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S7-1200: Basic Controller with Advanced Functions

Online Diagnostics and Maintenance Functions

Getting Online

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Online Diagnostic & Maintenance Features
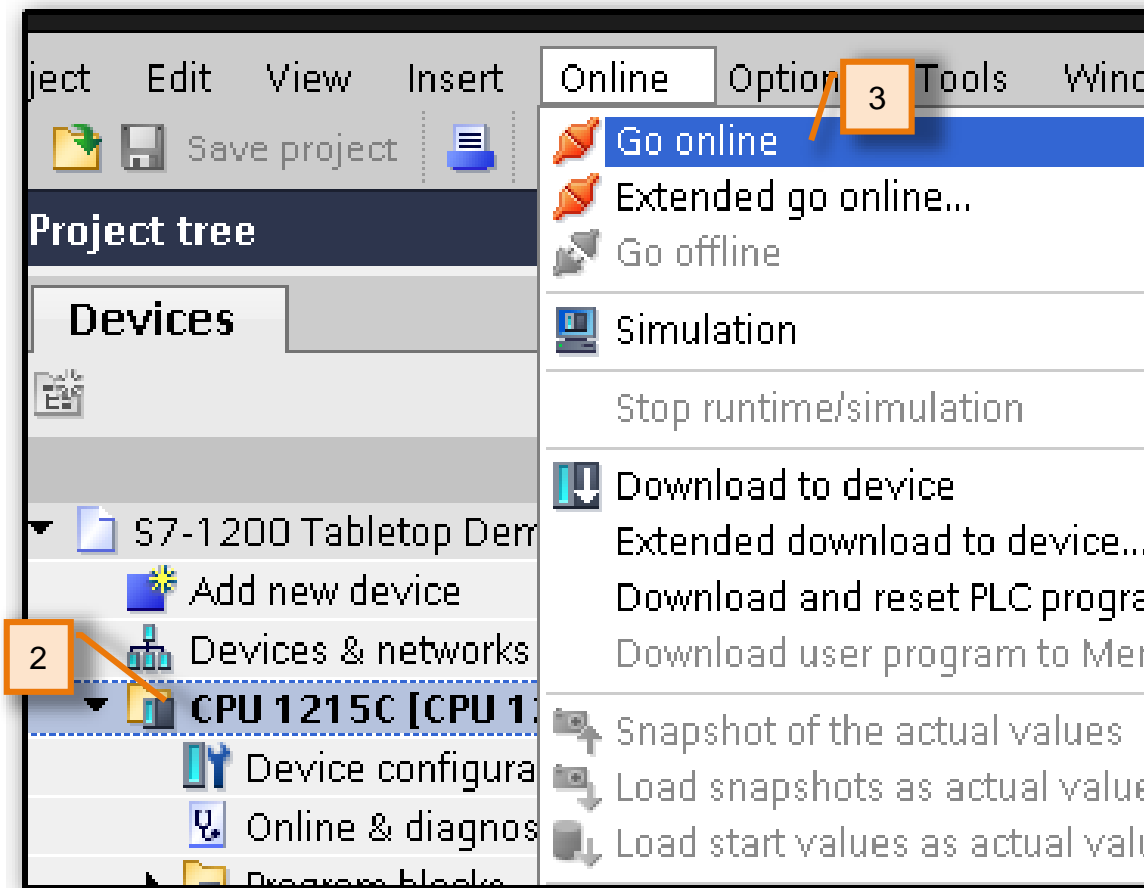## Getting online

1. Open the project called *'S7-1200 Tabletop Demo KTP700 V3.ap16'* by double clicking on it on the "recent projects" list.

   If the project does not appear in the list, press Browse and navigate to the *"\Desktop\S7-1200 Event\S7-1200 Tabletop Demo V16 KTP700 V3.ap16"*

2. Click the "Open" Button.

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Online Diagnostic & Maintenance Features
Getting online

1. **Save project under a different name/directory.**

2. Select the CPU in the project Tree

3. Select "Go online" in the "Online" menu

   Note:

   If the device has already been connected online, the online connection is automatically established using the previously specified settings.

   If there was no previous connection or if the device address is not located in the same subnet of the laptop, the "Go online" window opens.

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Online Diagnostic & Maintenance Features
Getting online

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Select the connection path:

1. Select the "PN/IE" type of interface from the "Type of the PG/PC interface" drop-down list.

2. Select the appropriate interface of your laptop from the "PG/PC interface" drop-down list. If you are unsure which to use, consult your instructor.

3. Select the "Direct at slot '1 X1' " interface from the "Connection to interface/subnet" drop-down list.

4. Select "Show all compatible devices" from the dropdown above the device list

5. Click the "Start search button.
    Devices which can be reached by the set connection path are displayed in the table of the target devices. The connection line in the graphic on the left is displayed as solid.

6. Select the target device in the table

7. confirm the selection with clicking "Go online".

Result: The online connection to the selected PLC is established.

Online Diagnostic & Maintenance Features
Getting online

After the online connection has been established successfully, the user interface changes. The following shows if a device connected online and the corresponding user interface:

1. The title bar of the active window gets an orange background as soon as at least one of the devices currently displayed in the editor has been successfully connected online.

2. The title bars of inactive windows for the relevant station now have an orange line below them.

3. An orange, pulsing bar appears at the right-hand edge of the status bar. If the connection has been established but is functioning incorrectly, an icon for an interrupted connection is displayed instead of the bar.

4. The left column in the project tree indicates the diagnostics status for hardware objects in online mode through symbols.

5. The right column in the project tree indicates the comparison status for software objects in online mode through symbols. A comparison of the online and offline state is performed automatically. Differences between online and offline objects are displayed in the form of symbols.

6. The "Online Tools" task card displays active runtime diagnostic information and the ability to control the operating mode of the CPU between RUN, STOP, and MRES (reset memory to default values)

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Editing Online Blocks

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Many times it is necessary to modify program logic in the CPU while keeping it in the "RUN" state so as not to disrupt other tasks/operations in the process. This is process of editing program logic, downloading, then maintaining the "RUN" status is and has always been possible in the S7 family of programmable controllers – for the S7-1200 controller this still holds true.

The program of a block can only be changed in the offline version. Therefore, If you wish to modify the online version, you must carry out the change in the offline version and subsequently download the changed block(s) to the CPU. Upon the next PLC scan cycle, the CPU will run with the new program changes.

Note: The only changes that require a CPU stop are "hardware configuration" changes (network settings, security settings, rack configuration, etc.). Therefore, changes which are considered 'program changes' (program logic, tag names and addresses, data block structures, etc.) do not require a "STOP" of the CPU.

