

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

Analog input/output modules

Analog input modules

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Application



The analog input modules convert the analog signals from the process into digital signals for further processing in the programmable controller.

Analog input modules are only approved for non-safety-related functions.

For modules which can be used in the S5-95F see tables on page 2/9.

Design

The following can be set by a coding switch on the front of the module:

- 1-, 2- or 4-channel operation
- Line frequency 50 or 60 Hz
- Wire-break alarm signal on/off (not for current inputs)

The modules have mechanical coding and are plugged into the bus units. This also

establishes contact to the terminal block for the signal cables. The signal cables need not be disconnected to replace a module fixed wiring.

The modules have fixed slot coding and do not require an address setter. No address displacements occur if modules are interchanged or gaps are left between modules.

The module with characteristic linearization for thermoelements contains the characteristic curves for

- Ni-Cr/Ni-Al (type K) in accordance with IEC 584
- Fe/Cu-Ni (type J) in accordance with IEC 584
- Fe/Cu-Ni (type L) in accordance with DIN 43 710

The characteristic curve for Pt 100 corresponds to DIN IEC 751.

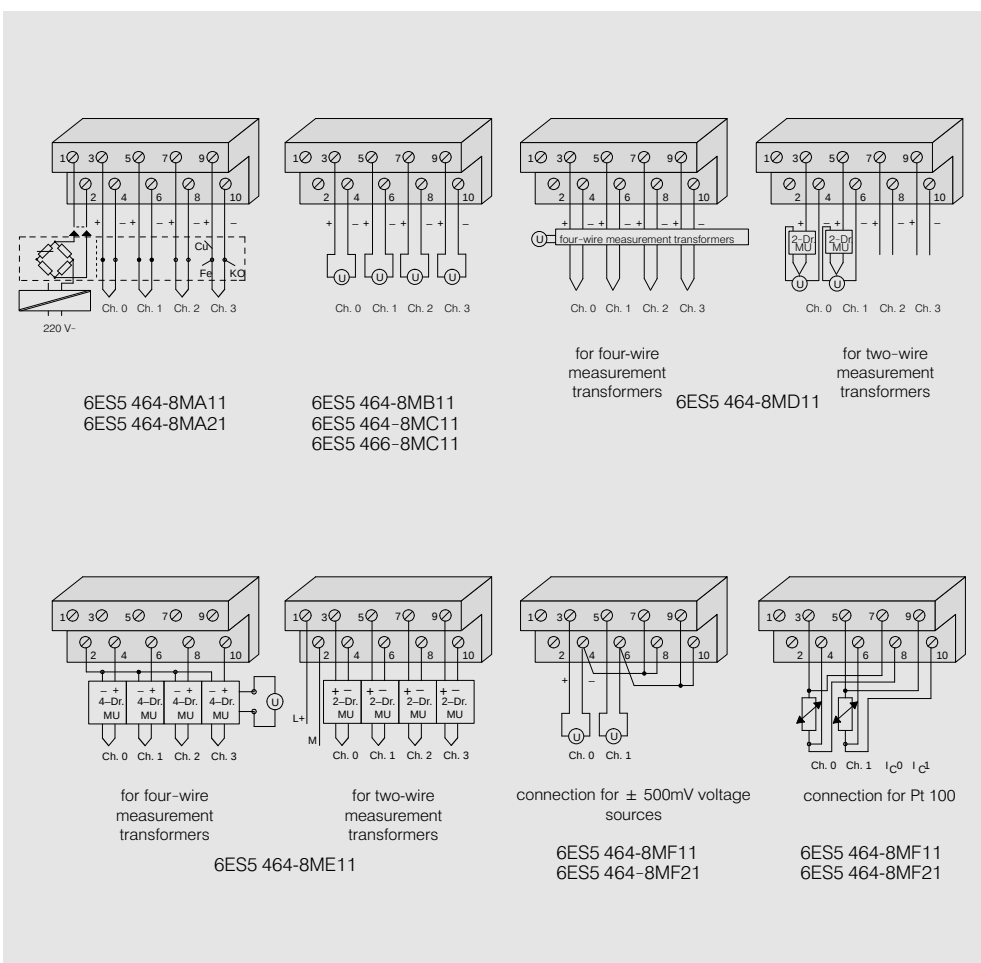


Fig. 2/19 Connection diagrams for analog input modules

Analog input modules (continued)

