

# SIEMENS

SIMATIC

S7-1200

Update to the S7-1200 System Manual, edition 03/2014

Product Information

In spite of efforts to ensure the accuracy and clarity in the product documentation, some of the pages in the *S7-1200 Programmable Controller System Manual* contain information that has been identified as being incomplete, incorrect or misleading.

## Security information

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## Warning about writes from Web server Variable Status page

### WARNING

#### **Variable Status Web page can write unintended values to data block tags**

Writes to absolute data block addresses from the Variable Status Web server page can corrupt memory in the CPU.

Corrupted memory in the CPU can cause process disruption, which could result in death, severe personal injury, and/or property damage.

Do not use the Variable Status page to write to data block tags using absolute addressing of the form DBx.DB[BWDL]nn. Only write to data block tags using the data block name and tag name.

## User-defined Web pages can cause CPU to go to defective state

The S7-1200 V4.0 CPU has a memory leak such that user-defined Web pages that access data from the CPU through AWP commands can eventually consume all of the available CPU memory resources. If this happens, the user-defined Web page ceases to display and the CPU might go to defective state. Because of the memory leak, you cannot prevent the problem. To delay the possibility of the CPU defective state, you can avoid continual or frequent refreshes of user-defined Web pages. Note that this memory leak is only in the V4.0 version of the S7-1200 CPU.

## Standard Web pages cause memory leak in PC or PG

The standard Web pages use JavaScript for many of the page functions. One of the JavaScript files has a memory leak such that the Web server can eventually consume all of the available memory of the PC or PG. This situation would only likely occur if a Web server page was running continually on the PG or PC. You can take the following actions to free the memory:

- If running on HMI Panel, reset the HMI runtime by exiting and restarting the application
- If running on a PC, close the Web browser and restart the Web server
- Reboot the PG or PC

You would need to do one of these actions periodically to avoid the gradual consumption of all of the memory.

As an alternative, you could disable JavaScript from the Internet options of the Web browser of your PC. Note that without enabling JavaScript, your Web pages are limited in functionality as defined in the topic "Feature restrictions when the Internet options disable JavaScript" in the Web server chapter of the S7-1200 Programmable controller System Manual.

## AS-i V1.0 to V1.1 firmware upgrade power cycle requirement

For V4.0 S7-1200 CPUs, if using the web server or a SIMATIC Memory card to upgrade from V1.0 to V1.1 AS-i firmware, you must update the AS-i firmware in the AS-i Master CM 1243-2 according to the following procedure:

1. Download the firmware upgrade to the AS-i Master CM 1243-2.
2. When the download is complete, power cycle the S7-1200 CPU to complete the firmware upgrade process in the AS-i Master CM 1243-2.
3. Repeat steps 1 and 2 for each additional AS-i Master CM 1243-2. The S7-1200 PLC allows a maximum of three AS-i Master CM 1243-2.

## DTL (Date and Time Long) data value restriction

The maximum value for the DTL data type is reduced to correct a compatibility issue.

Table 1 From: Maximum DTL value, as stated in the system manual

Year	Month	Day	Hour	Minute	Second	Nanosecond
2554	12	31	23	59	59	999 999 999

DTL#2554-12-31-23:59:59.999 999 999

Table 2 To: New maximum DTL value

Year	Month	Day	Hour	Minute	Second	Nanosecond
2262	04	11	23	47	16	854 775 807

DTL#2262-04-11:23:47:16.854 775 807

## SIMATIC MC 32 GB

Consult with your Siemens contact or distributor for availability of the 32 GB SIMATIC Memory Card, order number 6ES7 954-8LT02-0AA00.

## RF120C Communications module

The RF120C allows Siemens RFID and code reading systems to be connected directly and easily to an S7-1200. The reader is connected to the RF120C via a point-to-point connection. Up to three communications modules can be connected to an S7-1200 to the left of the CPU. The RF120C communications module is configured via the TIA Portal. The order number for the RF120C communications module is 6GT2002-0LA00.

For more information about this product and for the product documentation, refer to the product catalog web site for the RF120C. (<http://support.automation.siemens.com/WW/view/en/78961671>)

## Monitoring execution status

When monitoring program execution status, you can see value updates for a maximum of 50 data elements. Scrolling the program block window allows you to view status for data elements of other instructions.

