

### CPU 948R/RL for S5-155H/S5-155H Lite

#### Application



The CPU 948R is designed for the S5-155H fault-tolerant programmable controller, the CPU 948RL for the S5-155H Lite.

They have a large user memory and are suitable for both high-speed word processing (arithmetic operations and closed-loop control) and high-speed binary signal processing (logic control).

#### Design

The CPU 948R/RL differs only in its firmware from the CPU 948 for the S5-155U programmable controller. You must plug in a CPU 948R/RL into both subunits of the S5-155H/-155H Lite fault-tolerant programmable controller.

The module contains the following:

- STEP 5 processing unit (with 2 ASICs) for processing the user program

- Microprocessor (16 bit) for processing the operating system of the module
- Microprocessor (16 bit) for processing the built-in serial interface
- Internal memory (RAM) with 128, 640 or 1664 Kbyte for the user program (355 memory submodule and RAM memory submodules are no longer required)

- Memory (high-speed RAM) for bit memories, S bit memories, timers, counters, process image, etc.
- Receptacle for memory card (flash EPROMs, non-volatile and electrically erasable)
- Hardware clock
- Built-in serial interface (TTY) for programming device or operator panel

The CPU 948R requires 2 slots. It can be plugged into the ZG 135U/155U central controller.

#### Principle of operation

Depending on the application, the central processing unit executes the user program either cyclically, time-controlled, interrupt-controlled or time interrupt-controlled. The firmware executes all additional functions of the fault tolerant programmable controller S5-155H/-155H Lite automatically.

These functions include the following:

- Data exchange
- Synchronization of the two subunits
- Self-test
- Fault handling (switchover to standby unit)
- Fault locating

Multi-processor operation as with the CPU 948 is not possible with the CPU 948RL. The additional functions (self-test, synchronization, fault locating) increase the execution time by 5 to 15 %.

#### Functions

- Event-driven synchronization
- Transparent programming
- Any combination of 1-, 2- and 3-channel I/O configuration (3-channel configuration only for inputs)
- Support of redundant analog inputs and outputs with fault detection and fault locating

- Comprehensive self-test functions
- Comprehensive system diagnostics functions
- Single-channel and redundant connection to the SINEC L1, PROFIBUS and Industrial Ethernet LANs
- Single-channel and redundant connection to the PROFIBUS-DP field bus

- Programming device functions via the Industrial Ethernet LAN

For further information on functions, program execution and restart modes, refer to the description of the CPU 948 on page 4/27.

#### Programming

In addition to programming in STEP 5, the CPU 948R/RL can also be programmed with the SCL compiler in the SCL programming language. The SCL high-level language is a programming language similar to PASCAL which has been optimized for PLC applications.

SCL can be used for programming complex tasks simply and easily in the SIMATIC S5. The SCL compiler is integrated in the STEP 5 basic package S5-DOS/MT, Version 6.

The user programs can be stored in the integral RAM (128, 640 or 1664 Kbyte). If necessary, the programming device can be used to store the user program on a flash EPROM to protect it from power failures. For this purpose, a programming adapter is required.

