SIEMENS

SIMATIC S5
S5-110A Programmable Controller

Catalog ST 51 · 1981

Revised Edition 9.81

Survey of the catalogs on the electronic SIMATIC Control Systems

ST 11	SIMATIC C1, C2 Static Switching Systems, Electronic Sensors
ST 13	SIMATIC C3 Static Switching System
ST 14	SIMATIC C3 Static Switching System, Modules for SIMATIC S3 Control Systems
ST 21	SIMATIC S1, S2 Control Systems (in German only)
ST 22	SIMATIC S3 111, SIMATIC S31 – 210 Programmable Controllers
ST 24	SIMATIC S31 Control System
ST 25	SIMATIC S32 Control System (in English available: Section 4 STEP 3 Programming Language)
ST 31	SIMATIC MS3 Event Signalling System
ST 32	SIMATIC MD3 Event Recording System
ST 51	SIMATIC S5, S5 – 110A Programmable Controller
ST 53	SIMATIC S5, S5 – 130 Programmable Controllers
ST 55	SIMATIC S5, S5 – 150 Programmable Controllers

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SIMATIC S5
S5–110A Programmable Controller

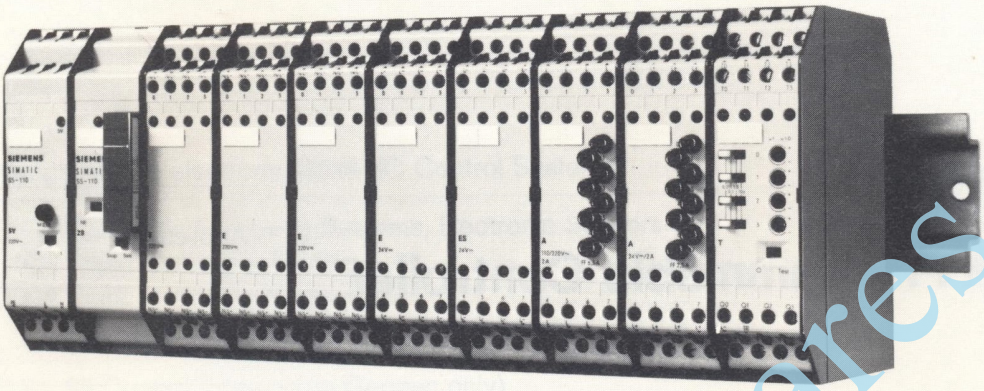
Catalog ST 51 · 1981

Revised Edition 9.81
Supersedes Catalog ST 51 · 1981

SIEMENS AKTIENGESELLSCHAFT

Features

Developments in the electronics field have made it possible to use programmable controllers economically at the bottom end of the automation and control hierarchy. Such a device is the SIMATIC S5 – 110A, which is used to solve control problems handled previously and exclusively by relays and contactors, mainly for reasons of economy.



The following features are of prime importance for the economical application of programmable controllers at the lower end of the automation hierarchy:
They must be easy to use
The basic outlay must be kept as low as possible
Programming must be simple
They must lend themselves to simple troubleshooting.

The similarity to contactors with regard to handling etc. is the result of new design features: Rugged block modules for simply snapping onto a standard mounting rail and contactor-type screw terminals for attaching the external leads.

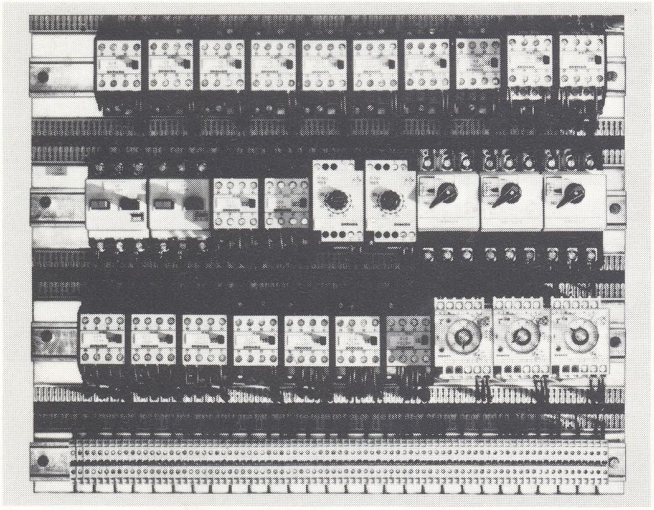
The low basic outlay on the electronics side is achieved by using a bit processor.

The controller is programmed by means of a simple programming unit. Since the S5 – 110A programmable controller is part of a complete system, however, it can also be programmed with the more sophisticated programming units of the system.

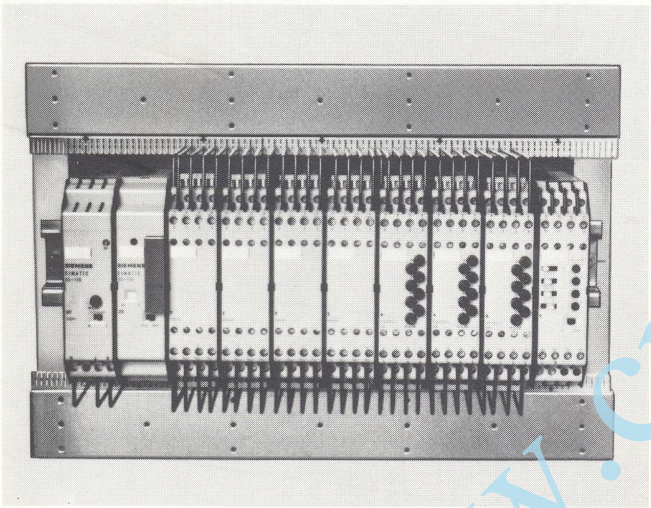
Fast and reliable troubleshooting is guaranteed by light-emitting diodes at all the inputs and outputs, and on the central and power supply modules, and is therefore also no problem for persons without specific electronics training.

Further features of the SIMATIC S5 – 110A programmable controller:

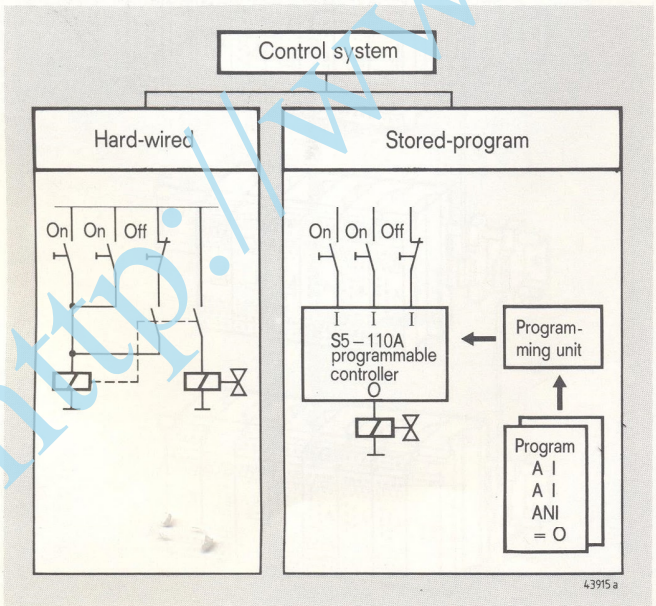
- Fast planning and design at minimum cost
- Simple construction
- No fans required; no need for mounting in protective environments, e.g. in cabinets
- Modular expansion capabilities
- EPROM as program memory
- Control functions can be modified by simply reprogramming the program memory
- Retentive latches for storing information in the event of a power failure
- Isolated, noise-proof inputs for voltages of 24 V d.c., 48 V d.c./a.c., 110 V d.c./a.c., 220 V d.c./a.c.
  and outputs for voltages of 24 V d.c./a.c., 48 V d.c./a.c., 110 V a.c., 220 V a.c.
- Outputs protected by individual 2 A fuses; built-in overvoltage protector



Contactor control system



S5 – 110A programmable controller



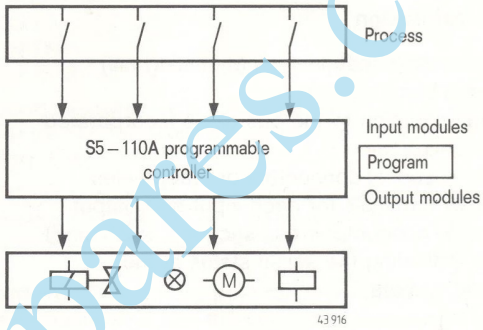
The S5 – 110A programmable controller can be used to implement binary logic, storage, counting and timing functions in the field of automatic control and automation.

The programmable controller can be used economically to replace the relay and contactor control systems used previously for processing signals from

- Position switches
- Pushbuttons
- Level switches
- Pressure and temperature monitors

and for controlling

- Motor contactors
- Solenoid valves
- Electromagnetic brakes
- Alarm indicators



Application

Monitoring and control of processes in the foodstuffs industry, petrochemical industry, water treatment plants, etc.

Control of drive systems, machine tools, automatic packing machines, conveyor systems and textile machines, etc.

When used in safety-oriented (fail-safe) control schemes, the relevant regulations must be observed.

What advantages can the user expect?

In hard-wired control systems, the control sequence is determined by the wiring of the individual relays and contactors.

In the case of stored-program systems, the control sequence is defined by a program stored in the controller in the form of statements. This principle affords the user the following advantages:

Flexibility

- The program can be modified at site to adapt it to the task in hand.
- The use of a limited number of standardized modules permits modular expansion.

Simple and rapid planning and design

- The program can be written while the hardware is being configured.
- The final control function can be defined at the last minute.
- The program can be tested in the programming unit during the commissioning phase.

Modules of the S5 – 110A programmable controller

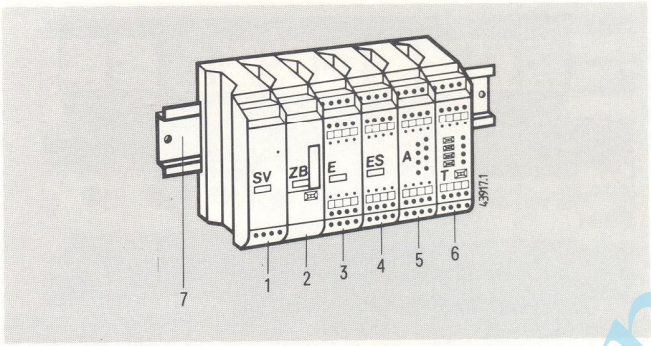
The programmable controller consists of the following basic modules:

Power supply module (SV)	(1)
Central module with EPROM memory module (ZB) and peripheral modules.	(2)

The following peripheral modules are available:

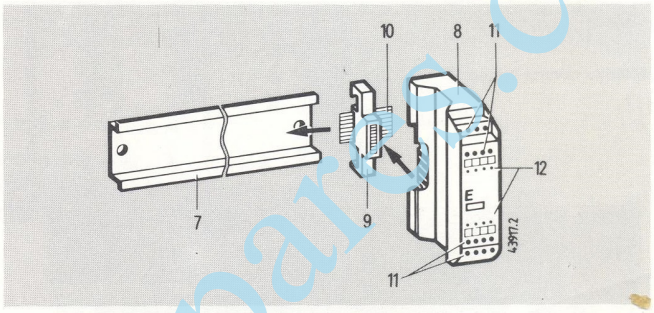
Input modules (E)	(3)
Input module with group signal (ES)	(4)
Output modules (A)	(5)
Timer/counter module (T)	(6)

The individual modules are simple snapped onto a 75 mm standard sectional rail (mounting rail) to form a complete controller.



Mechanical design

75 mm standard sectional rail (mounting rail)	(7)
Modules of block design	(8)
Module connection to the bus cable incorporated in the mounting rail	(10)
via snap-on socket connectors or receptacles	(9)
Two screw terminals for each input and output (permissible conductor cross-section 2 × 2.5 mm²)	(11)
LEDs for indicating the signal status at the inputs and outputs	(12)

