is designed to familiarize you with the human-machine interface (HMI) developed by Festo Didactic under the Siemens architecture. It explains how to use the SIMATIC HMI with the supported controller.

This user guide is intended for both instructors and students.

Required software

The required software applications are preinstalled on the HMI.

System of units

Measurements are expressed in International System of Units (SI), followed by U.S. customary units in parentheses.

Introduction to the learning system

Automated process control provides many advantages over manual control and is therefore used in most modern industrial processes. Breweries, wastewater treatment plants, mining operations, and the automotive industry are examples of industries that rely on automated process control systems.

Keeping process variables such as pressure, flow, level, temperature, and pH within defined operating ranges is essential to produce products with consistent composition and quality.

The Instrumentation and Process Control Training System reproduces an industrial environment using modern, industrial-grade equipment. Throughout the course, students develop skills in installing and operating process control equipment, combining theoretical knowledge with hands-on practice.

The system's modular design allows instructors to select equipment that matches specific course objectives. Two mobile workstations form the core of the system. Optional components for pressure, flow, level, temperature, and pH control, as well as valves, calibration equipment, and software, can replace basic components with the same function as needed. Different controllers can be used interchangeably during control exercises, depending on instructional needs.

We hope your experience with the Instrumentation and Process Control Training System is the first step toward a successful career in the process control industry.



LVProSim, a software application used in the system's courses, can be downloaded here:



LVProSim

http://bit.ly/LVPROSIM32600

© Festo Didactic

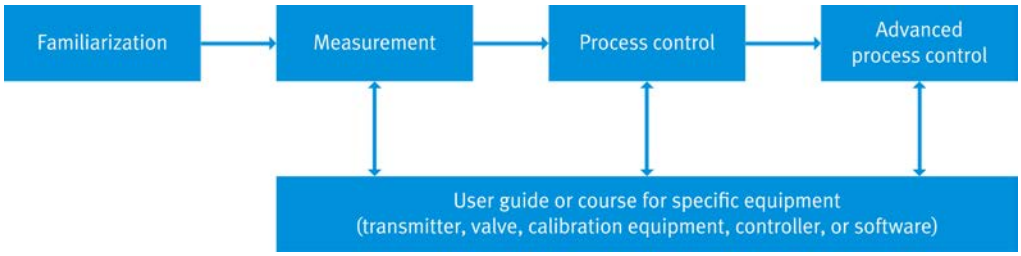


Figure 1: Standard learning path for the Instrumentation and Process Control Learning System.

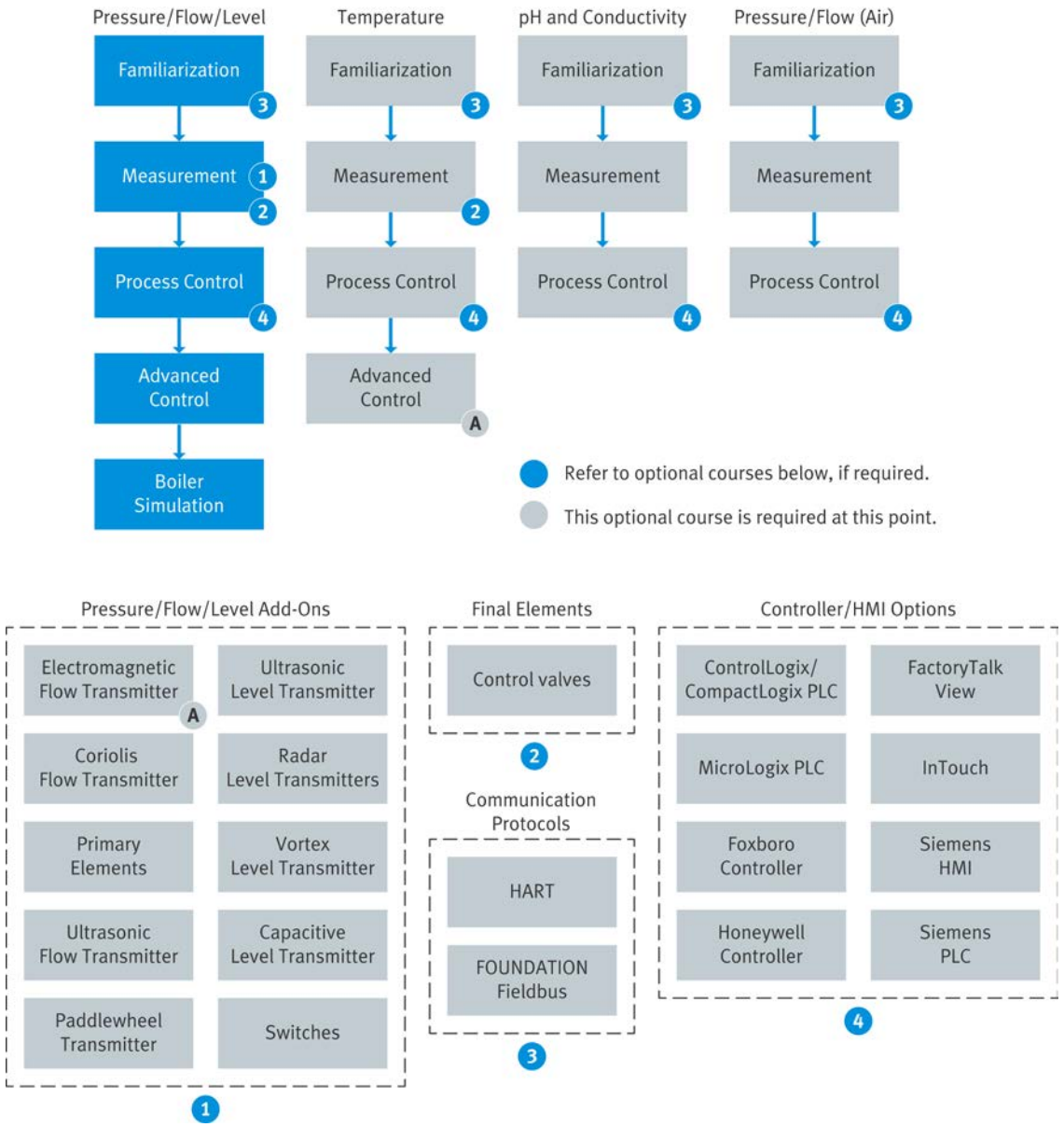


Figure 2: Instrumentation and Process Control Learning System.

© Festo Didactic

To the Instructor

This instructor version includes all content from the student version, plus answers, measurement results, graphs, explanations, suggestions, and, when needed, instructions to help you guide students through the learning process. Instructor-only information appears in red and is placed between markers.

Accuracy of measurements

Hands-on results may vary from one student to another. Use the results and answers provided as a guide. Students who perform the exercises correctly should demonstrate the principles involved and obtain similar observations and measurements.

Time requirements

Each exercise includes an estimated completion time for an average student. This estimate is for reference only; actual times may vary significantly between classes and students.

To estimate class time more accurately, perform the exercises beforehand. This will help you identify potential delays and adjust the schedule for your class.

Circuit diagrams and setups

The circuit diagrams and setups are designed to represent real systems as closely as possible. However, because they are used in a training environment, they may differ from industrial installations.

Safety Symbols and Procedures

The following table lists the safety and common symbols that may appear in this document and on the equipment. Before using the equipment, read all safety sections in the accompanying User Guide. Additional safety instructions appear before tasks that require specific precautions.

Symbol	Description
⚠ DANGER	**DANGER** indicates a high-risk hazard that, if not avoided, will result in death or serious injury.
⚠ WARNING	**WARNING** indicates a medium-risk hazard that, if not avoided, could result in death or serious injury.
⚠ CAUTION	**CAUTION** indicates a low-risk hazard that, if not avoided, could result in minor or moderate injury.
NOTICE	**NOTICE** indicates important information not related to personal injury. Failure to follow this information may result in property damage.
	Caution: hazard. Consult the relevant user documentation.

© Festo Didactic

Symbol	Description
	Caution: risk of electric shock.
	Caution: lifting hazard.
	Caution: hot surface.
	Caution: risk of fire.
	Caution: risk of explosion.
	Caution: belt-drive entanglement hazard.
	Caution: chain-drive entanglement hazard.
	Caution: gear-drive entanglement hazard.
	Caution: hand-crushing hazard.
	Electrostatic-discharge-sensitive device. Follow the applicable handling precautions.
	Notice: non-ionizing radiation.
	Consult the relevant user documentation.

© Festo Didactic

Symbol	Description
	Radio Equipment Directive (RED) geographical restrictions: consult the relevant user documentation.
	Direct current.
	Alternating current.
	Direct and alternating current.
	Three-phase alternating current.
	Earth (ground) terminal.
	Protective conductor terminal.
	Frame or chassis terminal.
	Equipotentiality.
	On (power supply).
	Off (power supply).
	Equipment fully protected by double or reinforced insulation.
	In position of a bistable push control.

Symbol	Description
	Out position of a bistable push control.

© Festo Didactic

Getting Started

6 min.

Prerequisites

This section explains how to get started with the Siemens human-machine interface (HMI) designed to work with the Instrumentation and Process Control Training System, series 353X. Before proceeding with this section, be sure that:

- The PLC is properly connected and running a program suited to work with the HMI.
- The PROFINET communication between the HMI, the PLC, and the drive(s) is functional.

Terminology to identify process variables may differ from one controller manufacturer to another and from what is found in textbooks. Using PV (process variable) in place of controlled variable is com-mon. Also, CV (control variable) is frequently used in place of manipulated variable.

The need for graphic terminals

Industrial processes may use hundreds of components. Technicians must attend to these components at various times, especially during startup and shutdown.

Most industrial systems operate autonomously but still require monitoring to detect problems. Monitoring involves displaying and interpreting data. For example, a monitoring system can display the pressure in a gas tank and alert an operator if it exceeds a set limit.

Even small systems need a convenient way to monitor and control their components. Lights and buttons alone are usually insufficient: users need a central panel to assess system status quickly and make changes. Graphic terminals provide this interface. The training system's HMI has an interface similar to those of industrial graphic terminals.

Hardware and software components

SIMATIC HMI

The Siemens SIMATIC HMI shown in the following figure has a 483 mm (19 in) display with a resolution of 1366 × 768. Its color touch screen lets users monitor and control some features of the Instrumentation and Process Control Training System. Its interface is preprogrammed for the system's components, and the required software is preinstalled.

© Festo Didactic

The device powers on when its rear power input is connected to a wall outlet and its power switch is turned on. It has two PROFINET communication ports, three USB ports, and a display port.



Figure 3: SIMATIC HMI, Model 46973.

The SIMATIC HMI is a touch-screen computer that runs Windows. Although its interface supports touch input, some applications, such as SIMATIC Process Device Manager (PDM), are easier to use with a mouse and keyboard. Connect these devices to the USB ports.

Starting the HMI

1. Turn on the touch screen using the switch at the back of the device.

2. The interface should launch automatically. If not, click on the WinCC Runtime Loader icon on the desktop and click Start.

If you need to restart the graphic terminal, be sure to turn it off for at least 10 seconds.

Using the interface on a personal computer

The interface can be run on a personal computer rather than on a SIMATIC HMI. To run the interface on a personal computer, you must install SIMATIC WinCC first. Once the software is installed, follow the steps below to configure WinCC.

3. The interface can be downloaded at the following link. Copy the content on your computer. The interface files can be copied anywhere, but the default folder for HMI projects is given in the following table.

SIMATIC WinCC Interface.

https://lx.festo.com/media/8648c0744abd4e169dffd4a44693664d

© Festo Didactic

Table 1: Default paths to configure WinCC.

Name	Path
Configuration path	C:\ProgramData\Siemens\CoRtHmiRTm\HmiRTm\PROJECTS\
Autostart application	C:\Program Files (x86)\Siemens\Automation\WinCC RT Advanced\HmiRTM.exe

4. Start WinCC Runtime Loader from Windows Start menu. This opens the Start Center menu of WinCC. Select Settings to open the Start Center Settings window (The following figure).

