



**SIWAREX MS – S7-200  
Weighing System**

**service &  
SUPPORT**

Description of the “MicroScale\_add”  
STEP 7 Micro/WIN Library

**SIEMENS**



Library Description

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SIWAREX MS - MicroScale\_add

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SIWAREX MS - MicroScale\_add

## 1 Library Overview

### 1.1 Scope

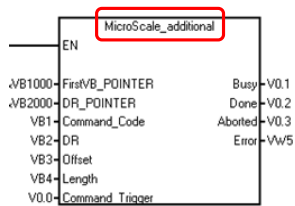
#### 1.1.1 Libraries

##### MicroScale\_additional

This library contains the following block:

- MicroScale\_additional

Figure 1-1

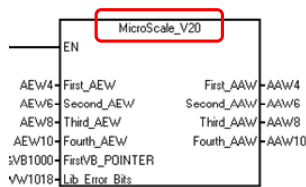


This library is an extension of the “MicroScale\_V20” library.

##### MicroScale\_V20

- MicroScale\_V20

Figure 1-2



To be able to use the functionality of the “MicroScale\_additional” library, the “MicroScale\_additional” block **and** “MicroScale\_V20” have to be called cyclically in the controller’s user program.

This document focuses on the “MicroScale\_additional” library.

## SIWAREX MS - MicroScale\_add

### 1.1.2 Excel spreadsheet

In addition to the library, the same HTML page provides an Excel spreadsheet. This Excel spreadsheet includes tables that can be copied to the STEP 7 Micro/WIN project with the aid of the copy & paste function. In STEP 7 Micro/WIN, this enables the user to easily create and conveniently expand

- symbol tables
- status charts
- data blocks.

Figure 1-3

The screenshot shows the STEP 7 Micro/WIN interface on the left and the Microsoft Excel spreadsheet 'MicroScale\_additional.xls' on the right. The spreadsheet contains data for two variables: S1\_0300\_AdjDigits0 and S1\_0302\_AdjDigits1. A legend below the spreadsheet explains the numbered callouts in the spreadsheet cells:

- ① Symbolic name of the variable
- ② Memory location and data type in the global V memory of the controller
- ③ Default value (SIWAREX MS factory settings)
- ④ Comment
- ⑤ Display mode

Below the legend, a row of the spreadsheet is shown with red boxes highlighting the cells: S1\_0300\_AdjDigits0, VW0, 5461, Scale1, and Unsigned. A note below this row states: 'Can be easily adapted to the desired memory area of the controller and to the number of SIWAREX MS used per S7-200 controller'.

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SIWAREX\_MS\_Library\_add\_V1d0\_en.doc

For importing to STEP 7 Micro/WIN and operating these Excel spreadsheets, please also note the short film, see chapter 1.1.3.

### 1.1.3 Screencast as a configuring aid

Another element of the HTML page is a flash animation (screencast) that shows the startup of the "MicroScale\_add" library in combination with an S7-200 controller CPU 224XP. The core objective of the screencast is to show the efficient use of the Excel spreadsheet in combination with STEP 7 Micro/WIN.

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### 1.2 Features

The following section lists the main functions of the library, including all files:

- User interface
  - Edited representation of process values, system and error information of the "MicroScale\_V20" library
  - Status charts and symbol tables subdivided into functions for all relevant values
  - Dynamic adjustment of the variable addresses for memory area changes of status charts and symbol tables
- Control functions
  - Edited option to enter parameters and process values of the SIWAREX MS. The SIWAREX MS can thus be completely controlled and parameterized via the S7-200.
  - Edited read function for parameters and process values from the SIWAREX MS.
- Configuration support
  - Data block with default values for the SIWAREX MS weighing module
  - Easy expansion to up to seven weighing modules per S7-200 controller

### 1.3 Maximum configuration and memory allocation

Figure 1-4

Available capacities in the S7-200 (EM/UP/UD)														
CPU 221			CPU 222			CPU 224			CPU 224XP			CPU 226		
EM	UP	UD	EM	UP	UD	EM	UP	UD	EM	UP	UD	EM	UP	UD
	4096	2048	2	4096	2048	4 <sup>*1)</sup>	12288	8192	4 <sup>*1)</sup>	16384	10240	7	24576	10240