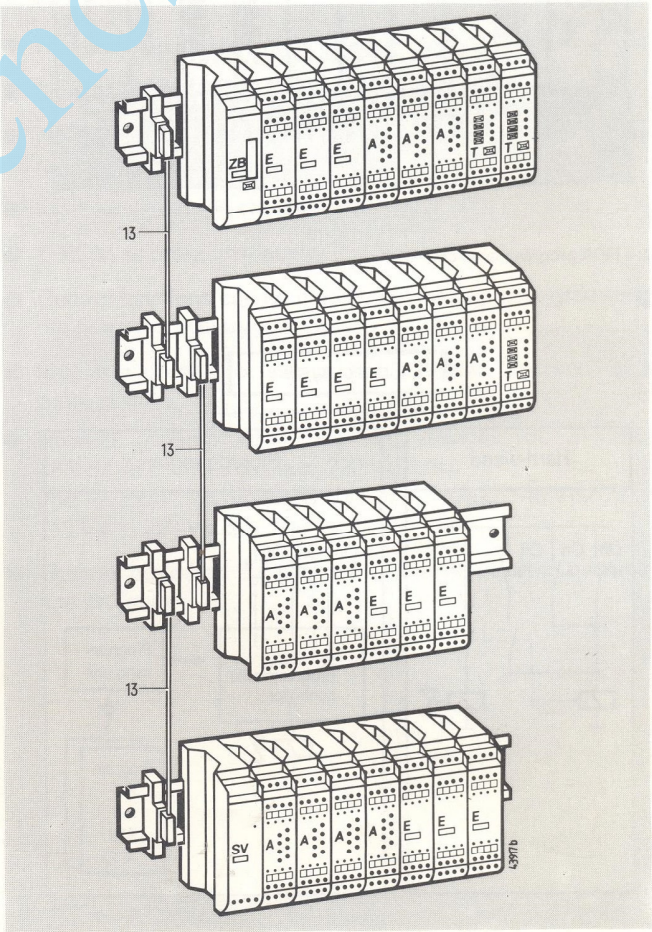


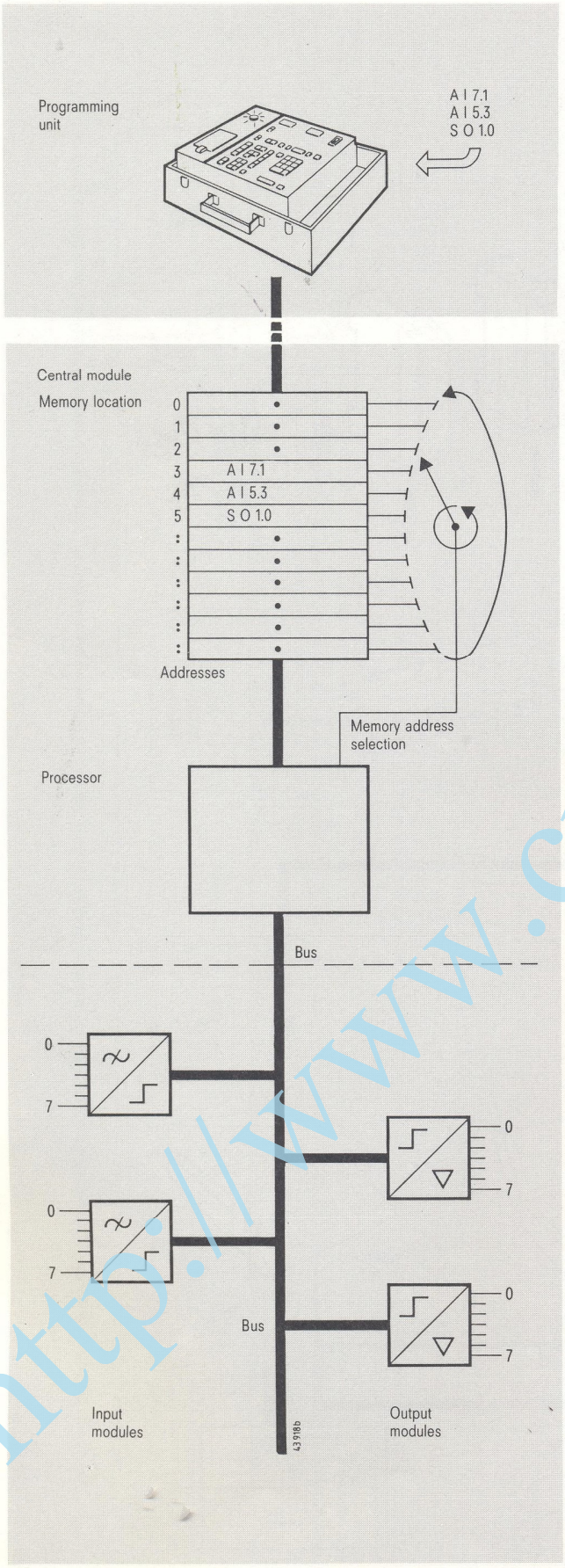
Expansion features

The controller can be expanded in steps by simply adding further (up to four) mounting rails. The electrical connection between the bus cables of the individual mounting rails is established by a cable (13).

In addition to the power supply module and the central module, the single-tier programmable controller has eight socket connectors or receptacles for peripheral modules in any combination. Each additional tier or mounting rail has eight additional receptacles for peripheral modules.

In the case of the three and four-tier configurations, certain constraints must be observed (see p. 20).





The desired control functions of the S5 – 110A programmable controller are determined by the stored program, consisting of a number of individual STEP 5 statements.

The program statements are written consecutively into the locations of the memory from a programming unit.

During operation, the processor scans the memory cyclically, selecting the memory addresses one after the other. The statement read out of the memory location is interpreted and the corresponding operation executed.

When the end of the program is reached, i. e. the EM operation in the last memory location has been executed, the processor starts again from the beginning of the program.

Example of how statements are processed

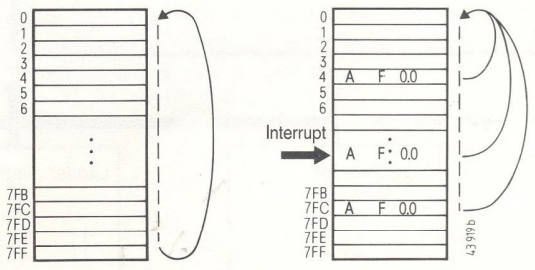
A I 7.1
A I 5.3
S O 1.0

The statement A I 5.3 causes the signal status of terminal 3 of the input module in receptacle 5 to be scanned. The result of this scanning operation is then ANDed with the result of the previously executed statement.

The result of this logical operation is temporarily stored and, on the occurrence of an output statement, in this case S O 1.0, is made available at terminal 0 of the output module in receptacle 1 as an output command.

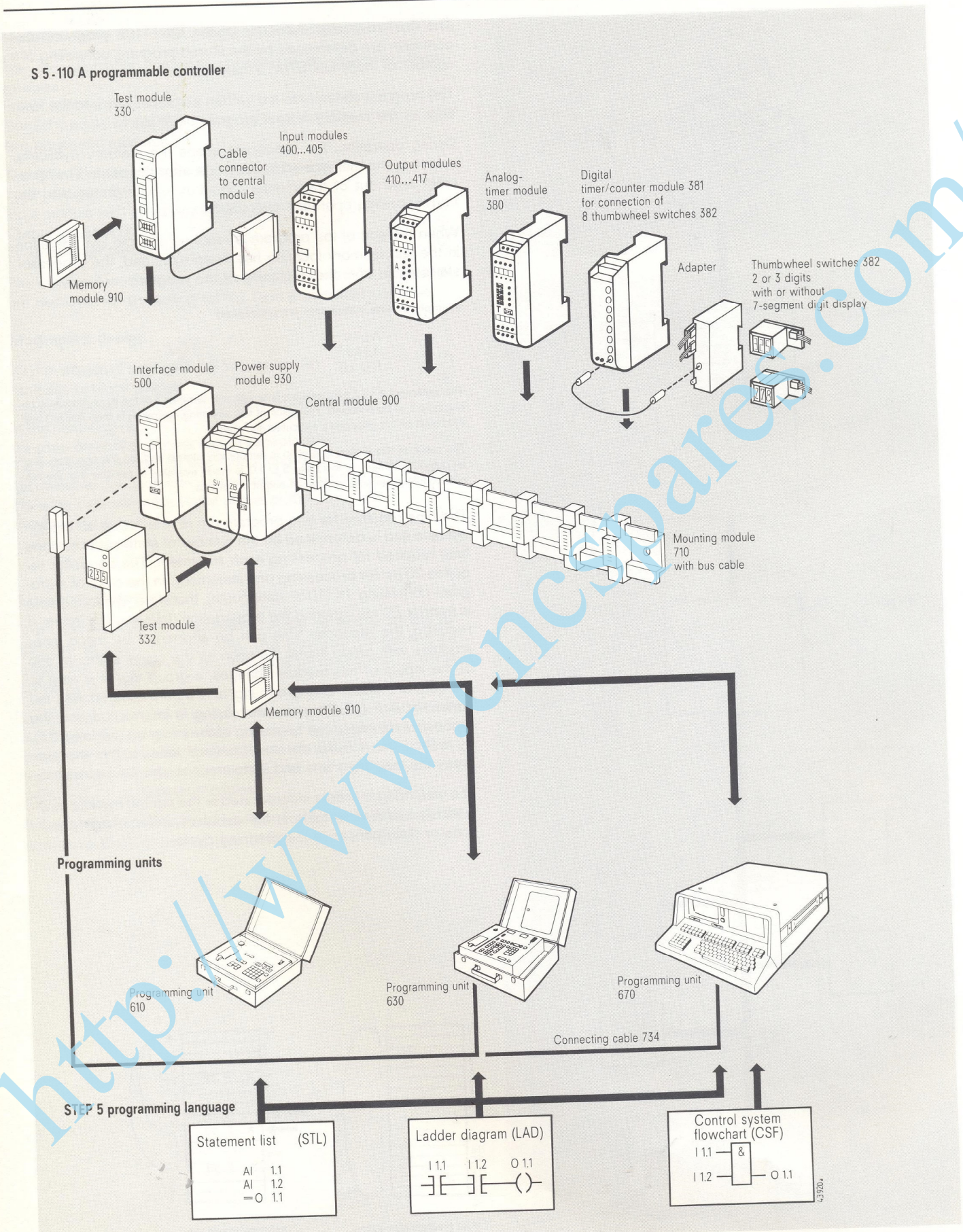
The time required for one program run is referred to as the cycle time and is determined by the number of statements and the time required for processing each statement. The controller requires 20 µs for processing one statement. In the case of a program containing 1K (1024 statements), therefore, the cycle time is approx. 20 ms, ignoring the propagation delays at the inputs. If required, the response time can be shortened by using input modules with group signal. As soon as the signal status at one of the inputs of this module changes, a group signal is sent to the central module. This group signal is then evaluated with the statement A F 0.0. Program processing is interrupted and the processor returns to the beginning of the program (address "0"). By writing the A F 0.0 statement several times within the program, the response time and its tolerances can be decreased.

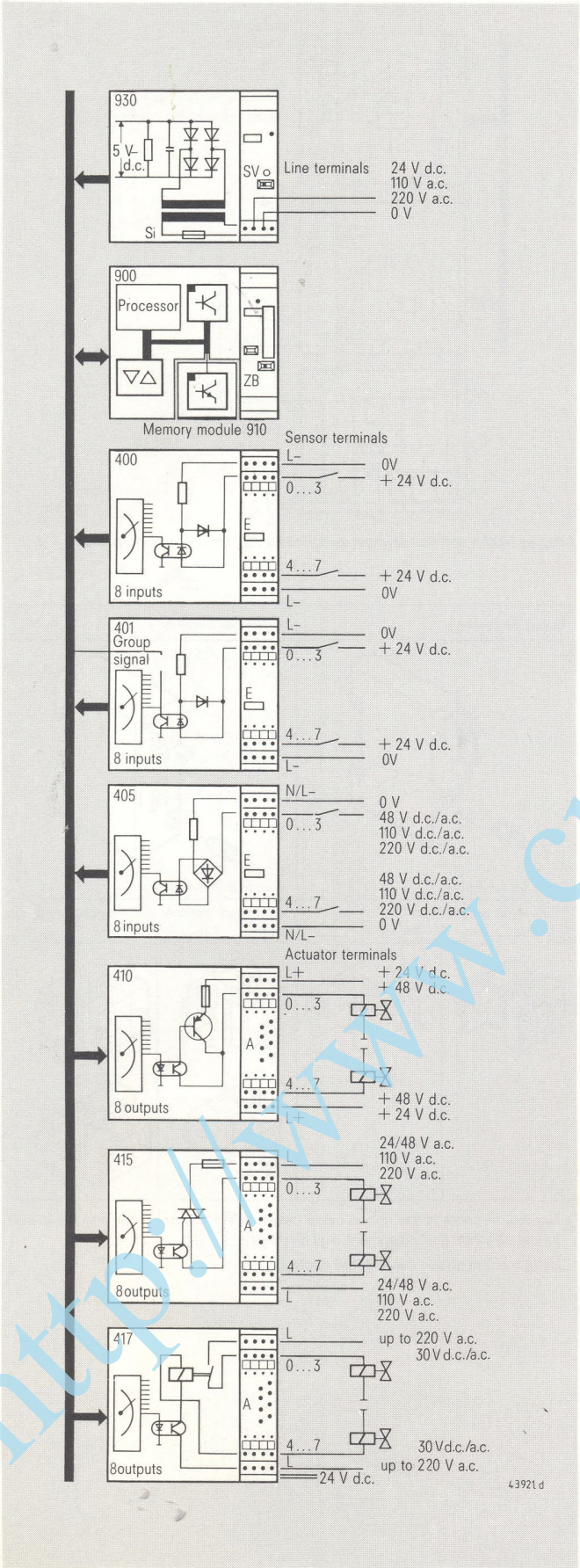
The watchdog monitors incorporated in the central module automatically reset all outputs in the event of undervoltage conditions or disturbances in the scanning cycle.



Cyclic program processing

Interrupt processing





S5–110A programmable controller

The controller consists of the mounting rail, the power supply module, the central module with memory module and the peripheral modules.

930 power supply module

The power supply module is used for the internal power supply of the programmable controller. It also contains the fuses, status indicators and screw terminals for the line connection. The line voltage is 220 V a.c., 110 V a.c. or 24 V d.c. An additional external power supply unit must be provided for powering the external devices, such as sensors, contactors and valves, etc.

900 central module

The central module consists of the following:
Bit processor
Memory for flags
Memory for the process image of the outputs
Receptacle for 910 memory module
Voltage monitor
Cycle watchdog
Selector switch for "Run" and "Stop"
(in the event of disturbances in the scanning cycle or "Stop", the output modules are reset and inhibited and cyclic processing stopped)
Switch for changing over from retentive to non-retentive flags
With or without backup battery option to prevent loss of the flag contents in the case of power failure
LEDs for indicating the stop status of the central module or undervoltage conditions of the backup battery.

910 memory module

The memory module consists of a UV-erasable read-only memory (EPROM) for 0.5, 1, 2 or 4K statements, depending on the particular configuration (1 K ≙ 1024 statements).

400, 401 and 405 digital input modules

each with eight isolated inputs. Polarized 24 V input modules. LEDs for indicating the signal status. 24 V, 48 V, 110 V or 220 V input voltage. Digital input module with group signal triggered by the leading or trailing edge of the signal pulse.

410, 415 digital output modules

each with eight 2A outputs, static, isolated and fused. Built-in overvoltage protector. LEDs for indicating the signal status. Voltages: 24 V, 48 V, 110 V or 220 V.

417 digital output module with relay outputs

each with eight 2A or 5A outputs, isolated and fused. Built-in overvoltage protector. LEDs for indicating the signal status. Voltages: 220 V a.c. or 30 V d.c.

Timer modules

380 timer module (analog time generation)

with four timing elements for times between 10 ms and 100 s adjustable in four steps, and incorporating a potentiometer for fine adjustment.