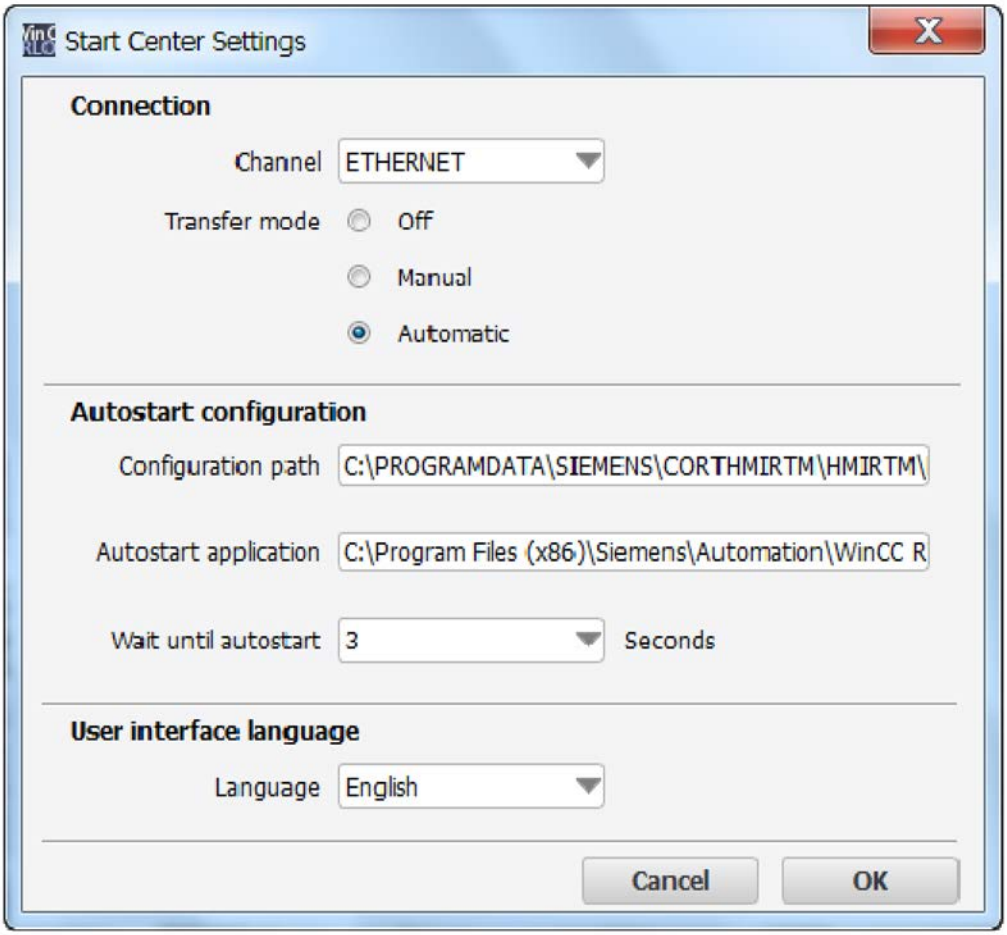


Figure 4: Start Center Settings window.

5. Configure WinCC as shown in the preceding figure. In the Configuration path field, enter the path of the folder containing the interface files. The Autostart application field must contain the path to the runtime loader executable file. The preceding table gives the default path to this file, but location may vary depending on your system.

© Festo Didactic

6. Click OK to save the configuration.

7. Click Start in the Start Center menu to launch the interface.

© Festo Didactic

Familiarization with the Interface

23 min.

Home screen

The following figure shows the Home screen that appears when you start the interface. In the bottom-right corner of this window, a Quit button allows you to exit the application.

Each screen of this interface has a series of buttons giving access to screens or displaying pop-up windows. Buttons linked to a specific loop are usually located in the PID loop panel. For example, each loop has a Configuration button that gives access to the configuration window of the loop. Generic buttons, such as the Access PLC I/O button, are located at the bottom of the screen.

The Home screen displays two PID loop panels at the same time. In the left portion of this screen, different visualizations are shown.

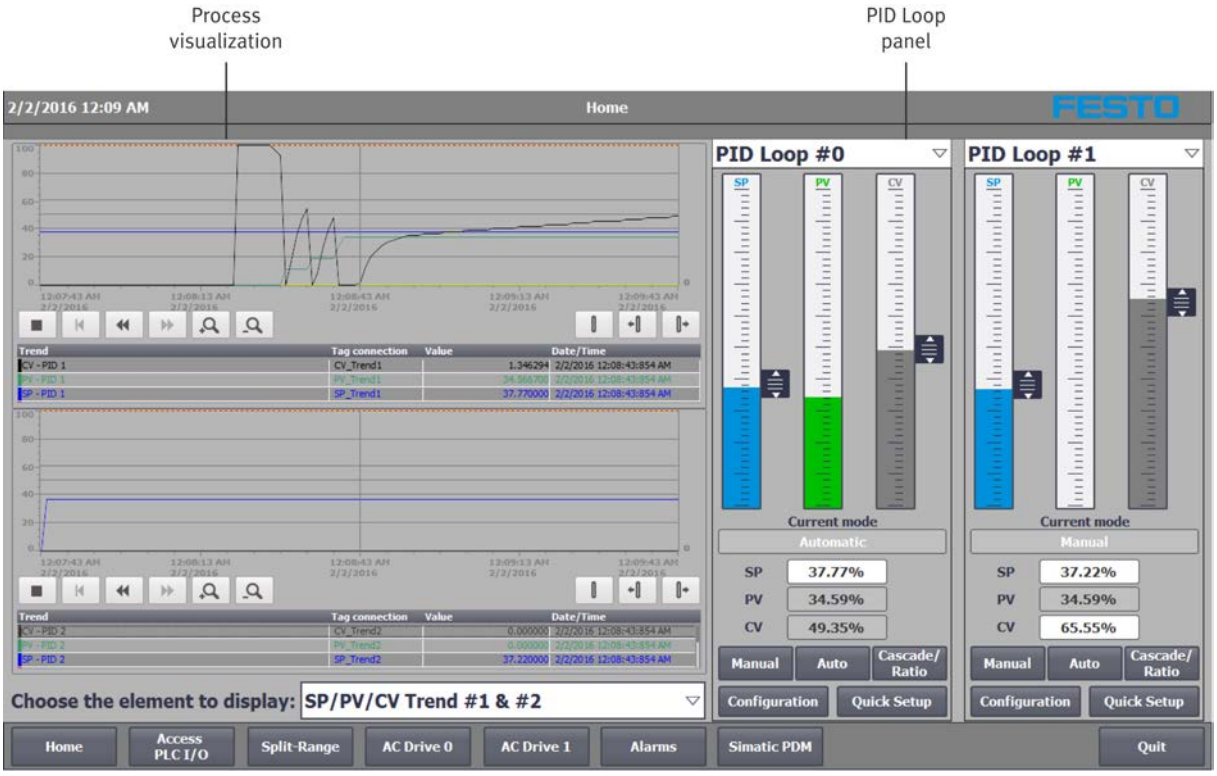


Figure 5: Home screen.

Control loop configuration

Up to eight loops, numbered 0 through 7, can run simultaneously. To view a loop's status and configuration, select its number from the drop-down list shown in the following figure.

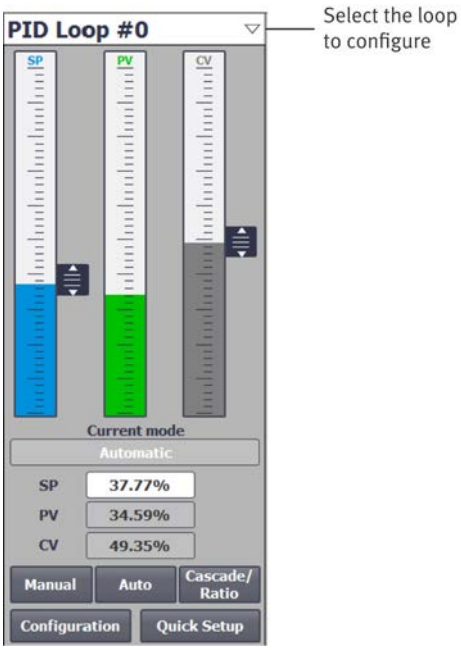


Figure 6: PID loop selection.

To configure the selected loop, click Configuration. The PID Configuration screen opens, as shown in the following figure.

© Festo Didactic



Figure 7: PID loop configuration screen.

This screen shows the selected loop's parameters. Some are required; others are optional or available only in certain modes.

Inputs and outputs

The Inputs and outputs section lets you configure the process variable input (PV), control variable output (CV), feedforward input (FF), and set points (SP) for automatic and cascade/ratio modes, as shown in the following figure. Select each signal from its drop-down list.

For example, select Analog Input #1 from the PV input drop-down list to use that PLC input as the loop's process variable. Examples of PID, on-off, and cascade control loops appear later in this manual.

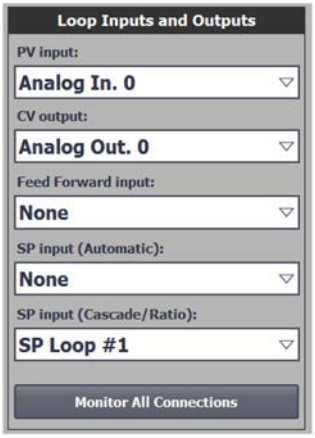


Figure 8: Loop input and output configuration.

Monitor All Connections displays the inputs and outputs assigned to each control loop. Reset All restores the PV, CV, FF, and SP settings for all loops to their default values. None indicates that a parameter is unassigned.

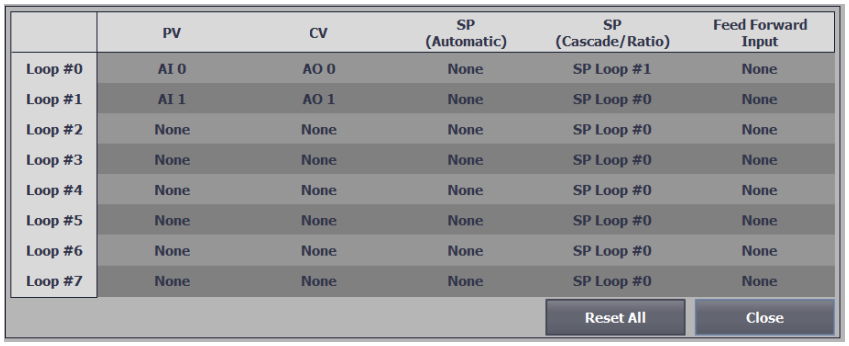


Figure 9: Monitor Connections pop-up window.

Loop setup

The Loop setup section contains the loop's PID parameters: proportional gain (P), integral time (Ti), and derivative time (Td), as shown in the following figure. A button beside each parameter enables or disables it, allowing configurations such as P-only control.

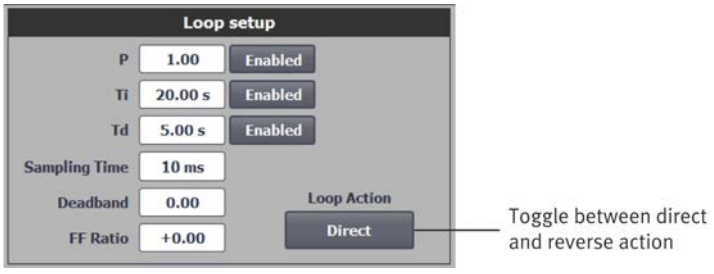


Figure 10: Loop parameters.

© Festo Didactic

You can also configure the loop's sampling time, dead band, and feedforward ratio.

A button in the lower-left corner of Loop setup switches the control loop between direct and reverse action.

Nonlinear function

Some control schemes change the PID parameters according to an input variable. The input can be either the control variable (CV) or the process variable (PV).

The 2 Ranges and 3 Ranges nonlinear functions use two or three sets of PID parameters, respectively, according to the input value. Set the upper limit for each applicable range in the High Limit fields shown in the following figure.

For example, with 2 Ranges selected, CV as the input, and the low range's high limit set to 40%, the loop uses the low-range PID parameters when CV is below 40% and the mid-range parameters when CV is above 40%.

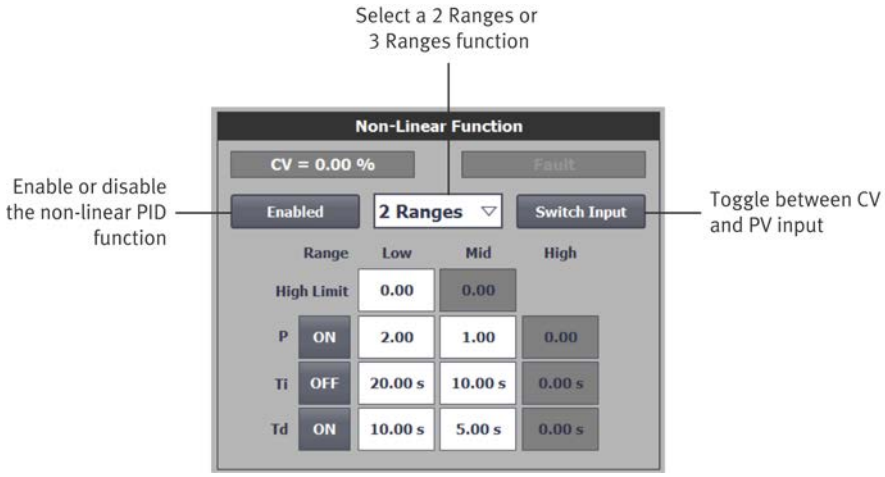


Figure 11: Nonlinear function.

Loop digital output

Each control loop can control the digital output with the same number. The output switches according to the process variable (PV) relative to the set point (SP), as shown in the following figure. With On if SP–PV>0 selected, the output turns on when PV is below SP. With On if PV–SP>0 selected, it turns on when PV is above SP. With No Control selected, the loop does not control the output.

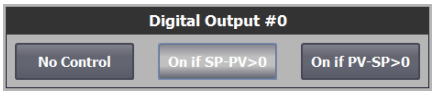


Figure 12: Loop digital output.

