

SIMATIC S5

**S5-90U/S5-95U
Programmable Controller**

System Manual

EWA 4NEB 812 6115-02b

Edition 03

Scope of the S5-90U/S5-95U System Manual

The S5-90U/S5-95U System Manual is valid for the following programmable controllers:

- S5-90U from Order No. 6ES5 090-8MA01, Edition 02
- S5-95U from Order No. 6ES5 095-8MA04, Edition 01
- S5-95U from Order No. 6ES5 095-8MB03, Edition 01
- S5-95U from Order No. 6ES5 095-8MC02, Edition 01
- S5-95U from Order No. 6ES5 095-8MD02, Edition 01

The Manuals listed below are required for starting up the S5-90U and the various versions of the S5-95U programmable controller.

Programmable Controller	Manuals Required for Start-Up
S5-90U Order No. 6ES5 090-8MA01	• S5-90U/S5-95U System Manual, Order No. 6ES5 998-8MA22
S5-95U (basic unit), Order No. 6ES5 095-8MA04	• S5-90U/S5-95U System Manual, Order No. 6ES5 998-8MA22
S5-95U, SINEC L2 Interface, Order No. 6ES5 095-8MB03	• S5-90U/S5-95U System Manual, Order No. 6ES5 998-8MA22 • SINEC L2 Interface of the S5-95U Manual, Order No. 6ES5 998-8MB22
S5-95U, Second Serial Interface, Order No. 6ES5 095-8MC02	• S5-90U/S5-95U System Manual, Order No. 6ES5 998-8MA22 • Second Serial Interface of the S5-95U Manual Order No. 6ES5 998-8MC21
S5-95U, SINEC L2-DP Interface, Order No. 6ES5 095-8MD02	• S5-90U/S5-95U System Manual, Order No. 6ES5 998-8MA22 • SINEC L2-DP Interface of the S5-95U Manual, Order No. 6ES5 998-8MD21

Training

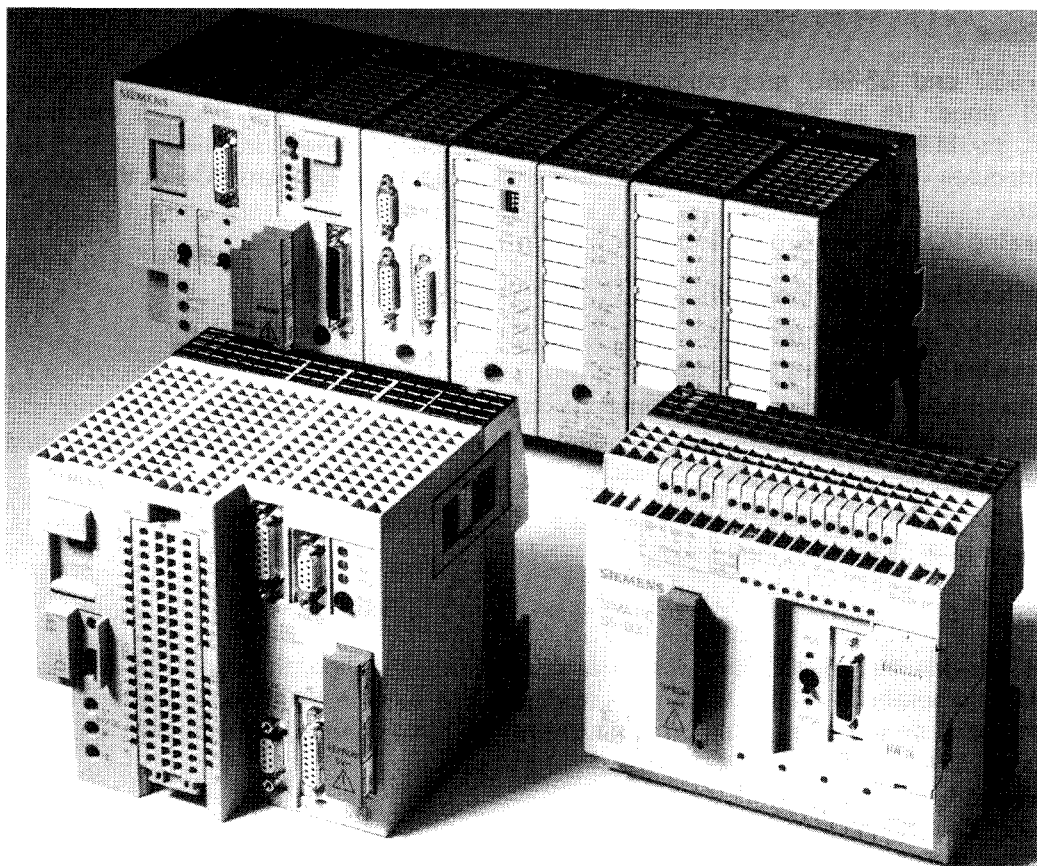
Siemens offers a wide range of training courses for SIMATIC S5 users. Contact your Siemens representative for more information.