# SIMATIC S5-135U, S5-155U/H

## Central processing units

### CPU 948R/RL for S5-155H/S5-155H Lite (continued)

Technical specifications			
Microprocessors			80186 (16 bit) 80188 (8 bit), 2 ASICs
Total memory space			
• Internal memory (RAM)			128 Kbyte (CPU 948RL) 640 or 1664 Kbyte (CPU 948R)
• Memory submodule (flash EPROM)			128 Kbyte (CPU 948RL) 640 or 1664 Kbyte (CPU 948R)
Programming language			STEP 5, SCL
Program execution			<ul style="list-style-type: none"> <li>• Cycle (OB1),</li> <li>• Interrupt-driven</li> <li>• Time-controlled</li> <li>• Operator-controlled stop</li> </ul>
Execution times for			
• Bit operations			0.18 µs
• Word operations			0.5 µs
• Timer/counter operations			14/0.18 µs
• Fixed-point addition			0.55 µs
• Floating-point addition			3.3 µs
Basic cycle time	typ.		10 ms (CPU 948R) 20 ms (CPU 948RL)
Scan time monitoring			Programmable, default: 200 ms
Inputs	digital	max.	1024 with process image (1-, 2- or 3-channel) <sup>2)</sup>
	additional	max.	3072 without process image (1-channel)
	additional	max.	6144 for direct memory access (1-channel)
	additional	max.	518,152 for page addressing <sup>1)</sup>
Inputs	analog	max.	CPU 948RL: 192 (1-, 2- or 3-channel) CPU 948R: 64 (1- or 2-channel)
	additional	max.	384 for direct memory access (1-channel)
	additional	max.	32,130 for page addressing <sup>1)</sup>
Outputs	digital	max.	1024 with process image (1- or 2-channel)
	additional	max.	3072 without process image (1-channel)
	additional	max.	6144 for direct memory access (1-channel)
	additional	max.	518,152 for page addressing <sup>1)</sup>
	analog	max.	CPU 948R: 192 (1- or 2-channel) CPU 948RL: 64 (1- or 2-channel)
	additional	max.	384 for direct memory access (1-channel)
	additional	max.	32,130 for page addressing <sup>1)</sup>
Bit memories/S bit memories			2048/32768
Timers			
• Number/Range			256/0.01 to 9990 s
Counters			
• Number/Range			256/0 to 999
Current consumption (at 5 V DC)			
• CPU 948R		max.	3.6 A
• Memory card			0.2 A
Power loss		max.	20 W
Space requirements			2 slots
Weight		approx.	1 kg (2.2 lb)

1) Only with IM 308 interface module (theoretical end value).

2) 3-channel not possible with CPU 948RL.

Ordering data	Order No.	Order No.
<b>CPU 948R</b> For S5-155H With 640 Kbyte user memory With 1664 Kbyte user memory	<b>6ES5 948-3UR12</b> <b>6ES5 948-3UR22</b>	
<b>CPU 948RL</b> For S5-155H Lite With 128 Kbyte user memory	<b>6ES5 948-3UR51</b>	
<b>Memory card</b> (flash EPROM) 256 Kbyte 1 Mbyte 2 Mbyte	<b>6ES5 374-2KH21</b> <b>6ES5 374-2KK21</b> <b>6ES5 374-2KL21</b>	
<b>ZG 135U/155U subrack</b> 230 V/115 V AC; 5 V, 18 A 230 V/115 V AC; 5 V, 40 A 24 V DC; 5 V, 18 A 24 V DC; 5 V, 40 A	<b>6ES5 188-3UA12</b> <b>6ES5 188-3UA22</b> <b>6ES5 188-3UA32</b> <b>6ES5 188-3UA52</b>	
<b>ZG 155H subrack</b> 24 V DC; 5 V, 14 A	<b>6ES5 188-3UH31</b>	
<b>COM 155H parameterization software</b> for configuration and diagnostics of the S5-155H fault-tolerant PLC on 3 1/2" diskettes, Single license Copy license	<b>6ES5 895-3SR 3</b> <b>6ES5 895-3SR 3-0KL1</b> ↑ <b>1</b> <b>2</b> <b>3</b>	
German English French	<b>1</b> <b>2</b> <b>3</b>	
To be ordered as a separate item: <b>S5-155H manual</b> consisting of the S5-155H operating instructions, the programming instructions and the CPU 948R/RL quick reference German English French		<b>6ES5 998-4SR11</b> <b>6ES5 998-4SR21</b> <b>6ES5 998-4SR31</b>
<b>S5-135U/155U system manual</b> consisting of the descriptions of the central controllers (CC) and expansion units (EU), the interface modules (IM), the power supply and the I/Os German English French		<b>6ES5 998-0SH11</b> <b>6ES5 998-0SH21</b> <b>6ES5 998-0SH31</b>