Screw terminals for external setting potentiometers and external measurement of the preset time. LEDs for indicating the timer runtime.

381 timer/counter module (digital time generation)

with eight timing elements or counters. The module consists of the timer/counter, 832 adapter block with thumbwheel switches and the LED or 7-segment digit indicator.

The timer/counter module has eight connectors for establishing the electrical connection to the adapter blocks. An additional 24 V d.c. power supply for indicators and LEDs is connected at screw terminals on the adapter block.

Two or three-decade thumbwheel switches are available with either 7-segment digit displays for the actual time/count value or LEDs for indicating the timer or counter operation.

There is a switch on the adapter block for selecting between counter and timer mode.

Selectable time ranges: 0.01 s to 9.99 s
0.1 s to 99.9 s
1 s to 999 s

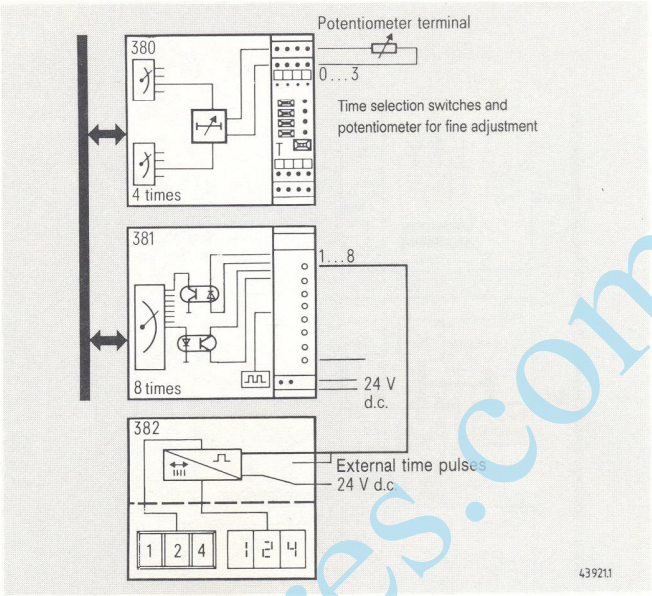
Counter range: 0 to 999

Counting takes place from the preset number down to zero.

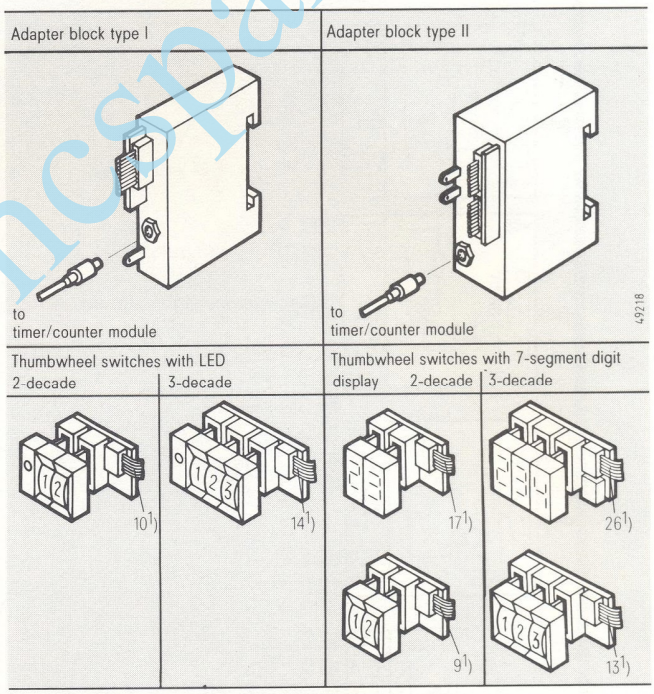
The adapter block is attached to a 35 mm mounting rail.

931 power supply module

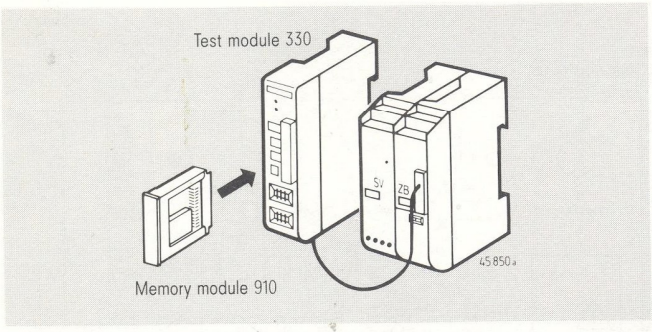
e.g. for 24 V d.c. power supply to
— relay modules (417)
— timer/counter modules (381)
— BERO proximity switches
for snapping onto a 75 mm standard mounting rail.

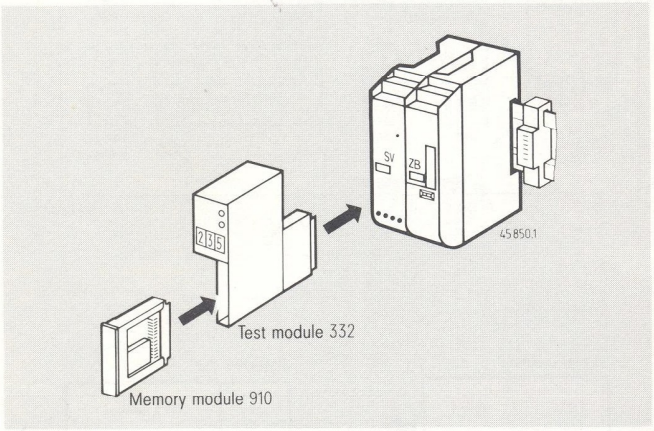


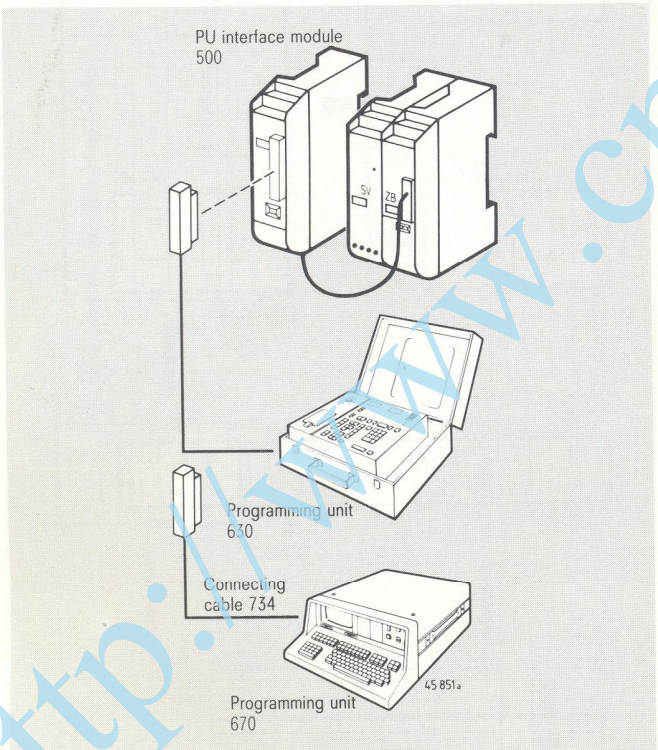
Adapter blocks and thumbwheel switches for 381 timer/counter module

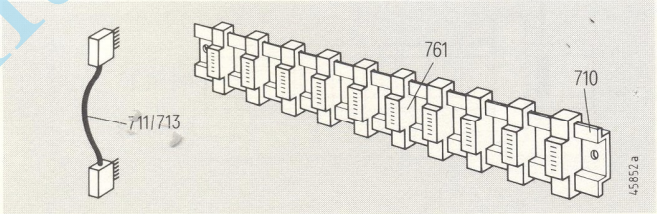


¹) Number of cores in the ribbon cable between the adapter block and the thumbwheel switches and 7-segment digit displays
Length of the ribbon cable 20 cm approx.









330 test module

The 330 test module and 332 test module (adapter) simplify commissioning and error diagnostics.

The test module is snapped onto the mounting rail to the left of the power supply unit. It is hooked up to the memory module receptacle of the central module by means of a cable connector. The programmed memory module is plugged into the test module.

Functions: Commissioning of individual program sections by setting, starting and end addresses.
Display of memory addresses and the associated statements, with signal statuses and results of logic operations; program execution can be checked by processing individual program sections.

332 test module (adapter)

The test adapter is plugged into the socket connector for the central module and the memory module plugged into the test adapter.

Functions: Display of signal statuses and the results of the logic operations at a selectable memory address.

500 programming unit interface module

This module is used for on-line startup of the program with the 630 or 670 programming unit (PU). The programmable controller then operates with the memory (RAM) of the programming unit connected. In on-line mode, it is possible to carry out test functions with the program in the PU memory. The electrical connection between the programming unit interface module and the central module is established by means of a cable connector.

734 cable connector

The 734 cable connector establishes the electrical connection between the 670 programming unit and its interface module.

710 mounting rail, 761 bus cable
711 and 713 cable connectors

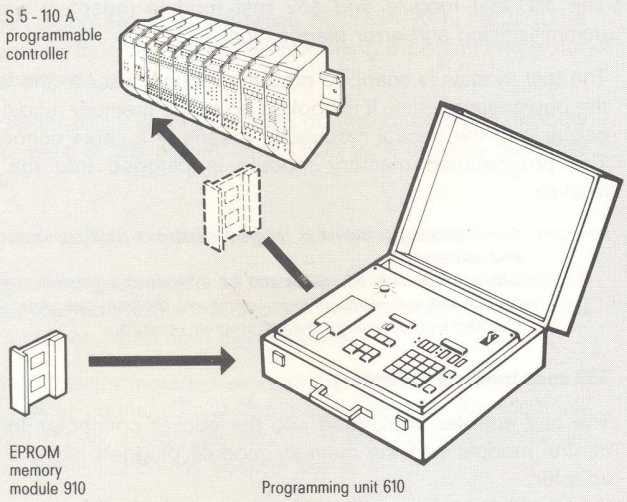
The 75 mm standard sectional rail mounts the power supply module, the central module and eight socket connectors (receptacles) for peripheral modules. The receptacles with bus cable are snapped onto the standard mounting rail. The 761 bus cable with socket connectors for up to 18 modules is available for expanding the system on a standard mounting rail.

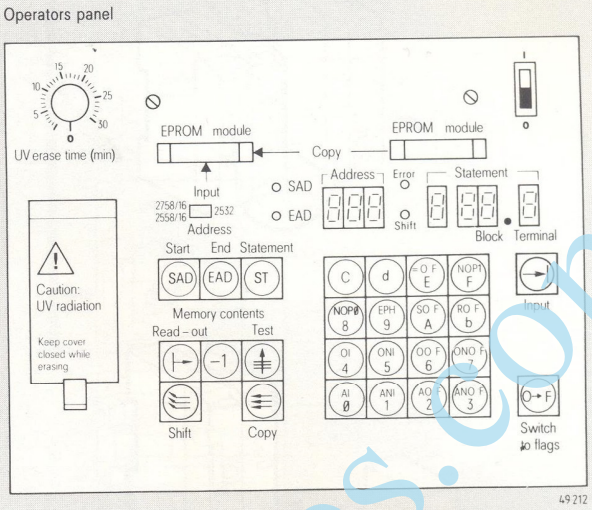
The 711 cable connector establishes the electrical connection between the bus cables in multi-tier configurations and configurations where the 710 mounting rails are arranged adjacent to each other.

The 713 cable connector establishes the connection between the 761 bus cables in configurations with extended mounting rails.

Description of programming units

610 programming unit





Construction

The 610 programming unit is used for programming 910 memory modules.

Programming takes place off-line, i.e. no connection is necessary to the programmable controller. The programming unit is accommodated in a convenient carrying case.

The operator's panel contains the following:
Selector and function keys
Single-row display for the statements keyed in
Two receptacles for memory modules.

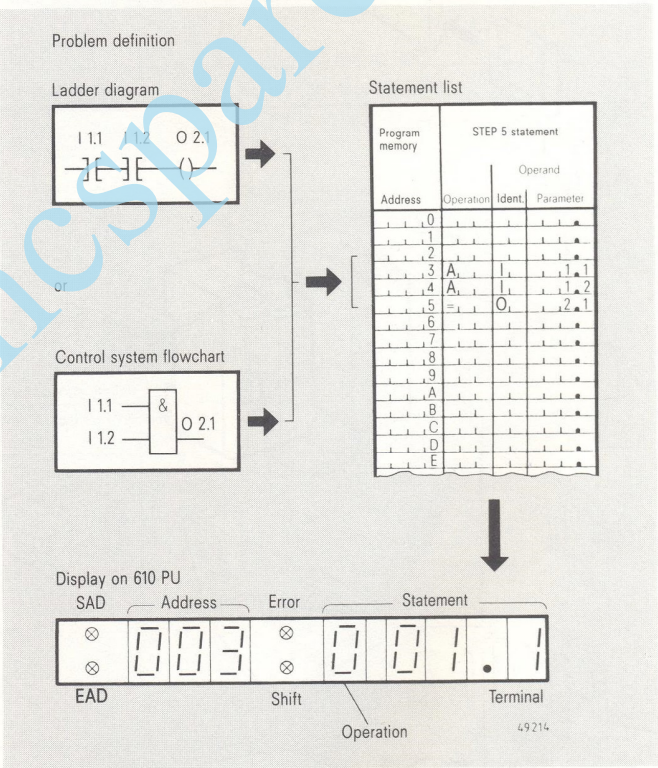
The programming unit has a UV erasing facility.