1 System Description

The SIMATIC S5 system family includes programmable controllers of all performance levels, i.e. from the simplest and smallest to high-end PLCs.

The following SIMATIC programmable controllers (PLCs) are suited especially for automation tasks where only little space is available for the controller:

- S5-90U,
- S5-95U and
- S5-100U



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Figure 1-1. S5-90U, S5-95U and S5-100U Programmable Controllers

S5-90U Programmable Controller

The S5-90U is the most economical option for solving simple automation tasks requiring only ten inputs and six outputs.

It is mainly used for automation tasks which could previously only be solved by means of contactors and relays for reasons of space and cost. Even circuits with only four contactors can now be implemented more economically with the S5-90U.

Salient features of the S5-90U:

- Modular expansion capability
- Networking capability (via SINEC L1)
- Battery for data maintenance

S5-95U Programmable Controller

The S5-95U is a fast and compact PLC designed for complex applications with digital and analog inputs and outputs where space is a crucial factor.

It is suitable for small control tasks with high demands regarding response times and supplementary functions.

Salient features of the S5-95U:

- Onboard analog inputs/outputs with extremely short conversion times
- PID controller
- Networking capability as active or passive station in the SINEC L2 LAN

I/O Modules

The S5-90U and S5-95U programmable controllers can be expanded with I/O modules of the S5-100U range. Up to 32 modules can be connected directly to the S5-95U. For the S5-90U, however, the IM 90 interface module is required for connecting up to six modules.

These modules offer a variety of functions that supplement the onboard I/Os of the programmable controllers.

The following I/O modules are available:

- Digital input and output modules
- Analog input and output modules
- Ex modules for hazardous applications
- Function modules for external timer functions, fast counters and analog limit monitoring
- Intelligent I/O modules for closed-loop control and positioning tasks and for cam mechanisms
- Intelligent programmable modules for fast preprocessing functions
- Diagnostic modules for monitoring the I/O bus of the S5-100U
- Simulator modules for program testing.

Bus Units

Bus units provide the S5-90U/95U with extra-discrete configuration and expansion capabilities. The bus units incorporate the signal leads for communication between I/O modules and CPU. They are simply mounted on a 35 mm standard mounting rail and interconnected using the integral flat ribbon cable connectors.

Each bus unit has

- Two module slots
- Rotatable coding "locks" to avoid confusing of modules
- A terminal block for the signal leads.

Communications Capabilities

The SINEC L1 and SINEC L2 (S5-95U only) LANs offer extensive communications functions for data interchange with various devices and stations. The internal 20 mA (TTY) interfaces and the CP modules additionally permit point-to-point connections, for instance, to

- Printers
- Terminals
- Personal computers
- Other programmable controllers.

Dimensions

The S5-90U and S5-95U programmable controllers are distinguished by their low space requirement. They can be used even in places too small for accommodating a conventional control consisting of contactors and relays. They are thus the ideal solution if a controller for a small control task must additionally be fitted in a control cabinet already containing a complete configuration.

The two PLCs can also be operated without any I/O modules. They constitute, of course, the most economical solution with regard to space requirements if the onboard I/Os are sufficient for implementing the control task.

The number of bus units used for external I/Os determines the space requirement.

Table 1-1. Dimensions

Programmable Controller	Width	Height	Depth
S5-90U programmable controller	145 mm	135 mm	97 mm
S5-95U programmable controller	145 mm	135 mm	146 mm
Bus unit with two I/O modules, with terminal block for	screw-type connection	91.5 mm	162 mm
	crimp snap-in connection	91.5 mm	135 mm
			137.8 mm
			137.8 mm

Mounting

The S5-90U can be mounted directly on walls or mounting plates. For this purpose, you need four **wall brackets** that can be pushed into the four openings on the rear of the casing and then mounted on the wall using screws.