Online Diagnostic & Maintenance Features
Editing Online Blocks

To edit an online block, follow these steps:

1. Ensure you are online with the CPU (See 'getting online')

2. Double-click the block to be edited, in this case we will use Main (OB1) *Program blocks > Demo > Main[OB1]*

3. Monitor the block by clicking the 'monitor on/off' icon in the LAD editor toolbar

4. Click on Network 1.

5. Click the 'insert network' icon in the LAD editor toolbar

    > Notice the block is no longer monitoring 'online'. This is because edits must be performed offline, then subsequently downloaded. Also notice there is now a 'difference' vs online (running) CPU program, as indicated in the project tree with an icon

6. Add logic as shown into the new network

7. Click Download icon in the TIA Portal toolbar.

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Online Diagnostic & Maintenance Features
Editing Online Blocks

After clicking download, the software will compile and a "Load Preview" dialog appears.

1. Click 'Load'

   ! Notice the CPU did not go into "STOP" during the loading process and the project tree now indicates consistency between online and offline projects.

2. Click 'monitor on/off' icon in the LAD editor toolbar and notice the changes have been adapted and running.

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System Diagnostics

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System diagnostics

Trace

Webserver

Teleservice

In a plant a lot different faults can occur. The TIA Portal offers many ways of diagnosing of these faults.

These include the integrated System diagnostics. The system diagnostics are automatically setup when a device is configured -You don't need to write a single line of code.

If an overvoltage or short circuit on a channel occurs, for example, the device automatically detects the fault and sends the associated diagnostics data to the controller. The controller then displays the fault information via all display media, which enables you to localize the fault and troubleshoot very quickly.

Since system diagnostics are standard and integrated into the firmware, system faults are actively monitored despite the PLC operating mode (i.e. RUN / STOP).

We will explore the different methods to view system diagnostic messages including
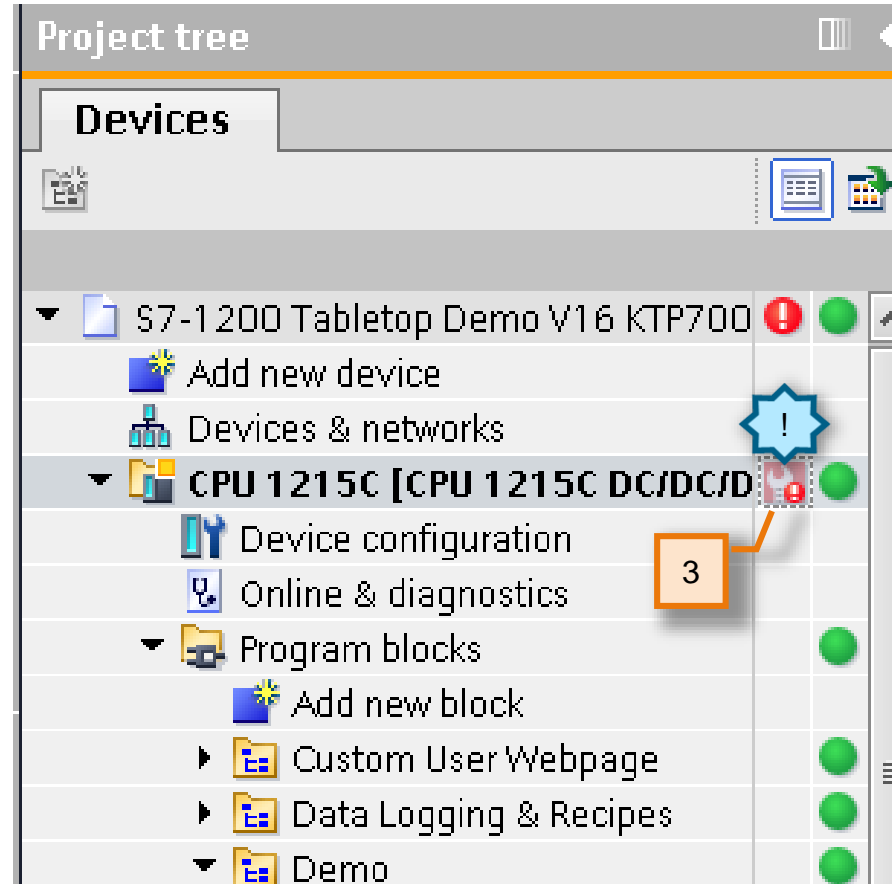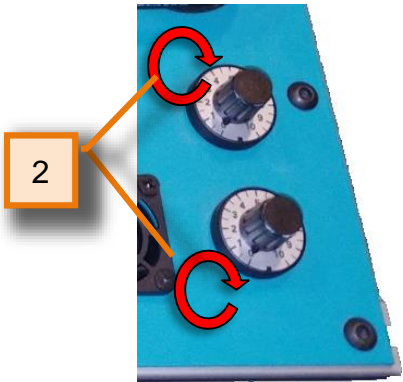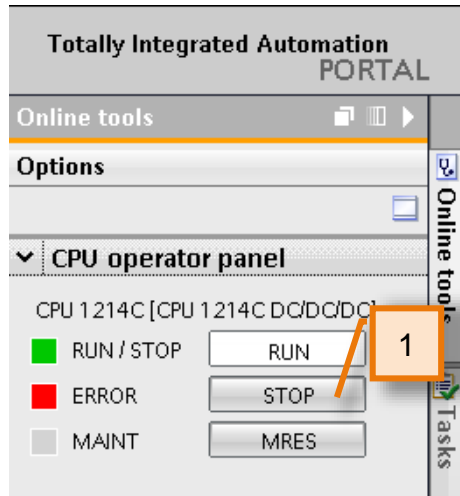
From within TIA Portal

From the SIMATIC HMI

From the integrated Web Server of the CPU

Online Diagnostic & Maintenance Features
System Diagnostics via TIA Portal

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1. While still connected Online in TIA Portal, go to "Online tools" task bar and put the CPU in STOP

2. On the Tabletop demo, rotate the potentiometers clockwise as far as they physically can.

   This will generate an overvoltage fault on the analog input channel(s)

   Notice the fault indicator in the project tree, the "ERROR" LED flashing on the CPU and the CPU operator panel in the Online tools task card within TIA Portal.

3. Double-click on the fault indicator. You should be directed to "Online & Diagnostics" in the editor window.

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Online Diagnostic & Maintenance Features
System Diagnostics via TIA Portal

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1. Navigate to the Diagnostics buffer.