Process variable alarm

The loop's process variable can trigger alarms. In the PV Alarm section of the PID Configuration screen, you can configure high-high, high, low, and low-low limits, as shown in the following figure.

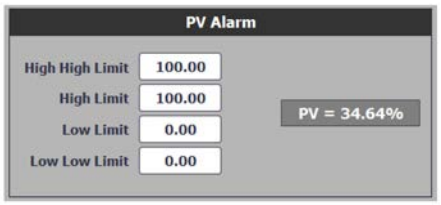


Figure 13: Process variable alarms.

Managing control loops

The Home screen displays up to two control loops, as shown in the following figure. Use the buttons below the vertical bar graphs to enable or disable functions and adjust PID parameters without opening the configuration screen.

The Manual button puts the loop in manual mode. In this mode, you set the control variable (CV) directly; the PID parameters are ignored.

The Auto button puts the loop in automatic mode. The controller uses the loop's PID parameters to determine the control variable (CV).

The Cascade/Ratio button enables the set-point (SP) input used in cascade and ratio modes.

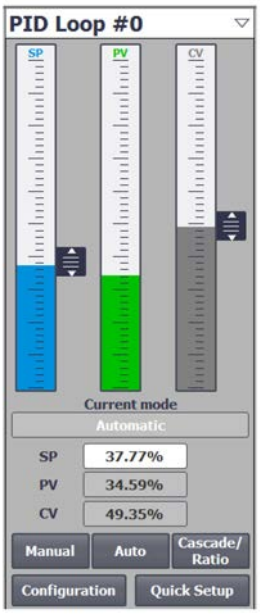


Figure 14: PID loop display.

The Quick Setup button opens the loop setup pop-up window shown in the following figure. Use it to adjust the loop parameters shown without opening the configuration screen.

© Festo Didactic

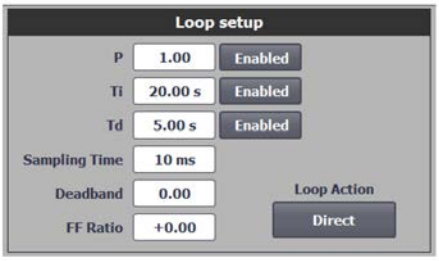


Figure 15: Loop setup pop-up window.

Process visualization

Process-loop visualizations appear on the left side of the Home screen. By default, two trend recorders are displayed, one for each control loop selected on the right. To select another visualization, use the drop-down list at the bottom of the visualization area.

The following figures show the available visualizations. The table describes the trend controls.

Table 2: Visualization control buttons.

Icon	Function
▶	Start data plotting on the trend
■	Stop data plotting
⏮	Jump to the beginning of the recording
◀◀	Move backward on the trend timeline
▶▶	Move forward on the trend timeline
🔍+	Zoom in on the data

Icon	Function
	Zoom out on the data
	Center the cursor on the trend. The values of the plotted variable at the cursor position are shown in a table at the bottom of the screen
	Move the cursor left
	Move the cursor right

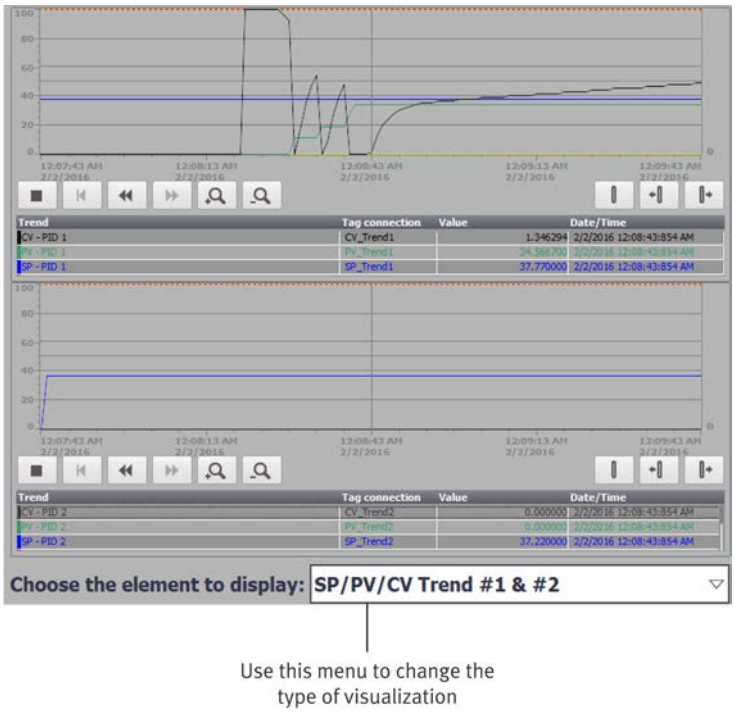


Figure 16: Process control visualization with two trend displays.

© Festo Didactic

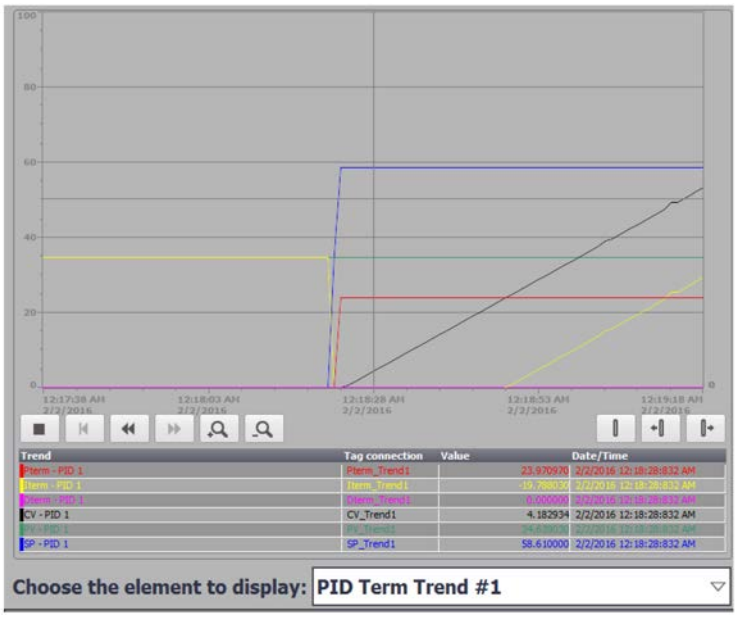


Figure 17: Process control visualization with a single SP/PV/CV trend display.

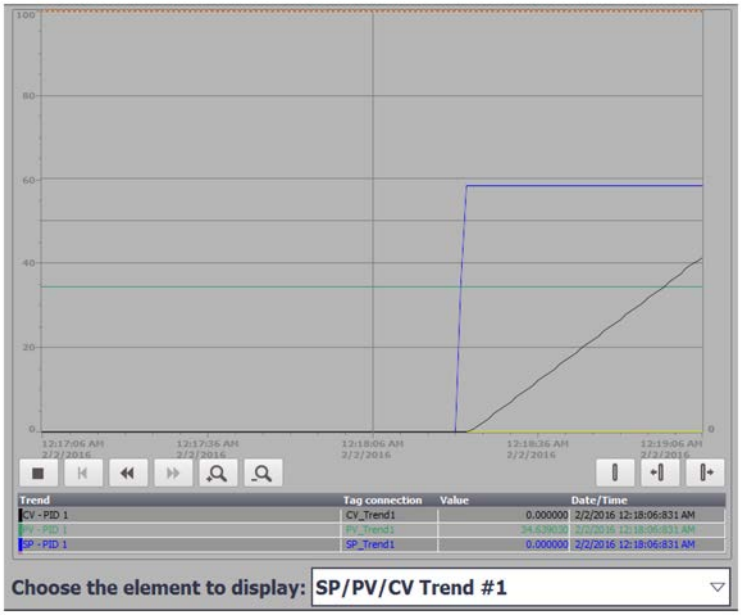


Figure 18: Process control visualization with a single PID trend display.

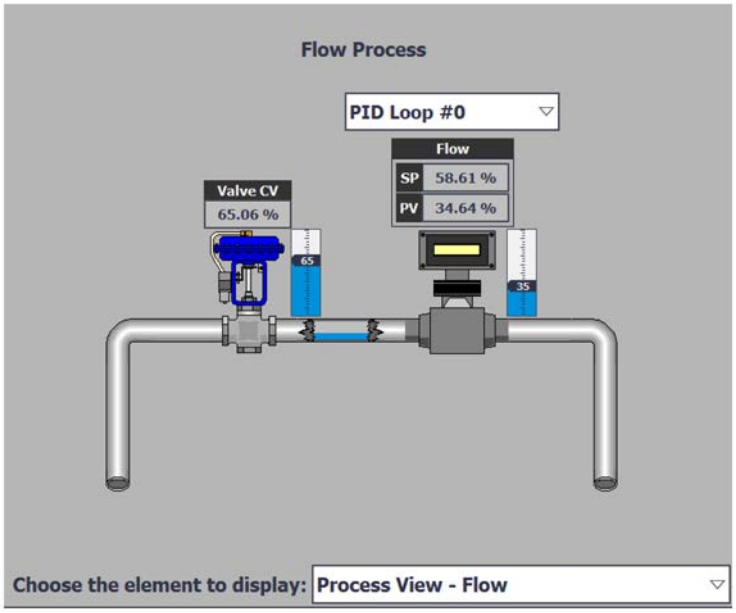


Figure 19: Process control visualization of a flow process.

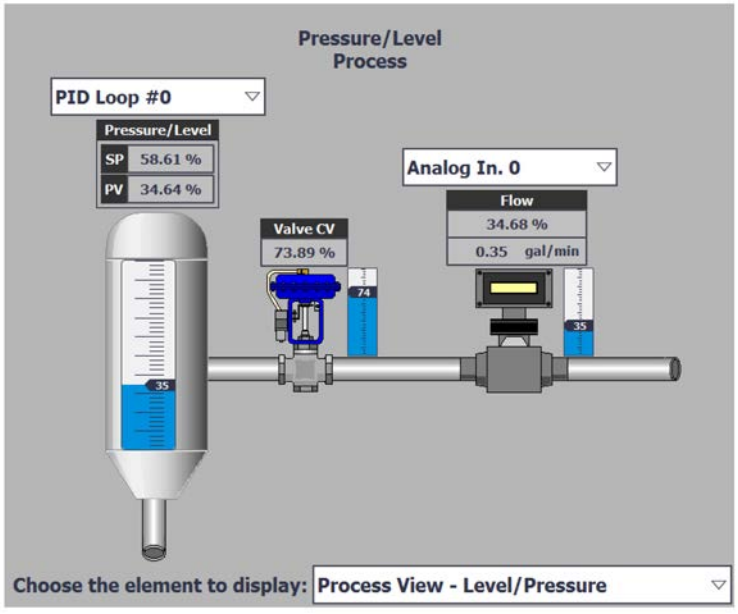


Figure 20: Process control visualization of a pressure/level process.

© Festo Didactic

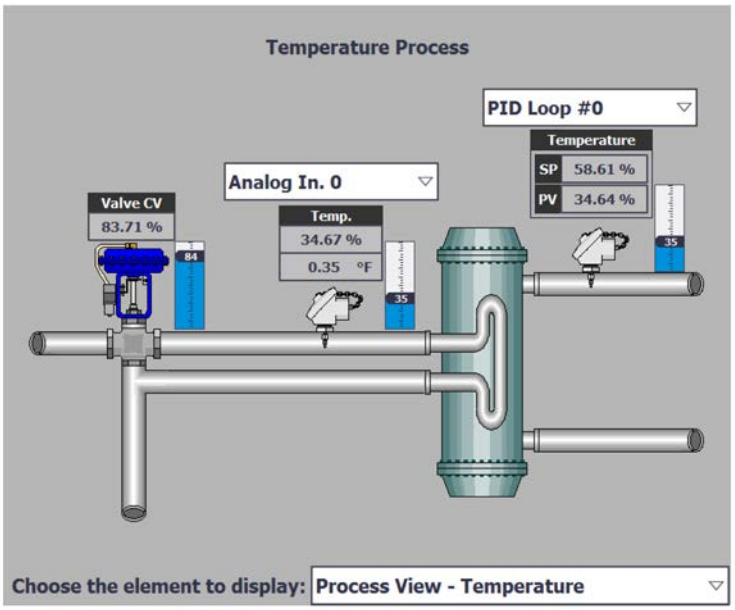


Figure 21: Process control visualization of a temperature process.

Accessing PLC inputs and outputs

Digital inputs and outputs

The Access PLC I/O button at the bottom of the Home screen opens the PLC I/O screen shown in the following figure. This screen displays the current status of the PLC inputs and outputs. The available input and output types depend on the PLC; for example, some PLCs do not have HART inputs and outputs.

The square beside a digital input label is green when the input is actuated (logic 1) and gray when it is not (logic 0). Press the button beside a digital output label to actuate the output. An actuated output is ON; a disabled output is OFF.



Figure 22: PLC I/O.

Analog I/O

Press an analog input or output button to open a pop-up window showing its current status, scaling information, and raw data. You can also set the minimum and maximum values of its engineering-unit range, as shown in the following figure.