## Correction of relay performance data

The Typical performance data table (Table A-8) has been corrected as shown below. The number of operating cycles (typical) is 2.0 million (not 12.0 million).

Table 3 Typical performance data

Switching capacity and life of the contacts			
For ohmic load	Voltage	Current	Number of operating cycles (typical)
	230 VAC	0.5A	2.0 million

# SM 1221 DI 16 x 24 VDC connector pin locations

The connector pin locations table (Table A-108) has been corrected and is shown below.

Table 4 Connector pin locations for SM 1221 DI 16 x 24 VDC (6ES7 221-1BH32-0XB0)

Pin	X10	X11	X12	X13
1	No connection	GND	No connection	No connection
2	No connection	No connection	No connection	No connection
3	1M	2M	3 M	4 M
4	DI a.0	DI a.4	DI b.0	DI b.4
5	DI a.1	DI a.5	DI b.1	DI b.5
6	DI a.2	DI a.6	DI b.2	DI b.6
7	DI a.3	DI a.7	DI b.3	DI b.7

## Effect of data logs on memory cards

### Note

To ensure the overall performance and robustness of your system, limit the data log rate to no faster than every 200 ms.

## Calculating the size of a data log file

The data log data bytes calculation in section 8.7.2.4 is incorrect. The correct calculation is shown below.

Data log data bytes = ((data bytes in one record + time stamp bytes + 12 bytes) \* number of records)

## Maximum size rule for data log files

The maximum size of one data log file cannot exceed the free load memory size or 500 megabytes, whichever is smaller. The size of 500 megabytes in this case refers to the decimal definition of megabyte, such that the maximum data log file size is 500,000,000 bytes or  $500 \times 1000^2$  bytes.

## Data log access

### Data log access

For security reasons, the S7-1200 V4.0 CPU does not support the ability to access data logs directly from a Web browser without using the Web server. The S7-1200 V4.0 System Manual is incorrect in describing the way to access data logs directly from a Web browser (section 8.7.2.3). This method of data log access is only available for V3.0 CPUs

To access data logs, use the File Browser page of the Web server.

# Measurement ranges of the analog inputs for voltage (SB and SM)

The following table (Table A-159) has been updated to describe other uses of the value 7FFF.

Table 5 Analog input representation for voltage (SB and SM)

System		Voltage Measuring Range				
Decimal	Hexadecimal	±10 V	±5 V	±2.5 V	±1.25 V	
32767	7FFF <sup>1</sup>	11.851 V	5.926 V	2.963 V	1.481 V	Overflow
32512	7F00					
32511	7EFF	11.759 V	5.879 V	2.940 V	1.470 V	Overshoot range
27649	6C01					
27648	6C00	10 V	5 V	2.5 V	1.250 V	Rated range
20736	5100	7.5 V	3.75 V	1.875 V	0.938 V	
1	1	361.7 µV	180.8 µV	90.4 µV	45.2 µV	
0	0	0 V	0 V	0 V	0 V	
-1	FFFF					
-20736	AF00	-7.5 V	-3.75 V	-1.875 V	-0.938 V	
-27648	9400	-10 V	-5 V	-2.5 V	-1.250 V	
-27649	93FF					Undershoot range
-32512	8100	-11.759 V	-5.879 V	-2.940 V	-1.470 V	
-32513	80FF					Underflow
-32768	8000	-11.851 V	-5.926 V	-2.963 V	-1.481 V	

<sup>1</sup> 7FFF can be returned for one of the following reasons: overflow (as noted in this table), before valid values are available (for example immediately upon a power up), or if a wire break is detected.

## Upload device as new station

You can now upload a device as a new station from the Online menu.

In Online menu, the "Upload device as new station (hardware and software)" menu command uploads the hardware configuration and software from a device connected online and creates a new station in the project .

This is an alternative to detecting the configuration of an unspecified CPU and then uploading the software from the CPU as described in sections 5.2 and 6.8 of the system manual.