\*3)

Required capacities per SIWAREX MS module (UP/UD)													
1 module		2 modules		3 modules		4 modules		5 modules		6 modules		7 modules	
UP	UD	UP	UD	UP	UD	UP	UD	UP	UD	UP	UD	UP	UD
2813	212	2921	424	3029	636	3137	848	3245	1060	3353	1272	3461	1484

\*2)\*3)

EM expansion modules  
UP user program  
UD user data

\*1) Due to the current limiting of 660mA for this CPU type and due to the max. current input of 140mA per module, it is not possible to use all seven expansion modules

\*2) The "MicroScale\_V20" and "MicroScale\_additional" libraries are considered

\*3) Values in bytes

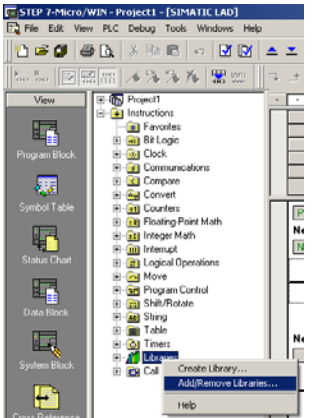
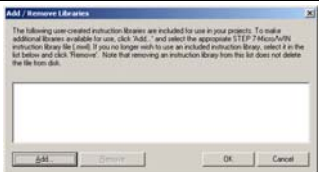
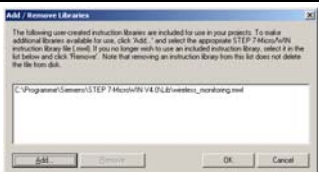
SIWAREX MS - MicroScale\_add

## 2 Working with the Library

### 2.1 Integrating the library into STEP 7 Micro/WIN

To be able to use a library in STEP 7 Micro/WIN, it first has to be integrated into the configuration software. The necessary steps are listed in the following table.

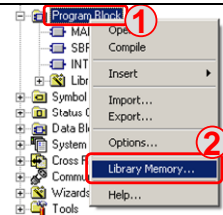
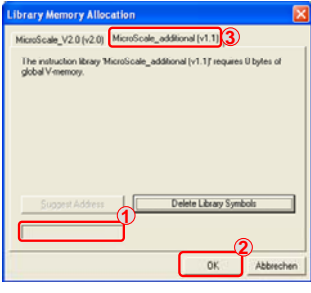
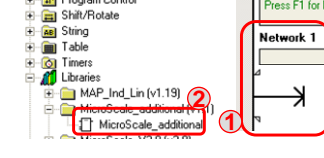
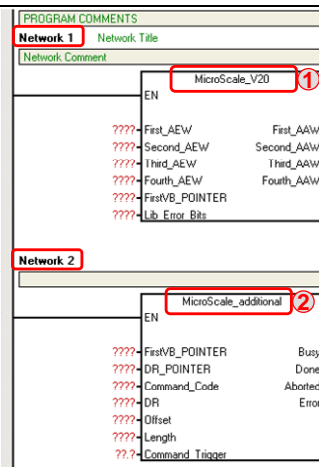
Table 2-1

Step	Instruction	Remark
1.	The library is available on the HTML page from which you have downloaded this document. Save the library to your hard disk.	MicroSet_add.mwl
2.	Open STEP 7 Micro/WIN.	
3.	<ul style="list-style-type: none"> <li>In the project tree, right-click "Libraries".</li> <li>Select "Add/Remove Libraries...".</li> </ul>	
4.	<ul style="list-style-type: none"> <li>Click the left "Add" button.</li> <li>On your hard disk, navigate to the position of the stored library and select it.</li> <li>Confirm this dialog box with "OK".</li> </ul>	
5.	<ul style="list-style-type: none"> <li>The library appears in a window.</li> <li>Confirm this window with "OK".</li> </ul>	
6.	The library is now available in STEP 7 Micro/WIN.	