Technical specifications				
Analog input module	6ES5 464-8MA11	6ES5 464-8MA21 ²⁾	6ES5 464-8MB11 ²⁾	6ES5 464-8Mc11 ²⁾
Nominal input ranges (nominal values)	± 50 mV	± 50 mV	± 1 V	± 10 V
Number of inputs	1, 2 or 4 (optional)			
Galvanic isolation	Yes (inputs to ground, not to one another)			
Input resistance min.	10 MΩ	10 MΩ	10 MΩ	50 kΩ
Connection method of sensors	Two-wire connections			
Digital representation of input signal	13 bit two's complement (2048 units = nominal value)			
Measuring principle	Integrating			
Conversion principle	Voltage-time conversion			
Integration time (adjustable for optimum noise suppression)	20 ms at 50 Hz 16 ² / ₃ ms at 60 Hz			
Encoding time max.	60 ms at 50 Hz 50 ms at 60 Hz			
Cycle time for				
4 inputs	At 50 Hz: 240 ms	At 60 Hz: 200 ms		
2 inputs	120 ms	100 ms		
1 input	60 ms	50 ms		
Permissible voltage				
• Between inputs max.	± 1 V			
• Between inputs and central grounding point (destruction limit) max.	60 V AC/75 V DC			
Permissible input current (destruction limit) max.	—			
Permissible input voltage (destruction limit) max.	24 V	24 V	24 V	50 V
Fault indication in the case of				
• Range exceeded	At 200 % of nominal value (over 4095 units)			
• Sensor wire break	Yes (centrally indicated by red LED)			No
Noise suppression for f = n · (50/60 Hz ± 1 %); n = 1,2 ...				
• Common mode rej. min. (V _p < 1 V)	86 dB			
• Series-mode rejection min. (peak value of noise < nominal range value)	40 dB			
Basic error limits ¹⁾ (at 25 °C)	± 1.5 ‰	± 1.5 ‰	± 1 ‰	± 2 ‰
Operation error limits ¹⁾ (0 °C to 60 °C; for one year)	± 4 ‰	± 4 ‰	± 3.5 ‰	± 4.5 ‰
Cable length (shielded) max.	50 m (164 ft)	50 m (164 ft)	200 m (656 ft)	200 m (656 ft)
Supply voltage (for 2-wire transducers)	None			
Current consumption				
• Internal (at 9 V) typ.	70 mA	100 mA	70 mA	70 mA
• External (at 24 V) typ.	—	—	—	—
Power loss typ.	0.7 W	0.7 W	0.7 W	0.7 W
Weight approx.	0.23 kg (0.62 lb)			

¹⁾ In accordance with DIN 43 745; referred to nominal measuring range.²⁾ Also for S5-95F

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Analog input/output modules

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Analog input modules (continued)

Technical specifications (continued)