2. Select the latest incoming diagnostic fault message, denoted by the "incoming envelope" symbol

3. Notice the fault description in the "Help on event" section below and extended description with recommended remedy.

4. Rotate analog potentiometers counter-clockwise to remove the overvoltage condition.

! Notice the ERROR LEDs stop flashing and the diagnostic message appears as an outgoing event in the diagnostics buffer, as indicated b the "outgoing envelope" symbol

! Also note: the PLC is still in STOP confirming that system diagnostics are integrated into the firmware with no programming needed

Online Diagnostic & Maintenance Features
System Diagnostics via Integrated Web Server

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The S7-1200 CPU has the ability to host an integrated web page. This integrated web server supports many functions. Among those functions, you can also see the system faults in the diagnostic buffer page. To view the system faults from the integrated web server, follow the following steps:

1. On your laptop, open the web browser of choice (Chrome, Firefox, Internet Explorer).

2. Type 192.168.0.10 into the address bar. This is the IP address of the S7-1200 controller. Click "Enter" when seeing the S7-1200 intro splash page

3. Navigate to "Diagnostic Buffer". Trigger the overvoltage fault via the analog potentiometers and notice the incoming and outgoing fault messages.

   Note the webpage is designed to update every 5s. If the diagnostics message does not immediately appear, waits 5s for the page to refresh automatically or you can refresh the page manually

4. Navigate to the "Module Information" tab. Notice the fault status of the CPU.

5. Navigate to the analog input channel by clicking on "Details" where a fault is indicated

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Online Diagnostic & Maintenance Features
System Diagnostics via HMI

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S7-1200: Compact Controller with Advanced Capabilities

State	...	Lot Number	Operator	...	⊘
Idle		**10005**			

Diagnostic overview \ Diagnostic buffer view

No.	Date	Time	Event
1	6/6/2020	3:07:23 PM	High limit exceeded
2	6/6/2020	3:06:50 PM	High limit exceeded
3	6/6/2020	3:06:49 PM	High limit exceeded
4	6/6/2020	3:06:25 PM	High limit exceeded
5	6/6/2020	3:06:08 PM	High limit exceeded
6	6/6/2020	3:05:35 PM	High limit exceeded
7	6/6/2020	3:05:34 PM	High limit exceeded
8	6/6/2020	3:01:42 PM	High limit exceeded
9	6/6/2020	3:01:41 PM	High limit exceeded
10	6/6/2020	3:00:55 PM	High lim
11	6/6/2020	3:00:54 PM	High lim
12	6/6/2020	3:00:52 PM	High lim
13	6/6/2020	3:0 PM	High lim

2

1

3

Diagnostic overview \ Diagnostic buffer view \ Detail view

1 6/6/2020 3:07:23 PM
Error: High limit exceeded on Input channel 1
CPU 1215C / CPU 1215C.AI 2/AQ 2_1

- ...

For sensors: The measured value exceeds the measuring range.
For actors: The output value exceeds a high limit value.

!

1. On the HMI, open the diagnostics screen as shown

2. Trigger the overvoltage fault via the analog potentiometers and notice the incoming fault message "High limit exceeded".

3. Select the fault message and expand details by clicking the → arrow at the bottom of the diagnostic buffer window

! Notice the detailed diagnostic information in plain text. No cryptic "error codes" to cross reference!

Integrated Signal Trace

Online Diagnostic & Maintenance Features
Integrated Trace

System diagnostics

Trace

Webserver

Teleservice

The trace function can be used for localizing sporadic faults.

In the past, analyzing errors involved wiring and monitoring each individual device separately to oscilloscopes, for example. However, now the integrated trace function of the S7-1200 and TIA Portal can handle this task for you.

Trace recording is handled within the S7-1200 CPU firmware. This means you are able to record highly dynamic signals without missing a single scan or trigger - also, no extra hardware is required!

The recordings are saved in the system memory of the CPU or optional SIMATIC Memory Card (SMC - if used). If the optional SMC is used and the trace is configured to save to the memory card, the measurement can then be uploaded to a laptop to be analyzed, saved or converted to CSV format, if needed.

Online Diagnostic & Maintenance Features
Integrated Trace

1. Expand the "Traces" folder in the project tree.

2. Double-click on the already-configured offline trace "MyTrace" to open the configuration screen in the work area.

3. Transfer the trace configuration to the PLC By clicking the ⬇ button in the trace toolbar.

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Online Diagnostic & Maintenance Features
Integrated Trace

Notice the Work Area now shows a scaled trace window with various toolbar options at the top. The following describes the different toolbar options:

Transfer the trace configuration to the device (you already did this in previous page)

Transfer the configuration from the device to your TIA Portal project

Monitor on/off

Activate recording
Note: By activating recording, you are essentially monitoring the tags in real-time. The trace will not be measured/saved until recording is activated in TIA Portal and the trigger condition is met (if configured). Once the trigger condition is met, then recording of the measurement will proceed until the recording duration is met. However, if you have a memory card and configured the trace to save the measurements on memory card, then TIA Portal does not need to be connected in order to record & measure the values once the trigger condition is met..

Deactivate recording

Delete installed trace from device

Automatically repeat trace

Transfer the recorded measurement from the device to the offline TIA Portal project

Export trace configuration (i.e. for use in further TIA Portal projects)