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### 2.2 Using library blocks

Table 2-2

Step	Instruction	Figure/remark
1.	Open STEP 7 Micro/WIN.	
2.	Assign the respective memory area to the library. Right-click "Program Block" (1) and select "Library Memory..." (2) in the context menu.	
3.	In the following menu, enter the memory area (1) you want to use. Confirm with "OK" (2). <b>Attention:</b> You cannot assign a memory area in this library since the library was programmed only with local variables. However, you can read out the version of the library you are using (3).	
4.	In the program, navigate to the location where you want to insert the subprogram of the library (1). In "Libraries", select the desired block (2) and use drag & drop to move it to your user program.	
5.	Link the EN input of the library block to the SM0.0 variable.	The SM0.0 variable is a special memory bit and it is "On" in each CPU cycle.
6.	Ensure that the "MicroScale_V20" block is also called in the program. It is important that the "MicroScale_additional" block (2) (considering the CPU cycle) is called after the "MicroScale_V20" block (1).	



SIWAREX MS - MicroScale\_add

## 3 Interface Description of the Library

### 3.1 Calling MicroScale\_V20

Figure 3-1

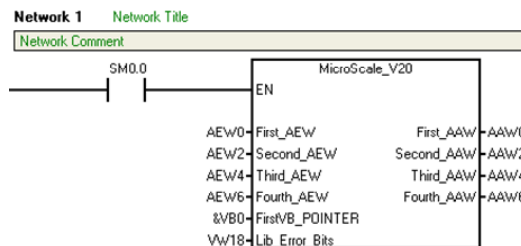


Table 3-1

No.	Designation	Transfer	Data type	Description/note
1.	EN	IN	BOOL	<ul style="list-style-type: none"> <li>Activates the subprogram</li> <li>Is usually called with the “SM0.0” special memory bit</li> </ul>
2.	First_AEW	IN	WORD	<ul style="list-style-type: none"> <li>1<sup>st</sup> of 4 analog input words that are used for the communication between SIWAREX MS and S7-200 controller</li> <li>Follows the already existing analog inputs <u>in front of</u> the SIWAREX MS module</li> </ul>
3.	Second_AEW	IN	WORD	<ul style="list-style-type: none"> <li>2<sup>nd</sup> of 4 analog...</li> </ul>
4.	Third_AEW	IN	WORD	<ul style="list-style-type: none"> <li>3<sup>rd</sup> of 4 analog...</li> </ul>
5.	Fourth_AEW	IN	WORD	<ul style="list-style-type: none"> <li>4<sup>th</sup> of 4 analog...</li> </ul>
6.	FirstVB_POINTER	IN	BYTE	<ul style="list-style-type: none"> <li>Is transferred as a pointer and therefore has to be marked by a leading “&amp;” (e.g., &amp;VB0)</li> <li>Is used as a buffer for process/status variables from the SIWAREX MS that are transferred via the analog inputs/outputs</li> <li>Requires a buffer size of 26 bytes</li> <li>For a more detailed description, please refer to the SIWAREX MS manual <a href="http://support.automation.siemens.com/WW/view/en/22600601">http://support.automation.siemens.com/WW/view/en/22600601</a> (table 8-1)</li> </ul>
7.	Lib_Error_Bits	IN/OUT	WORD	<ul style="list-style-type: none"> <li>Outputs errors of the “MicroScale_V20” library</li> <li>Described in greater detail in <b>Table 3-3</b></li> </ul>

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No.	Designation	Transfer	Data type	Description/note
8.	First_AAW	OUT	WORD	<ul style="list-style-type: none"><li>• 1<sup>st</sup> of 4 analog output words that are used for the communication between SIWAREX MS and S7-200 controller</li><li>• Follows the already existing analog outputs <u>in front of</u> the SIWAREX MS module</li></ul>
9.	Second_AAW	OUT	WORD	<ul style="list-style-type: none"><li>• 2<sup>nd</sup> of 4 analog...</li></ul>
10.	Third_AAW	OUT	WORD	<ul style="list-style-type: none"><li>• 3<sup>rd</sup> of 4 analog...</li></ul>
11.	Fourth_AAW	OUT	WORD	<ul style="list-style-type: none"><li>• 4<sup>th</sup> of 4 analog...</li></ul>

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### 3.2 Calling MicroScale\_additional

