

# DATASHEET

**SIEMENS**

6ES5 095-8MA03

**OTHER SYMBOLS:**

6ES50958MA03, 6ES5095 8MA03, 6ES5095-8MA03, 6ES5 0958MA03, 6ES5 095 8MA03, 6ES5 095-8MA03

**RGB ELEKTRONIKA AGACIAK CIACIEK  
SPÓŁKA JAWNA**

Jana Długosza 2-6 Street  
51-162 Wrocław  
Poland

✉ [biuro@rgbelektronika.pl](mailto:biuro@rgbelektronika.pl)

☎ +48 71 325 15 05



[www.rgbelektronika.pl](http://www.rgbelektronika.pl)



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# SIMATIC S5-90U, S5-95U/F, S5-100U

## CPUs/Compact PLCs

2

### S5-90U, S5-95U

#### Design



The S5-90U and S5-95U consist of a tough plastic case, into which the processor, power supply, inputs and outputs are integrated. This enclosure can be snapped onto a DIN rail. Both devices can be expanded with all I/O modules of the S5-100U. The S5-90U is expandable over the IM 90 interface, the S5-95U is directly expandable (see also page 2/3).

Technical specifications		S5-90U	S5-95U
<b>General</b>			
Range of functions		Boolean logic, bracketed operations, result assignment, setting/resetting (latching/unlatching), counter and timer functions, load, transfer, comparison and jump operations, block calls, special functions, arithmetic	
Programming language		STEP 5	STEP 5
Methods of representation		STL, LAD, CSF	STL, LAD, CSF, GRAPH Mini, GRAPH 5 (with restrictions)
Program organization		Linear or structured	Linear or structured
Integral function blocks (in the operating system)		—	Analog value input, output, BCD/binary code conversion, multiplication and division for 16-bit fixed-point numbers, L2 SEND, L2 RECEIVE (L2 interface only)
Integral organization blocks (in the operating system)		Cyclic, alarm-driven program execution, manual and automatic restart	Cyclic, alarm-driven program execution, manual and automatic restart, time-controlled program execution, response in case of battery failure, retriggering the scan time, PID control algorithm
Execution time for 1024 binary statements	approx.	2 ms	2 ms
Program memory		4 Kbyte	16 Kbyte, can be allocated to program or data according to user requirements; additionally 4 Kbyte for data blocks <sup>1)</sup>
• RAM (internal) or alternatively EPROM or EEPROM (in memory submodule) (2 byte = 1 statement)			
Backup time for RAM	min.	1 year	1 year
Bit memories		1024, 512 of which are retentive	2048, 512 of which are retentive
• Number			
Timers		32	128
• Number			
• Range		0.01 to 9990 s	0.01 to 9990 s
Counters		32; 8 of which are retentive	128; 8 of which are retentive
• Number			
• Range		0 to 999	0 to 999
Number of inputs/outputs		176/16	480/32
• Digital inputs/outputs maximum/onboard		16/—	41/9
• Analog inputs/outputs maximum/onboard		1/1	4/4
• Interrupt inputs maximum/onboard		13/1	66/2
• Counter inputs maximum/onboard		—	Date/time/operating hours counter/clock prompt
Hardware clock			