Export measurement with the settings from the current view

Online Diagnostic & Maintenance Features
Integrated Trace
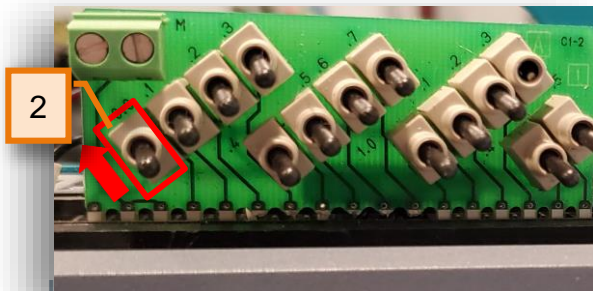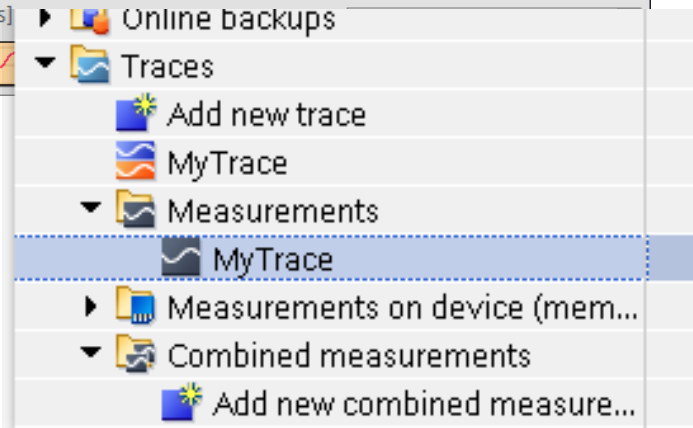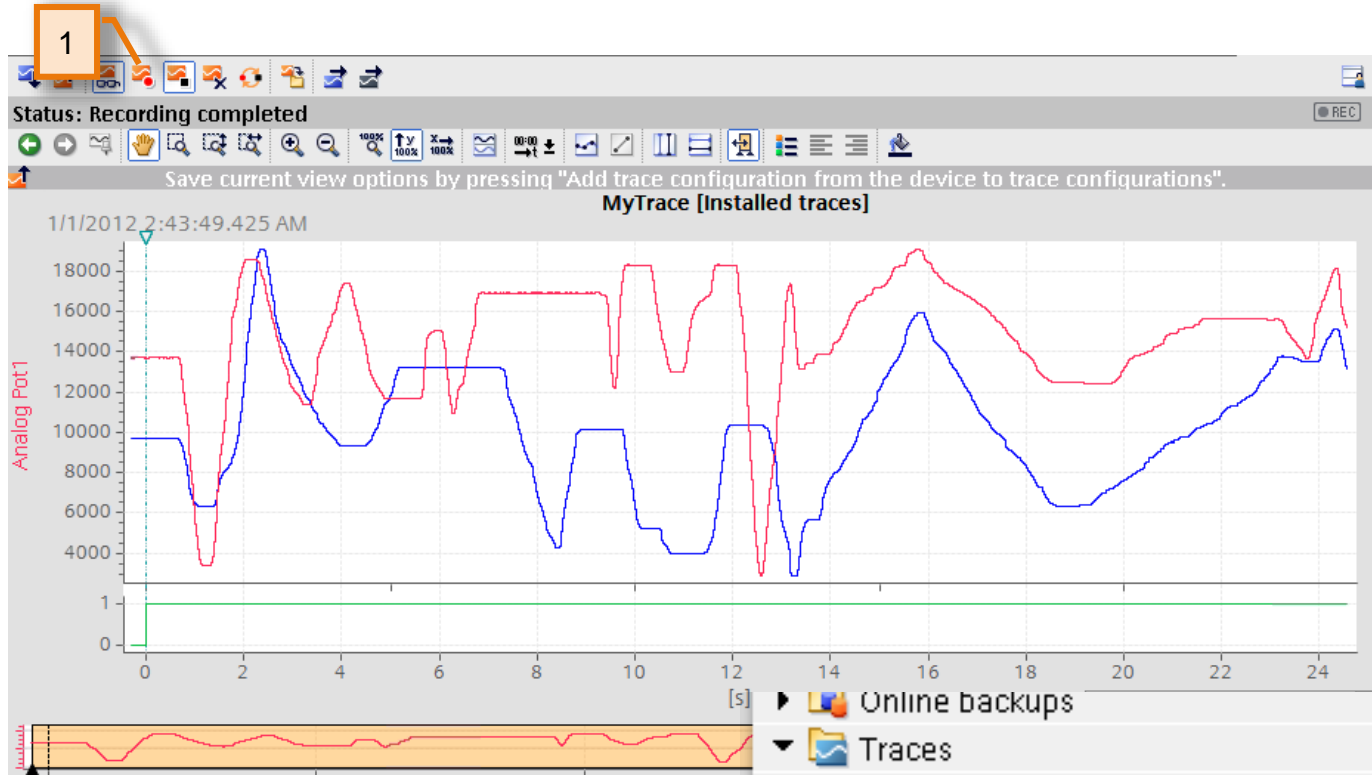
Now we will begin the trace recording and measurement:

1. Click the "Activate Recording" button in the trace toolbar. (If this is greyed out, select the "Monitor on/off" button first)

   Notice below the trace toolbar the status of the recording shows "Waiting for trigger". If you rotate the analog potentiometers on the demo, you can see the values changing. However, no measurements are being recorded because the system is waiting for the trigger condition to be met.

2. Switch on the first switch on the input simulator board. If the switch is already in the "ON" position, then switch off and then on again (trigger condition is set to "rising edge").

   Notice the status bar changed from "Waiting for trigger" to "Recording"

3. After switching on, randomly rotate the analog potentiometers on the demo until the measurement stops recording (about 20s) or until you hit the "deactivate recording" button in the trace toolbar.

4. Export the recording to TIA Portal by clicking the "Add to measurements" button on the trace toolbar.

At this point you can analyze the trace within TIA Portal by double-clicking on the recorded trace measurement in the "Measurements" folder in the project tree or export the recorded values to a .csv file format for further analysis in other tools such as Microsoft Excel.
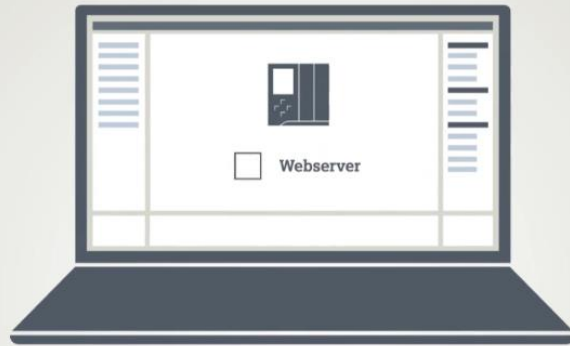
Integrated Web Server

Online Diagnostic & Maintenance Features
Integrated Web Server

System diagnostics   Trace   **Webserver**   Teleservice

The web server enables monitoring and administering of the CPU by authorized users over a connected network. This allows evaluation and diagnostics over long distances without the need for TIA Portal – all you need is a web browser.

The integrated Web Server of the S7-1200 provides the following functions:
- Troubleshooting & diagnostic information
- Update firmware
- Backup/restore
- Monitor/modify tags
- Access data logs
- Access recipe files
- Create/operate custom webpage
- Upload/download custom files (manuals, prints, supporting documentation, etc.)