## Use of the DPRD\_DAT and DPWR\_DAT instructions to access consistent data

The DPRD\_DAT and DPWR\_DAT instruction descriptions are corrected and shown below:

Table 6 DPRD\_DAT and DPWR\_DAT instructions

LAD / FBD	SCL	Description
	<pre>ret_val := DPRD_DAT(   laddr:=_word_in_,   record=&gt;_variant_out_);</pre>	<p>Use the DPRD_DAT instruction to read one or more bytes of data from one of the following locations:</p> <ul style="list-style-type: none"> <li>• Module or submodule in the local base</li> <li>• DP standard slave</li> <li>• PROFINET I/O device</li> </ul> <p>The CPU transfers the data read consistently. If no errors occur during the data transfer, the CPU enters the read data into the target area set up by the RECORD parameter. The target area must have the same length as you configured with STEP 7 for the selected module. When you execute the DPRD_DAT instruction, you can only access the data of one module or submodule. The transfer starts at the configured start address.</p>
	<pre>ret_val := DPWR_DAT(   laddr:=_word_in_,   record:=_variant_in_);</pre>	<p>Use the DPWR_DAT instruction to transfer the data in RECORD consistently to the following locations:</p> <ul style="list-style-type: none"> <li>• Addressed module or submodule in the local base</li> <li>• DP standard slave</li> <li>• PROFINET I/O device</li> </ul> <p>The source area must have the same length as you configured with STEP 7 for the selected module or submodule.</p>

- PROFIBUS supports up to 4 bytes of consistent data. Use the DPRD\_DAT and DPWR\_DAT instructions to access more than 4 bytes of data consistently.

# Parameter description update for TSEND\_C and TRCV\_C instructions

The following table shows an update to Table 10-3 for the REQ, EN\_R, and CONT parameter descriptions for the TSEND\_C and TRCV\_C instructions:

Table 7 TSEND\_C and TRCV\_C data types for the parameters

Parameter and type		Data type	Description
REQ (TSEND_C)	IN	Bool	REQ = 1 starts the TSEND_C send job on a rising edge with the connection described in the CONNECT parameter. (CONT = 1 is also required to establish and maintain the communication connection.)
EN_R (TRCV_C)	IN	Bool	When EN_R = 1, TRCV_C is ready to receive. The receive job is processed. (CONT = 1 is also required to establish and maintain the communication connection.)
CONT	IN	Bool	Controls the communication connection: <ul style="list-style-type: none"> <li>• 0: Disconnect the communication connection</li> <li>• 1: Establish and maintain the communication connection</li> </ul> When sending data (TSEND_C) (rising edge at the REQ parameter), the CONT parameter must have the value TRUE in order to establish or maintain a connection. When receiving data (TRCV_C) (rising edge at the EN_R parameter), the CONT parameter must have the value TRUE in order to establish or maintain a connection.

## Read access security level for the CPU

Section 6.6.1 Access protection for the CPU incorrectly states that a password is required to change the CPU operating mode (RUN/STOP) for the Read access security level.

You do not have to enter a password to change the CPU operating mode.

## Spare parts compatibility for communication modules

The new communication modules (6ES7 2xx-xxx32-0XB0) replace existing communication modules (6ES7 2xx-xxx30-0XB0). The new modules provide spare parts compatibility. You can employ the revised communication module in place of existing modules without any changes.

## Behavior of RCV\_PTP instruction

Note the following correlation between the EN\_R input and the message buffer of the RCV\_PTP instruction:



Input EN\_R controls the copy of a received message to the BUFFER.

When the EN\_R input is TRUE and a message is available, the CPU transfers the message from the CM or CB to the BUFFER and updates the NDR, ERROR, STATUS and LENGTH outputs.

When EN\_R is FALSE, the CPU checks the CM or CB for messages and updates the NDR, ERROR and STATUS outputs, but does not transfer the message to the BUFFER. (Note that the default value of EN\_R is FALSE.)

The recommended practice is to set EN-R to TRUE and control execution of the RCV\_PTP instruction with the EN input.

## Behavior of the SRT\_DINT instruction

The S7-1200 V4.0 CPU has unexpected behavior when the user program asserts EN=1 for the SRT\_DINT instruction and a delay timer is already running for the OB. In V4.0, the time delay begins on the initial call with EN=1. A subsequent call with EN=1 referencing the OB of the running timer has no effect. The Time Delay Interrupt executes after the number of milliseconds in the parameter DTIME elapses, starting from the initial call with EN=1.