Figure 3-2

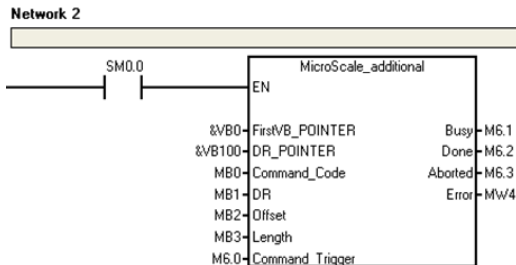


Table 3-2

No.	Designation	Transfer	Data type	Description/note
1.	EN	IN	BOOL	<ul style="list-style-type: none"> <li>Activates the subprogram</li> <li>Is usually called with the "SM0.0" special memory bit</li> </ul>
2.	FirstVB_POINTER	IN	BYTE	<ul style="list-style-type: none"> <li>Refers to the buffer of the "MicroScale_V20" library</li> <li>Is transferred as a pointer and therefore has to be marked by a leading "&amp;" (e.g., &amp;VB0)</li> <li>Requires a buffer size of 26 bytes</li> <li>Buffer contents correspond to the "MS" sheet from the Excel spreadsheet associated with the library</li> <li>Is used for the internal processing of "MicroScale_additional" and simultaneously provides the user with all process values and status values of "MicroScale_V20" for further processing</li> <li><b>Must be the same pointer as the one at the "FirstVB_POINTER" input of the "MicroScale_V20" library</b></li> </ul>
3.	DR_POINTER	IN	BYTE	<ul style="list-style-type: none"> <li>Defines the buffer area of the "MicroScale_additional" library</li> <li>Is transferred as a pointer and thus has to be marked by a leading "&amp;" (e.g., &amp;VB100)</li> <li>Buffer contents correspond to the "MS_add", "DR03", "DR04", "DR09", "DR15", "DR26" and "DR30" sheets from the Excel spreadsheet associated with the library</li> </ul>

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No.	Designation	Transfer	Data type	Description/note
				<ul style="list-style-type: none"> <li>Requires a buffer size of VB186 bytes</li> <li>Is used to provide process values and status values to the user</li> </ul>
4.	Command_Code	IN	BYTE	<ul style="list-style-type: none"> <li>Indicates the command that is sent to the SIWAREX MS expansion module</li> <li>Has two different command sets: "New command set" and "old command set"</li> <li>Old command set: 1 to 26 → see this manual: <a href="http://support.automation.siemens.com/WW/view/en/22600601">http://support.automation.siemens.com/WW/view/en/22600601</a> (chapter 6.2)</li> <li>New command set: 254 and 255               <ul style="list-style-type: none"> <li>254: Read parameters</li> <li>255: Write parameters</li> </ul> </li> <li>Additionally requires the "Command_Trigger" input for executing a command of the old command set</li> <li>Additionally requires the "DR", "Offset", "Length" and "Command_Trigger" inputs for executing a command of the new command set</li> </ul>
5.	DR	IN	BYTE	<ul style="list-style-type: none"> <li>Required only in conjunction with command 254 or command 255</li> <li>Specifies the data record that is to be written or read from the SIWAREX MS</li> <li>For more information, please refer to this manual: <a href="http://support.automation.siemens.com/WW/view/en/22600601">http://support.automation.siemens.com/WW/view/en/22600601</a> (chapter 5 and the following chapters)</li> </ul>
6.	Offset	IN	BYTE	<ul style="list-style-type: none"> <li>Required only in conjunction with command 254 or command 255</li> <li>Specifies the offset between the first parameter in the data record ("DR" input) and the parameter (set) that is to be written or read</li> <li>In combination with DR26 at the "DR" input, this "Offset" input has no function. The complete DR26 is always read (CRC).</li> </ul>