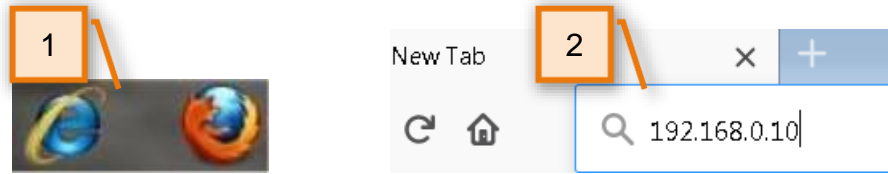The web server offers the following security functions:
- Access via secure SSL/TLS transmission (Port 443)
- User authorization by means of custom user list
- Customizable access restrictions from certain web server functions

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Online Diagnostic & Maintenance Features
Integrated Web Server

1. In order to access the web server of the S7-1200 CPU, we open any web browser on a PC that is connected to the CPU via TCP/IP (i.e. Chrome, Firefox, Internet Explorer, etc.)

2. In the browser address bar, type the IP address of the CPU (http://192.168.0.10)

3. On the displayed webpage click 'ENTER'

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Online Diagnostic & Maintenance Features
Integrated Web Server – Start Page

On the 'Start Page' we see general information about the PLC and its status.

You can also switch to the integrated web server of the CP 1243-1 module via the connected interface.

We can also change the operating mode of the CPU (This can be disabled for certain users – see 'Security features' module).

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Online Diagnostic & Maintenance Features
Integrated Web Server - Diagnostics

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S7-1200 station_1 / PLC_1

11:27:3

Username

Login

Diagnostics

[!]

| Identification | Program protection | Memory |

- Start Page
- **Diagnostics**
- Diagnostic Buffer
- Module Information
- Communication
- Tag status
- Watch tables
- Online backup
- Data Logs
- User Files
- User-defined pages
- File Browser

- Introduction

Order Identification:

Plant designation:

Location identifier:

Serial number: S C-E4S21500

Order number:

Hardware: 6ES7 214-1AG40-0XB0

Version:

Hardware: 1

Firmware: V04.04.00

Diagnostics

[!]

| Identification | Program protection | Memory |

Know-how protection:

Know-how protection: Not present

Binding:

CPU serial number: No binding

Memory card serial number: No binding

Program copy to memory card:

From internal load memory: Enabled

[!]

| Identification | Program protection | Memory |

Load memory

0.4% in use

Free: 3.98 MB / Total: 4.00 MB

Work Memory

0.0% in use

Free: 99.98 KB / Total: 100.00 KB

Retentive memory

0.0% in use

Free: 10.00 KB / Total: 10.00 KB

Under 'Diagnostics' we see diagnostic information on the CPU such as Identification & Maintenance data (I&M data) such as 'Plant designation' and 'Location identifier'. In addition, order number, installed firmware, and program information via separate tabs.

Online Diagnostic & Maintenance Features
Integrated Web Server – Diagnostics Buffer

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The 'Diagnostic Buffer' page displays descriptive information for all events in the CPU. Diagnostic events are recorded in a circular buffer. The most recent event is displayed in the top line.

Username _____   Login

Diagnostic Buffer
Diagnostic buffer entries 1-25 ▼

Number	Time	Date	Status	Event
1	05:37:23 pm	5/15/2020	Incoming event	High limit exceeded
2	05:36:59 pm	5/15/2020	Incoming event	New startup information - Current CPU operating mode: STOP
3	05:36:58 pm	5/15/2020	Incoming event	Follow-on operating mode change - CPU changes from STOP to STOP mode
4	05:36:57 pm	5/15/2020	Incoming event	New startup information - Current CPU operating mode: STOP
5	05:36:54 pm	5/15/2020	Outgoing event	High limit exceeded
6	05:29:47 pm	5/15/2020	Incoming event	High limit exceeded
7	05:29:39 pm	5/15/2020	Outgoing event	High limit exceeded
8	05:29:36 pm	5/15/2020	Incoming event	New startup information - Current CPU operating mode: STOP
9	05:29:36 pm	5/15/2020	Incoming event	Communication initiated request: STOP - CPU changes from RUN to STOP mode
10	05:28:50 pm	5/15/2020	Incoming event	High limit exceeded
11	05:28:43 pm	5/15/2020	Outgoing event	High limit exceeded
12	01:31:39 am	1/1/2012	Incoming event	Follow-on operating mode change - CPU changes from STARTUP to RUN mode
13	01:31:39 am	1/1/2012	Incoming event	Communication initiated request: WARM RESTART - CPU changes from STOP to STARTUP mode
14	01:31:39 am	1/1/2012	Incoming event	New startup information - Current CPU operating mode: STOP
15	01:31:36 am	1/1/2012	Incoming event	New startup information - Current CPU operating mode: STOP

Details:1

Error: High limit exceeded
HW_ID= 263, Input channel number   1

Incoming event

Navigation menu (left side):
- ▸ Start Page
- ▸ Diagnostics
- ▸ **Diagnostic Buffer**
- ▸ Module Information
- ▸ Communication
- ▸ Tag status
- ▸ Watch tables
- ▸ Online backup
- ▸ Data Logs
- ▸ User Files
- ▸ User-defined pages
- ▸ File Browser

Online Diagnostic & Maintenance Features
Integrated Web Server – Module Information

The 'Module Information' page will display the status of individual modules of our S7-1200 station and remote IO (when applicable).

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Online Diagnostic & Maintenance Features
Integrated Web Server – Communication

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SIMATIC 1200 Station_1 / CPU 1215C

> In the "Communication" page you can see details about the communication settings and statistics.

Username
Login

- ▸ Start Page
- ▸ Diagnostics
- ▸ Diagnostic Buffer
- ▸ Module Information
- ▸ **Communication**
- ▸ Tag status
- ▸ Watch tables
- ▸ Data Logs
- ▸ User Files
- ▸ User-defined pages
- ▸ File Browser
- ▸ Introduction

Communication

| Parameter | Statistics | Connection resources | Connection |

PROFINET Interface [X1]

Network connection:

MAC address: E0-DC-A0-B5-FD-5F
Name: cpuxa1215cd4d4

IP parameter:

IP Address: 192.168.0.10
Subnet mask: 255.255.255.0
Default router: 0.0.0.0
IP settings: IP address set in project

Physical properties:

Port number	Link status	Settings	Mode
X1 P1	OK	Automatically	100 MBit/s full-duple
X1 P2	disconnected	Automatically	10 MBit/s half-duple

| Parameter | **Statistics** | Connection resources | Connection status |

Total statistics

Sent data packages:

Sent without errors: 88869339 Bytes
Collision during sending attempt: 0
Canceled due to other errors: 0

Received data packages:

Received without errors: 64152081 Bytes
Rejected due to error: 0
Rejected due to resource bottleneck: 0

X1 P1

Sent data packages:

Sent without errors: 88869339 Bytes
Collision during sending attempt: 0
Canceled due to other errors: 0

Received data packages:

Received without errors: 64152081 Bytes
Rejected due to error: 0

| Parameter | Statistics | **Connection resources** | Connection |

Number of connections:

Maximum connections: 128
Connections not in use: 123

Connections:	reserved	in use
ES communication	4	0
HMI communication	12	0
S7 communication	8	0
OpenUser communication	8	0
Web communication	0	5

Parameter	Statistics	Connection resources	**Connection status**
State			Local ID (Hex)
✅ Connection is established			0

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Online Diagnostic & Maintenance Features
Integrated Web Server – Tag Status

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03:18:15 pm   1/1/2012   PLC

In the 'Tag Status' page, you can modify or view individual tags status (like a watch table).