Analog input module	6ES5	464-8MD11 ²⁾	464-8ME11 ²⁾	464-8MG11 ³⁾	464-8MF11	464-8MF21	466-8MC11
Nominal input ranges (nominal values)		± 20 mA	+ 4 to 20 mA	+ 4 to 20 mA	± 500 mV/Pt 100	± 500 mV/Pt 100	± + 0 to 10 V
Number of inputs		1, 2 or 4 (optional)			1 or 2 (optional)		4
Galvanic isolation		Yes (inputs to ground, not to one another)					No
Input resistance		25 Ω	31.25 Ω	31.25 Ω	min. 10 MΩ	min. 10 MΩ	100 kΩ
Connection method of sensors		Two-wire connection			2- or 4-wire		2-wire
Digital representation of input signal		13 bit two's complement (2048 units = nominal value)					8 bit (256 units = nominal value)
Measuring principle		Intergrating					Successive
Conversion principle		Voltage-time conversion					Approximation
Intergration time (adjustable for optimum noise suppression)		20 ms at 50 Hz 16 ² / ₃ ms at 60 Hz					
Encoding time	max.	60 ms at 50 Hz 50 ms at 60 Hz					5 ms
Cycle time for		at 50 Hz:		at 60 Hz:			20 ms
4 inputs		240 ms	200 ms				—
2 inputs		120 ms	100 ms				—
1 input		60 ms	50 ms				
Permissible voltage							
• Between inputs	max.	± 1 V					
• Between inputs and central grounding point (destruction limit)	max.	60 V AC/75 V DC					
Permissible input current (destruction limit)	max.	80 mA	80 mA	80 mA	—	—	—
Permissible input voltage (destruction limit)	max.	—	—	—	24 V	24 V	60 V
Fault indication in the case of							
• Range exceeded		At 200 % of nominal value (over 4095 units)					No
• Sensor wire break		No	No	No	Yes (centr. indic. by red LED)		No
Noise suppression for f = n · (50/60 Hz ± 1 %); n = 1,2 ...							
• Common mode rej. (V _p < 1 V)	min.	86 dB					
• Series-mode rejection (peak value of noise < nominal range value)	min.	40 dB					
Basic error limits ¹⁾ (at 20 °C)		± 2 ‰	± 1.5 ‰	± 1.5 ‰			± 4 ‰
Operation limits ¹⁾ (0 °C to 60 °C; for one year)		± 4.5 ‰	± 4 ‰	± 4 ‰			± 6 ‰
Cable length (shielded)	max.	200 m (656 ft)					
Supply voltage (for 2-wire transducers)							
• Nominal value		—	24 V DC	24 V DC	—		
• Ripple	max.	—	3.6 V	3.6 V	—		
• Permissible range		—	20 to 30 V	20 to 30 V	—		
Current consumption							
• Internal (at 9 V)	typ.	70 mA	70 mA	70 mA	70 mA	100 mA	100 mA
• External (at 24 V)	typ.	—	80 mA	80 mA	—	—	
Power loss	typ.	0.7 W	1 W (2-wire transducer) 0.7 W (4-wire transducer)		0.9 W	0.9 W	0.9 W
Weight	approx.	0.23 kg (0.62 lb)					0.2 kg (7 oz)

¹⁾ In accordance with DIN 43 745; referred to nominal measuring range.

²⁾ Also for S5-95F

³⁾ For for S5-95F only

Ordering data	Order No.	Order No.
Analog input module with 4 inputs, floating for ± 50 mV for thermoelements (± 50 mV, with linearization) for ± 1 V for ± 10 V for ± 20 mA with 4 inputs, floating for ± 4 to + 20 mA	6ES5 464-8MA11 6ES5 464-8MA21 6ES5 464-8MB11 6ES5 464-8MC11 6ES5 464-8MD11 6ES5 464-8ME11	with 2 inputs, floating for ± 500 mV or Pt 100 for Pt 100 with linearization with 4 inputs, non-floating for 0 to 10 V Failsafe analog input with 4 inputs, floating for ± 4 to + 20 mA 6ES5 464-8MF11 6ES5 464-8MF21 6ES5 466-8MC11 6ES5 464-8MG11

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

Analog input/output modules

Analog output modules

Application



The analog output modules convert digital values from the programmable controller into the analog signals required for controlling the process. Analog output modules are only approved for non-safety-related functions. For modules which can be used in the S5-95F see tables on page 2/9.

Design

The modules have mechanical coding and are plugged into the bus units. This also establishes contact to the terminal block for the signal cables. The latter need not be detached when replacing a module (fixed wiring).

The modules have fixed slot coding and do not require an address setter. No address displacements take place if modules are interchanged or gaps are left between modules.