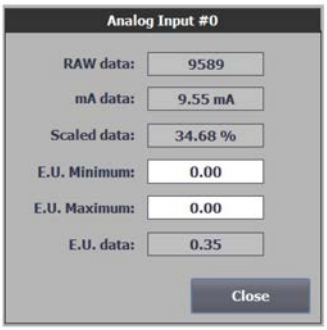


Figure 23: Analog input.

If your PLC has HART inputs and outputs, you can view the HART data for each one, as shown in the following figure.

© Festo Didactic

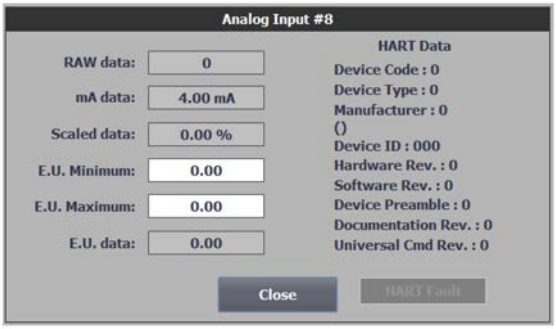


Figure 24: HART input data.

Split range

Split range is a control scheme frequently used in the chemical industry. For example, a chemical reactor may have an upstream valve and a downstream valve that must open as a function of the pressure in the vessel.

The interface enables easy split-range configuration and visualization via the Split Range screen. To open this configuration screen, click on the Split-Range button at the bottom of the Home screen.

When using the split-range function, a single process-variable input influences two or three different analog outputs. Each analog output operates in a different range in its own PID loop.

The following figure shows a configuration for a split-range application with two loops. In this example, analog input 0 is the process variable (PV) and the set point is 50%. In the first control loop (Loop #0), analog output 0 varies from 0% to 100% (CV Effective Range) while the CV of the split-range scheme varies between 0% and 50% (Split-Point Range). When the value of the CV is above 50%, analog output 0 is topped at 100%. At this point, the second loop starts to operate. When the CV is between 50% and 100%, analog output 1 varies between 0% and 100%. Take note that the two loops need to be enabled, in automatic mode, and configured to work properly.

The Split Range screen has its own trend that monitors the process variables.

© Festo Didactic

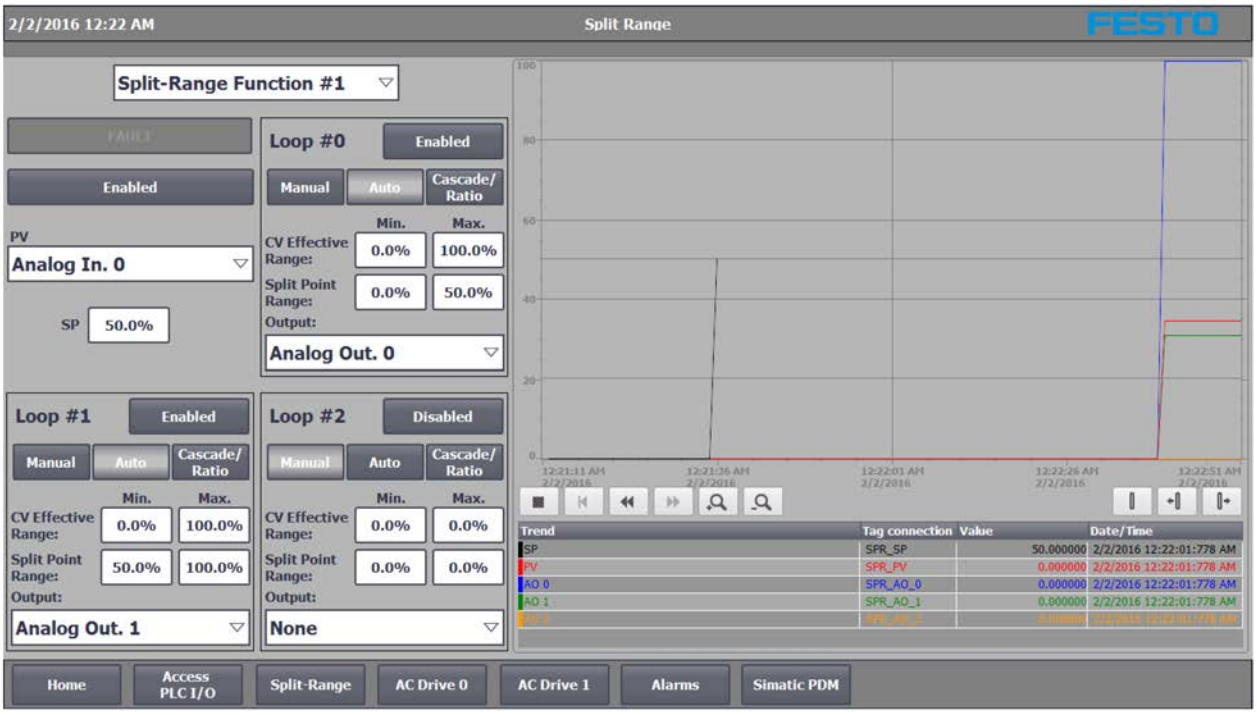


Figure 25: Split range.

AC drive control

The interface can control up to two Siemens drives over PROFINET. The drives must be connected and configured as described in Appendix A.

Press an ac drive button to open the corresponding drive pop-up window shown in the following figure. The window displays the drive's current status. To start the drive, enter the desired speed set point in the text box and press Start.

If a control loop uses the drive as its CV output, the loop output can serve as the drive's automatic set point. Press Automatic SP to enable automatic drive control. Press Reset Faults to reset drive faults.

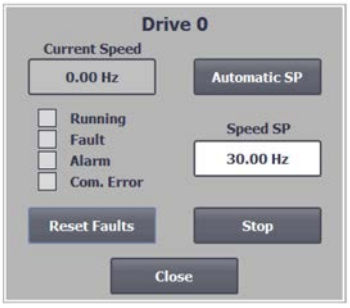


Figure 26: AC drive control.

© Festo Didactic

Alarms

Click Alarms to open the Alarms screen shown in the following figure. This screen displays active alarms. To acknowledge an alarm, click the checkmark icon in the lower-right corner. An “A” in the alarm’s Status column indicates that it has been acknowledged.

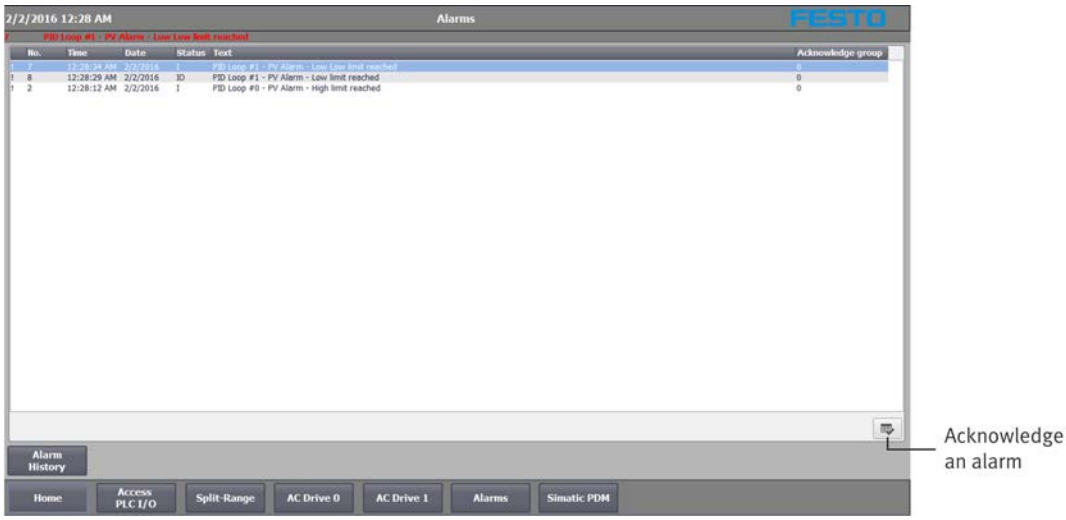


Figure 27: Alarm status.

A resolved alarm disappears from the Alarms screen. Current and past alarms remain in the Alarms History window. To open it, click the button in the lower-left corner of the Alarms screen, as shown in the following figure.

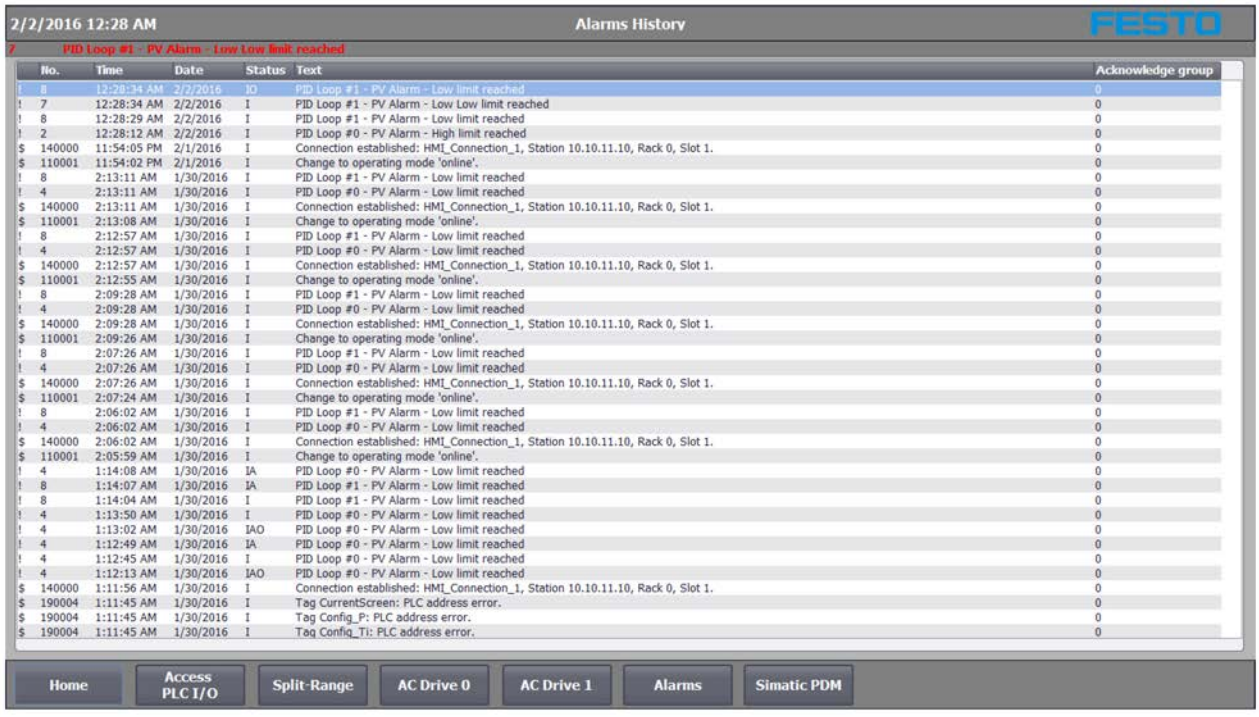


Figure 28: Alarms history.

Data logging

Trend values and alarms are logged in files on the graphic terminal. To access the logs, press Quit on the Home screen to exit the interface.

In Windows, open the C:\winCC_Logs folder. It contains trend logs in CSV format and a subfolder containing the alarm history. The alarm history is stored in .RDB files. Software compatible with these files is required to view their contents.

© Festo Didactic

On-Off Control

13 min.

PLCs can be used to implement on-off control for a process. This basic type of control is efficient for slowly changing processes. In an on-off control scheme, an analog input and an analog output are used for the process variable (PV) and control variable (CV) respectively. Three parameters must be set according to the requirements of the process: the set point, the deadband, and the loop action.

Connecting the PLC to the process loop

1. Connect the PLC to the process loop as shown in the following figure.

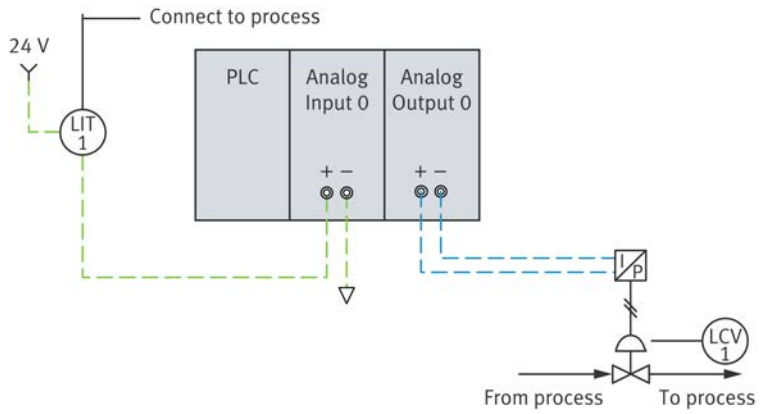


Figure 29: Typical connection for on-off control.

HMI configuration for on-off control

2. Confirm that the PLC and HMI are set up as described in Appendix A.

3. This project requires an emergency button for increased safety. When PLC digital input 0 is not powered, all processes shut down. Connect PLC digital input 0 to a switched 24 V dc output on the electrical unit of the Instrumentation and Process Control Training System. Pressing the emergency button removes power from the switched output jacks.

