SIEMENS

SIMATIC
S7-1200
Update to the S7-1200 System Manual, edition 11/2019

Product Information

Overview to Documentation Update S7-1200

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.

This document contains the following updates

- Overview of communications protocols and ports used by Ethernet communication (Page 2)
- EU declaration of conformity (Page 3)
- Webserver certificates (Page 3)
- Thermocouple analog values (Page 4)
- Analog modules input impedance (Page 4)
- Correction to topic, "Industrial environments" (Page 4)
- Update to HSC applications (Page 5)
- Correction to AC suppressor and capacitor values (Page 5)

A5E03929122-AO, 06/2020

Overview of communications protocols and ports used by Ethernet communication

Overview of communications protocols and ports used by Ethernet communication

This is an overview of the supported protocols and ports used for communication over PN/IE interfaces. The specified ports are the standard port numbers used by the S7-1200 PLC. Many communication protocols and implementations enable you to use other port numbers. The following tables show different layers, protocols, and ports used in the S7-1200 PLC.

Table 1 Transport layer ports and protocols by S7-1200

Port(s)	Direction	Protocol	Application	Description
25	Outbound	TCP	SMTP	SMTP is used for sending e-mails.
80	Inbound	TCP	HTTP	HTTP is used for communication with the CPU-internal webserver.
102[1]	Inbound/Outbound	TCP	ISO-on-TCP	ISO-on-TCP (according to RFC 1006) is used for message-oriented data exchange with remote CPU, S7 communication with ES, HMI.
123	Outbound	UDP	NTP	NTP is used for synchronization of the CPU system time with the time of an NTP server.
161[1]	Inbound	UDP	SNMP	SNMP is used for reading and setting network management data (SNMP managed Objects) by the SNMP Manager.
443	Inbound	TCP	HTTPS	HTTPS is used for communication with the CPU-internal web server over TLS.
465, 587	Outbound	TCP	SMTPS	SMTPS is used for sending e-mails over secure connections.
502	Inbound/Outbound	TCP	Modbus	Modbus/TCP is used by MB_CLIENT/MB_SERVER instructions in the user program.
4840[2]	Inbound	TCP	OPC UA	Communication standard ranging from the enterprise level to the field level.
34964[1]	Inbound/Outbound	UDP	PROFINET Context Manager	The PROFINET Context Manager provides an endpoint mapper in order to establish an application relation (PROFINET AR).

[1] These ports are open and accessible in the out-the-box configuration with configured IP address. Other applications must be enabled/configured as a part of the S7-1200 user program.

[2] Port 4840 is the default port, however this port can also be configured.

Table 2 Port ranges that could be used by open user communication (OUC) and other protocols. Exact communication parameters are defined by the user as a part of the S7-1200 user program

Port Range	Direction	Protocol	Application	Description
1-999	Varies	TCP/UDP	OUC	Port range can be used to limited extent, excluding already used ports.
2000-5000	Varies	TCP/UDP	OUC	Recommended port range for OUC
5001-49151	Varies	TCP/UDP	OUC	Port range can be used to limited extend, excluding already used ports.
49152-65535	Outbound	TCP/UDP	Varies	Dynamic port area used for active connection end point if the application does not determine the local port number.

Table 3 Protocols used by S7-1200 in the Data Link and Network Layer (Layer 2, 3) of the OSI model.

Protocol	Direction	Ethertype	Description
PROFINET DCP	Inbound/Outbound	0x8892	DCP is used by PROFINET to discover PROFINET devices and provide basic settings.
LLDP	Outbound	0x88CC	LLDP is used by PROFINET to discover and manage neighbor relationships between PROFINET devices. LLDP uses the special multicast MAX address: 01-80-C2-00-00-0E.
PROFINET IO	Inbound/Outbound	0x8892	The PROFINET IO frames are used to transmit IO data cyclically between PROFINET IO controller and IO devices via Ethernet.
ICMP	Inbound	0x800	Internet Control Message Protocol is used for diagnostic or control purposes.

EU declaration of conformity

CE Declaration of conformity

The CE Declaration of Conformity is held on file available to competent authorities at:

Siemens AG
Digital Industries
Factory Automation
DI FA AS SYS
Postfach 1963
D-92209 Amberg
Germany

Webserver certificates

The S7-1200 system manual, section 12.6 incorrectly stated that:

- You can download the default Siemens security certificate to your Internet options with an S7-1200 V4.4 CPU using TIA Portal V16.
- You can create certificates for the Web server of an S7-1200 V4.3 CPU using STEP 7 V15 SP1.

This is not possible with the noted S7-1200 CPUs or TIA Portal versions. This feature will be available in S7-1200 V4.5 TIA Portal V17.

Thermocouple analog values

Representation of analog values for Thermocouple Type J

An updated representation of the analog values of thermocouples type J is shown in the table below. In the S7-1200 system manual (edition 11/2019), the table is A-175.