To avoid this problem in V4.0 user programs, the program must explicitly cancel a running timer (using CAN\_DINT) before restarting it

## Uploading program blocks from online CPU to offline project

In section 6.8.1 "Copying elements of the project", the description of uploading program blocks from the online CPU to the offline project is incorrect.

When you upload the program blocks, you do not upload the technology blocks or tags. To upload technology blocks, right-click "Technology objects" in the project tree node and select "Upload from device (software)". To upload tag names, you must upload the entire PLC.

Note also when uploading program blocks, you can upload all blocks or blocks individually.

## Configuring the SM 1278 4 x IO-Link Master

The TIA Portal version in section 15.3.1 is incorrect.

For the module integration, you need the Siemens engineering tool TIA Portal V13 or higher (not TIA Portal V12).

# Number of asynchronous communication connections supported

## Overview of communication services

The CPU supports the following communication services:

Communication service	Functionality	Using PROFIBUS DP		Using Ethernet
		CM 1243-5 DP master module	CM 1242-5 DP slave module	
PG communication	Commissioning, testing, diagnostics	Yes	No	Yes
HMI communication	Operator control and monitoring	Yes	No	Yes
S7 communication	Data exchange using configured connections	Yes	No	Yes
Routing of PG functions	For example, testing and diagnostics beyond network boundaries	No	No	No
PROFIBUS DP	Data exchange between master and slave	Yes	Yes	No
PROFINET IO	Data exchange between I/O controllers and I/O devices	No	No	Yes
Web server	Diagnostics	No	No	Yes
SNMP (Simple Network Management Protocol)	Standard protocol for network diagnostics and parameterization	No	No	Yes
Open communication over TCP/IP	Data exchange over Industrial Ethernet with TCP/IP protocol (with loadable FBs)	No	No	Yes
Open communication over ISO on TCP	Data exchange over Industrial Ethernet with ISO on TCP protocol (with loadable FBs)	No	No	Yes
Open communication over UDP	Data exchange over Industrial Ethernet with UDP protocol (with loadable FBs)	No	No	Yes

## Available connections

The CPU supports the following number of maximum simultaneous, asynchronous communication connections for PROFINET and PROFIBUS. The maximum number of connection resources allocated to each category are fixed; you cannot change the values:

Connection resources

Available connection resources reserved for

PG communication:	<input type="text" value="4"/>	
HMI communication:	<input type="text" value="12"/>	
S7 communication:	<input type="text" value="8"/>	Already configured: <input type="text" value="0"/>
Open user communication:	<input type="text" value="8"/>	
Free available connections:	<input type="text" value="6"/>	Already configured: <input type="text" value="0"/>
Maximum number available resources:	<input type="text" value="38"/>	

Based upon the allocated connection resources, the following number of connections per device are available:

	Programming terminal (PG)	Human Machine Interface (HMI)	GET/PUT client/server	Open User Communications	Web server
Maximum number of connection resources	3 (guaranteed to support 1 PG device)	12 (guaranteed to support 4 HMI devices)	8	8	30 (guaranteed to support 3 web browsers)

For an example, a PG has 3 available connection resources. Depending on the current PG functions in use, the PG might actually use 1, 2, or 3 of its available connection resources. In the S7-1200, you are always guaranteed at least 1 PG; however, no more than 1 PG is allowed.

Another example is the number of HMIs, as shown in the figure below. HMIs have 12 available connection resources. Depending on what HMI type or model that you have and the HMI functions that you use, each HMI might actually use 1, 2, or 3 of its available connection resources. Given the number of available connection resources being used, it may be possible to use more than 4 HMIs at one time. However, you are always guaranteed at least 4 HMIs. An HMI can use its available connection resources (1 each for a total of 3) for the following functions:

- Reading
- Writing
- Alarming plus diagnostics

Example	HMI 1	HMI 2	HMI 3	HMI 4	HMI 5	Total connection resources available
Connection resources used	2	2	2	3	3	12

#### Note

Web server (HTTP) connections: The CPU provides connections for multiple web browsers. The number of browsers that the CPU can simultaneously support depends upon how many connections a given web browser requests/utilizes.

#### Note

The Open User Communications, S7 connection, HMI, programming device, and Web server (HTTP) communication connections can utilize multiple connection resources based upon the features currently being used.