4. Configure the PID loop for on-off control as shown in the following figure.

© Festo Didactic

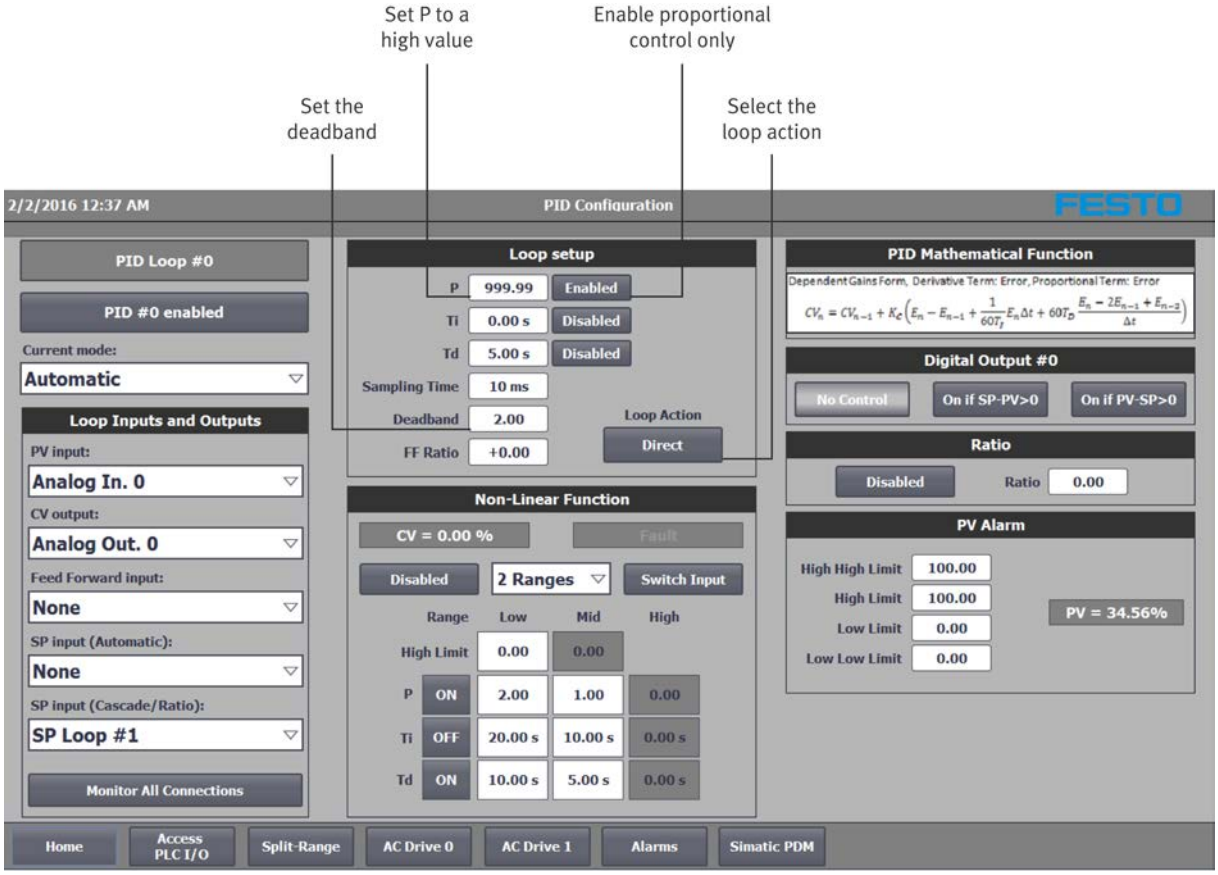


Figure 30: On-off control configuration.

Running on-off control

5. Verify the setup, then use the slider in the PID loop display to set an appropriate set point. Set the PLC mode to Auto so the loop performs on-off control. You can now start the process.

© Festo Didactic

PID Control

13 min.

PLC controllers can be used to implement PID control, which is a common process control scheme in the industry. In such a scheme, an analog input and an analog output are used for the process variable (PV) and control variable (CV) respectively. A series of parameters must be set according to the requirements of the process and the type of control (P, PI, PD, or PID).

Connecting the PLC to the process loop

1. Connect the PLC to the process as shown in the following figure.

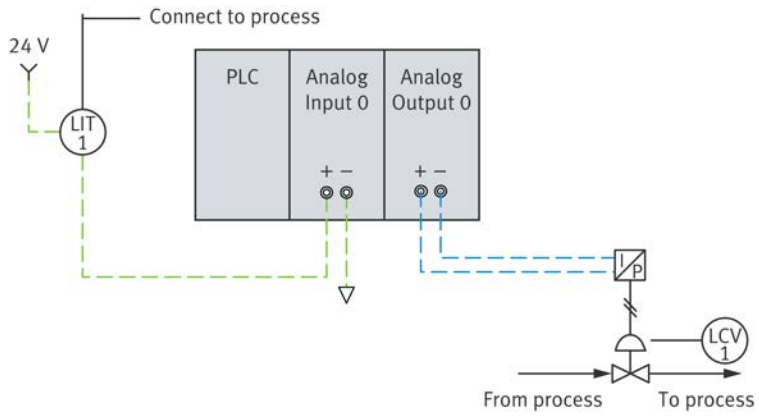


Figure 31: Typical connection for PID control.

HMI configuration for PID control

2. Make sure the PLC and the HMI are set up as explained in Appendix A.

3. This project requires you to connect an emergency button for increased safety. If the PLC digital input 0 is not powered, all processes are shut down. Connect digital input 0 of your PLC to a 24 V dc switched output source on the electrical unit of the Instrumentation and Process Control Training System. The switched output jacks become unpowered when the emergency button is pressed.

4. Set the PID Configuration for PID control as shown in the following figure.

© Festo Didactic

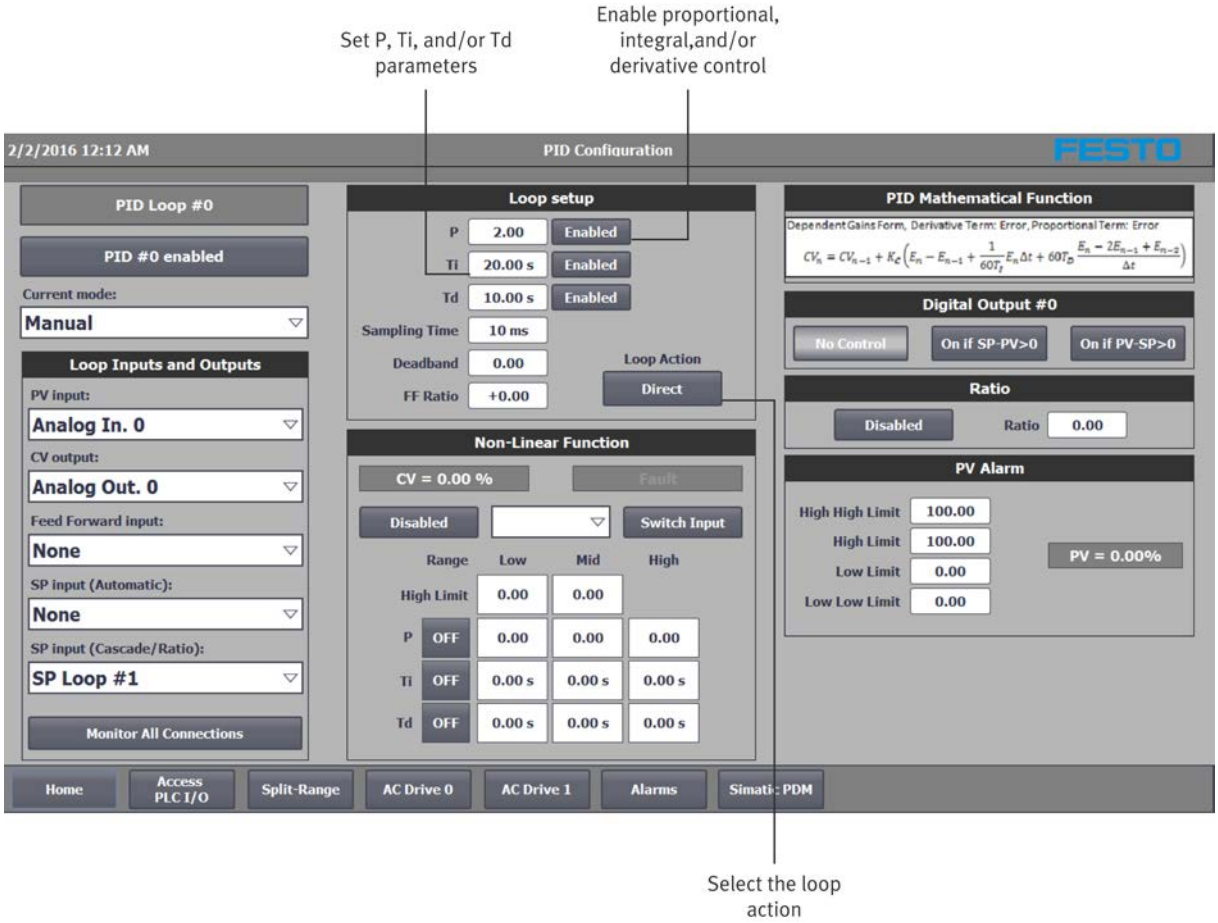


Figure 32: PID control configuration.

Tuning the control loop

5. Verify your setup and perform the tuning of your PID loop by either adjusting the tuning parameters while in Auto mode (trial-and-error or ultimate-cycle method) or by performing a step change in Manual mode and proceeding with the Ziegler-Nichols calculations. In any case, fine-tune your process until it meets your control expectations.

© Festo Didactic

Cascade Control

14 min.

Cascade control is useful when a fast-changing secondary process variable provides information about changes affecting the primary variable. This information can improve control performance. A PLC can implement cascade control by combining two PID control instructions.

The two process variables (PVs) use two analog inputs, and the control variable (CV) uses one analog output. The control parameters must be set to suit the process.

Understanding PID control is essential before using cascade control. Exercise 4 provides a review if needed.

Connecting the PLC to the process loop

1. Connect the PLC to the process as shown in the following figure.

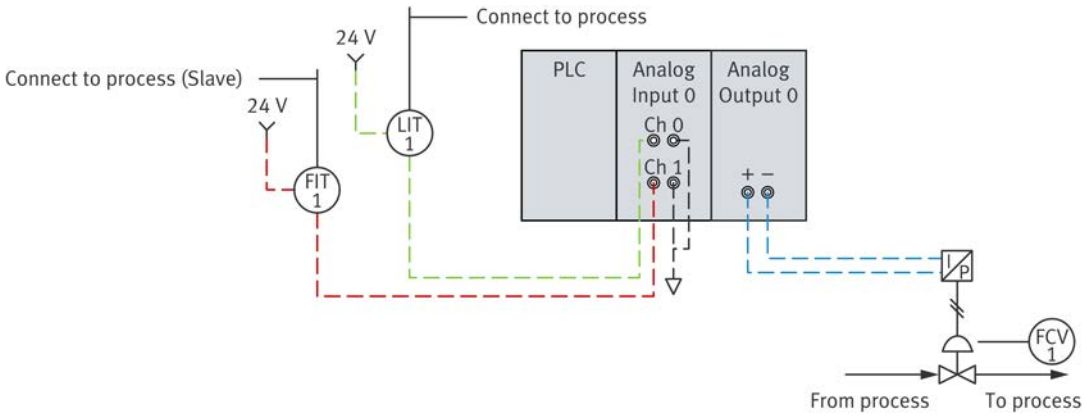


Figure 33: Typical connection for cascade control.

HMI configuration for cascade control

2. Make sure the PLC and the HMI are set up as explained in Appendix A.

3. This project requires you to connect an emergency button for increased safety. If the PLC digital input 0 is not powered, all processes are shut down. Connect digital input 0 of your PLC to a 24 V dc switched output source on the electrical unit of the Instrumentation and Process Control Training System. The switched output jacks become unpowered when the emergency button is pressed.

© Festo Didactic

4. Set the PID Configuration of two control loops for cascade control as shown in the following figures. The following figure shows the master loop configuration; it uses analog input 0 to read the process level. The second loop is the slave loop; its configuration is shown in the last figure and it uses analog input 1 to read the process flow while analog output 0 is connected to the control valve. The master and slave loops should both be in Manual mode for now.

   The output of the master loop will be used (when in cascade mode) as the set point of the slave loop. This output does not have any other use and is simply ignored when the cascade mode is inactive.