Table 4 Representation of analog values of thermocouples Type J

Type J in °C	Units		Type J in °F	Units		Range
	Decimal	Hexadecimal		Decimal	Hexadecimal	
> 1450.0	32767	7FFF	> 2642.0	32767	7FFF	Overflow
1450.0 : 1200.1	14500 : 12001	38A4 : 2EE1	2642.0 : 2192.2	26420 : 21922	6734 : 55A2	Over-range
1200.0 : -150	12000 : 1500	2EE0 : FA24	2192.0 : -238.0	21920 : -2380	55A0 : F6B4	Rated range
-150.1 : -210	-1501 : -2100	FA23 : F7CC	-238.1 : -346.0	-2381 : -3460	F6B3 : F27C	Under-range
< -210.0	-32768	8000	< -346.0	-32768	8000	Underflow[1]

[1] Faulty wiring (for example, polarity reversal, or open inputs) or sensor error in the negative range (for example, wrong type of thermocouple) may cause the thermocouple module to signal underflow.

Analog modules input impedance

SM 1231 and SM 1234 Input impedance

Table A-141, Analog inputs for the SM 1231 AI 4 x 13 bit (6ES7231-4HD32-0XB0), has been updated to show:

Input impedance	≥ 9 MΩ, FS 06 and above ≥ 1 MΩ (voltage) / ≥ 270 Ω, < 290 Ω (current)

Table A-156, Analog inputs for the SM 1234 AI 4 x 13 bit / AQ 2 x 14 bit (6ES7234-4HE32-0XB0)has been updated to show:

Input impedance	≥ 9 MΩ, FS 07 and above ≥ 1 MΩ (voltage) / ≥ 270 Ω, < 290 Ω (current)

Correction to topic, "Industrial environments"

Removal of note in Industrial environments

The note in Section A.2, "Industrial environments" of the *S7-1200 Programmable Controller System Manual* has been removed. This note is no longer valid.

Update to HSC applications

Update to HSC Applications

The section 1.1.1.5, Applications has been updated to include further information about the High Speed counter.

A typical application uses the HSC to monitor feedback from an incremental shaft encoder. The shaft encoder provides a specified number of counts per revolution that you can use as the clock generator input to the HSC. There is also a reset pulse that occurs once per revolution that you can use as the sync input to the HSC.

To start, the user program should load the initial reference value into the HSC and set the outputs to their initial states. The outputs remain in this state for the time period that the current count is less than the reference value. The HSC provides an interrupt when the current count is equal to the reference value, when the sync event (reset) occurs, and also when there is a direction change.

As each counter value equals the reference value, an interrupt event occurs. Within the interrupt OB, the user program should load the next reference value into the HSC and set the outputs to their next state.

When the sync input is triggered, the current count value is set to the start value, and an interrupt event occurs. Within this interrupt OB, the user program should load the initial reference value into the HSC and set the outputs to their initial state. At this point the HSC has returned to its initial state and the cycle repeats with the HSC continuing to count.

Since the interrupts occur at a much slower rate than the counting rate of the HSC, you can implement precise control of high-speed operations with relatively minor impact to the scan cycle of the CPU. The method of interrupt attachment allows each load of a new preset to be performed in a separate interrupt routine for easy state control. Alternatively, you can process all interrupt events in a single interrupt routine.

The Gate function, triggered either by the user program or an external input signal, can disable counting of the encoder pulses. You can ignore any movement of the shaft by deactivating the gate. This means that while the encoder continues to send pulses to the HSC, the count value is held at the last value before the gate goes inactive. When the gate goes active, counting resumes from the last value before the gate went inactive.

When enabled, the Capture function causes the current count to be captured on the occurrence of an external input. A process (for example, a calibration routine) can use this function to determine how many pulses occur between events.

When enabled, the Compare output function generates a single, configurable pulse that occurs every time the current count reaches one of the reference values or overflows (exceeds the counting limits). You can use this pulse as a signal to start another process whenever a certain HSC event occurs.

The counting direction is controlled by either the user program or an external input signal.

To obtain the speed of the rotating shaft, you can configure the HSC for Frequency mode. This function provides a signed integer value in units of Hz. Because the reset signal occurs once per revolution, measuring the frequency of the reset signal provides a quick indication of the shaft's speed, in revolutions per second.

If you desire a floating point value of the frequency, configure the HSC for Period mode. You can use the ElapsedTime and EdgeCount values returned in Period mode to calculate the frequency.

Correction to AC suppressor and capacitor values

The AC suppressor circuit resistor and capacitor values table has been corrected as shown below. In the S7-1200 system manual (edition 11/2019), the table is 4-18.

Table 5 AC suppressor circuit resistor and capacitor values

Inductive load			Suppressor values		
0.05	11.5	6	5600	0.25	47

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