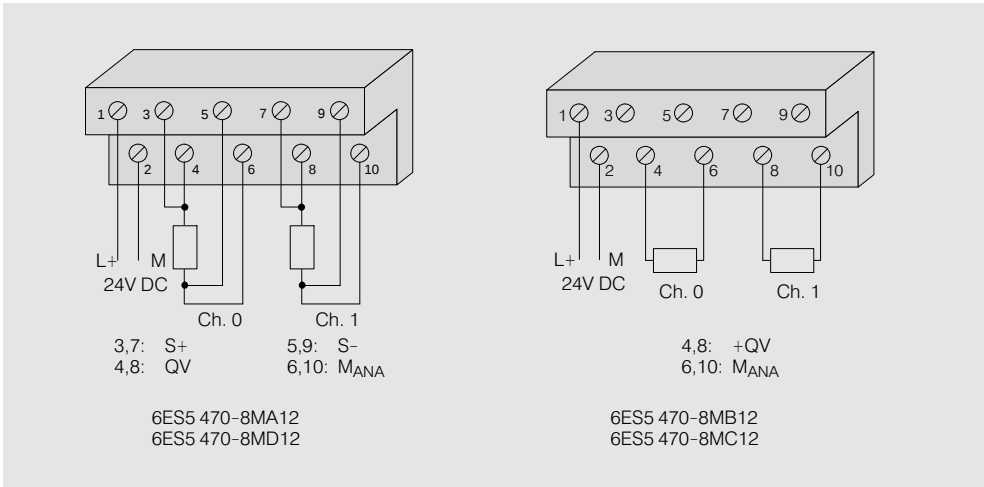


Fig. 2/20 Connection diagrams for analog output modules

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

Analog input/output modules

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Analog output modules (continued)

Technical specifications				
Analog output module	6ES5 470-8MA12 ²⁾	6ES5 470-8MB12 ²⁾	6ES5 470-8MC12 ²⁾	6ES5 470-8MD12 ²⁾
Nominal output range (nominal values)	± 10 V	± 20 mA	+ 4 to 20 mA	+ 1 to 5 V
Number of outputs	2	2	2	2
Galvanic isolation	Yes	Yes	Yes	Yes
Load impedance	Purely ohmic	Purely ohmic	Purely ohmic	Purely ohmic
• Voltage outputs min.	3.3 kΩ	—	—	3.3 kΩ
• Current outputs max.	—	300 Ω	300 Ω	—
Load connection	2 or 4-wire connection	2-wire connection	2-wire connection	2 or 4-wire connection
Digital representation of output signal	12 bit two's complement (1024 units = nominal value)	12 bit two's complement (1024 units = nominal value)	12 bit two's complement (1024 units = nominal value)	12 bit two's complement (1024 units = nominal value)
Conversion time max.	0.15 ms	0.15 ms	0.15 ms	0.15 ms
Permissible overload approx.	25 %	25 %	25 %	25 %
Short-circuit protection	Yes	Yes	Yes	Yes
Short-circuit current approx.	± 30 mA	± 30 mA	—	± 30 mA
Open-circuit voltage approx.	—	15 V	15 V	—
Permissible voltage between outputs and central grounding point max.	60 V AC/75 V DC	60 V AC/75 V DC	60 V AC/75 V DC	60 V AC/75 V DC
Basic error limits ¹⁾ (at 25 °C)	± 2.5 ‰	± 3 ‰	± 2 ‰	± 2 ‰
Operational error limits ¹⁾ (0 °C to 55 °C; for 1 year)	± 6 ‰	± 6 ‰	± 6 ‰	± 6 ‰
Length of cable (shielded) max.	200 m (656 ft)	200 m (656 ft)	200 m (656 ft)	200 m (656 ft)
Supply voltage				
• Nominal value	+ 24 V	+ 24 V	+ 24 V	+ 24 V
• Ripple V _{pp}	3.6 V	3.6 V	3.6 V	3.6 V
• Permissible range (including ripple)	20 to 30 V	20 to 30 V	20 to 30 V	20 to 30 V
Current consumption				
• Internal (9 V) typ.	170 mA	170 mA	170 mA	170 mA
• External (at 24 V) typ.	100 mA	130 mA	130 mA	100 mA
Weight approx.	0.3 kg (0.81 lb)	0.3 kg (0.81 lb)	0.3 kg (0.81 lb)	0.3 kg (0.81 lb)

1) In accordance with DIN 43 745; referred to nominal measuring range.

2) Also for S5-95F

Ordering data	Order No.
Analog output module	
2 outputs for ± 10 V, floating	6ES5 470-8MA12
2 outputs for ± 20 mA, floating	6ES5 470-8MB12
2 outputs for + 4 to 20mA, floating	6ES5 470-8MC12
2 outputs for + 1 to 5 V, floating	6ES5 470-8MD12