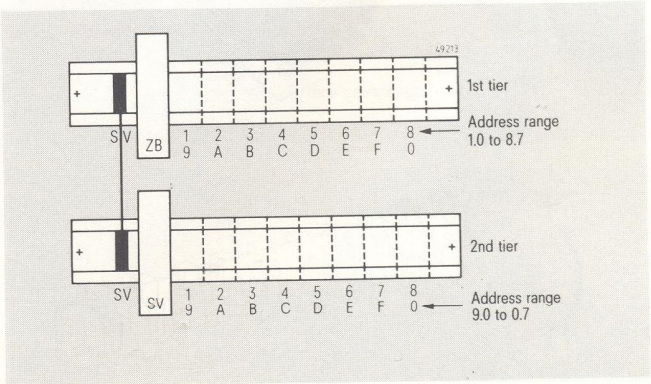
Functions

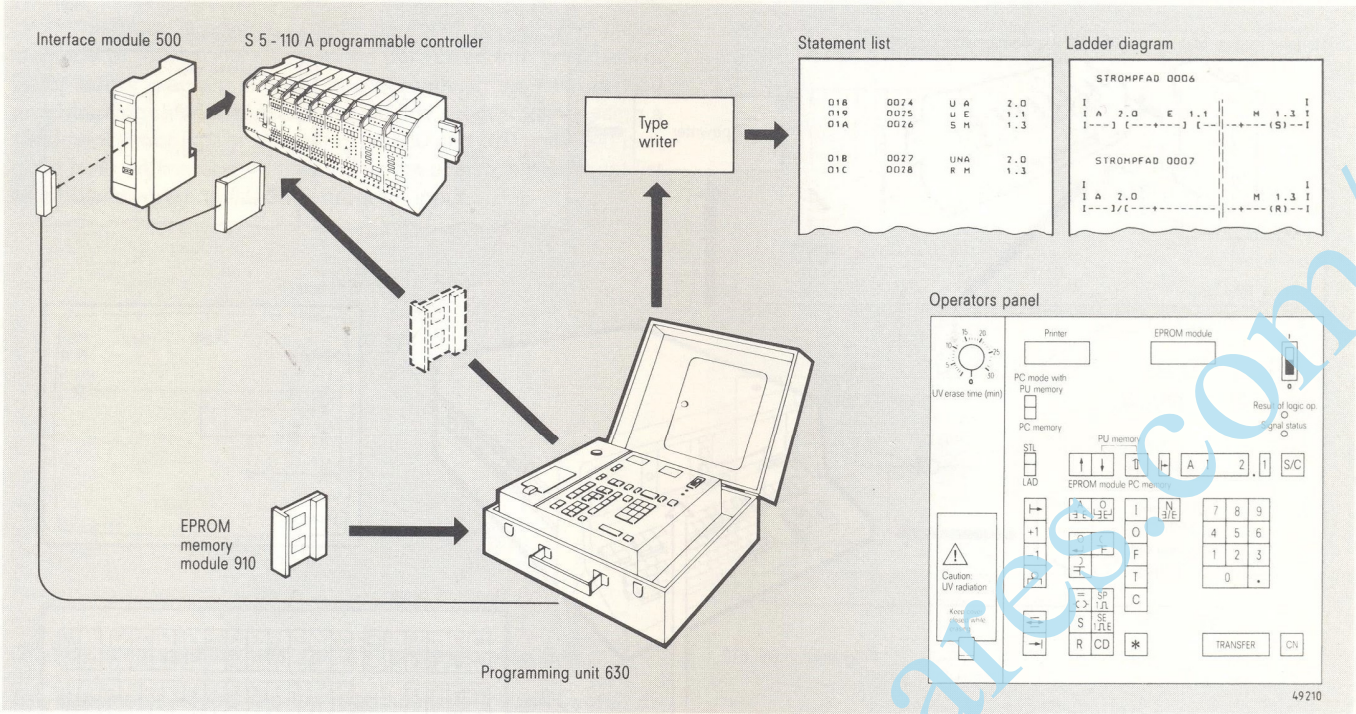
Input of STEP 5 statements directly to the EPROM
Read-out of statements
Overwriting of statements
Copying of programs
Relocation of program sections when copying
Testing the programmability of memories.

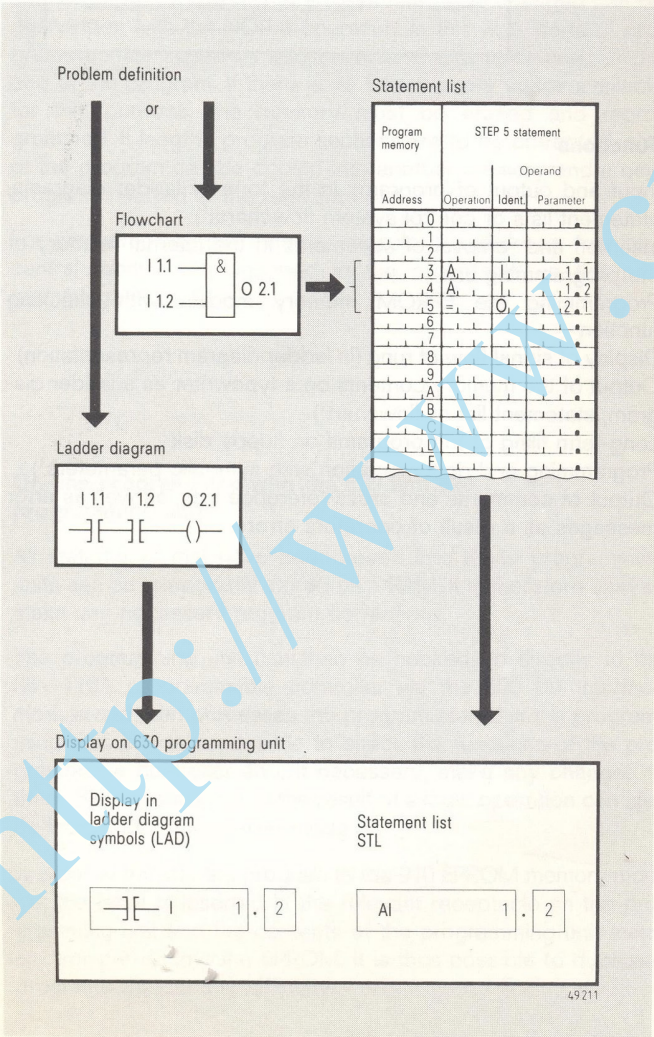
STEP 5 statements are used for programming. These are keyed into the memory from the operator's keypad. The keys are labelled to make programming simple.

The memory address, operation and parameter of each STEP 5 statement are displayed above the keypad.









Construction

The 630 programming unit is used for programming the 910 memory module. Programming takes place off-line, i.e. no connection is necessary to the programmable controller. To test the program, the 630 PU is connected to the programmable controller via the 500 programming unit interface module (on-line operation).

The programming unit is accommodated in a convenient carrying case.

The operator's panel contains the following:
Function keys for selecting and inputting functions
Alphanumeric display
Receptacle for the 910 EPROM memory module
Program memory (RAM for 2 or 4 K statements) for on-line operation, with battery backup for half an hour
Connection facility for typewriter.

The programming unit has a UV erasing facility.

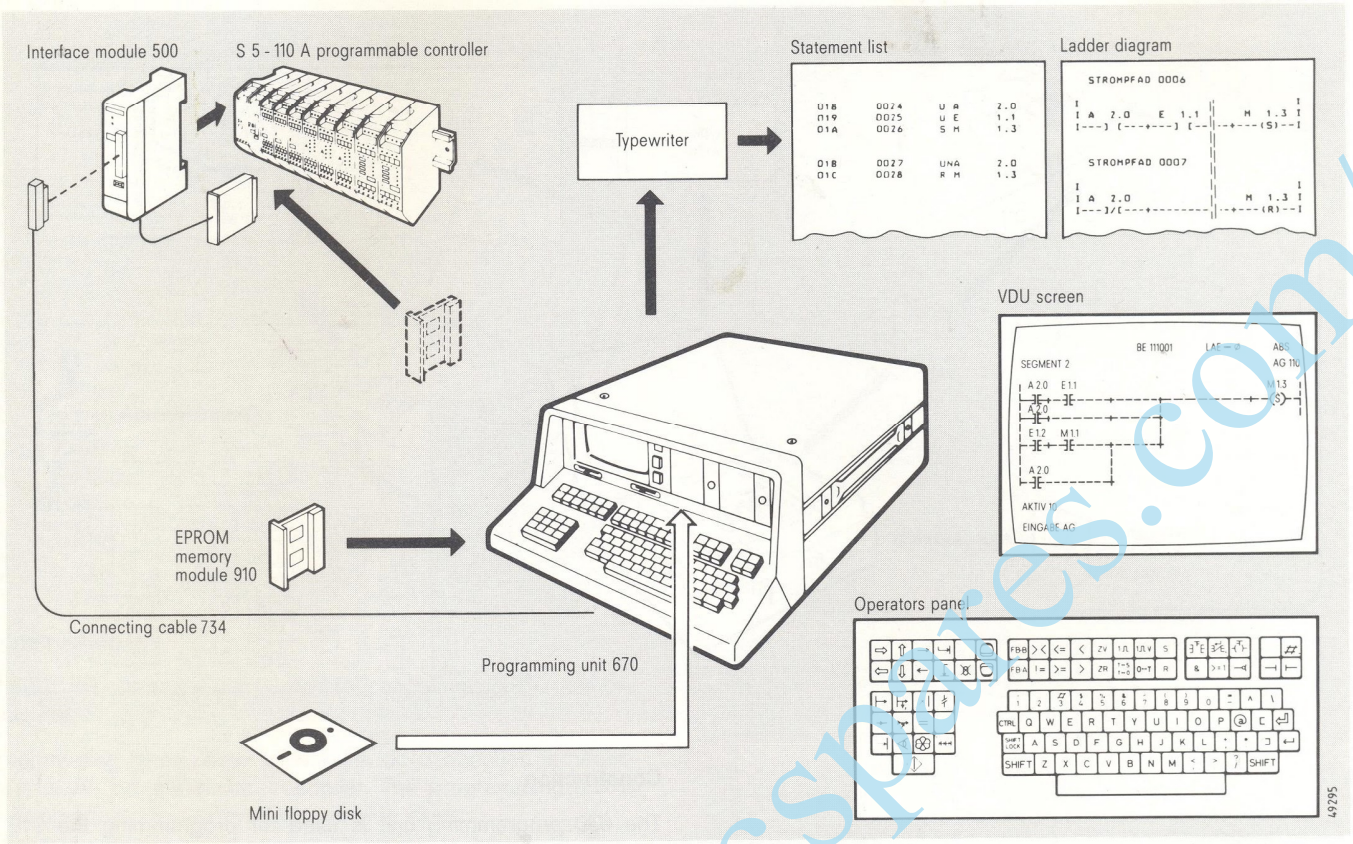
Functions

Input and output of programs in the form of ladder diagrams or statement lists
Insertion and removal of statements in the internal memory of the programming unit (RAM)
Programming the EPROM memory module with checking function
Scanning of signal statuses at inputs and outputs, flags, timers and counters (on-line operation)
Scanning the results of logical operations (on-line operation)
Output of the memory contents on a printer in the form of a ladder diagram or statement list
Error messages as a result of operator errors or device faults.

The individual STEP 5 program statements are keyed into the memory in the form of a ladder diagram or statement list. The display shows a statement or a contact symbol, depending on which method of representation is used.

Description of programming units

670 programming unit



Construction

The 670 programming unit is used for programming the 910 memory module.

Programming takes place off-line, i.e. no connection is necessary to the programmable controller. The 670 programming unit is hooked up to the programmable controller by a 500 programming unit interface module for testing the program (on-line operation).

The 670 programming unit is accommodated in a transport case with casters and can therefore be used direct at site. The programming unit can also be removed from the case and used as a desk-top unit.

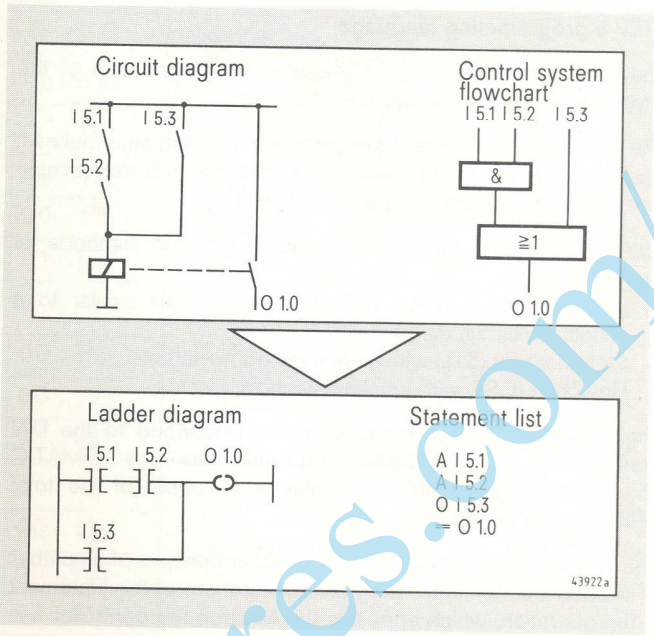
The programming unit contains the following:
VDU screen (23 cm) for displaying the program
Two mini floppy-disk drives for loading the programming unit software and for storing the programs
Receptacle for 910 EPROM memory module
Interface for typewriter (V.24 or current loop)
Program memory (RAM for 2K or 4K statements[1]) for on-line operation, with battery backup for half an hour
Function and alphanumeric keyboards
UV erasing facility.

Functions

Input and output of programs in the form of ladder diagrams, statement lists or control system flowcharts[1])
Insertion and removal of statements in the internal memory of the programming unit
Programming the EPROM memory module with checking function
Display of signal flow of rung (in ladder diagram representation)
Output of the memory contents on a typewriter as a ladder diagram, statement list or flowchart[1])
Long-term filing of the programs on floppy disk
Programming and documentation with symbolic parameters[1])
Output of comments and cross-reference lists, as well as error messages as a result of operators errors.