Tag status

Username

Login   ⟳ Off 🖨

- Start Page   Enter the address of a tag here which you want to monitor/modify

- Diagnostics

Address	Display Format	Monitor Value	Modify Value	⚡
Q0.3	BOOL ▼	☐ false		Go
I0.0	BOOL ▼	☑ true		Go
New variable	▼			

- Diagnostic Buffer

- Module Information

- Communication   Refresh   Apply

- **Tag status**

- Watch tables

- Data Logs

- User Files

- User-defined pages

- File Browser

Online Diagnostic & Maintenance Features
Integrated Web Server – Watch Tables

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SIEMENS | SIMATIC 1200 Station_1 / CPU 1215C

03:29:10 pm 1/1/

> The 'Watch Tables' page allows you to monitor or modify tag values from 'watch tables' that are created within TIA Portal.

Username
Login

Watch tables

Conveyor ▼

- ▸ Start Page
- ▸ Diagnostics
- ▸ Diagnostic Buffer
- ▸ Module Information
- ▸ Communication
- ▸ Tag status
- ▸ **Watch tables**
- ▸ Online backup
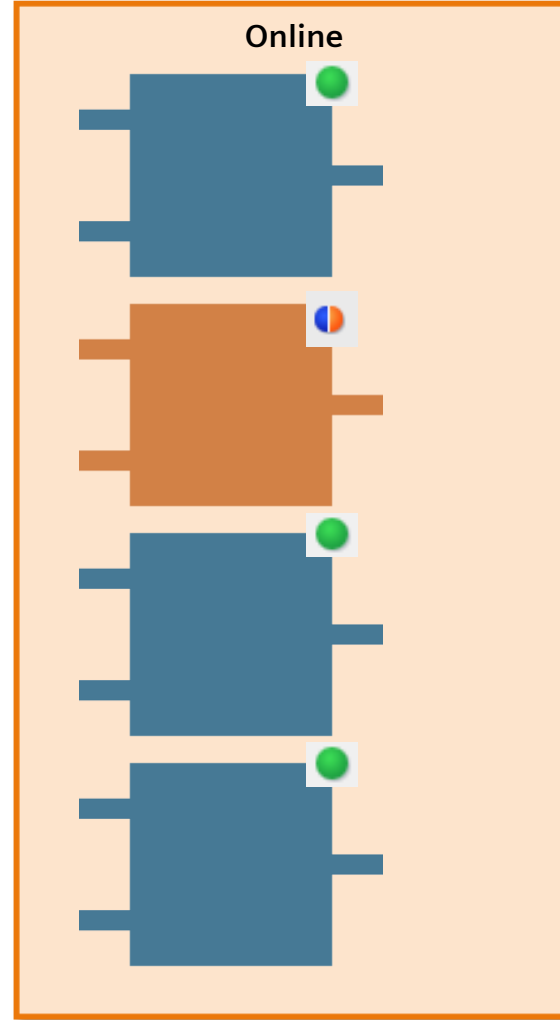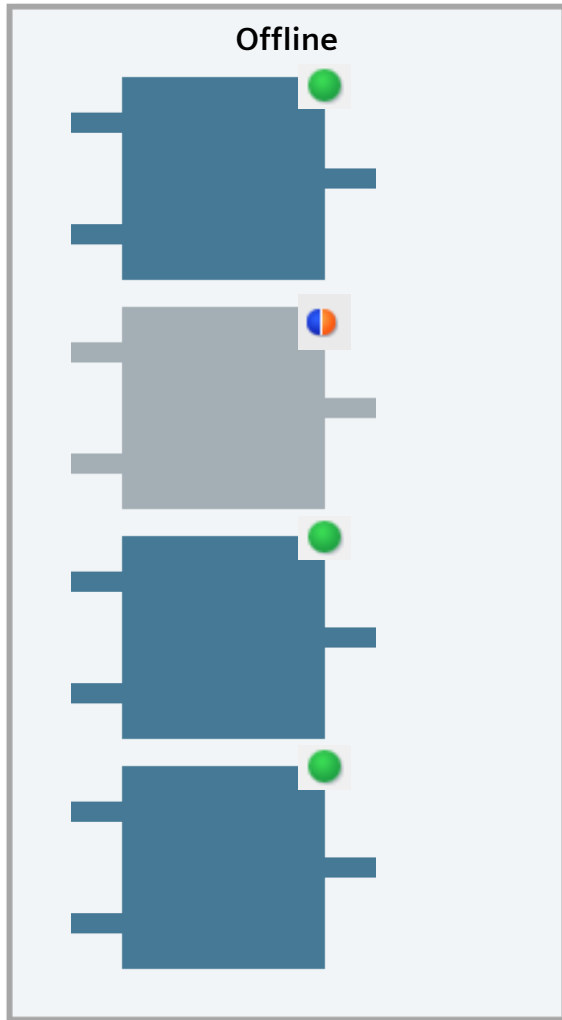- ▸ Data Logs
- ▸ User Files
- ▸ User-defined pages
- ▸ File Browser