## Device exchange additional information

The S7-1200 V4.0 System Manual describes considerations for exchanging a V3.0 CPU for a V4.0 CPU; however, the following points are also important to note.

### S7-1200 V3.0 projects might not fit in S7-1200 V4.0 CPUs

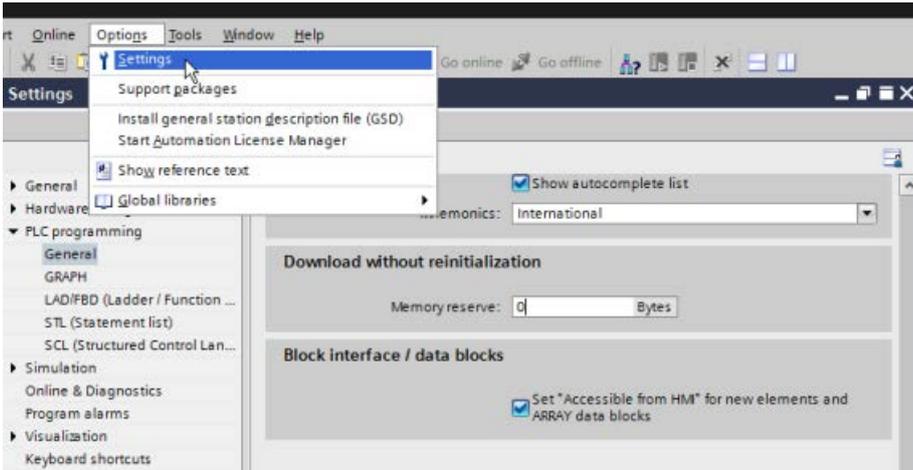
S7-1200 V4.0 added a reserve area of 100 bytes to each DB to support download without reinitialization. Also, STEP 7 V13 has an error in calculating the size of code blocks that can make the size of small blocks a few hundred bytes larger than they were in STEP 7 V12.

You can remove the 100-byte reserve area from DBs prior to attempting to download a V3.0 project to a V4.0 CPU, but there is no workaround for the block calculation error.

To remove the 100-byte reserve area, follow these steps before you perform the device exchange:

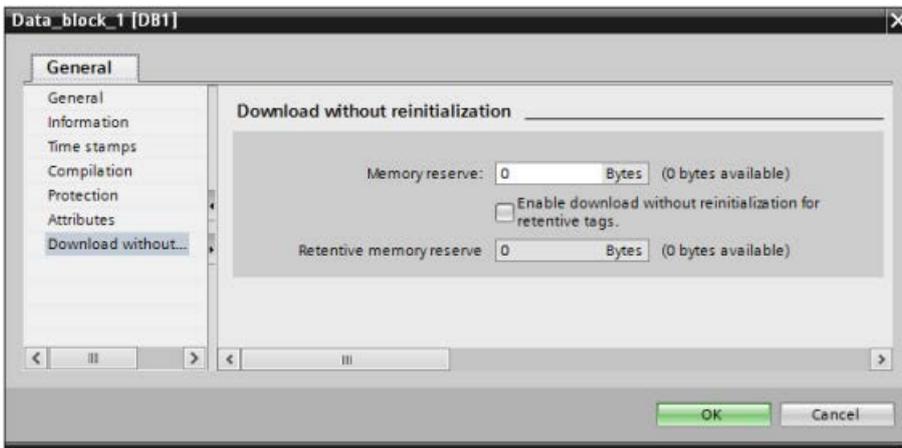
1. From the TIA Portal main menu, select the Options > Settings menu command.
2. From the navigation tree, open the PLC programming > General node.

3. In the "Download without reinitialization" area, set the memory reserve to 0 bytes.



If you have already performed the device exchange, you must remove the 100-byte reserve from each block individually:

1. From the project tree, right-click a data block from the Program blocks folder and select Properties from the shortcut menu.
2. In the Data block properties dialog, select the "Download without reinitialization" node.
3. Set the memory reserve to 0 bytes.
4. Repeat for each data block in your project.