[1]) 4K RAM and flowchart method of representation in preparation

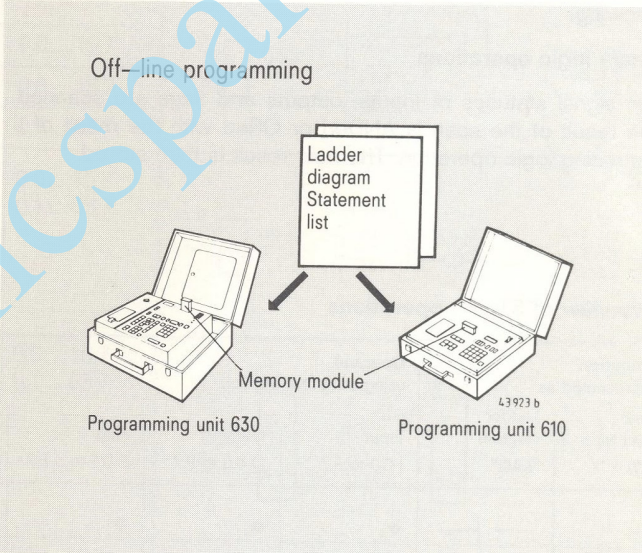
Control system functions can be described by a schematic circuit diagram, a control system flowchart or verbally. These methods of representation must be converted into a statement list or ladder diagram in order to program with the 610 and 630 programming units. The 610 is for off-line programming, using a statement list or ladder diagram. The 630 and 670 units can program both on-line and off-line. In this case, also, a statement list or ladder diagram is used for program input.



Off-line programming with the 610 programming unit

The statements keyed into the programming unit are written directly into the memory module. Corrections or modifications cannot be made directly. The statement to be changed can be overwritten with the NOP Ø operation. In this way, parts of programs containing errors can be erased and re-entered at the end of the program. If there is no free memory space available for this purpose, the memory must be erased and reprogrammed. If lengthy program sections are to be corrected, part of the program can be copied into another memory and a new program inserted at the relevant point.

For programming, the memory module is withdrawn from the central module and inserted in the receptacle on the programming unit.

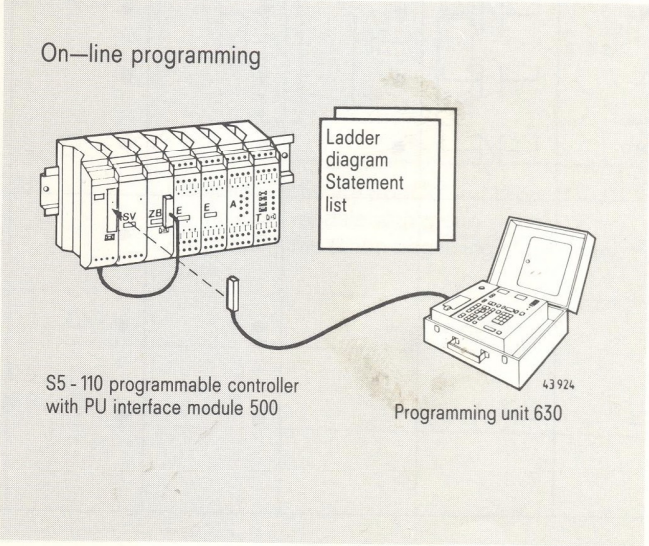


On-line programming with the 630 and 670 programming units

All statements that have been keyed into these programming units can be temporarily stored on a RAM. It is therefore easy to make any necessary program corrections.

The programming unit can then be hooked up directly to the S5 – 110A programmable controller via the 500 PU interface module and then processes the program stored in the programming unit. It is thus possible to check the functions of the programmable controller and, if necessary, make any changes to them. Signal statuses and the result of a logic operation can also be indicated in the on-line mode.

In order to transfer the program to the 910 EPROM memory module, the latter is inserted in the relevant receptacle on the programming unit and the contents of the programming unit memory transferred into the EPROM. It is thus possible to duplicate programs without any difficulty.



STEP 5 programming language

The STEP 5 programming language is an integral part of the SIMATIC S5 automation system.

The operation repertoire of this programming language makes it possible to program automation schemes, ranging from simple binary logic to complex digital processing.

The program can be written in three different methods of representation:
- Ladder diagram (LAD) with contact symbols similar to a schematic circuit diagram
- Statement list (STL) with mnemonic abbreviations
- Flowchart (CSF) with function symbols.

The three methods of representation correspond to the DIN draft 19239. The operation repertoire for the SIMATIC S5 — 110A programmable controller is a subset of the total STEP 5 operation repertoire.

The program of a programmable controller consists of a number of individual statements. The basic component of the statement is the operation, which specifies the function the controller has to perform. In this connection, a distinction is made between the following:

Binary logic operations

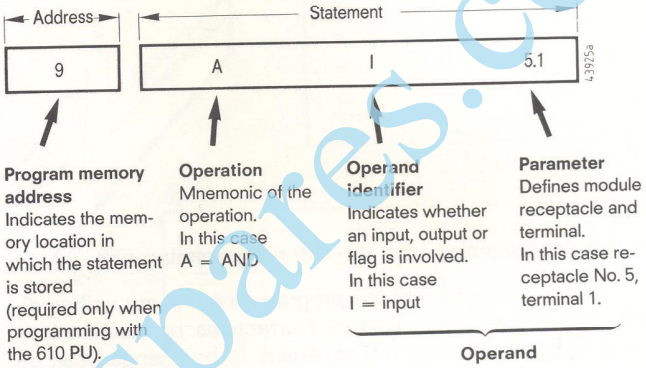
The signal statuses of inputs, outputs and flags are scanned. The result of the scan is ANDed or ORed with the result of a preceding logic operation. The new result is then stored.

Memory operations

These are executed as a function of the result of previous scanning operations, and include operations with which outputs or flags can be set or reset.

Organizational operations

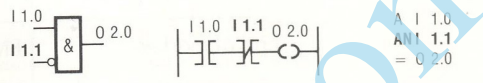
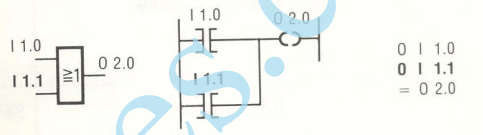
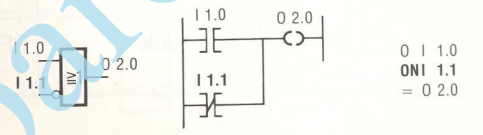
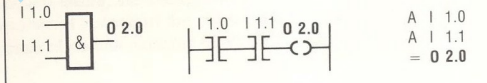
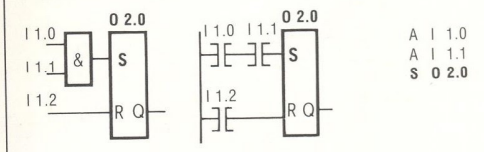
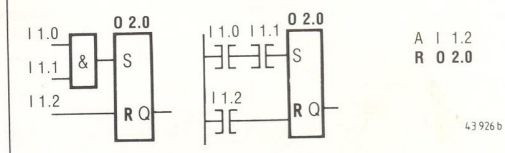
These serve to influence program execution.



Overview of STEP 5 operations

Operation Represented as		Operand using programming unit						Description
Statement list "STL"	Ladder diagram "LAD"	610 Input I 0.0 to F.7	Output[1] O 0.0 to F.7	Flag F 0.1 to 3 F.7	630, 670, 690 Input I 0.0 to 15.7	Output[1] O 0.0 to 15.7	Flag F 0.1 to 63.7	
A –	–] [–	•	•	•	•	•	•	"Normally open contact" connected in series
AN –	–]/[–	•	•	•	•	•	•	"Normally closed contact" connected in series
O –	┘[ ]└	•	•	•	•	•	•	"Normally open contact" connected in parallel
ON –	┘]/[└	•	•	•	•	•	•	"Normally closed contact" connected in parallel
S –	–(S)–		•	•		•	•	Set if result of logic operation "1"; no effect if "0"
R –	–(R)–		•	•		•	•	Reset if result of logic operation "1"; no effect if "0"
= –	–( )–		•	•		•	•	Assignment of result of logic operation (set if result "1", reset if "0")

[1]) as output flags from 10.0 to 3 F.7 or 16.0 to 63.7

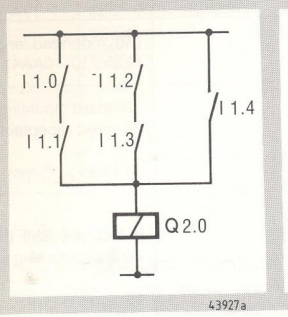
		Operation	Parameter range with programming unit 610	630, 670, 690	Program as Flowchart / Ladder diagram / Statement list
AND logic	Scan for "1" signal status				
	of an input	A I	0.0…F.7	0.0…15.7	
	of an output	A O	0.0…F.7	0.0…15.7	
	of a flag	A F	0.1…3F.7	0.1…63.7	
	Scan for "0" signal status				
	of an input	AN I	0.0…F.7	0.0…15.7	
	of an output	AN O	0.0…F.7	0.0…15.7	
	of a flag	AN F	0.1…3F.7	0.1…63.7	
OR logic	Scan for "1" signal status				
	of an input	O I	0.0…F.7	0.0…15.7	
	of an output	O O	0.0…F.7	0.0…15.7	
	of a flag	O F	0.1…3F.7	0.1…63.7	
	Scan for "0" signal status				
	of an input	ON I	0.0…F.7	0.0…15.7	
	of an output	ON O	0.0…F.7	0.0…15.7	
	of a flag	ON F	0.1…3F.7	0.1…63.7	
Memory operations	A "1" signal appears at the output (or flag) if the logic condition is satisfied; a "0" appears if the condition is not satisfied	= O = F	0.0…F.7 0.1…3F.7	0.0…15.7 0.1…63.7	
	The output (or flag) is set to "1" (stored) if the logic condition is satisfied; if the condition is not satisfied, the signal status does not change	S O S F	0.0…F.7 0.1…3F.7	0.0…15.7 0.1…63.7	
	The output (or flag) is set to "0" (stored) if the logic condition is satisfied; if the condition is not satisfied, the signal status does not change	R O R F	0.0…F.7 0.1…3F.7	0.0…15.7 0.1…63.7	 43926b
Interrupt scan		A F	0.0	0.0	On a signal change from "0" → "1" or "1" → "0" on the input module with group signal. Automatic jump to the beginning of the program.
Flag range			0.1…3F.7	0.1…63.7	
Output range			0.0…F.7 10.0…3F.7[1])	0.0…15.7 16.0…63.7[1])	

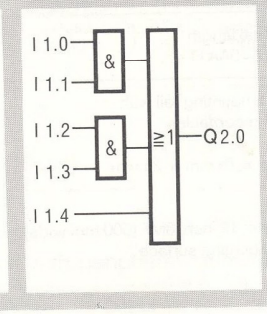
[1]) to be used only as output flag

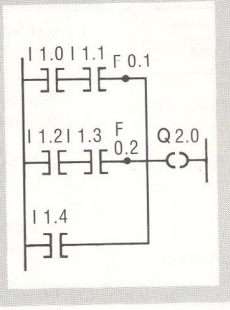
Description of operations

		Operation	Parameter range with programming unit		Remarks
			610	630, 670, 690	
Organisational operations	No operation	NOP Ø	—	—	No operations are carried out. This operation is used to overwrite the contents of a memory location.
	No operation	NOP 1	—	—	No operations are carried out. This operation is used to keep a memory location free for patching or expanding programs.
	End of module	EM	—	—	End of program. Jump to beginning of program.
	Conditional end of module	EMC	—	—	End of program, depending on the result of a logic operation. If result is "1", jump to beginning of program; if "0", no effect.
	Inhibit module	SF	0.0	—	If logic condition is satisfied, the following STEP 5 statements are inhibited for further processing.
	Enable module	RF	0.0	—	Inhibit cancelled. The following STEP 5 statements are further processed.

Logic operation







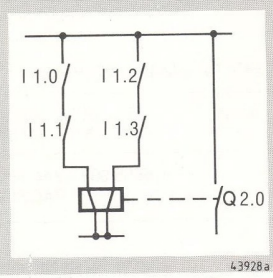
Statement list

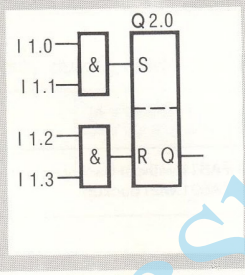
1st possibility			2nd possibility		
A	I	1.0	A	I	1.0
A	I	1.1	A	I	1.1
=	F	0.1	=	F	0.1
A	I	1.2	A	I	1.2
A	I	1.3	A	I	1.3
=	F	0.2	O	I	1.4
O	F	0.1	O	F	0.1
O	F	0.2	=	Q	2.0
O	I	1.4			
=	Q	2.0			

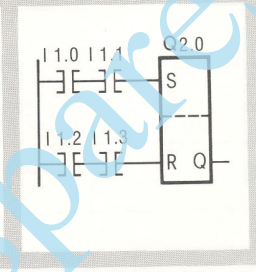
Rule: If there is more than one scanning level, the results must be temporarily stored in a flag

The following can be used as **flag addresses:**
Range 0.1 to 3F.7 with programming unit 610, 630, 670, 690
0.1 to 63.7 with programming units

Memory function







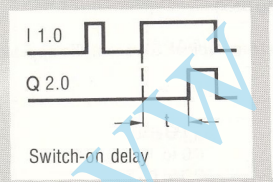
Statement list

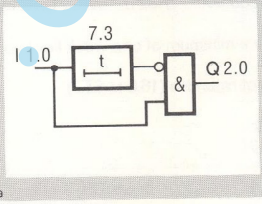
A	I	1.0
A	I	1.1
S	Q	2.0
A	I	1.2
A	I	1.3
R	Q	2.0

Rule: If set input S and reset input R are "1", the last operation input has priority (in this case RO)

On power failure, the information in the memory is lost. If a flag is programmed instead of the output, the information is retained (in the case of central modules 6ES5 900–7AB21, –7AC21 only).