Name	Address	Display Format	Monitor Value	Modify Value	⚡	Comment
"Conveyor_Prox_Min"	%I8.4	BOOL ▼	☐ false		Go	
"Conveyor_Prox_Home"	%I8.5	BOOL ▼	☐ false		Go	
"Conveyor_Prox_Max"	%I8.6	BOOL ▼	☐ false		Go	
"Conveyor_Encoder"	%I0.2	BOOL ▼	◼ true		Go	
"Conveyor_Encoder_1"	%I0.3	BOOL ▼	◼ true		Go	
"Conveyor_Encoder_Count"	%ID1004	DEC+/- ▼	0		Go	
"Conveyor_Home_Switch"	%I0.6	BOOL ▼	☐ false		Go	
"Conveyor_Lo_Switch"	%I0.5	BOOL ▼	☐ false		Go	
"Conveyor_Hi_Switch"	%I0.7	BOOL ▼	☐ false		Go	
"Conveyor_Pulse"	%Q0.0	BOOL ▼	☐ false		Go	
"Conveyor_Direction"	%Q0.1	BOOL ▼	☐ false		Go	
"Conveyor_iDB"."Conveyor Enable"		BOOL ▼	☐ false		Go	
"Conveyor_iDB".Conveyor_Encoder_Count		DEC+/- ▼	0		Go	
"Conveyor_iDB".Conveyor_HSC_Addr		▼	⚠			
"Conveyor_iDB".Conveyor_Homing_Mode		DEC+/- ▼	3		Go	
"Conveyor_iDB".Conveyor_JogFWD_Command		BOOL ▼	☐ false		Go	
"Conveyor_iDB".Conveyor_JogREV_Command		BOOL ▼	☐ false		Go	
"Conveyor_iDB".Conveyor_JogVelocity_SP		Floating_Point ▼	2.274722		Go	
"Conveyor_iDB".Conveyor_Reset_Command		BOOL ▼	☐ false		Go	
"Conveyor_iDB".Conveyor_Actual_Position		Floating_Point ▼	0.0		Go	

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Online Diagnostic & Maintenance Features
Integrated Web Server – Online Backup/Restore

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SIEMENS   **SIMATIC 1200 Station_1 / CPU 1215C**

03:31:42 pm   1/1/2012 | PLC Local ▼ | | English ▼ |

Username

Login

Online backup

- ▸ Start Page
- ▸ Diagnostics
- ▸ Diagnostic Buffer
- ▸ Module Information
- ▸ Communication
- ▸ Tag status
- ▸ Watch tables
- ▸ **Online backup**
- ▸ Data Logs
- ▸ User Files
- ▸ User-defined pages
- ▸ File Browser

Backup PLC:

| Create online backup |

Restore PLC:

| Browse... | No file selected.

| Restore selected online backup |

Status:

> Under "Online backup" you can create a backup of the project in the PLC and/or restore your PLC from a previous backup file.

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Online Diagnostic & Maintenance Features
Integrated Web Server – Data Logs

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SIMATIC 1200 Station_1 / CPU 1215C

03:33:48 pm 1/1/2012   PLC Local ▼   English ▼

Username
Login

Data Logs

↻ Off 🖶

Name	Size	Changed	Active	Delete	Retrieve and clear
Production_Data.csv	835	07:56:12 pm 12/31/2011	Yes	✗	💾

▸ Start Page

▸ Diagnostics

▸ Diagnostic Buffer

▸ Module Information

▸ Communication

▸ Tag status

▸ Watch tables

▸ Online backup

▸ **Data Logs**

▸ User Files

▸ User-defined pages

The 'Data Logs' page allows you to access data log files stored in the system memory of the CPU. This can either be in the integrated CPU memory or the optional SD Card.

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Online Diagnostic & Maintenance Features
Integrated Web Server – User Files

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User: OEM
Logout

- ▸ Start Page
- ▸ Diagnostics
- ▸ Diagnostic Buffer
- ▸ Module Information
- ▸ Communication
- ▸ Tag status
- ▸ Watch tables
- ▸ Online backup
- ▸ Data Logs
- **▸ User Files**
- ▸ User-defined pages
- ▸ File Browser

User Files

Name	Size	Changed
Instruction Guide - S7-1200 Demo in a Bag.pdf	473383	11:57:20 am 3/12/2020
Passwords.txt	2134	11:59:00 am 3/12/2020
Website files - 1200.zip	262674	01:08:04 pm 2/27/2020

| Browse... | No file selected. | Upload file |

> The 'User Files' Page allows you to save and access files stored in the CPU memory or SD card.
>
> This can be user-defined files such as OEM files, electrical drawings, operations manuals, etc.

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Online Diagnostic & Maintenance Features
Integrated Web Server – Customer User-defined Webpage

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S7-1200 Tabletop Demo

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System Status

Processor Parameters

Last Scan Time	7 ms
Average Scan Time	4.92 ms
System Tick	1779378 ms

Plant Parameters

Top Analog Pot	49.58 %
Bottom Analog Pot	57.18 %
Fan Speed	0 %
Conveyor Position	0 %
Production Cycle	100 %

Production Record

Last Lot Number	10009

Custom pages are also possible to have within the integrated web server. This page(s) can be access from the "User-defined pages" page.

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Online Diagnostic & Maintenance Features
Integrated Web Server – File Browser

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The "File Browser" page allows you to access system-generated files such as recipes and data logs files.

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Block Comparison with TIA Portal

Online Diagnostic & Maintenance Features
Block Comparison

Offline

Online

It is often important to know whether the saved data or logic in your project matches what is running in the controller. For this, TIA Portal offers a unique comparison function that allows you to see detailed differences and similarities between what is offline and what is loaded on your controller (online).

You can compare the following objects of a PLC program in order to detect any differences:
- Code blocks with other code blocks
- Data blocks with other data blocks
- PLC tags of a PLC tag table with the PLC tags of another PLC tag table
- PLC data types with other PLC data types