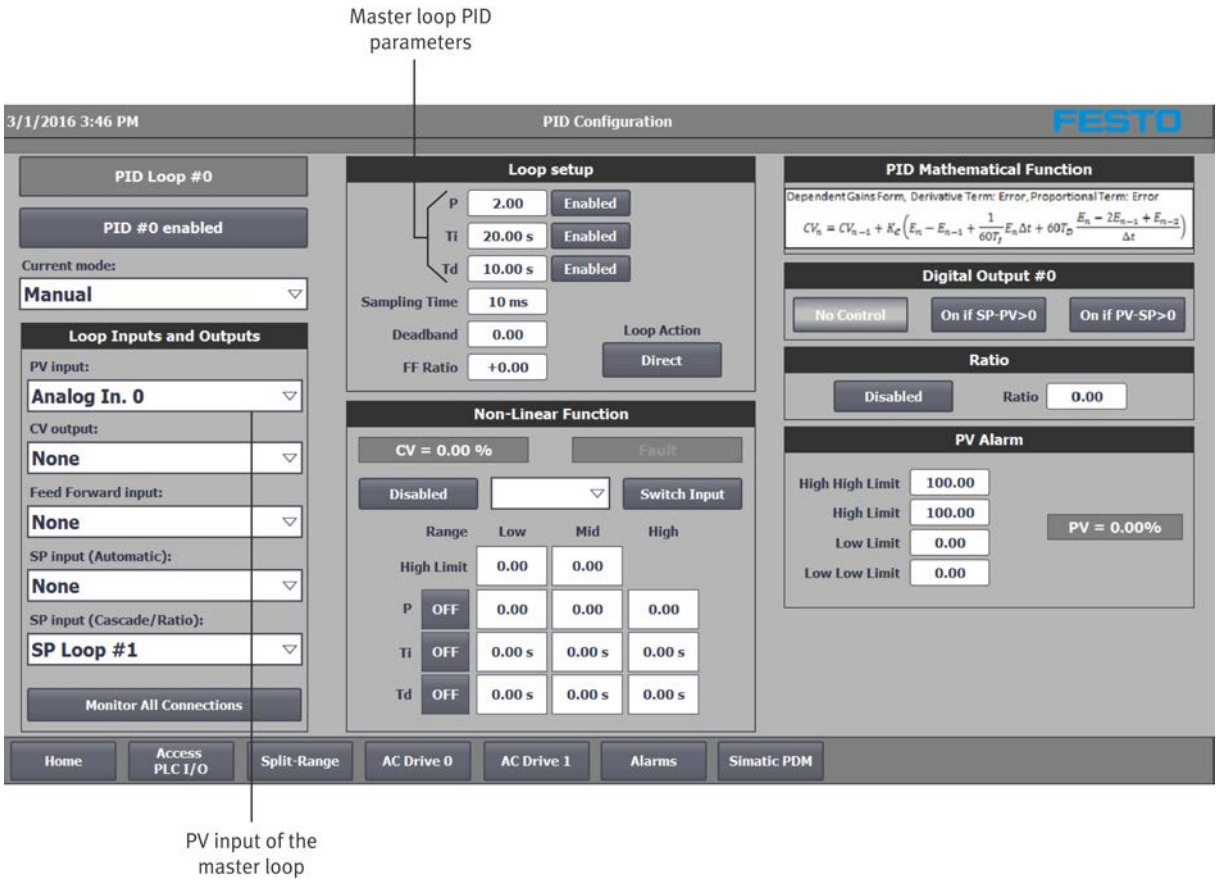


Figure 34: Master loop configuration (loop #0).

© Festo Didactic

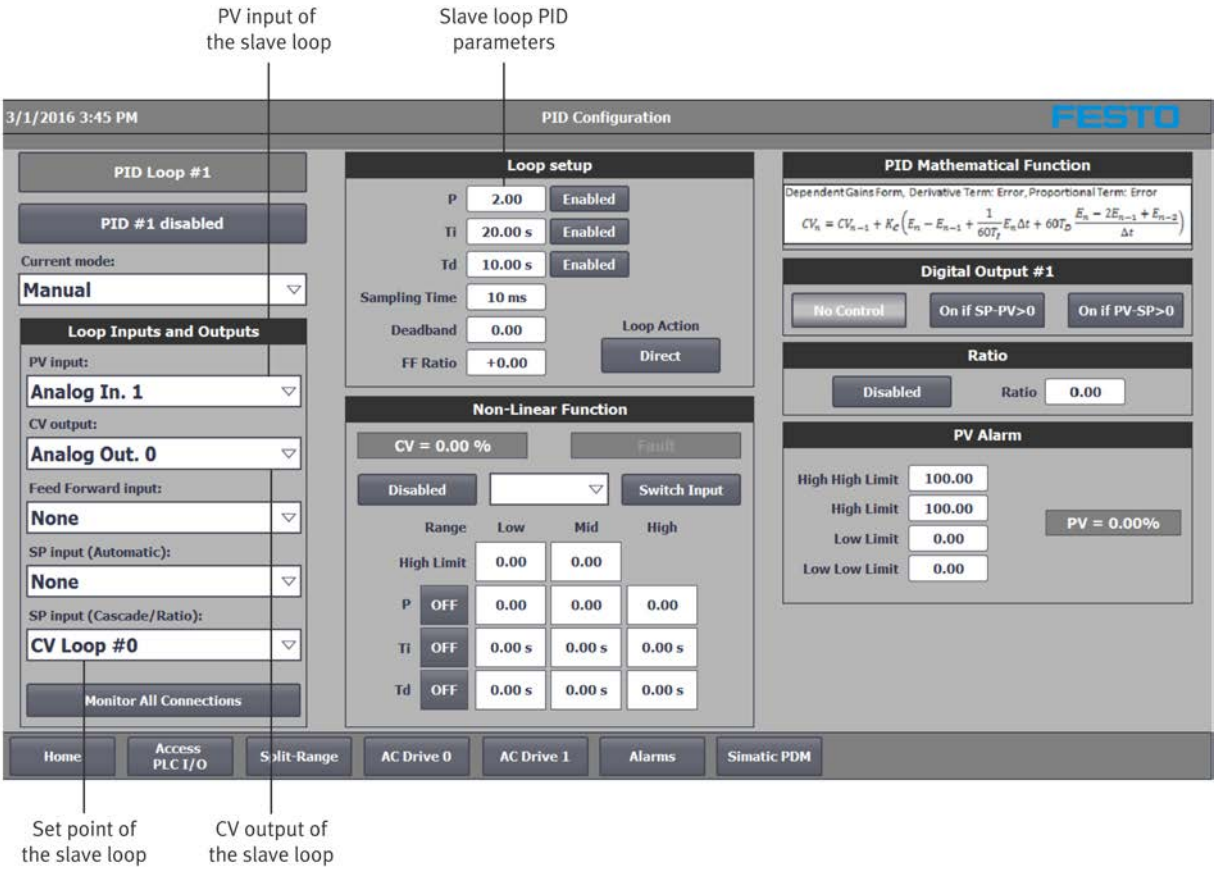


Figure 35: Slave loop configuration (loop #1).

Tuning the control loops

Tuning the slave loops

5. Perform the tuning of the PID slave loop by either adjusting the tuning parameters while in Auto mode, or by performing a step change in Manual mode and proceeding with the Ziegler-Nichols calculations. In any case, fine-tune your process until it meets your control expectations.

   Keep in mind that the slave and the master loops work on different variables. In the archetypal example, the slave loop controls the flow going into a tank while the master loop controls the level in the tank.

   Once the slave loop is tuned, press the Cascade/Ratio button to activate the cascade mode.

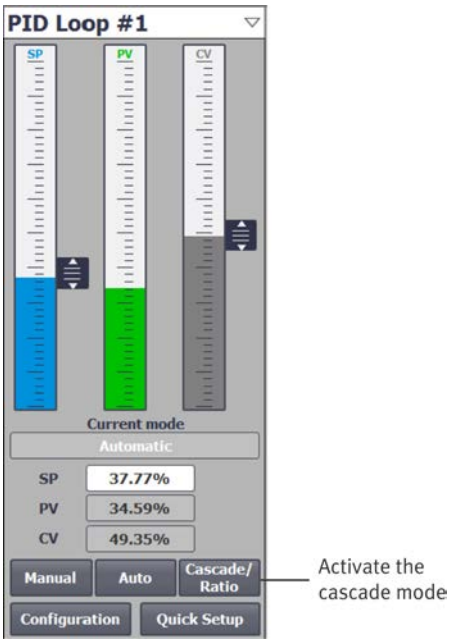


Figure 36: Activating cascade mode for the slave loop.

Tuning the master loop

6. Perform the tuning of the PID master loop by either adjusting the tuning parameters while in Auto mode, or by performing a step change in Manual mode and proceeding with the Ziegler-Nichols calculations. In any case, fine-tune your process until it meets your control expectations.

7. Leave the master loop in Auto mode. The PLC is now controlling your process in cascade.

© Festo Didactic

Process Device Manager

6 min.

Managing devices

SIMATIC Process Device Manager (PDM) is a complete tool to configure and commission HART devices. You can open this software using the SIMATIC PDM button at the bottom of the interface.

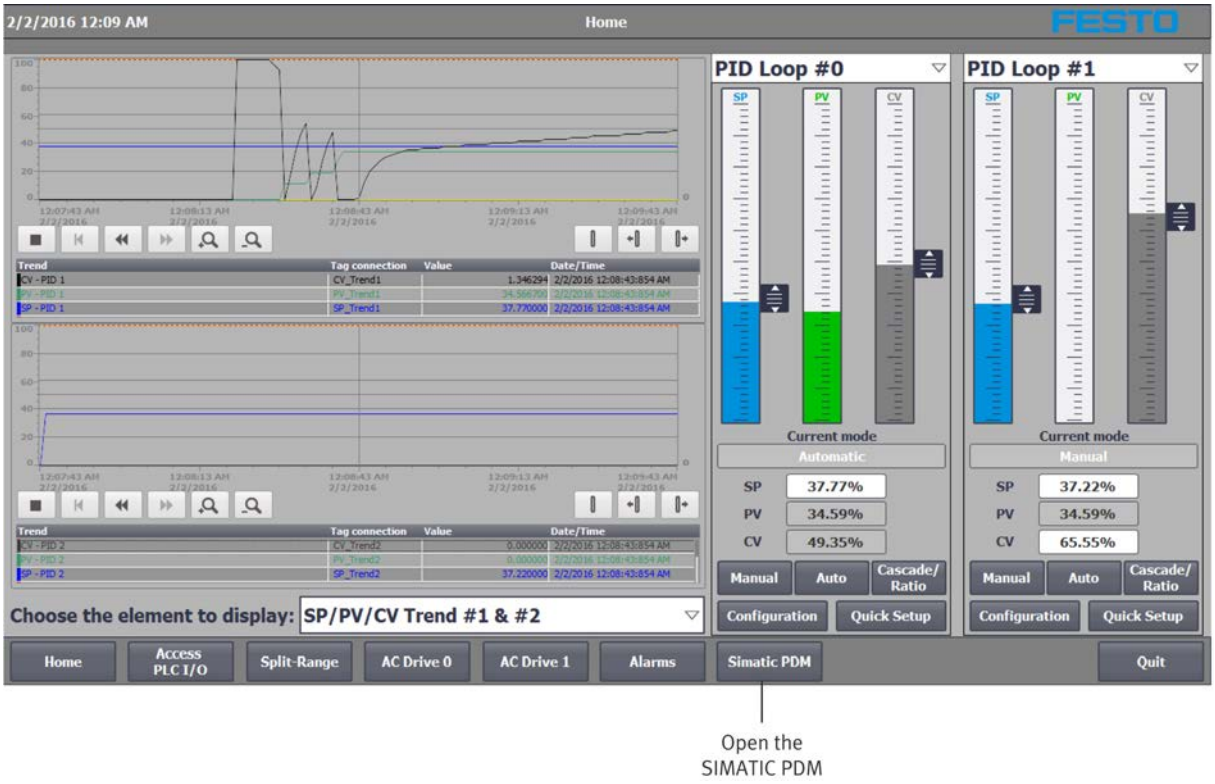


Figure 37: Click the SIMATIC PDM button to open the SIMATIC Process Device Manager.

The interface of the SIMATIC Process Device Manager is shown in the following figure. The PDM version installed on the HMI is preconfigured to communicate with three types of transmitters. This section describes how you can add or remove devices from the PDM, as well as how to use the PDM to monitor and configure your devices.

As shown in the following figure, each preconfigured transmitter (TMT162, PDM75 HR, and PDM75 LR) is associated to a channel. Each channel corresponds to a HART input on the distributed I/O module. For example, to use the default PDM configuration to configure and monitor a temperature transmitter (TMT162), you must connect it to input 0 of the distributed I/O module.