Time function





Statement list

A	I	1.0
=	Q	7.3
A N	I	7.3
A	I	1.0
=	Q	2.0

Note

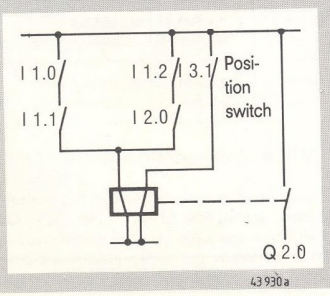
Input signal
Start timer
Scan timer

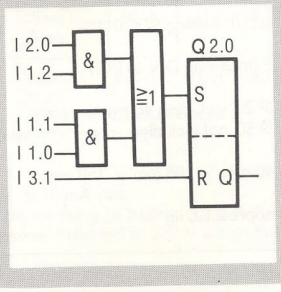
Output signal

To start the time function, the timer is set like an output. The "Timer ended" state is scanned as for an input.

Addresses that can be used for timer modules:
Receptacles 0 to F
Timer (terminal No.) 0 to 3

Interrupt generation





Statement list

			Note
A	I	3.1	} Interrupt processing
R	Q	2.0	
A	I	1.0	
A	I	1.1	
=	F	0.1	
A	F	0.0	Interrupt scan
A	I	1.2	
A	I	2.0	
O	F	0.1	
S	Q	2.0	
A	F	0.0	Interrupt scan

Example: Input module with interrupt generation in receptacle No. 3.
A position switch is connected to terminal No. 1.
If the position switch is actuated, a group signal is generated and passed on to the central module.

Scanning the group signal with A F 0.0.
If the signal is "1", a jump is made to the beginning of the program.
The program is reprocessed. This results in a short and constant reaction time.

Technical specification

Mounting rails

Mounting rail for central controller and/or extension unit	with normal length 6ES5 710—0AA11	with extended length 6ES5 710—0AA41
Mechanical construction	Standard mounting rail with 10 wired receptacles	Standard mounting rail with 18 wired receptacles
Dimensions of the standard mounting rail (W × H × D)	482.6 mm × 75 mm × 25 mm	813 mm × 75 mm × 25 mm
Mounting arrangements	in cabinets: 19 inch, 8MF (600 mm wide) vertical mounting surface	in cabinets: 8MF (900 mm wide) vertical mounting surface
Receptacles total	10	18
Receptacles for peripheral modules	8	16
Max. number of mounting rails, coupled via connecting cable arranged one beneath the other side by side	 4 2	 2 —
Weight approx.	1.53 kg	2.56 kg

Central modules

Central modules	6ES5 900—7AB11 without backup —7AB21 with backup	6ES5 900—7AC11 without backup —7AC21 with backup
Addressing volume	up to 2K statements	up to 4K statements

Processing time per statement	20 µs	
Cycle monitoring time	300 ms	
Flags	511 bits (switch-selectable from "retentive" to "non-retentive" for central modules 6ES5 900—7AB21/—7AC21), (0.1 to 63.7)	
Battery backup for flags	Battery for a minimum of one week backup time (typical: 6 weeks), life approx. 3 years	
Output flags	384 bits, not retentive (16.0 to 63.7)	
Addressing volume	for PU 610	for PU 630
for inputs	0.0 to F.7	0.0 to 15.7
for outputs	0.0 to 3F.7	0.0 to 63.7
for output flags	10.0 to 3F.7	16.0 to 63.7
for times	0.0 to F.7	0.0 to 15.7
for flags	0.1 to 3F.7	0.1 to 63.7
Permissible ambient temperature during operation	0 °C to 55 °C	
Storage temperature	−40 °C to +85 °C	
Insulation class	"C" (following VDE 0110)	
Humidity class	F (following DIN 40 040)	
Degree of protection	IP 20, including screw terminals IP 50, not including screw terminals	
Dimensions of modules (W × H × D)	40 mm × 166 mm × 150 mm	
Weight	approx. 0.6 kg	

Memory modules

Memory module	6ES5 910—0AA11 equipped with EPROM	6ES5 910—0AA21 equipped with EPROM	6ES5 910—0AA31 equipped with EPROM	6ES5 910—0AA41 equipped with EPROM	6ES5 910—0AA01 not equipped (for EPROM 2716 or 2516)	6ES5 910—0AB01 not equipped (for EPROM 2532)
Memory capacity (statements)	0.5 K	1 K	2 K	4 K	for max. 2 K	for max. 4 K
Weight	0.04 kg	0.04 kg	0.04 kg	0.04 kg	0.03 kg	0.03 kg

Power supply modules

for internal 5 V supply (sufficient for maximum extension with peripheral modules, as well as test modules or interface module 500)

Power supply module 6ES5 ...—.....	Input voltage, frequency, tolerance	Current consumption with max. extension	Output voltage/ current	Load	Perm. duration of voltage dips	Module dimensions W × H × D in mm	Weight approx. kg
930—7AA11 930—7AA21 930—7AA31	220 V a.c., 50/60 Hz, +10%, −15% 110 V a.c., 50/60 Hz, +10%, −15% 24 V d.c., +25%, −15%	25 mA 65 mA 400 mA	5 V d.c./0.7 A 5 V d.c./0.7 A 5 V d.c./0.7 A	100% at 55 °C	≤20 ms with EPROM module operation ≤5 ms with interface and test module operation	40 × 166 × 150	0.5

for external 24 V supply (e.g. for voltage supply of the relay output modules, timer/counter modules or BERO proximity switches)

931—7AA11 931—7AA21	220 V a.c., 59/60 Hz, +10%, −15% 110 V a.c., 50/60 Hz, +10%, −15%	25 mA 65 mA	24 V d.c./0.8 A 24 V d.c./0.8 A	100% at 45 °C 75% at 55 °C	Ripple content ≤10% from 24 V d.c.	40 × 166 × 150	0.5

Input modules

Number of inputs: 8, isolated

Digital input module 6ES5...—.....	Input voltage (nominal)	Input voltage for signal "0"	Input voltage for signal "1"	Nominal input current at signal "1"	Maximum delay with signal change On "0"→"1"	Maximum delay with signal change Off "1"→"0"	Maximum length of signal line in power cable at[6] 24/28 V a.c./d.c.	Maximum length of signal line in power cable at[6] 110 V a.c.	Maximum length of signal line in power cable at[6] 220 V a.c.	Separate[5]	Diversity factor at 1.2 U_N	Insulation voltage[7] Nominal value	Insulation voltage[7] Tested at	Weight approx. kg
400—7AA12	24 V d.c.	−35 V to +4.5 V	+13 V to +35 V	9.5 mA[1]	1.5 ms to 5 ms		1000 m	100 m	50 m	600 m	100%	36 V d.c.	500 V a.c.	0.39
400—7AA13				8.5 mA[1]										
401—7AA12	24 V d.c.[4] with group signal			9.5 mA[1]										
401—7AA13				8.5 mA[1]										
405—7AA11	110 V a.c./d.c.	0 V to 40 V a.c./d.c.	85 V a.c./d.c. to 132 V a.c./d.c.	7.3 mA[2] a.c./d.c.	2.3 ms to 13 ms	2.0 ms to 20 ms	100 m	200 m	100 m		75%	250 V a.c./d.c.	2.0 kV a.c.	0.39
405—7AA21	220 V a.c./d.c.	0 V to 70 V a.c./d.c.	170 V a.c./d.c. to 264 V a.c./d.c.	3.9 mA[2] a.c./d.c.	2.3 ms to 13 ms	2.0 ms to 20 ms	50 m	100 m	50 m		75%	250 V a.c./d.c.	2.0 kV a.c.	0.39
405—7AB11	110 V a.c./d.c.	0 V to 40 V a.c./d.c.	85 V a.c./d.c. to 132 V a.c./d.c.	10 mA a.c.[3] 5.7 mA d.c.	2.3 ms to 13 ms	10 ms to 25 ms	100 m	500 m	250 m		75%	250 V a.c./d.c.	2.0 kV a.c.	0.4
405—7AB21	220 V a.c./d.c.	0 V to 70 V a.c./d.c.	170 V a.c./d.c. to 264 V a.c./d.c.	15 mA a.c.[3] 2.4 mA d.c.	2.3 ms to 13 ms	10 ms to 35 ms	50 m	100 m	500 m		75%	250 V a.c./d.c.	2.0 kV a.c.	0.4
405—7AB31	48 V a.c./d.c.	0 V to 18 V a.c./d.c.	38 V a.c./d.c. to 65 V a.c./d.c.	13 mA a.c.[3] 12 mA d.c.	2.3 ms to 13 ms	2.0 ms to 20 ms	800 m	400 m	200 m		75%	250 V a.c./d.c.	2.0 kV a.c.	0.4

[1]) Also suitable for two-wire BERO proximity switches (Voltage: 22 V to 30 V).
[2]) Not suitable for a.c. BERO proximity switches.
[3]) For a.c. BERO proximity switches (Voltage: 22 V to 30 V) $I_{"C"} \leq 5$ mA rms, $I_{"1"} \leq 10$ mA rms.
[4]) On rising edge in the case of module 6ES5 401—7AA12 and jumber-selectable for rising or trailing edge in the case of module 6ES5 401—7AA13.
[5]) Several unscreened live conductors laid closely side by side, e.g. in cable channel (referred to 220 V a.c. in the adjacent cable).
[6]) Several unscreened live conductors in a common cable, e.g. multicore cable.
[7]) Internal 5 V d.c. voltage/external input voltage, inputs and outputs of a module to each other. According to VDE 0160.

Output modules with static outputs

Number of outputs: 8, isolated

Digital output module 6ES5…—…..	Output voltage (nominal value)	Supply voltage ranges min.	Supply voltage ranges max.	Max. output current for "1" signal	Max. residual current for "0" signal	Signal level of outputs for "1" signal	Limitation of inductive voltage peak on disconnection	Switching frequency Resistive load	Switching frequency Lamp load	Switching frequency Inductive load	Diversity factor (s. fig. p. 19b)	Insulation tested at	Weight approx. kg
410—7AA11	24 V d.c.	3 V d.c.	33 V d.c.	2 A	1 mA[1])	U—1.8 V	—17 V[3])	100 Hz	11 Hz	2 Hz	100% at 20 °C;	500 V a.c.	0.68
410—7AA21	48 V d.c.	3 V d.c.	53 V d.c.	2 A, resistive[6]) 0.5 A, inductive	5 mA[2])		—3 V[4])	11 Hz		0.1 Hz			
415—7AB11	110 V a.c.	88 V a.c.	132 V a.c.	2 A	8 mA a.c.[2])	U—2.0 V	Disconnection at I = 0 A	20 Hz	11 Hz	2 Hz	50% at 55 °C	2.0 kV a.c.	0.68
415—7AB21	220 V a.c.	176 V a.c.	264 V a.c.	2 A	10 mA a.c.[2])[5])	U—2.0 V		20 Hz	11 Hz	2 Hz		2.0 kV a.c.	0.68
415—7AA31	24 V a.c./48 V a.c.	20 V a.c.	65 V a.c.	2 A	5 mA a.c.[2])	U—2.0 V	400 V a.c.	20 Hz	11 Hz	2 Hz		1.5 kV a.c.	0.68

Output moduls with relay outputs

Number of outputs: 8, isolated

Digital output module 6ES5…—…..	Switching capacity of contacts at	Supply voltage/ current consumption	Max. continuous current	Contact life in switching cycles	Max. switching frequency	Diversity factor (s. fig. p. 19b)	Insulation[7]) tested at	Weight approx. kg
417—7AA11	max. 30 V a.c./d.c., 0.5 A, resistive min. 80 mV, 50 µA, resistive	24 V/0.1 A	I_{th2} = 1 A	at 0 to 30 V d.c., 0.5 A 5×10^5 resistive at 80 mV, 50 µA 10×10^5 resistive	100 Hz resistive	100% at 40 °C; 50% at 55 °C	500 V a.c.	0.7
417—7AA21	250 V a.c.; 1.5 A, inductive 30 V a.c./d.c.; 4 A, resistive 30 V a.c./d.c.; 0.5 A, inductive	24 V/0.2 A	I_{th2} = 5 A	to DC 11 2×10^5 to AC 11 1.5×10^5	10 Hz resistive 2 Hz inductive		2 kV a.c.	0.7

Timer module, for analog time generation

Timer module 6ES5…—…..	Number of times	Run time adjustable coarse with switch	Run time adjustable fine with potentiometer	Max. frequency	Repeat accuracy from time	Temperature influence setting value	Cumulative error	Recovery time	Fine setting with potentiometer (500 kΩ)		Weight approx. kg
380—7AA11	4	0.01 s 0.1 s 1.0 s 10.0 s	0.008... 0.160 s 0.050... 1.500 s 0.750... 25 s 7.0 ...230 s	100 Hz	±3%	+1%/ 10 °C	<5% per 1000 h	none	internally on frontplate	externally, maximum length of connecting lead 10 m (screened)	0.4

Timer/counter module, for digital time generation, 24 V voltage supply from power supply module 931 or any other with corresponding conditions (Time processing: Time setting by internal crystal)

Timer/counter module 6ES5…—…..	Number of times	Run time	Counting range	Setting	Display	Repeat accuracy	Recovery time	Weight approx. kg
381—7AA11	8	0.01 s to 9.99 s 0.1 s to 99.9 s 1.0 s to 999 s	0 to 999	digital via 2 or 3-decade thumbwheel switches	Digit display or LED	1 unit from the time range set	52 µs (3 statements)	0.8

Adapter block (Counter processing: Counting pulses by external 24 V d.c. signals)

6ES5…—…..	with thumbwheel switch and LED display Decades	with thumbwheel switch and digit display Decades	Remarks		Weight approx. kg
382—0AA21	2	—	LED remains lit as long as the time or count value has not been reached	Max. cable length between adapter block and timer/counter module 381 : 10 m. The adapter block is permanently connected to the thumbwheel switch and digit display by a flat ribbon cable (approx. 20 cm long)	0.19
382—0AA31	3	—			0.19
382—0AB21	—	2	Digit display shows the current time value		0.28
382—0AB31	—	3			0.34

[1]) Can be used to drive input module 6ES5 400—7AA13
[2]) Can be used to drive input module 6ES5 405—7AB..
[3]) At U_p = 30 V d.c.
[4]) At U_p = 53 V d.c.
[5]) Cannot drive contactors of range 3TJ
[6]) Not short-circuit-proof
[7]) Internal 5 V d.c. voltage against external input voltage, inputs and outputs of a module against each other. According to VDE 0160.

