SIEMENS

SIMATIC
S7-1200
Update to the S7-1200 System Manual, edition 06/2015
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

Motion control

The following motion control issues are described in this system manual update:

A5E03929122-AH, 08/2015

Executing motion function blocks (FB) in FW V4.1.2

To ensure proper operation of motion control programs with S7-1200 FW V4.1.2, you must execute all motion function blocks from OB 1 or from blocks that OB 1 calls. To use motion control without this restriction, use FW V4.1.1.

If you do not use motion control in your project, you can use FW V4.1.2.

Motion control instruction versions

Note

Instructions in motion control V1.0 to V3.0 actively control the ENO output of the instruction. When an error occurs within the block, the ENO output is turned to the OFF state. An error is indicated by the ERROR, ErrorID and ErrorInfo outputs on the block. Using the ENO output, it is possible to evaluate the status of the instruction and execute subsequent instructions after it in a serial manner.

With instructions in motion control V4.0 and V5.0, the ENO output stays true as long as the instruction executes regardless of its error state. This could cause a program that used V3.0 or earlier motion control that depends on the ENO status to function incorrectly. To remedy this situation, you should use the DONE and ERROR outputs to evaluate the status of the instruction rather than the ENO output when using motion control V4.0 or later.

MC_Home (Home axis) instruction

The MC_Home instruction has been extended with the absolute value encoder adjustment:

- Absolute encoder adjustment (relative)
  MC_Home.Mode = 6
  The current position is shifted by the value of the parameter "MC_Home.Position". The calculated absolute value offset is stored retentively in the CPU. (<Axis name>.StatusSensor.AbsEncoderOffset)
- Absolute encoder adjustment (absolute)
  MC_Home.Mode = 7
  The current position is set to the value of the parameter "MC_Home.Position". The calculated absolute value offset is stored retentively in the CPU. (<Axis name>.StatusSensor.AbsEncoderOffset)

Table 1 Parameters for the MC_Home instruction

Parameter and type		Data type	Description
Axis	IN	TO_Axis_PTO	Axis technology object
Execute	IN	Bool	Start of the task with a positive edge
Position	IN	Real	• Mode = 0, 2, and 3 (Absolute position of axis after completion of the homing operation) • Mode = 1 (Correction value for the current axis position) • Mode = 6 (The current position is shifted by the value of the parameter "MC_Home.Position".) • Mode = 7 (The current position is set to the value of the parameter "MC_Home.Position".) Limit values: $-1.0e^{12} \leq$ Position $\leq 1.0e^{12}$
Mode	IN	Int	Homing mode: • 0: Direct homing absolute New axis position is the position value of parameter "Position". • 1: Direct homing relative New axis position is the current axis position + position value of parameter "Position". • 2: Passive homing Homing according to the axis configuration. Following homing, the value of parameter "Position" is set as the new axis position. • 3: Active homing Reference point approach in accordance with the axis configuration. Following homing, the value of parameter "Position" is set as the new axis position. • 6: The current position is shifted by the value of the parameter "MC_Home.Position". The calculated absolute value offset is stored retentively in the CPU. (<Axis name>.StatusSensor.AbsEncoderOffset) • 7: The current position is set to the value of the parameter "MC_Home.Position". The calculated absolute value offset is stored retentively in the CPU. (<Axis name>.StatusSensor.AbsEncoderOffset)
Done	OUT	Bool	TRUE = Task completed
Busy	OUT	Bool	TRUE = The task is being executed.
CommandAborted	OUT	Bool	TRUE = During execution the task was aborted by another task.
Error	OUT	Bool	TRUE = An error has occurred during execution of the task. The cause of the error can be found in parameters "ErrorID" and "ErrorInfo".
ErrorID	OUT	Word	Error ID for parameter "Error"
ErrorInfo	OUT	Word	Error info ID for parameter "ErrorID"

MC_WriteParam instruction

For drive connection via PROFIdrive/analog output, you cannot write parameters with MC_WriteParam that require a restart of the technology object. The TIA Portal online help statement concerning this instruction is incorrect.