© Festo Didactic

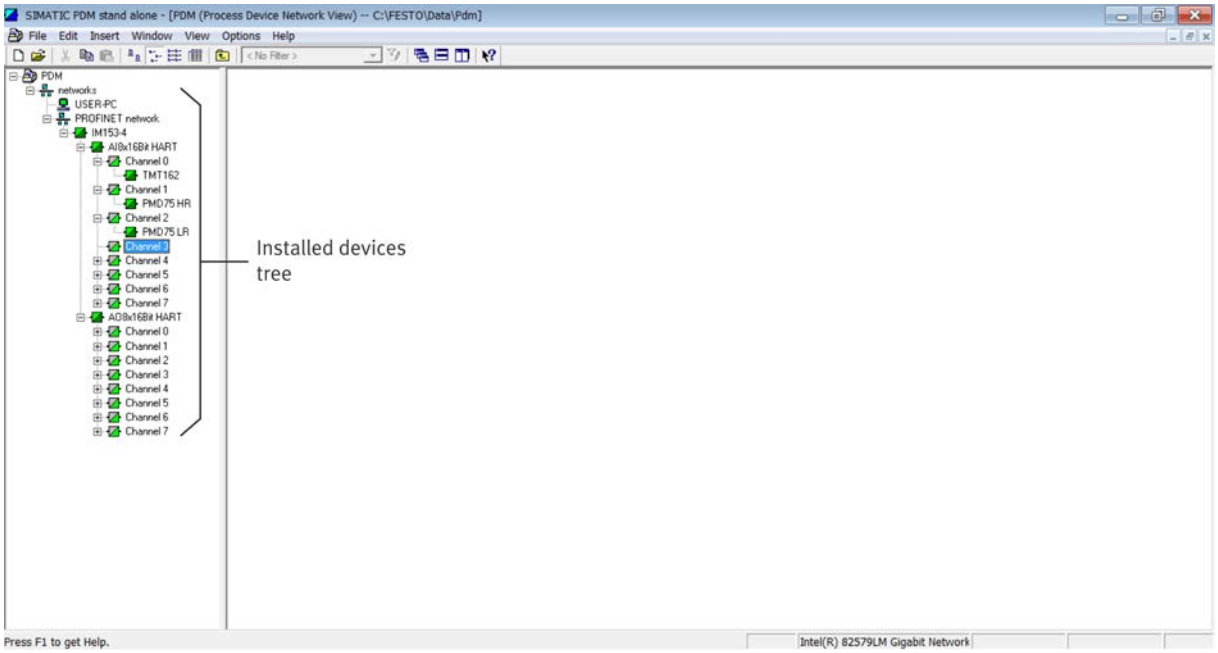


Figure 38: Device Manager interface.

Accessing a preconfigured device

To connect to a device via PDM, first make sure it is in the devices tree and connect the transmitter output to the I/O module. Use the HART input corresponding to the channel number in the PDM.

To open a device configuration, right click on the device name and select Open Object as shown in the following figure.

© Festo Didactic

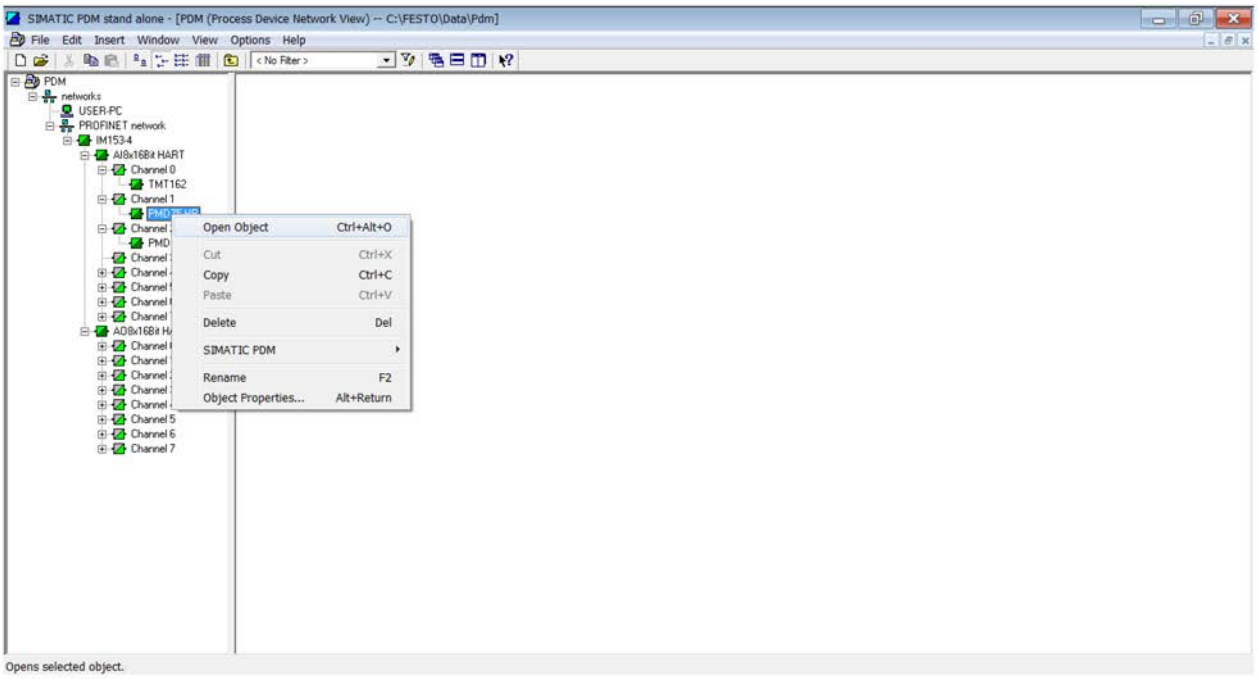


Figure 39: Opening a device configuration.

This opens the device configuration, as the following figure shows. In this window, you can monitor and commission the device. You have access to the full menu hierarchy of the device and you can modify its parameters.

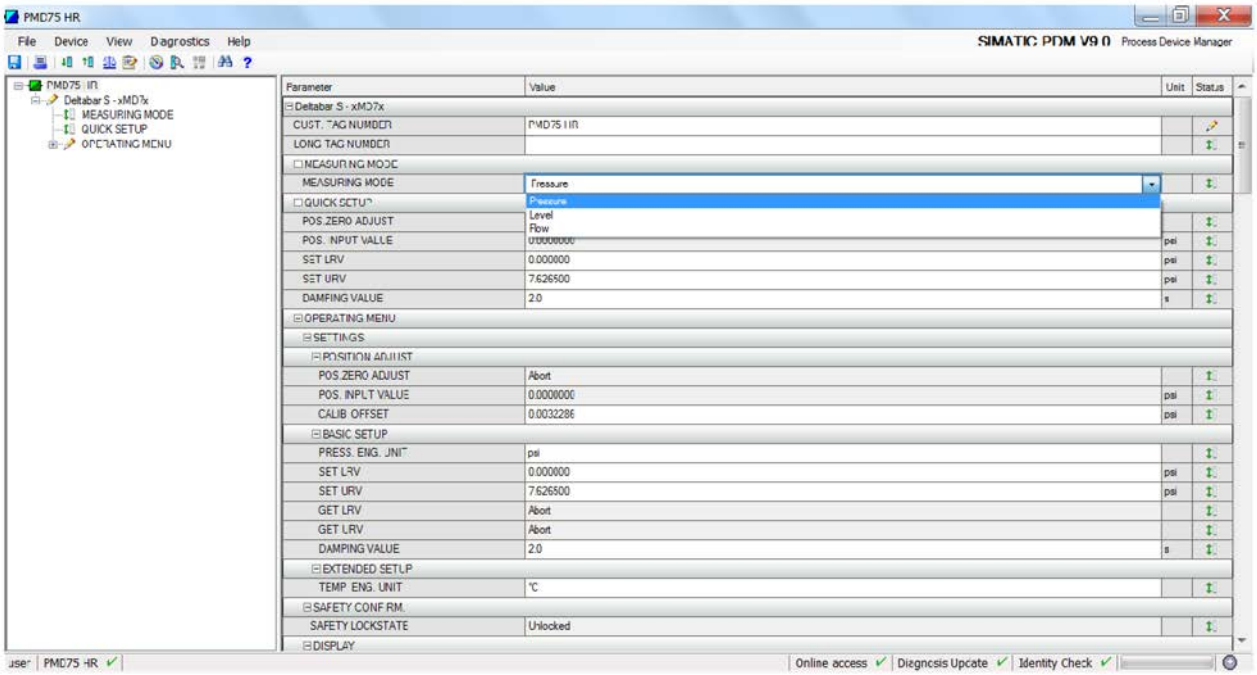


Figure 40: Device configuration.

If you changed parameters in PDM and want to apply them to the device, download the PDM configuration to the device, as shown in the following figure. If you changed

parameters on the device and want to update the local PDM configuration, upload the parameters from the device. Before transferring parameters, confirm which configuration you want to keep.



Figure 41: Downloading configuration to device.

To refresh the information from the device, right click on the device name and select Update Diagnostics, as the following figure shows.

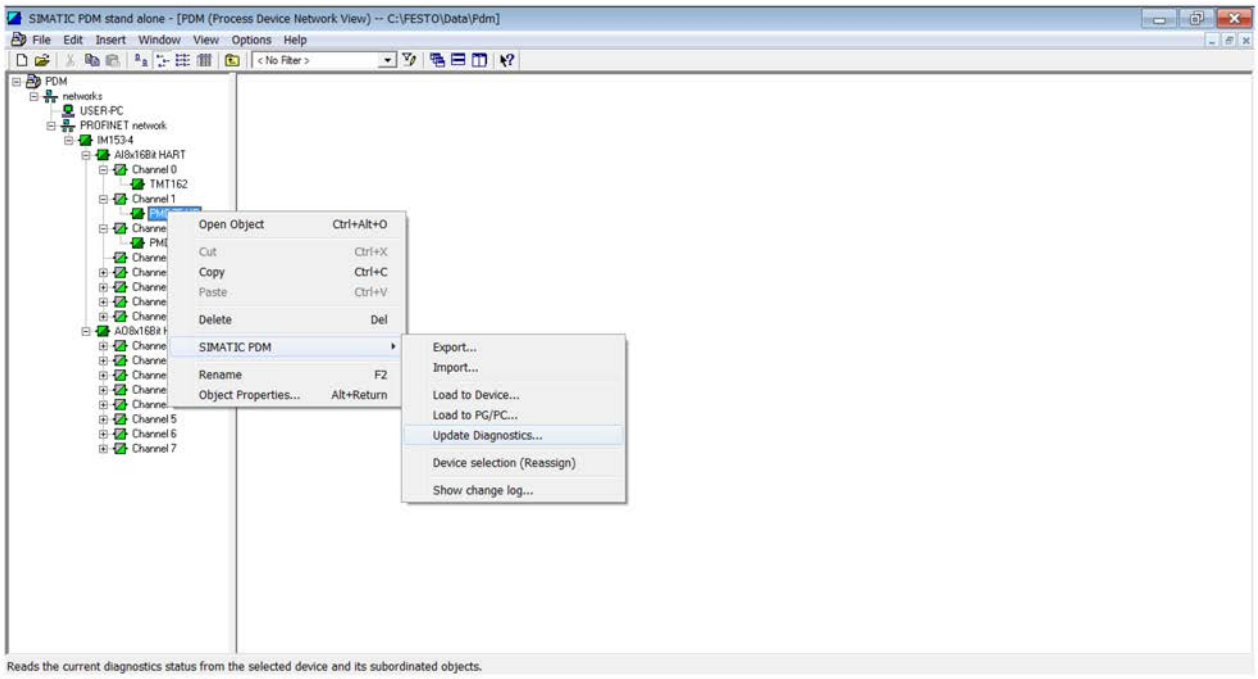


Figure 42: Refresh the information from the device.

© Festo Didactic

Adding a device

Only some devices are preconfigured in PDM. To add a device, follow these steps.

In the PDM devices tree, select the channel to which the device will be connected under AI8x16Bit HART. Right-click the channel and select Insert New Object ▶ Object, as shown in the following figure.

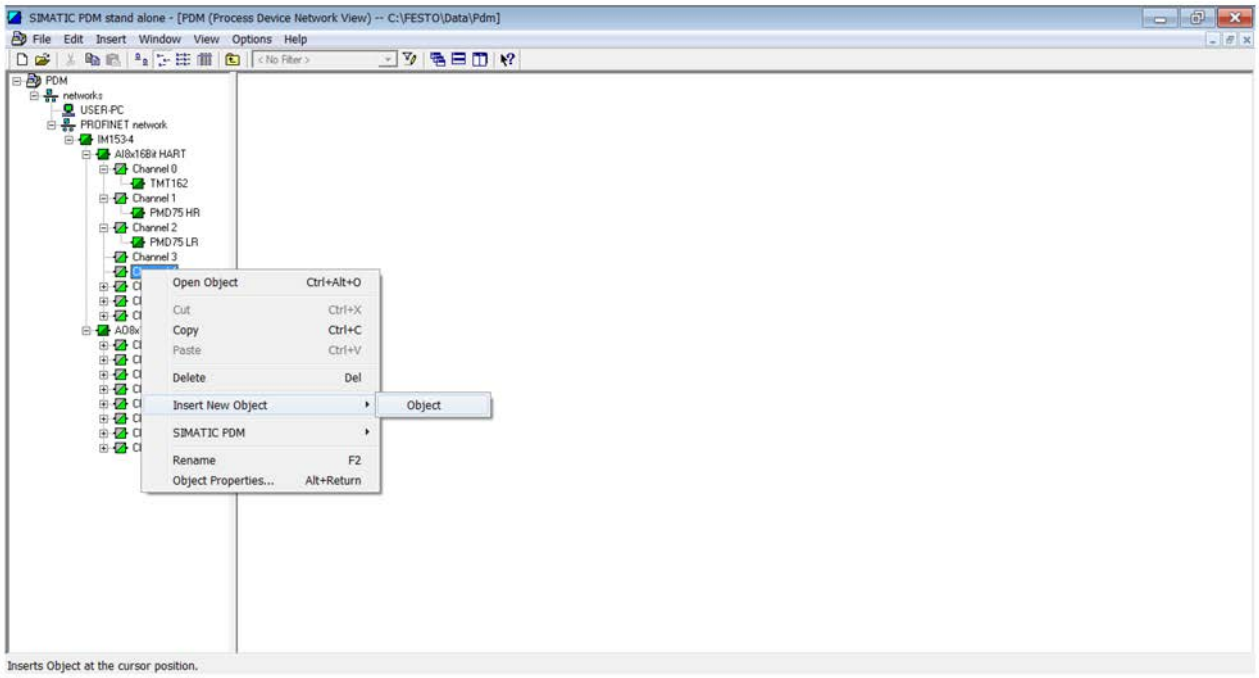


Figure 43: Adding a new device.