<sup>1)</sup> Not with basic unit

**S5-90U, S5-95U (continued)**

Technical specifications (continued)		S5-90U	S5-95U
Expansion	max.	6 S5-100U modules via IM 90, including IPs and CPs	32 S5-100U modules, including IPs and CPs
Module configuration Arrangement of modules		Installation in up to 4 tiers, with max. 10 m between tiers Horizontal or vertical (vertical arrangement reduces the permissible ambient temperature)	
Linkup		programming devices	
• programming devices port (20 mA current loop)		PG, PC <sup>1)</sup> , OP, SINEC L1 (slave), PROFIBUS (via CP 541)	PG, PC <sup>1)</sup> , OP, SINEC L1 (slave), PROFIBUS (via CP 541)
• 2nd serial interface (20 mA current loop) (optional)		—	PG, PC <sup>1)</sup> , OP, SINEC L1 (slave, p.t.p. master), computer link with 3964(R), ASCII driver
• PROFIBUS interface (RS 485) (optional)		—	Standard connection, PLC-PLC link, cyclic I/O, layer 2 services, FMA services, programming devices functions
• PROFIBUS-DP interface (RS 485) (optional)		—	DP slave or master interface, DIN E 19245 Part 3 (1.5 Mbit/s), Data transfer rate 9.6 to 1500 kbit/s
programming devices		PG 605, PG 720, PG 720C, PG 760, PC (AT-compatible)	PG 605, PG 720, PG 720C, PG 740, PG 760, PC (AT-compatible)
Degree of protection		IP 20 in acc. with IEC 529	
Ambient temperature		0 to 60 °C	
• Horizontal installation		0 to 40 °C	
• Vertical installation		- 40 °C to + 70 °C	
Transport and storage temperature		- 40 °C to + 70 °C	
Humidity rating		F in acc. with DIN 40 040 (15 % to 95 %, indoor)	
Altitude rating		S in acc. with DIN 40 040 (860 to 1060 hPa)	
Mechanical rating		IEC 68-2-6	
• Oscillation test		10 to 57 Hz (constant amplitude 0.075 mm)	
Tested with		57 to 150 Hz (constant acceleration 1 g)	
• Shock test		IEC 68-2-27	
Tested with		12 shocks (semisinusoidal, 15 g, 11 ms)	12 shocks (semisinusoidal, 15 g, 11 ms)
Dimensions (W x H x D) in mm (in)		145 x 135 x 97 (5.6 x 5.2 x 3.7)	145 x 135 x 146 (5.6 x 5.2 x 5.6)
Weight			
• PLC	approx.	1.5 kg (4 lb)	
• Memory submodule	approx.	0.1 kg (0.27 lb)	
Onboard power supply			
Supply voltage			
• Rated value		115 V/230 V AC	24 V DC
• Permissible range		93 V to 127 V/187 to 253 V	20 V to 30 V
Output voltage			
• V <sub>1</sub>		24 V DC (for sensor)	9 V DC (for external I/O)
• V <sub>2</sub>		5.2 V DC (for PGs)	5.2 V DC (for PGs)
Output current			
• from V <sub>1</sub>	max.	100 mA	
• from V <sub>2</sub>	max.	100 mA	
Short-circuit protection		Electronic	Electronic
Backup battery		Lithium battery	
• Backup period		1 year	
at 25 °C and uninterrupted backup of the CPU with memory submodule			
• Battery life	approx.	5 years	
Protection class		Class 1 to IEC 536	
Galvanic isolation V <sub>1</sub>		Yes	No
Galvanic isolation V <sub>2</sub>		No	No
RI specification		A in acc. with VDE 0871	
Cable cross-section for screw terminals			
- Flexible cables		2 x (0.5 to 1.5) mm <sup>2</sup>	2 x (0.5 to 1.5) mm <sup>2</sup>
(with connector sleeves)		(with connector sleeves)	(with connector sleeves)
- Solid cables		2 x (0.5 to 2.5) mm <sup>2</sup>	2 x (0.5 to 2.5) mm <sup>2</sup>

1) Via interface converter

# SIMATIC S5-90U, S5-95U/F, S5-100U

## CPUs/Compact PLCs

2

### S5-90U, S5-95U (continued)

Technical data (continued)			
		S5-90U	S5-95U
<b>Onboard digital inputs</b>			
Number of inputs		10	16
Galvanic isolation/in groups of		Yes/10	Yes/16
Input voltage			
• Rated value		24 V DC	24 V DC
• At "0" signal		0 to 5 V	- 30 V to + 5 V
• At "1" signal		13 V to 30 V	13 V to 30 V
Input current			
• At "1" signal		typ. 8.5 mA (at 24 V)	6.5 mA (at 30 V)
Delay time			
• At "0" → "1"		typ. 2.8 ms	2.5 ms
• At "1" → "0"		typ. 3.6 ms	2.0 ms
Cable length (unshielded)		max. 100 m (328 ft)	100 m (328 ft)
Quiescent current with 2-wire BERO connected		max. 1.5 mA	1.5 mA
<b>Onboard digital outputs</b>			
Number of outputs		6 (relay contacts)	16
Galvanic isolation/in groups to		Yes/1	Yes/16
Load voltage L+			
• Rated value		—	24 V DC
• Permissible range		—	20 V to 30 V
Output current at "1" signal		max. —	0.5 A
Lamp load		max. —	5 W
Residual current at "0" signal		max. —	400 µA
Output voltage			
• At "0" signal		max. —	2.4 V (at 6 kΩ load voltage)
• At "1" signal		max. —	L+ - 0.6 V (at 0.5 A and 24 V DC)
Short-circuit protection		—	Electronic
Switching frequency			
• With resistive load		max. 10 Hz	100 Hz
• With inductive load		max. 10 Hz	2 Hz
Total current		—	6 A (8 A at max. 50 °C)
Cable length unshielded		max. 100 m (328 ft)	100 m (328 ft)
Continuous current		3 A	—
Switching capacity of the contacts			
• With resistive load		max. 3 A at 250 V AC; 1.5 A at 30 V DC	—
• With inductive load		max. 0.5 A at 250 V AC and 30 V DC	—
Operating cycles of the contacts (in acc. with VDE 0660, Part 200)			
• AC-11		1 x 10 <sup>6</sup>	—
• DC-11		0.5 x 10 <sup>6</sup>	—
<b>Onboard interrupt inputs</b>			
Number of inputs		1, can also be used as digital input	4, can also be used as digital input
Galvanic isolation		Yes	No
Input voltages and currents		See onboard digital inputs	
Delay time			
• At "0" → "1"		typ. 40 µs	75 µs
• At "1" → "0"		typ. 180 µs	140 µs
Pulse duration		min. 500 µs	500 µs
Cable length		max. 50 m (164 ft) (unshielded)	100 m (328 ft) (shielded)
<b>Onboard counter inputs</b>			
Number of inputs		1, can also be used as digital input	2
Galvanic isolation		Yes	No
Input voltages and currents		See onboard digital inputs	
Delay time			
• At "0" → "1"		typ. 40 µs	10 µs
• At "1" → "0"		typ. 180 µs	15 µs
Counting frequency		max. 1 kHz	Counter A: 5 kHz      Counter B: 2 kHz
Pulse duration		min. 500 µs	min. 100 µs
Cable length		max. 50 m (164 ft) (unshielded)	100 m (328 ft) (shielded)