MC_ChangeDynamic instruction

You can only use the MC_ChangeDynamic instruction for drive connection via PTO (Pulse Train Output).

Configuring the axis - Application cycle MC-Servo (OB 91)

Application cycle MC-Servo (OB 91)

To avoid disruptions in the program execution on the CPU, set the application cycle depending on the number of used axes as follows:

Application cycle = number of axes x 2 ms

Number of axes	Application cycle
1	2 ms
2	4 ms
4	8 ms
8	16 ms

The SINAMICS G120 drive updates the drive process image every 4 ms. To improve control, set the application cycle of the MC-Servo (OB 91) to 4 ms or to a multiple of 4 ms.

Overflow MC-Servo (OB 91)

The CPU does not go into STOP at overflow of the MC-Servo (OB 91). The TIA Portal online help statement concerning STOP at Overflow MC -Servo (OB 91) is incorrect.

If necessary, you can set the CPU to STOP at overflow of the MC-Servo (OB 91) using a time-error OB (OB 80).

Process image partition OB Servo PIP

For optimal control of all I/O modules (for example, hardware limit switches) used by motion control, assign them to the process image partition "OB Servo PIP". The assignment causes the I/O modules to be processed simultaneously with the technology object.

A high-speed counter (HSC) used by motion control is automatically assigned to the process image partition "OB Servo PIP".

Renaming technology objects

To ensure the consistency of your project after you rename the technology objects, download the project to the CPU while it is in STOP. A name change occurs when you delete a technolology object and create a new technology object with a new name and data block number.

ErrorIDs and ErrorInfos

The following ErrorIDs and ErrorInfo information have been added:

- The ErrorInfo 16#003D is also displayed if a drive with an analog drive connection has turned off.
- The ErrorInfo 16#002C has been supplemented for the ErrorID 16#820A as shown in the table below:

Table 2 ErrorID 16#820A

ErrorID	ErrorInfo	Description	Solution
16#820A		**It is not possible to retart the axis**	**-**
	16#0013	The axis is enabled in the user program.	Disable the axis with the MC_Power instruction; restart again.
	16#0027	The axis is currently being operated in manual control (axis control panel.	Exit manual control; restart again.
	16#002C	The axis is not disabled.	Disable the axis; restart the command.
	16#0047	The technology object is not ready for restart.	Download the project again.
	16#0048	Condition for restart of the technology object is not satisfied.	Disable the technology object.

Modbus RTU instructions data block (DB) tags update

The following Modbus RTU instructions have data block (DB) tag updates:

- Modbus_Comm_Load (Page 6)
- Modbus_Master (Page 7)
- Modbus_Slave (Page 7)

Modbus_Comm_Load instruction data block (DB) tags update

The following table shows the public static tags stored in the Modbus_Comm_Load instance DB that can be used in your program:

Table 3 Modbus_Comm_Load instance DB static tags

Tag	Data type	Default	Description
ICHAR_GAP	Word	0	Maximum character delay time between characters. This parameter is specified in milliseconds and increases the anticipated period between the received characters. The corresponding number of bit times for this parameter is added to the Modbus default value of 35 bit times (3.5 character times).
RETRIES	Word	2	Number of retries that the master executes before the error code 0x80C8 for "No response" is returned.
EN_SUPPLY_VOLT	Bool	0	Enable diagnostics for missing supply voltage L+.
MODE	USInt	0	Operating mode Valid operating modes are as follows: • 0 = Full duplex (RS232) • 1 = Full duplex (RS422) four-wire mode (point-to-point) • 2 = Full duplex (RS422) four-wire mode (multipoint master, CM PtP (ET 200SP)) • 3 = Full duplex (RS422) four-wire mode (multipoint slave, CM PtP (ET 200SP)) • 4 = Half duplex (RS485) two-wire mode (See Note below.)
LINE_PRE	USInt	0	Receive line initial state Valid initial states are as follows: • 0 = "No" initial state (See Note below.) • 1 = signal R(A) = 5 V DC, signal R(B) = 0 V DC (break detection): Break detection is possible with this initial state. Can only be selected with: "Full duplex (RS422) four-wire mode (point-to-point connection)" and "Full duplex (RS422) four-wire mode (multipoint slave)". • 2 = signal R(A) = 0 V DC, signal R(B) = 5 V DC: This default setting corresponds to the idle state (no active send operation). No break detection is possible with this initial state.
BRK_DET	USInt	0	Break detection The following selections are valid: • 0 = break detection deactivated • 1 = break detection activated
EN_DIAG_ALARM	Bool	0	Activate diagnostics interrupt • 0 = not activated • 1 = activated
STOP_BITS	USInt	1	Number of stop bits: • 1 = 1 stop bit • 2 = 2 stop bits • 0, 3 to 255 = reserved

Note

Required setting for the use of PROFIBUS cables with CM 1241 for RS485

Modbus_Master instruction data block (DB) tags update

The following table shows the public static tags stored in the Modbus_Master instance DB that you can use in your program:

Table 4 Modbus_Master instance DB static tags

Tag	Data type	Default	Description
Blocked_Proc_Timeout	Real	0.5	Duration (in seconds) for which to wait for a blocked Modbus_Master instance before this instance is removed as ACTIVE. This can occur, for example, if a Modbus_Master request is issued and the program then stops to call the Modbus_Master function before it has completely finished the request. The time value must be greater than 0 and less than 55 seconds, or an error occurs.
Extended_Addressing	Bool	FALSE	Configures single or double-byte slave station addressing: • FALSE = One-byte address; 0 to 247 • TRUE = Two-byte address (corresponds to extended addressing); 0 to 65535
MD_DB	MB_BASE	-	The MB_DB parameter of the Modbus_Comm_Load instruction must be connected to the MB_DB parameter of the Modbus_Master instruction.

Modbus_Slave instruction data block (DB) tags update

The following table shows the public static tags stored in the Modbus_Slave instance DB that you can use in your program:

Table 5 Modbus_Slave instance DB static tags

Tag	Data type	Default	Description
HR_Start_Offset	Word	0	Assigns the starting address of the Modbus holding register (default = 0)
Extended_Addressing	Bool	FALSE	Configures single or double-byte slave addressing: • FALSE = single byte address • TRUE = double-byte address
Request_Count	Word	0	Total of all requests received by this slave
Slave_Message_Count	Word	0	Number of requests received for this specific slave
Bad_CRC_Count	Word	0	Number of requests received that have a CRC error
Broadcast_Count	Word	0	Number of broadcast requests received
Exception_Count	Word	0	Modbus-specific errors that require an acknowledgement with a returned exception to the master
Success_Count	Word	0	Number of requests received for this specific slave that have no protocol errors
MB_DB	MB_BASE	-	The MB_DB parameter of the Modbus_Comm_Load instruction must be connected to the MB_DB parameter of the Modbus_Slave instruction.

Your program can write values to the HR_Start_Offset and Extended_Addressing tags and control the Modbus slave operations. The other tags can be read to monitor the Modbus status.

Maximum number of supported Modbus slaves

Modbus addressing supports a maximum of 247 slaves (slave numbers 1 through 247). Each Modbus network segment can have a maximum of 32 devices, based upon the loading and drive capabilities of the RS485 interface. When you reach the 32-device limit, you must use a repeater to expand to the next segment. You need seven repeaters to support the 247 slaves connected to one master for RS485.

Siemens repeaters work only with PROFIBUS; their function is to monitor PROFIBUS token passing. You cannot use Siemens repeaters with other protocols. Therefore, you require third party repeaters for Modbus.