Programming units

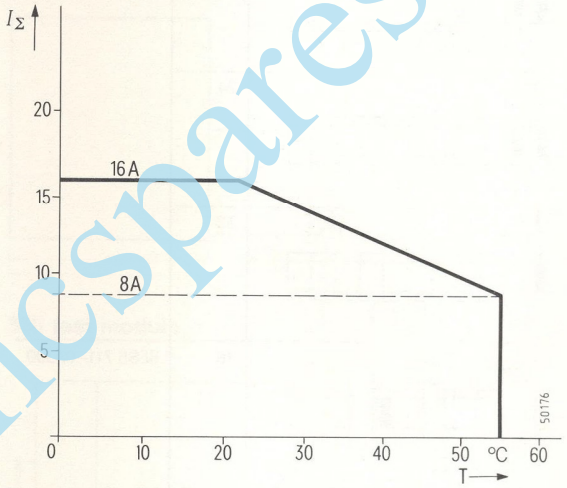
Programming unit	Supply voltage, frequency	Interface to typewriter	Ambient temperature Operation	Storage	Casing	Weight approx. kg
6ES5 610	110 V/220 V a.c., 50 Hz/60 Hz	—	0 °C... +55 °C	−40 °C... +70 °C	Plastics carrying case 420 mm × 320 mm × 115 mm	6
6ES5 630	110 V/220 V a.c., 50 Hz/60 Hz	Current loop (passive)	0 °C... +40 °C	−40 °C... +70 °C	Plastics carrying case 490 mm × 390 mm × 170 mm	15
6ES5 670	110 V/220 V a.c., 50 Hz/60 Hz	Current loop (passive) or V.24	0 °C... +40 °C	−40 °C... +70 °C	Transport case with castors 488 mm × 655 mm × 285 mm	20

Current consumption and dissipated power

Module	Current consumption with diversity 5 V d.c.	24 V d.c.	Dissipated power with diversity (see p. 19a)
930 Power supply module			
110/220 V a.c.: 5 V d.c./0.7 A	—		7.5 W
24 V d.c.: 5 V d.c./0.7 A	—		9 W
Central module, memory module incl. (with 2 K statement)	120 mA		1 W
Input module, static 24 V d.c.	1 mA		3 W
Input module, static 48 V a.c./d.c.	1 mA		3 W
Input module, static 110 V a.c./d.c.	1 mA		6 W
Input module, static 220 V a.c./d.c.	1 mA		10 W
Output module, static 24 V d.c.	12 mA		16 W
Output module, static 48 V d.c.	12 mA		16 W
Output module, static 48 V a.c.	12 mA		16 W
Output module, static 110 V a.c.	12 mA		16 W
Output module, static 220 V a.c.	12 mA		16 W
Output module with relay output			
6ES5 417—7AA11	12 mA	50 mA	1.5 W
6ES5 417—7AA21	12 mA	100 mA	3 W
380 Timer module	6 mA		
330 Test module	200 mA		1 W
500 PU interface module	400 mA		2 W
931 Power supply module 110/220 V a.c.: 24 V d.c./0.8 A	220 mA at 220 V a.c.		6 W
381 Timer/counter module per time and with adapter block (3 decade digit display)	12 mA	150 mA 77 mA	4.5 W

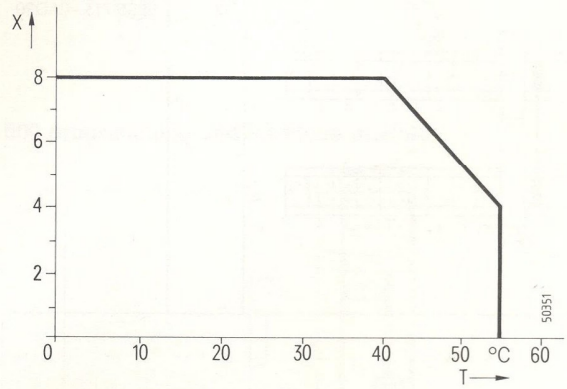
Permissible load of the outputs

Output modules, static



Test current for all the 8 outputs of a module depending on the ambient temperature.

Output modules with output relays

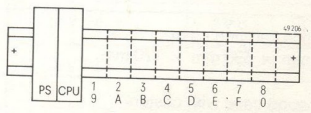
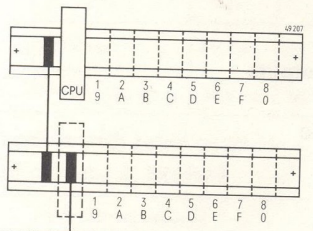
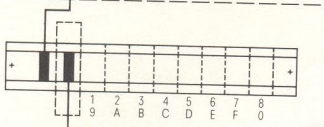
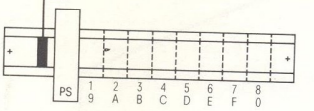
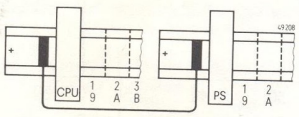
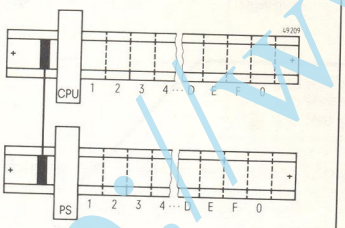


x = number of simultaneously connected outputs

Admissible number of simultaneously connected outputs depending on the ambient temperature.

Mounting arrangements

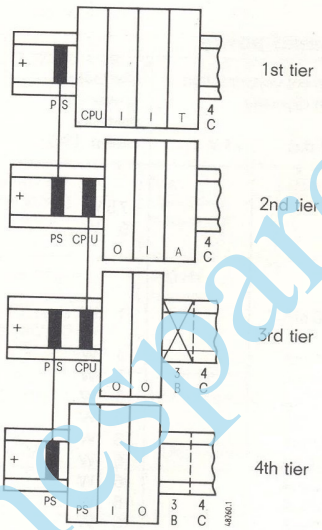
with mounting rail 6ES5 710—0AA11 and —0AA41

Arrangement	Mounting rail	No. of receptacles for peripheral modules	Cable connector Order No.
single-tier		8	–
two-tier		16	6ES5 711–0AD20
three-tier		24	
four-tier		32	
single-tier	 Side-by-side arrangement with 2 mounting rails	16	6ES5 711–0AJ00
	Mounting rail (extended type)		6ES5 710–0AA41
single-tier	without illustration	16	–
two-tier		32	6ES5 713–0AD20

Addressing the receptacles

The S5—110A programmable controller has location-coded addressing, i.e. when programming, a module is addressed with the address of the receptacle or socket connector into which it is plugged. The individual receptacle addresses are printed on the socket connectors of the mounting rail (see opposite illustrations) in two rows (top row from 1 to 8 and bottom row from 9 to 0). The upper row of addresses applies to the first and third tier and the bottom row to the second and fourth tiers.

Module configurations



In connection with three and four-tier configurations, the following should be noted:

1. Two receptacles with the same addresses must not accommodate identical modules.
2. Only one timer module may be plugged into receptacles with the same address; the second receptacle with the same address must be left free.

Examples:

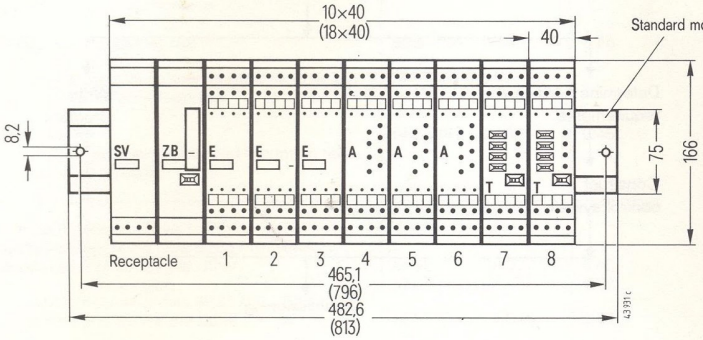
If receptacles 1 and 2 of the first tier have input modules plugged into them, receptacles 1 and 2 of the third tier can only take output modules.

If receptacle 3 of the first tier has a timer module, receptacle 3 in the third tier must be left free.

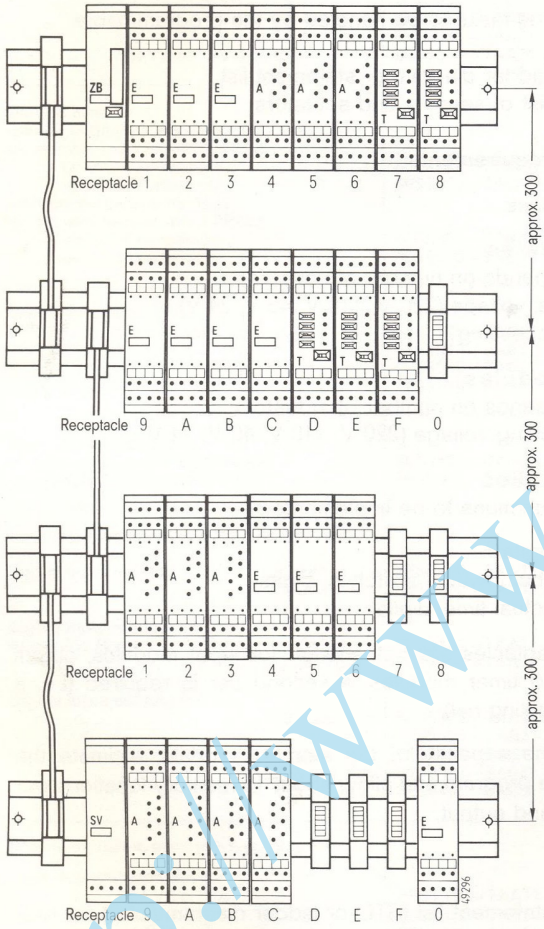
If an output module is plugged into receptacle 9 of the second tier, receptacle 9 of the fourth tier can only take an input module.

S5 – 110A programmable controller

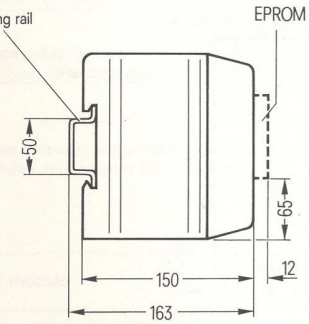
Single-tier configuration
Values in brackets for extended mounting rail



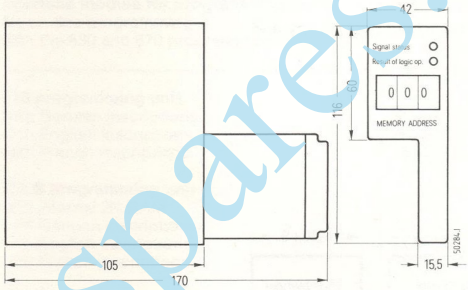
Four-tier configuration



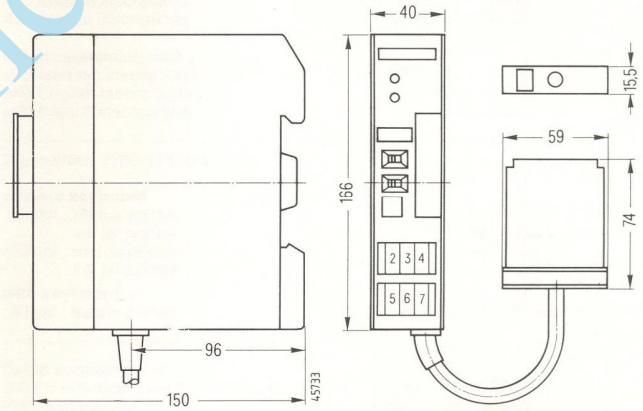
332 test module



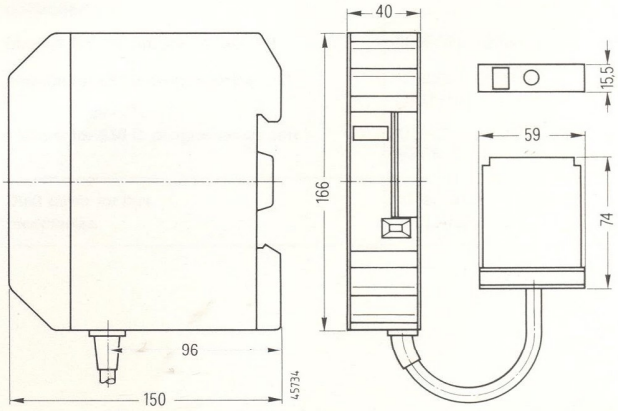
332 test module (adapter)



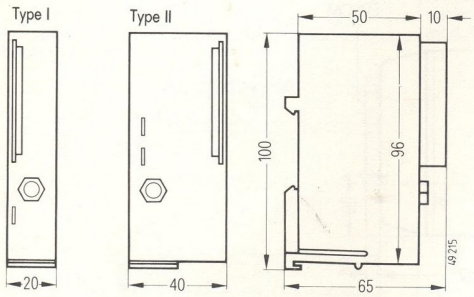
330 test module



500 programming unit interface module

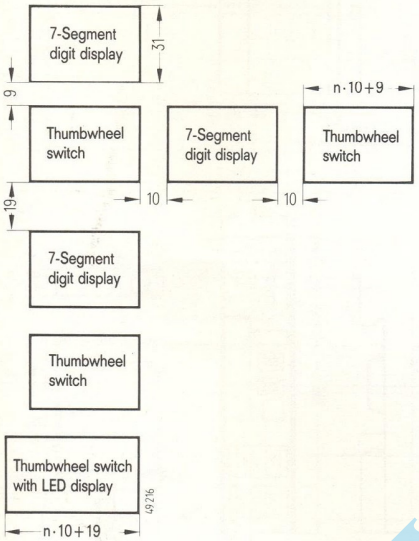


Adapter block

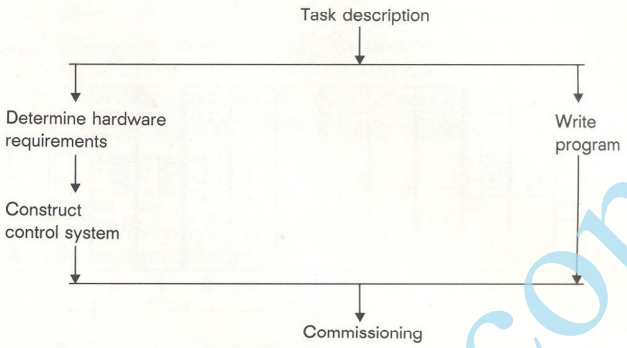


Frontplate cutouts for

thumbwheel switch with or without LED display and
7-segment digit display
n = number of decades (2 or 3)



Design recommendations



Task definition

Determine the tasks to be handled by the programmable controller
Compile a ladder diagram or statement list
Compile a list of sensors and actuators

Hardware requirements

Select modules

Input modules
Number depends on number of sensors
Select signal voltage (220 V, 110 V, 48 V, 24 V)
Interrupt processing?