### Digital input filter times and high-speed counters (HSCs)

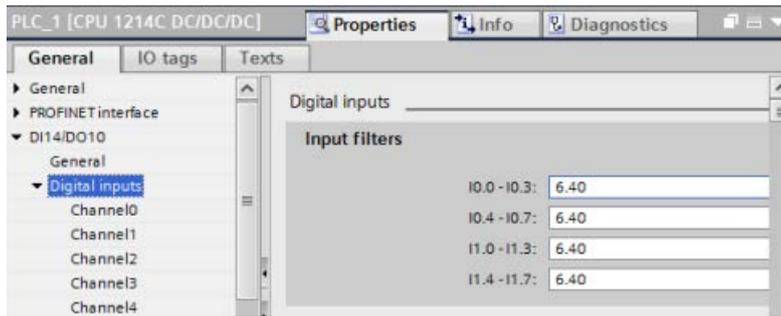
A device exchange from V3.0 to V4.0 does not preserve the digital input filter time settings and sets them all to the default 6.4 ms. You must edit the digital input filter settings after the device exchange to enter your custom settings. Edge interrupts will only work correctly if you reestablish your filter settings.

For digital inputs that you use as high-speed counters (HSCs), the V3.0 CPUs bypass the configured filter times and set filter times internally to 0.8 micro seconds.

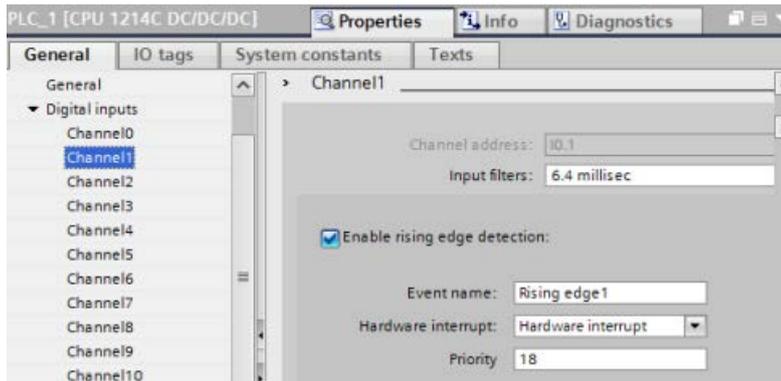
With the V4.0 CPUs, you can assign HSCs to any input and configure a filter time for each HSC input.

For V3.0, you assigned filter times as a group of four inputs and the fastest time was 200 microseconds. With V4.0, each input has its own filter time setting. The fastest time is 0.1 microseconds.

**V3.0:**



**V4.0:**



**HTTPS access setting for the Web server**

Regardless of whether or not you had selected "Permit access only with HTTPS" for the Web server for your V3.0 CPU, the device exchange to V4.0 always sets "Permit access only with HTTPS". If you want to allow HTTP access, you must deselect this setting after the device exchange.

**Motion control support**

During a device exchange from V3.0 to V4.0, the motion control Technological Object (TO) version does not automatically change to V4.0. If you want to upgrade to the later versions, you must go to the Instructions tree and select the required S7-1200 Motion Control version for your project as shown in the table below:

CPU version	Allowed motion control versions
V4.0	V4.0 or V3.0
V3.0	V3.0

**SB 1231 AI 1 x 12 bit**

Table A-207, Analog inputs is incorrect. The common rejection value for SB 1231 AI x 12 bit is 40 dB, DC to 60 Hz (not 400 dB, DC to 60 Hz).

In Table A-209, Wiring diagrams for the analog input SB, the note, ① is further clarified as Connect "R" and "0+" for current applications.

**TeleService modules**

The Teleservice module, TS Adapter IE Advanced (order number 6ES7 972-0EA00-0XA0) is available for use with the S7-1200.

## SM 1232, SM 1234, and SB 1232 analog output tables

In the following tables, the microsecond specification is incorrect. It should be shown as "µs" (microseconds), not "µS". The tables affected are:

- A-146 SM 1232 Analog outputs
- A-153 SM 1234 Analog outputs
- A-212 SB 1232 Analog outputs

## Behavior of the CPU when a rack or station failure event occurs

Section 4.1.3.9 of the *S7-1200 System Manual* incorrectly states that the CPU changes to STOP mode if a rack or station failure event occurs, and you have not created a rack or station failure OB. The CPU actually remains in RUN mode in this case.