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No.	Designation	Transfer	Data type	Description/note
7.	Length	IN	BYTE	<ul style="list-style-type: none"> <li>Required only in conjunction with command 254 or command 255</li> <li>Specifies the length within the data record ("DR" input) that is to be written or read from the SIWAREX MS (considering the offset)</li> <li>The value "0" does not designate the length zero, but the "rest" starting from the offset</li> <li>In combination with DR26 at the "DR" input, this "Length" input has no function. The complete DR26 is always read (CRC).</li> </ul>
8.	Command_Trigger	IN	BOOL	<ul style="list-style-type: none"> <li>Enables the "Command_Byte", "DR", "Offset" and "Length" parameters and starts the processing in the SIWAREX MS</li> <li>The library automatically resets the input</li> </ul>
9.	Busy	OUT	BOOL	<ul style="list-style-type: none"> <li>Is automatically enabled after setting the "Command_Trigger" input</li> <li>Is reset as soon as the command execution has been completed (positively or negatively)</li> </ul>
10.	Done	OUT	BOOL	<ul style="list-style-type: none"> <li>Is enabled when the command has been successfully executed.</li> <li>Attention: Provides no information on whether the written value has been "sensible" or not</li> </ul>
11.	Aborted	OUT	BOOL	<ul style="list-style-type: none"> <li>Is enabled when problems have occurred when executing the command</li> <li>Should always be considered in combination with the "Error" output</li> </ul>
12.	Error	OUT	WORD	<ul style="list-style-type: none"> <li>Provides support to enable the user to locate occurring errors</li> <li>Should always be considered in combination with the "Aborted" output</li> <li>Is not redundant to the SIWAREX MS error outputs. Thus it only provides information on errors within the "MicroScale_additional" library               <ul style="list-style-type: none"> <li>- Value 1 to x: Internal error.</li> </ul> </li> </ul>

## SIWAREX MS - MicroScale\_add

No.	Designation	Transfer	Data type	Description/note
				<p>Observe the explanation on the output decimal value</p> <ul style="list-style-type: none"><li>- Value 0: External error: Note the "Synchronous_Error_Code" and "Asynchronous_Error_Bits" error outputs in the "FirstVT_POINTER" buffer.</li></ul> <ul style="list-style-type: none"><li>• See also <a href="#">Table 3-3</a></li></ul>

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### 3.3 Diagnostic capabilities of the libraries

Table 3-3

Error output	No.	Description
"Error" output on the "MicroScale_additional" library	1	This is an old version of the SIWAREX MS expansion module The new commands 254 and 255 are not supported.
	2	A nonexistent data record has been selected at the "DR" library input. Only the values (data record numbers) 3,4,9,15,26 and 30 are permissible.
	3	The set "Offset" and/or "Length" values are invalid. The area of the selected data record has been exceeded.
	4	It has been attempted to write the DR09, DR26 or DR30 data records (command 255). This is not valid. These data records can only be read.
	0	The error has not been caused/detected by the "MicroScale_additional" library, but by the SIWAREX MS expansion module. Please observe the following diagnostic capabilities.
"Q_Sync_Error_Code" variable <sup>*1)</sup> (VBn+5 starting from FirstVB_POINTER)	n	The SIWAREX MS manual includes a description of the error numbers (decimal, signed): <a href="http://support.automation.siemens.com/WW/view/en/22600601">http://support.automation.siemens.com/WW/view/en/22600601</a> (chapter 7.5 and the following chapters)
"Q_Async_Error_Bits" variable <sup>*1)</sup> (VBn+6 starting from FirstVB_POINTER)	n.n	The SIWAREX MS manual includes a description of the error bits (binary): <a href="http://support.automation.siemens.com/WW/view/en/22600601">http://support.automation.siemens.com/WW/view/en/22600601</a> (chapter 7.6 and the following chapters).
"Q_Scale_Status_Bits" variable <sup>*1)</sup> (VWn+8 starting from FirstVB_POINTER)	n.n	The SIWAREX MS manual includes a description of the status bits (binary): <a href="http://support.automation.siemens.com/WW/view/en/22600601">http://support.automation.siemens.com/WW/view/en/22600601</a> (chapter 5.7.1 and the following chapters).
"Lib_Error_Bits" input/output on the "MicroScale_V20" library (HB=m, LB=n)	n.0	Not used
	-	
	n.7	
	m.0	Error in the "FirstVB_POINTER" parameter. A memory area that is too high for the CPU type was transferred.
	m.1	Life bit error message from the SIWAREX MS
	m.2	Error in the "Select_Process_Value" VBn+10 parameter
m.3	Command could not be executed due to a restart of the SIWAREX MS	
m.4	Not used	
-		
m.7		

\*1) Symbolic variables: See Excel spreadsheet or Getting Started project.

SIWAREX MS - MicroScale\_add

## 4 History

Table 4-1 History

Version	Date	Modification
V1.0	07.08.2008	First edition