The S5-95U snaps onto a 35 mm **standard mounting rail** which also accommodates the bus units for the external I/O modules. Optionally, the S5-90U can also be fitted on a 35 mm standard mounting rail.

Power Supply

When configuring a system or plant, you have to make sure the PLC is provided with the supply voltage required.

The S5-90U can be connected directly to the 115/230 V AC mains supply.

The S5-95U can be connected directly to a 24 V DC voltage supply. Power supply modules providing 1 A to 10 A (at 24 V) are available for connection to 115/230 V AC.

Digital Inputs/Outputs

Due to their wide range of applications, the number of inputs and outputs required by the PLCs varies considerably.

The two PLCs permit different configurations. You can therefore select the PLC that suits your specific task.

Table 1-2. All Inputs and Outputs

Inputs/Outputs	S5-90U		S5-95U	
	Onboard	Maximum	Onboard	Maximum
Digital inputs/outputs	16	208	32	480
Analog inputs/outputs	0	16	9	41
Counter inputs	1	13	2	66
Interrupt inputs	1	1	4	4

The PLCs offer onboard digital inputs and outputs to which the required number of I/O modules of the S5-100U range can be added.

Analog Inputs/Outputs

The PLCs also feature analog inputs and outputs. Analog inputs and outputs are incorporated on the S5-95U board. Both the S5-90U and S5-95U can be expanded using the relevant I/O modules of the S5-100U spectrum.

Interrupt Inputs

In addition to the above-mentioned inputs and outputs, the S5-90U and S5-95U feature onboard inputs for interrupt processing.

Counter Inputs

Many applications require the use of counters. The onboard counter inputs of the S5-90U and S5-95U are adequate for a great variety of counter functions.

The following onboard counter inputs are available:

- S5-90U One up counter (16-bit) Counting frequency: 1 kHz
 - S5-95U One up counter (16-bit) Counting frequency: 2 kHz,
One up counter (16-bit) Counting frequency: 5 kHz.
- Both up counters can be combined in a cascade to form one 32-bit up counter.

If these inputs do not meet your requirements, e.g. with respect to the counting frequency, they can be supplemented with counter modules of the S5-100U range.

Three different counter modules are available:

- A two-channel counter module for up to 500 Hz, two down counters;
- A fast, single-channel counter module for counting frequencies up to 500 kHz, with two comparison values, for both counting and position decoding;
- An intelligent I/O module with two counter channels for up to 58 kHz, up or down counters.

9.4.1 Parameter Blocks

The following Table shows the functions that can be parameterized in DB1.

Table 9-14. Parameter Blocks in DB1

Parameter Blocks and Their Default Settings in Default DB1	Block ID	S5-90U	S5-95U	Described in Section
Onboard Analog inputs Parameter block for analog Onboard I/Os <i>Default:</i> No analog input is cyclically read into the PII.	OBA: _	No	Yes	12
Onboard Interrupt Parameter block for interrupt inputs <i>Default:</i> No interrupt input enabled.	OBI: _	Yes	Yes	10
Onboard Counter Parameter block for onboard counters <i>Default:</i> No counter enabled.	OBC: _	Yes	Yes	11
SINEC L1 Parameter block for SINEC L1 parameters <i>Default:</i> No SINEC L1 parameter initialized.	SL1: _	Yes	Yes	14
System-Dependent Parameters Parameter block for system characteristics <i>Default:</i> All timers are processed and PLC starts up without external I/Os.	SDP: _	No	Yes	6
Timer Function Block Parameter block for time-controlled program execution <i>Default:</i> OB13 is called at intervals of 100 ms.	TFB: _	No	Yes	9
Clock Parameters Parameter block for the integral clock <i>Default:</i> Integral clock is not activated.	CLP: _	No	Yes	13
Error Return Parameter block with address for DB1 parameterization error code <i>Default:</i> No address specified.	ERT: _	Yes	Yes	9

_ stands for one or more fillers. Fillers can either be blanks or commas.

Additional parameter blocks are available for the variants of the S5-95U with a second interface. These parameter blocks are described in connection with the respective interface in the Manual.

Tables listing all permissible DB1 parameters for the above-mentioned functions of S5-90U and S5-95U are included in Appendix B.