The Insert Object window opens for the selected channel, as shown in the following figure.

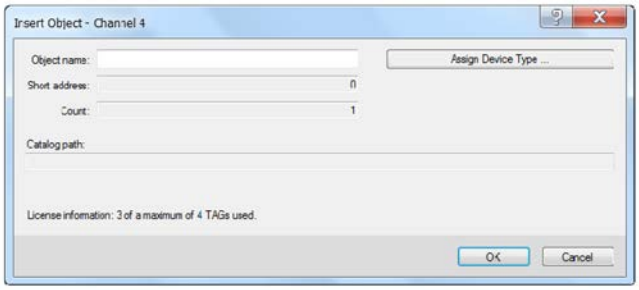


Figure 44: Insert Object window.

Click Assign Device Type to open the list of available devices, organized by manufacturer. Select the device type and revision that match your equipment. If necessary, check the revision on the device. Click OK to confirm.

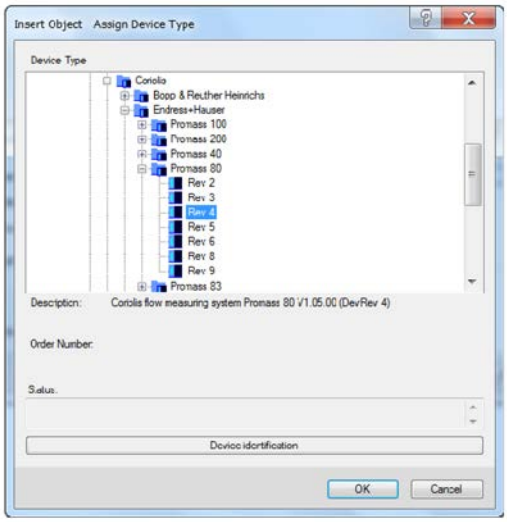


Figure 45: Selecting a device type.

Removing or reassigning a device

To remove a device from the manager, right-click its name and select Delete. To reassign it, select SIMATIC PDM ▶ Device selection (Reassign), as shown in the following figure.

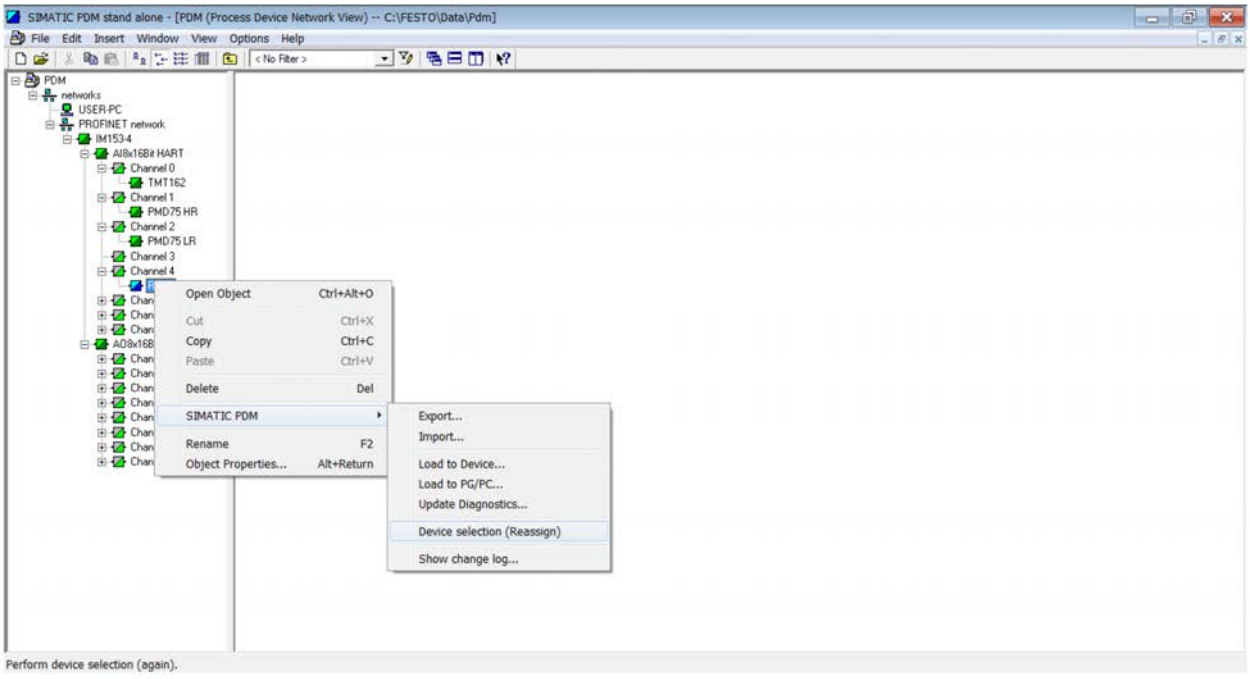


Figure 46: Reassigning a device.

© Festo Didactic

Setting Up Siemens Equipment

Starting the HMI for the first time

Depending on your training system, the HMI may be a Siemens IPC (SIMATIC IPC477E) or a standard desktop computer. The instructions in this course apply to both.

1. Before using the Siemens HMI for the first time, transfer the software licenses from the USB key supplied with the system to the HMI. This transfer is required only once.

2. Connect the USB key containing the Siemens licenses to the HMI.

3. If the HMI interface is running, close it. Then click the Automation License Manager icon on the desktop.

4. In Automation License Manager, select the USB key from the drive list on the left. The available licenses appear.

5. Select all available licenses.

6. From the License Key menu, select Transfer. The Transfer License Key window opens.

7. In the Transfer License Key window, select C: as the target drive and click OK.

   The Siemens software licenses are now stored on the HMI hard drive, allowing you to run the licensed software without restrictions.

   If your HMI is a SIMATIC IPC477E, the latest drivers and tools are available as a PDT (Panel Drivers and Tools) file from the Siemens Industry Online Support portal.

   - Go to the Siemens Industry Online Support portal.
   - Search for panel drivers and tools for the SIMATIC IPC477E.
   - If you need to update the SIMATIC IPC477E drivers or tools, download the applicable PDT file.

   Keep the PDT file on your computer for use later in the course exercises.

© Festo Didactic

Connecting the equipment

1. The HMI application must communicate with the other Siemens devices to work properly. Make sure all Siemens devices are powered.

2. Connect PLC input 0 to a switched 24 V dc output on the electrical unit of the Instrumentation and Process Control Training System. Pressing the emergency button removes power from the switched output jacks. For details, see the training system and PLC user guides.

3. With all Siemens equipment powered, connect each device to the Ethernet switch as shown in the following figure.

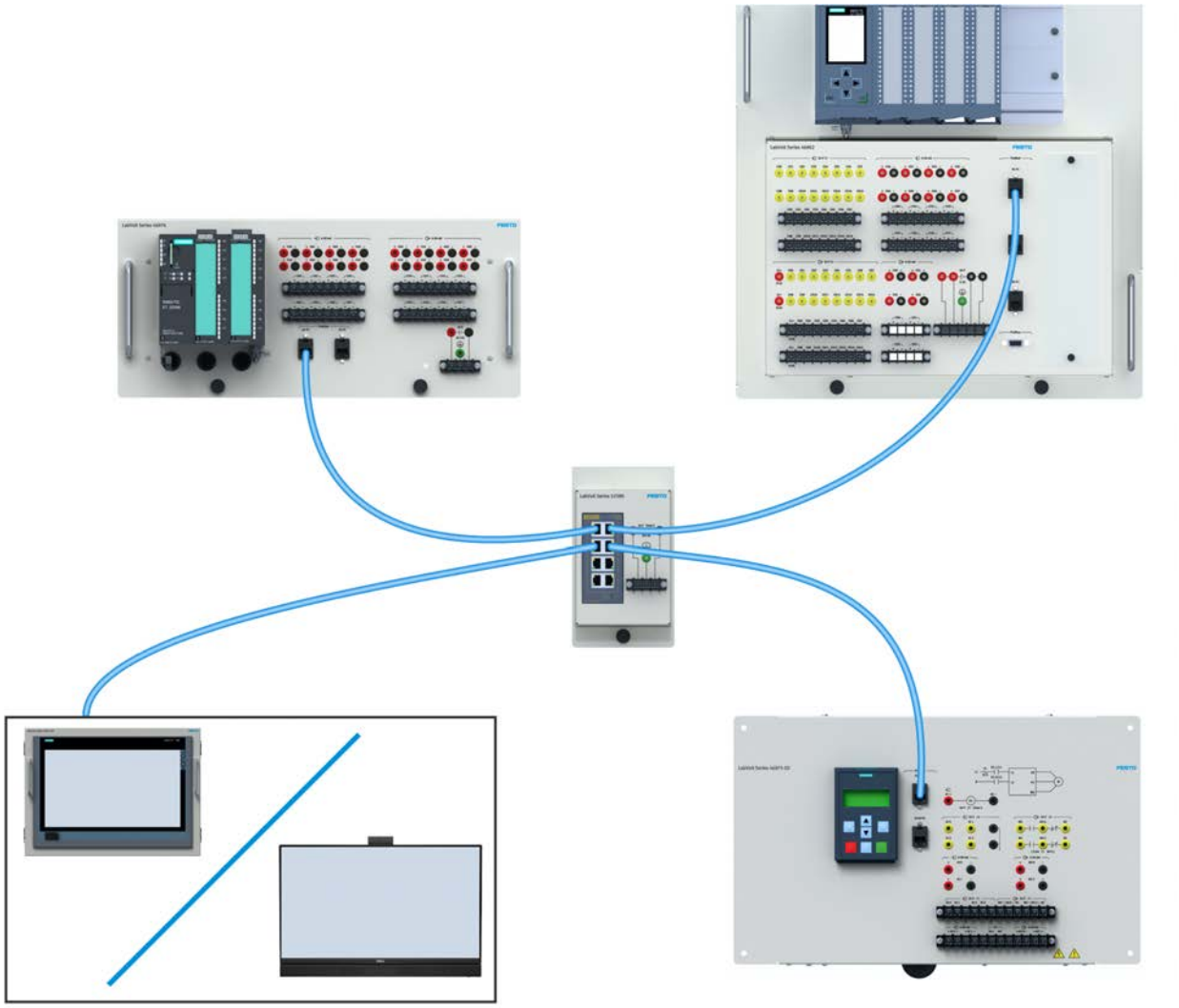


Figure 47: PROFINET network setup.

© Festo Didactic

4. For the HMI to communicate with the Siemens devices, set each device's IP address as shown in the following table. For instructions, see the user guide for each device.

Table 3: Network settings for Siemens devices.

Name	Model	Ip address	Subnet mask
PLC X1	46962	10.10.11.10	255.255.0.0
PLC X2	46962	192.168.1.1	255.255.0.0
Distributed I/O	46976	10.10.11.11	255.255.0.0
Drive 1	46975-E	10.10.11.12	255.255.0.0
Drive 2	46975-E	10.10.11.13	255.255.0.0
HMI	46973-A	10.10.11.15	255.255.0.0
Other PC		10.10.11.16	255.255.0.0

© Festo Didactic

FESTO

User Guide

Human-Machine Interface – Siemens SIMATIC

CE Importer:
Festo Didactic SE
Rechbergstr. 3
73770 Denkendorf
Germany
Tel.: +49 711 3467-0
did@festo.com

US Importer:
Festo Didactic Inc.
607 Industrial Way West
Eatontown, NJ 07724
United States
Tel.: +1 732 938-2000
Toll Free: +1-800-522-8658
services.didactic@festo.com

CA Manufacturer:
Festo Didactic Ltée/Ltd
675, rue du Carbone
Québec (Québec) G2N 2K7
Canada
Tel.: +1 418 849-1000
Toll Free: +1-800-522-8658
services.didactic@festo.com

UK Importer:
Festo Ltd
Applied Automation Centre
Brackmills
Northampton, NN4 7PY
United Kingdom
T +44 800 626 422
info_gb@festo.com

www.festo.com

0000590101000000000100