Modbus timeouts are long by default; the use of multiple repeaters does not create a time-delay problem. The Modbus master does not care if a slave is slow to respond or if multiple repeaters delay the response.

Wiring note for digital SBs

A note has been added to the wiring diagrams of the following digital SBs:

- SB 1223 DI 2 x 24 V DC /DQ 2 x 24 V DC, 200 kHz (6ES7223-3BD30-0XB0)
- SB 1223 DI 2 x 5 V DC /DQ 2 x 5 V DC, 200 kHz (6ES7223-3AD30-0XB0)
- SB 1222 DQ 4 x 24 V DC, 200 kHz (6ES7222-1BD30-0XB0)
- SB 1222 DQ 4 x 5 V DC, 200 kHz (6ES7222-1AD30-0XB0)

Note

Ensure that the M connection wire is securely grounded. Loss of the ground wire connection to the high-speed DQ SBs may allow enough leakage current to activate a DC load. If the outputs are used for critical DC load applications, extra caution should be exercised by using a redundant ground wire to the SB.

PtP module with CM 1243-5 PROFIBUS Master

Ensure the settings shown below have been selected in the instance DB for instructions for the following PtP modules: PtP - Module CM PtP RS232 BA, CM PtP RS422/485 BA, CM PtP RS232 HF, CM PtP RS422/485 HF, or CM PtP with a CM 1243-5 PROFIBUS Master with firmware V1.3.4 and earlier.

- Send_P2P
  max_record_len = 240
- Modbus_Master
  Send_P2P.max_record_len = 240
- Modbus_Slave
  Send_P2P.max_record_len = 240

CPU startup properties

Table 6-2 in the *S7-1200 Programmable Controller System Manual* does not list the correct names of the startup properties for the CPU. The manual names one of the startup properties as "Supported hardware compatibility". The name of this property is actually "Comparison preset to actual configuration". The two selections for this property are as follows:

- Startup CPU only if compatible: With this setting, the CPU starts up only when the actual module on a configured slot is compatible with the configured module.
- Startup CPU even if mismatch: With this setting, the CPU starts up regardless of what type of module is present.

The paragraph describing module compatibility in Table 6-2 is correct.

Deleting and renaming data logs

For authorized users, you can delete and rename data logs from the File Browser Web page. If a data log is not open, the delete or rename operation works as you would expect.

If a data log is open at the time you perform a delete operation, the CPU closes the data log and deletes the data log file. Subsequent write operations from the user program return an error.

If, however, a data log is open at the time you perform a rename operation, the CPU behaves as follows:

- The CPU does rename the file; however, the CPU can't use the new name until after the user program closes the open data log.
- DataLogWrite instructions from the user program continue to write to the open data log using the former name.

After the user program closes the data log with DataLogClose, the data log then has the new name. Any data records that the user program wrote with DataLogWrite prior to closing the file are in the data log file with the new name. Subsequent uses of DataLogOpen to open the data log with the former name will cause the CPU to create a new data log with the former name.

Note

Second attempt to rename a data log file fails

The CPU only supports one pending rename of a data log at a time. If you try a second rename before the CPU has applied first rename, then regardless of how much time has passed, the rename operation fails. (The first rename, as described above, only takes place after the user program closes the data log.) You might think that the first rename failed when in fact it had just not taken effect yet.

You can, of course, delete and rename data log files from a SIMATIC SD memory card using Windows Explorer. The user program, however, still continues to try to operate on the file based on the filename from the DataLogCreate instruction. Any deletes or renames performed while the file is open in the user program are subject to the consequences described above.

If possible, ensure that the user program has closed a data log before you delete it or rename it whether from the File Browser Web page or from Windows Explorer.