**S5-90U, S5-95U (continued)**

Technical specifications (continued)		S5-90U	S5-95U
<b>Onboard analog inputs</b>			
Number of inputs		—	8; can also be used as digital inputs
Input range (rated value)		—	0 to 10 V
Galvanic isolation		—	No
Input resistance		—	20 kΩ
Digital representation of the input signal		—	12 bit
Resolution		—	10 bit
Measuring principle		—	Instantaneous value coding (successive approximation)
Conversion time		—	40 μs
Internal setting time		—	3.5 ms
Error message in the event of overrange		—	Yes
Operational limits <sup>1)</sup> (0 to 60 °C)		—	1.68 %
Cable length (shielded)	max.	—	100 m (328 ft)
<b>Onboard analog outputs</b>			
Number of outputs		—	1
Galvanic isolation		—	No
Digital representation of the signal		—	11 bit
Resolution		—	10 bit
<b>Voltage output</b>			
• Output range (rated value)		—	0 to 10 V
• Load resistance	min.	—	2.5 kΩ
• Conversion time	max.	—	20 μs (incl. setting time)
• Short-circuit protection		—	Yes
• Short-circuit current	typ.	—	30 mA
• Operational limits <sup>1)</sup> (0 to 60 °C)		—	1 %
• Cable length (shielded)	max.	—	100 m (328 ft)
<b>Current output</b>			
• Output range (rated value)		—	0 to 20 mA
• Load resistance	max.	—	300 Ω
• Conversion time	max.	—	30 μs
• Operational limits <sup>1)</sup> (0 to 60 °C)		—	11 %
• Cable length (shielded)	max.	—	100 m (328 ft)

<sup>1)</sup> Based on rated value of measuring range (10 V or 20 mA)

Ordering data	Order No.		Order No.
<b>S5-90U programmable controller</b> incl. backup battery for 115/230 V AC, without User's Guide	<b>6ES5 090-8MA01</b>	<b>Wall fastenings</b> for direct mounting of the S5-90U on walls and supporting plates, 1 set, consisting of 4 fastenings	<b>6ES5 981-8MB11</b>
<b>375 memory submodule</b> EPROM           8 Kbyte EEPROM         2 Kbyte EEPROM         4 Kbyte	<b>6ES5 375-8LA12</b> <b>6ES5 375-8LC11</b> <b>6ES5 375-8LC21</b>	<b>IM 90 interface module</b> for expansion of the S5-90U by up to 6 I/O modules	<b>6ES5 090-8ME11</b>
<b>Backup battery</b> (lithium battery) To be ordered as a separate item: <b>S5-90U/-95U system manual</b> with User's Guide for S5-90U/-95U German English French Spanish Italian	<b>6ES7 971-1AA00-0AA0</b>  <b>6ES5 998-8MA12</b> <b>6ES5 998-8MA22</b> <b>6ES5 998-8MA32</b> <b>6ES5 998-8MA42</b> <b>6ES5 998-8MA52</b>	<b>Bus units, I/O modules</b>  <b>Simulator</b> for digital input signals	See as of page 2/27  <b>6ES5 788-8MK11</b>
<b>35 mm DIN rail</b> Length 483 mm (for 19 in cabinets) Length 530 mm (for 600 mm cabinets) Length 830 mm (for 900 mm cabinets) Length 2 m	<b>6ES5 710-8MA11</b>  <b>6ES5 710-8MA21</b>  <b>6ES5 710-8MA31</b>  <b>6ES5 710-8MA41</b>	<b>STEP 5 package for mini controllers</b> based on S5-DOS/ST, runs under PG/PC, in Ger., Eng., Fr., It., Sp. Single licence Copy licence	<b>6ES5 864-0MA03</b> <b>6ES5 864-0MA03-0KL1</b>  see S5-95U (next page)
		<b>COM DB1 parameterization software</b>	