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Online Diagnostic & Maintenance Features
Block Comparison
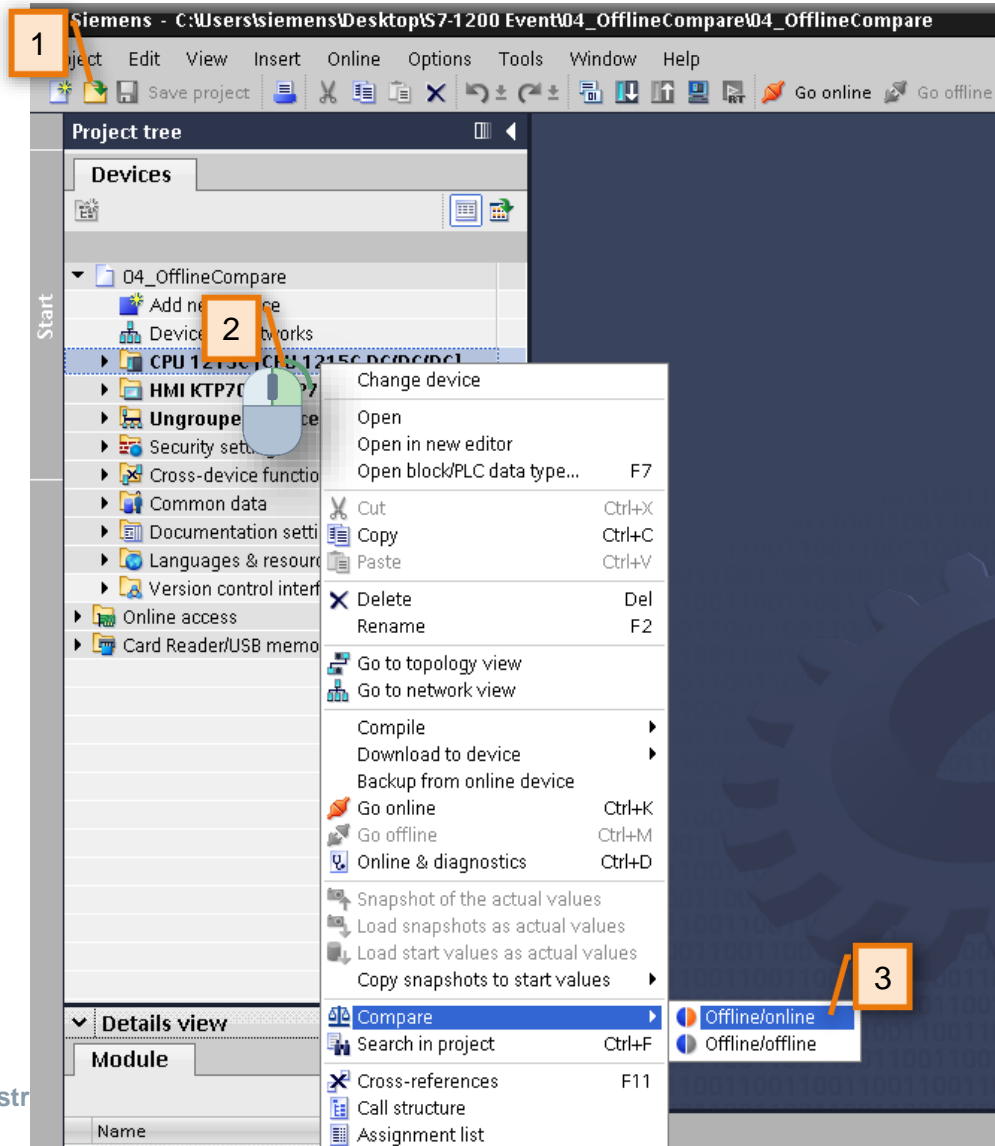
TIA Portal allows you to compare offline/online projects. To perform an offline/online comparison, follow these steps:

1. Open the following project in TIA Portal from the following directory:

   "\Desktop\S7-1200 Event\S7-1200 Tabletop Demo V16 KTP700 V3.ap16"

2. In the project tree, right-click on the PLC that you want to perform an offline/online comparison.

3. Select the "Compare > Offline/online" command in the shortcut (right-click) menu.

   Note: If you have not already established an online connection to this device, the "Go online" dialog opens. In this case, set all the necessary parameters for the connection and click "Connect". (for help, see 'getting online')

Result: The online connection is established and the compare editor opens.

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Online Diagnostic & Maintenance Features
Block Comparison

1. In the Compare editor window, select the toolbar filter icon to show only differences

2. In the compare editor window, expand the "Program blocks > Demo" folder .
   You can identify the comparison status based on the symbols in the status and action area.

   Indicates there is a difference between online and offline projects

   Indicates no differences between online and offline project

3. While in the compare editor, select the block for which you want to perform a detailed comparison.

   Notice underneath the comparison editor window, there is a summary of differences. The Compare tool validates program and compilation checksums, which are automatically generated by TIA portal

4. Click "Start detailed comparison" button   in the toolbar or select the "Start detailed comparison" command from the shortcut (right-click) menu.

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Online Diagnostic & Maintenance Features
Block Comparison

Result: One instance of the program editor will be opened for each version of the block compared and the two instances are displayed side by side.

The detailed comparison allows you to identify the exact places where versions of a block differ with synchronized scrolling and zoom.

A detailed description of all the differences are shown in the 'Comparison result' tab in the inspector window below. Here you can quickly jump to the differences by double-clicking on the description in the inspector window.

The toolbar at the top also allows you to quickly jump to differences without having to scroll manually.

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Online Diagnostic & Maintenance Features
Block Comparison

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1. Close the window of the detailed block comparison.

2. In the Comparison editor, an action can be selected for the block involved. Select the **"Download to device" action (→ Download to device)** for OB1

3. To execute the configured actions, click the toolbar icon to execute the actions. This will prompt an "Upload preview dialog".

4. Click 'Upload from device'.

   After the upload, the block(s) selected for upload should have no differences, as indicated by the green dot in the compare editor and the project tree.

   Note: you may have to reset the filter to "show all" compare results

Monitor & Modify Tags

Monitoring tag status is one the most common tools for troubleshooting programming errors, sequencing errors or testing if sensors or IO modules are faulty.

In this section we will explore the advanced online monitoring functions of tags within TIA Portal and the S-1200 controller.

Online Diagnostic & Maintenance Features
Monitor and modify tags – tag table

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The values of PLC tags can be directly monitored in the PLC tag table in online mode.

1. Double-click the corresponding PLC tag table in the project tree

2. Click the '*Monitor all*' button in the toolbar.

! The PLC tag table changes to online mode and the '*monitor value*' column is displayed. You can now monitor the tag values

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Online Diagnostic & Maintenance Features
Monitor and modify tags – data blocks (DB)

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The values of data tags can be directly monitored in the data block (DB) structure in online mode.

1. Double-click the corresponding data block (DB) in the project tree

2. Click the '*Monitor all*' button in the toolbar.

! The data block structure changes to online mode and the '*monitor value*' column is displayed. You can now monitor the tag values

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Online Diagnostic & Maintenance Features
Monitor and modify tags – watch tables

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Watch tables are another useful way to monitor or modify tag values. Watch tables contain tags whose values can be monitored and controlled during runtime. The tags can be combined in any manner so that a specially tailored watch table can be created for each test case. Tags from data blocks, peripheral I/O tags and bit memory can be used in watch tables.

1. Open the watch table '*Conveyor*' from the project tree under the folder '*Watch and force tables*'.

2. Click the '*Monitor all*' button   in the toolbar.

! The '*Monitor value*' and '*Modify value*' columns are displayed. Here you can see the current values of the configured tags and modify their values.

End of 'Online Diagnostic & Maintenance Features'

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