Note

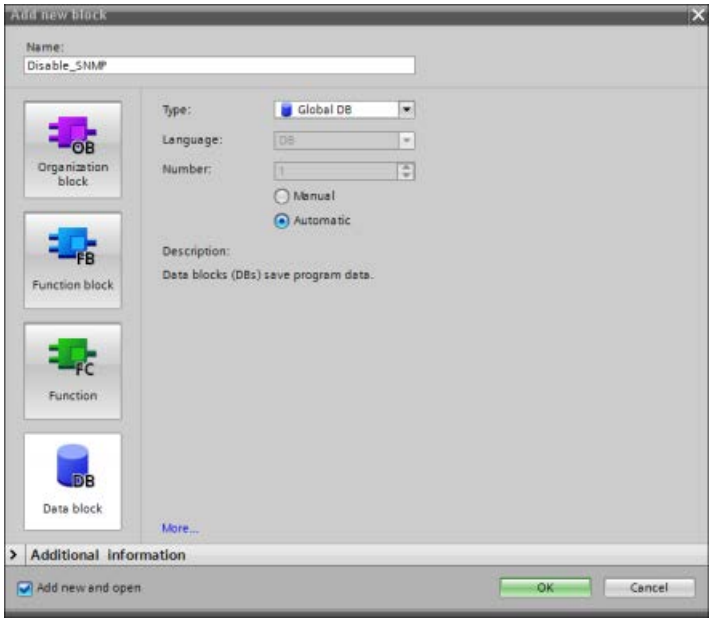
Memory usage and data logs

If you rename a data log from the File Browser Web page and then delete it, the CPU does not free up the memory that it allocated at the time the user program originally created the data log. The Web server deletes the file itself that has the new file name, but because the CPU based the memory allocation on the original file name, this memory remains in use. To ensure that the CPU frees the memory, create a new data log with the original name and then delete it.

Disabling SNMP

Follow these steps to disable SNMP in the S7-1200 CPU:

1. Create a classic data block (DB):

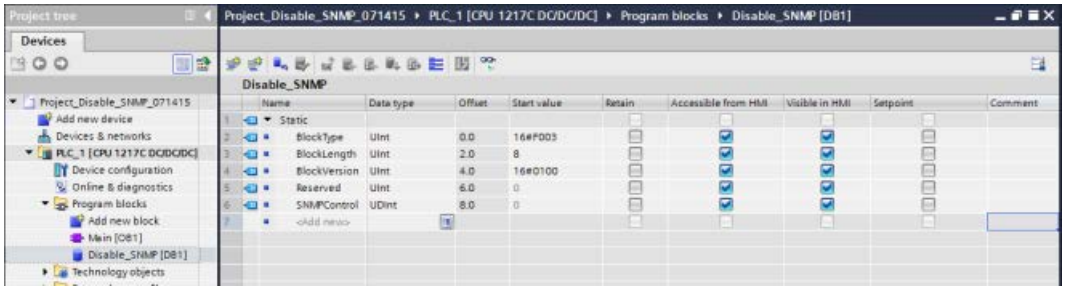


2. Select the Properties of the newly-created DB:
3. Select the Attributes tab. Deselect the check box for "Optimized block access":

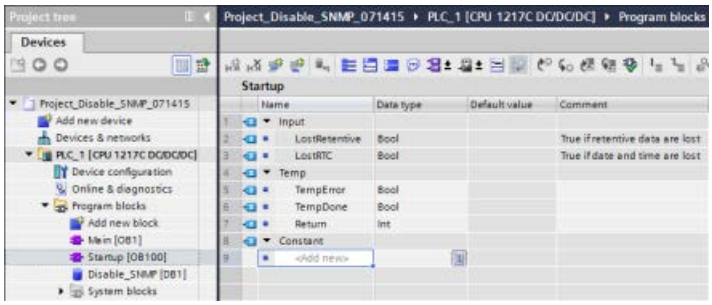
4. Click the OK button.

   A message displays advising you to recompile your program. Recompile your program at this time.