# SIMATIC S5-90U, S5-95U/F, S5-100U

## CPUs/Compact PLCs

2

### S5-90U, S5-95U (continued)

Ordering data	Order No.	Ordering data	Order No.
<b>S5-95U programmable controller</b> for 24 V DC, without User's Guide	6ES5 095-8MA03	<b>Power supply module</b> for 115/230 V AC ; 24 V DC/2 A for 115/230 V AC; 24 V DC/4 A for 115/230 V AC; 24 V DC/10 A <b>35 mm DIN rail</b>	<b>6ES5 931-8MD11</b> <b>6EW1 380-1AB</b> <b>6EW1 380-4AB01</b> see S5-90U (see page 2/19)
<b>S5-95U programmable controller with PROFIBUS interface</b> for 24 V DC, without User's Guide	6ES5 095-8MB02	<b>Front connector<sup>1)</sup></b> 40-pin for crimp terminals (increased EMC protection) <ul style="list-style-type: none"> <li>• With crimp contacts</li> <li>• Without crimp contacts</li> </ul> 40-pin, for screw terminals <ul style="list-style-type: none"> <li>• Standard</li> <li>• Increased EMC protection</li> </ul>	<b>6ES5 490-8MA13</b> <b>6ES5 490-8MA03</b>
<b>S5-95U programmable controller with 2nd serial interface</b> for 24 V DC, without User's Guide	6ES5 095-8MC01	<b>Sub D connector</b> 9-pin, male contacts 15-pin, male contacts	<b>6ES5 490-8MB11</b> <b>6ES5 490-8FB11</b>
<b>S5-95U programmable controller with PROFIBUS-DP slave interface</b> for 24 V DC, without User's Guide	6ES5 095-8MD01	<b>Extractor tool</b> for crimp contacts	<b>6ES5 750-2AA11</b> <b>6ES5 750-2AA21</b>
<b>S5-95U programmable controller with PROFIBUS-DP master interface</b> for 24 V DC, without User's Guide	6ES5 095-8ME01	<b>Crimp contacts,</b> pack of 250	<b>6ES5 497-8MA11</b>
<b>375 memory submodule</b> EPROM 8 Kbyte EPROM 16 Kbyte EPROM 32 Kbyte EEPROM 2 Kbyte EEPROM 4 Kbyte EEPROM 8 Kbyte EEPROM 16 Kbyte EEPROM 32 Kbyte	<b>6ES5 375-1LA15</b> <b>6ES5 375-1LA21</b> <b>6ES5 375-1LA41</b> <b>6ES5 375-0LC11</b> <b>6ES5 375-0LC21</b> <b>6ES5 375-0LC31</b> <b>6ES5 375-0LC41</b> <b>6ES5 375-0LC61</b>	<b>Crimping tool</b> for crimp contacts <b>Bus units, I/O modules</b> <b>STEP 5 package for mini PLCs</b> Runs under PG/PC, in German, English, French, Spanish, Italian Single license Copy license	<b>6XX3 070</b>  <b>6XX3 071</b> see page 2/27
<b>Backup battery (lithium battery)</b> To be ordered as a separate item:	6ES5 980-0MA11	<b>COM DB1 parameter assignment software</b> for high-speed, user-friendly parameter assignment of S5-90U, S5-95U, S5-100U, based on S5-DOS/ST, runs under PG/PC	<b>6ES5 864-0MA04</b> <b>6ES5 864-0MA04-0KL1</b>
<b>S5-90U/-95U system manual</b> with User's Guide for S5-90U/-95U	6ES5 998-8MA 2	Single license	<b>6ES5 895-3MW 1</b>
The following can be ordered in addition to the system manual:	↑	German English French Spanish Italian	↑ 1 2 3 4 5
<b>Manual of the PROFIBUS interface of the S5-95U</b> The following can be ordered in addition to the system manual:	6ES5 998-8MB 2		
<b>Manual of the 2nd serial interface of the S5-95U</b> The following can be ordered in addition to the system manual:	6ES5 998-8MC 1		
<b>Manual of the PROFIBUS-DP interface of the S5-95U</b> For Description of the S5-95U with PROFIBUS-DP master interface see	6ES5 998-8MD 1		
<b>Manual of the ET 200 distributed I/O system</b>	6ES5 998-3ES 2		
German English French Spanish Italian	1 2 3 4 5		

1) The left row of terminals on the front connector is marked with an "a", the right row with a "b".  
 2) Only for S5-95U with PROFIBUS-DP master interface (6ES5 095-8ME01)