Output modules
Number depends on number of actuators
Select switching voltage (220 V, 110 V, 48 V, 24 V)

Timer modules
Have time functions to be implemented?

Analog or digital?
Setting via thumbwheel switches, digital
Display of actual time, digital

If eight receptacles are not enough for input modules, output modules and timer modules, a second tier is required (i.e. a second mounting rail).

To select the capacity of the memory module, estimate the length of the program and allow about 15 memory locations per each input and output.

Program

Compile a statement list (STL) or ladder diagram (LAD) for programming with the 610, 630 or 670 programming unit.

Mounting guidelines

The S5-110A programmable controller can be mounted together with relays, contactors and other electronic equipment.

The cabinets need not be force-ventilated. No screening is required for the input and output leads (note maximum lengths).

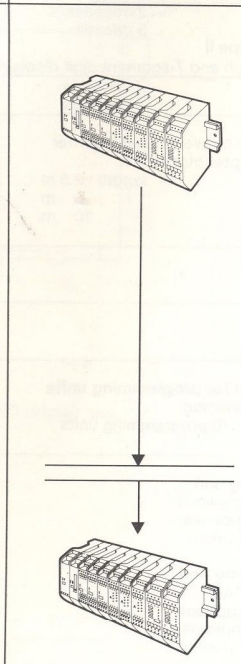
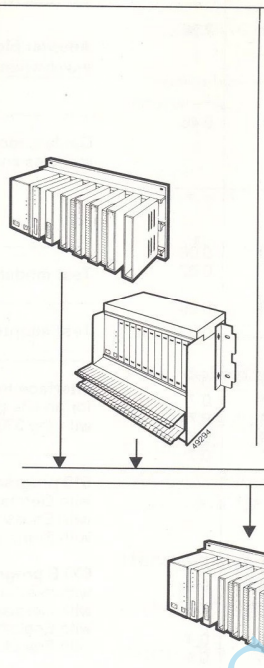
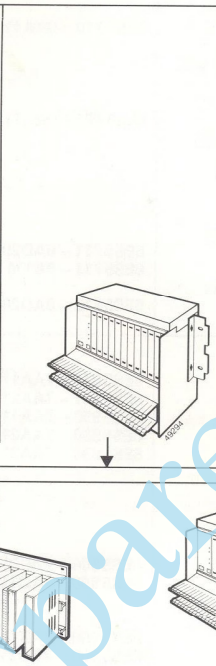
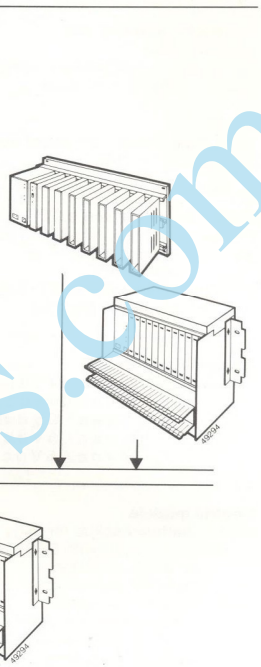
The individual tiers or mounting rails of the S5–110A programmable controller can be mounted one above the other or next to each other (two mounting rails only).

	Order No.	Approx. weight kg
Mounting rail for power supply module, central module and up to 8 peripheral modules	6ES5710–0AA11	1.53
Extended mounting rail with bus cable for power supply module, central module and up to 16 peripheral modules	6ES5710–0AA41	2.56
Bus cable for 18 receptacles if extended mounting rail procured separately	6ES5761–0AA11	0.46
Cable connector (see p. 20) between mounting rails 6ES5710–0AA11 mounted one above the other	6ES5711–0AD20	0.06
side by side	6ES5711–0AJ00	0.07
between mounting rails 6ES5710–0AA41 mounted one above the other	6ES5713–0AD20	0.06
Power supply module connected to 220 V a.c./24 V d.c., 0.8 A	6ES5931–7AA11	0.7
110 V a.c./24 V d.c., 0.8 A	6ES5931–7AA21	0.7
220 V a.c./ 5 V d.c., 0.7 A	6ES5930–7AA11	0.7
110 V a.c./ 5 V d.c., 0.7 A	6ES5930–7AA21	0.7
24 V d.c./ 5 V d.c., 0.7 A	6ES5930–7AA31	0.7
Central module without battery backup for flags for memory module with EPROM		
up to 2K statements	6ES5900–7AB11	0.4
up to 4K statements	6ES5900–7AC11	0.4
with battery backup for flags for memory module with EPROM		
up to 2K statements	6ES5900–7AB21	0.4
up to 4K statemens	6ES5900–7AC21	0.4
Memory module with EPROM for 0.5K statements[1])	6ES5910–0AA11	0.04
EPROM for 1K statements[1])	6ES5910–0AA21	0.04
EPROM for 2K statements[1])	6ES5910–0AA31	0.04
EPROM for 4K statements	6ES5910–0AA41	0.04
Memory module, empty for memory 2716 (2K statements)	6ES5910–0AA01	0.03
for memory 2532 (4K statements)	6ES5910–0AB01	0.03
Input modules, each with 8 inputs		
Digital input module 24 V d.c.	6ES5400–7AA12	0.39
24 V d.c.	6ES5400–7AA13	0.39
Digital input module with group signal 24 V d.c.	6ES5401–7AA12	0.39
24 V d.c.	6ES5401–7AA13	0.39
Digital input module for 110 V a.c./d.c.	6ES5405–7AA11	0.39
220 V a.c./d.c.	6ES5405–7AA21	0.39
110 V a.c./d.c.	6ES5405–7AB11	0.4
220 V a.c./d.c.	6ES5405–7AB21	0.4
48 V a.c./d.c.	6ES5405–7AB31	0.4
Output modules, each with 8 outputs		
Digital output modules for 24 V d.c., 2 A	6ES5410–7AA11	0.68
48 V d.c., 2 A	6ES5410–7AA21	0.68
110 V a.c., 2 A	6ES5415–7AB11	0.68
220 V a.c., 2 A	6ES5415–7AB21	0.68
24 V a.c./48 V a.c., 2 A	6ES5415–7AA31	0.68
Relay output module 30 V a.c./d.c.	6ES5417–7AA11	0.7
250 V a.c. or 30 V a.c./d.c.	6ES5417–7AA21	0.7
Timer module 4 timers 10 ms to 100 s	6ES5380–7AA11	0.4
Timer/counter module 8 timers/counters	6ES5381–7AA11	0.8

[1]) Cannot be used with central modules 6ES5900–7AC11 and 6ES5900–7AC21

	Order No.	Approx. weight kg
Adapter block type I for timer/counter module with thumbwheel switch and LED display 2 decades	6ES5382–0AA21	0.19
3 decades	6ES5382–0AA31	0.19
Adapter block type II thumbwheel switch and 7-segment digit display 2 decades	6ES5382–0AB21	0.28
3 decades	6ES5382–0AB31	0.34
Cable connector between timer/counter modules and adapter block length 2.5 m	6ES5715–0BC50	0.06
5 m	6ES5715–0BF00	0.1
10 m	6ES5715–0CB00	0.2
Test module	6ES5330–7AB11	0.52
Test adapter	6ES5332–0AA11	0.5
Interface module for programming units for on-line programming with the 630 and 670 programming units	6ES5500–7AA11	0.45
610 programming unit with German inscriptions	6ES5610–8AA11	6.0
with English inscriptions	6ES5610–8AB11	
with French inscriptions	6ES5610–8AC11	
630 B programming unit with internal 2K RAM with German inscriptions	6ES5630–0BA21	15.0
with English inscriptions	6ES5630–0BB21	
with French inscriptions	6ES5630–0BC21	
630 C programming unit with internal 4K RAM with German inscriptions	6ES5630–0CA21	15.0
with English inscriptions	6ES5630–0CB21	
with French inscriptions	6ES5630–0CC21	
670 programming unit with German inscriptions	6ES5670–0AA21	20.0
with English inscriptions	6ES5670–0AB21	
with French inscriptions	6ES5670–0AC21	
Typewriter, PT80/TTY, 600 baud		
without keyboard 80 cpl., matrix printer	L22751–A80–B295	
ink jet printer	L22751–A80–B294	
132 cpl., matrix printer	L22751–A80–B292	
ink jet printer	L22751–A80–B293	
with keyboard 80 cpl., matrix printer	L22751–A80–C256	19.0
Cable connector between 500 PU interface module and 670 PU	6ES5734–0BD20	
PT80 and 630 PU	6ES5736–0BD20	
PT80 and 670 PU	6ES5737–0BD20	
Manual for S5–110A programmable controller	6ES5998–0AA11	
Manual for 610 programming unit	6ES5998–0BA11	
Manual for 630 B programming unit	C79000–B8500–C107–3	
Manual for 630 C programming unit	C79000–B8500–C225–1	
Dust cover for bus receptacles	4T 807 0424 –01–000	

Overview of the SIMATIC S5 programmable controllers

	SIMATIC S5 – 110A	SIMATIC S5 – 130A 130K	130W	SIMATIC S5 – 150A 150K
	Low capacity	Medium capacity		High capacity
Central controllers **Rugged design** Rugged blocks (injection-moulded casings) snapping onto a standard sectional rail, screw terminal connections Modules enclosed in metal casings; module replacement without interfering with the wiring; screw, plug-in and termi-point connections. Without fans. **Compact design** Individual modules plugged into enclosure; connection direct on the module (plug-in connection) or via front connector. Built-in fans with monitoring. **Expansion units** **Rugged design** **Compact design**				
Application	Open-loop control		Open-loop control, closed-loop control, arithmetic and comparison functions, logging	
Functional scope	Binary logic operations, memory, timing and counting functions	Fault signalling	Comparison, arithmetic, digital and closed-loop control functions	Programmable function modules
Timers	4 or 8 per module	64	128	128
Counters	8 per module	16	64	128
Flags	511 retentive	512 retentive 128 non-retentive	1024 retentive 1024 non-retentive	2048 retentive
Program memory Type Capacity for	 EPROM 4K statements	 EPROM 4K statements	 EPROM/RAM 16K statements	 EPROM/RAM 23K statements
Cycle time for 1K statements	20 ms	4 ms	3 ms	5 ms
Expansion capability Digital inputs/outputs Analog inputs/outputs	 128/128 –	 256/256 –	 512/512 64/64	 1024/1024 64/64
Standard interfaces with 512 interface module	–	–	for computer linkup	for computer linkup, typewriter, VDU
Programming	linear	linear	structured in modules	
Mains connection	220 V a.c., 110 V a.c., 24 V d.c.	for S5 – 130A: 220 V a.c., 110 V a.c., 24 V d.c. for S5 – 130K: 24 V d.c.	24 V d.c.	for S5 – 150A: 220 V a.c., 110 V a.c., 24 V d.c. for S5 – 150K: 24 V a.c.
Fixing dimensions	to DIN 41 494 and IEC 297 (19 inch system)			
Suitable programming units 610 630 670/690	 ● ● ●	 – ● ●	 – – ●	 – – ●

Overview of programming units

	PU 610	PU 630	PU 670	PU 690
Programming of the programmable controllers	S5 – 110A	S5 – 110A and S5 – 130A, 130K	S5 – 110A to S5 – 150K	S5 – 110A to S5 – 150K
Type of program input	Function keys and decimal keypad	Function keys and decimal keypad	Function keys and alphanumeric keypad	Function keys, alphanumeric keypad, punched cards
Type of program output	Display Hexadecimal	Display Statement list or ladder diagram; absolute parameters	VDU screen Statement list, ladder diagram or flowchart[1]) absolute or symbolic parameters[1])	VDU screen Statement list, ladder diagram or flowchart; absolute or symbolic parameters
Documentation	–	PT80/TTY printer	PT80/TTY printer	Line printer
Programming	off-line	off-line on-line	off-line on-line	off-line
Data link to programmable controller	–	Parallel (3 m)	Parallel (3 m) for S5 – 110A, 130A, 130K, serial (up to 1000 m) for S5 – 130W, 150A, 150K	Serial (up to 1000 m) for S5 – 150A, 150K
Data medium	EPROM	EPROM	EPROM Mini-diskette	EPROM Mini-diskette
Special features	EPROM erasing facility	EPROM erasing facility, printer connection	EPROM erasing facility, printer connection, 2 mini floppy-disk drives	4 floppy-disk drives, line printer connection for MODEM, connection for 670 programming unit
Commissioning and maintenance aids	–	Displays: Signal status, result of logic operation (binary) Control[2]): Outputs and flags	Displays: Signal status, result of logic operation (binary and digital) Control[2]): Outputs and flags Compilation of cross-reference lists[1])	Compilation of cross-reference lists

[1]) In preparation
[2]) Not for SIMATIC S5 – 110A programmable controller

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