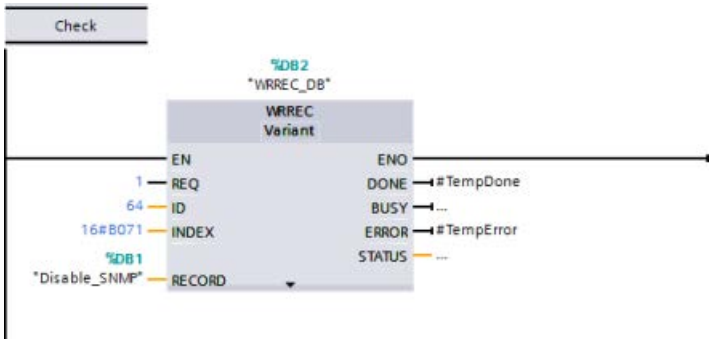
5. In the classic DB block interface, create the following static tags with the values shown. You will use these tags in your program to disable the internal SNMP implementation:



6. In the Startup OB (OB100), add the Temporary variables as shown:



7. Using the LAD editor, in the Startup OB (OB100), in Network 1, insert a Label (Jump label) (in the example below, the Label is named "Check") and a WRREC (Write Record) instruction with the inputs and outputs shown:



8. Insert the following loop and check code with the Jump to Label (JMP) output. This code ensures that the call completes and that you disable SNMP before leaving the Startup OB:

CTRL_HSC instruction NEW_PERIOD parameter

Table 10-2 contains an incorrect parameter description. The NEW_PERIOD parameter of the CTRL_HSC instruction is a value in milliseconds and is one (and only one) of the following values:

- 1000 = 1 second
- 100 = 0.1 second
- 10 = 0.01 second

SM 1231 Analog current range

Table 6 Analog input representation for current (SB and SM)

System		Current measuring range		
Decimal	Hexadecimal	0 mA to 20 mA	4 mA to 20 mA	
32767	7FFF	> 23.52 mA	> 22.81 mA	Overflow
32511	7EFF	23.52 mA	22.81 mA	Overshoot range
27649	6C01			
27648	6C00	20 mA	20 mA	Nominal range
20736	5100	15 mA	16 mA	
1	1	723.4 nA	4 mA + 578.7 nA	
0	0	0 mA	4 mA	
-1	FFFF			Undershoot range
-4864	ED00	-3.52 mA	1.185 mA	
32767[1]	7FFF		< 1.185 mA	Underflow (0 to 20 mA)
-32768	8000	< -3.52 mA		Wirebreak (4 to 20 mA)

[1] The wirebreak value of 32767 (16#7FFF) is always returned regardless of the state of the wirebreak alarm.

DPRD_DAT and DPWR_DAT (Read/write consistent data for DP slaves) instructions

PROFINET supports up to 1024 bytes of consistent data. You do not need to use these instructions for consistent transfers between the S7-1200 and PROFINET devices.

Importing Siemens security certificate for the Web server

Section 12.8.3 of the *S7-1200 Programmable Controller System Manual* describes how to import the Siemens security certificate for the Web server so that you do not see a security message and prompt for security verification when you enter the IP address of your CPU.

With V4.1.0 to 4.1.2 CPUs, importing the security certificate does not work if all four octets of the IP address are greater than or equal to 100.

Using USS protocol with the CB 1241

Note

When using the USS protocol library and the USS_Port_Scan instruction with a CB 1241, you must set the LINE_PRE data block tag to a value of 0 (No initial state). The default value of 2 for the LINE_PRE data block tag results in an error value of 16#81AB being returned by the USS_Port_Scan instruction. The LINE_PRE data block tag is found in the data block associated with the USS_Port_Scan instruction (usually named USS_Port_Scan_DB).

Ensure the start value of LINE_PRE is changed to a 0 (zero).

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A5E03929122-AH, 08/2015