

Overview



- Analog inputs
- For connection of voltage and current sensors, thermocouples, resistors and resistance thermometers

Technical specifications

	6ES7 331-7KF02-0AB0	6ES7 331-7HF01-0AB0	6ES7 331-1KF01-0AB0	6ES7 331-7KB02-0AB0
Voltages and currents				
Load voltage L+				
• Rated value (DC)	24 V	24 V		24 V
• reverse polarity protection	Yes	Yes		Yes
Current consumption				
from load voltage L+ (without load), max.	200 mA	50 mA		80 mA
from backplane bus DC 5 V, max.	50 mA	60 mA	90 mA	50 mA
Power loss, typ.	1 W	1.5 W	0.4 W	1.3 W
Connection point				
required front connectors	20-pin	20-pin	40-pin	20-pin
Isochronous mode				
Isochronous mode	No	Yes	No	No
Analog inputs				
Number of analog inputs	8	8	8	2
Number of analog inputs for resistance measurement	4		8	1
Cable length, shielded, max.	200 m; 50 m at 80 mV and with thermocouples	200 m	200 m; max. 50 m at 50 mV	200 m; 50 m at 80 mV and with thermocouples
permissible input frequency for voltage input (destruction limit), max.	20 V; continuous; 75 V for max. 1s (mark to space ratio 1:20)	20 V; 20 V continuous, 75 V for max. 1s (mark to space ratio 1:20)	30 V; 12 V continuous, 30 V for max. 1 s	20 V; continuous; 75 V for max. 1s (mark to space ratio 1:20)
permissible input current for current input (destruction limit), max.	40 mA	40 mA	40 mA	40 mA
Input ranges (rated values), voltages				
• 0 to +10 V			Yes	
• 1 to 5 V	Yes	Yes	Yes	Yes
• 1 to 10 V		Yes	No	
• -1 V to +1 V	Yes	Yes	Yes	Yes
• -10 V to +10 V	Yes	Yes	Yes	Yes
• -2.5 V to +2.5 V	Yes		No	Yes
• -250 mV to +250 mV	Yes		No	Yes
• -5 V to +5 V	Yes	Yes	Yes	Yes

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	6ES7 331-7KF02-0AB0	6ES7 331-7HF01-0AB0	6ES7 331-1KF01-0AB0	6ES7 331-7KB02-0AB0
Input ranges (rated values), voltages (continued)				
• -50 mV to +50 mV			Yes	
• -500 mV to +500 mV	Yes		Yes	Yes
• -80 mV to +80 mV	Yes			Yes
Input ranges (rated values), currents				
• 0 to 20 mA	Yes	Yes	Yes	Yes
• -10 to +10 mA	Yes			Yes
• -20 to +20 mA	Yes	Yes	Yes	Yes
• -3.2 to +3.2 mA	Yes			Yes
• 4 to 20 mA	Yes	Yes	Yes	Yes
Input ranges (rated values), thermoelements				
• Type E	Yes			Yes
• Type J	Yes			Yes
• Type K	Yes			Yes
• Type N	Yes			Yes
Input ranges (rated values), resistors				
• 0 to 150 Ohm	Yes			Yes
• 0 to 300 Ohm	Yes			Yes
• 0 to 600 Ohm	Yes		Yes	Yes
• 0 to 6000 Ohm			Yes	
Input ranges (rated values), resistance thermometers				
• Ni 100	Yes; Standard		Yes; Standard/AirCon	Yes
• LG-Ni 1000			Yes; Standard/AirCon	
• Pt 100	Yes; Standard		Yes; Standard/AirCon	Yes
Characteristic linearization				
• programmable	Yes		Yes	Yes
• for thermoelements	Type N, E, J, K, L			Type N, E, J, K, L
• for thermoresistor	Pt 100 (Standard, climatic range), Ni 100 (Standard, climatic range)		yes; Pt100 standard/air con.; Ni100 standard/air con.; Ni1000 standard/air con.; LG-Ni1000 standard/air con.	Pt 100 (Standard, climatic range), Ni 100 (Standard, climatic range)
Temperature compensation				
• programmable	Yes			Yes
• external temperature compensation with compensations socket	Yes			Yes
• internal temperature compensation	Yes			Yes
Analog value creation				
Measurement principle	integrating	Conversion of instantaneous values	integrating	integrating
Integrations and conversion time/resolution per channel				
• Resolution with overload area (bit including sign), max.	15 Bit; unipolar: 9 / 12 / 12 / 14 bit, bipolar: 9 + sign/12 + sign/12 + sign/14 + sign bit	14 Bit; unipolar: 14 bit; bipolar: 13+sign bit	13 Bit	15 Bit; unipolar: 9 / 12 / 12 / 14 bit, bipolar: 9 + sign/12 + sign/12 + sign/14 + sign bit

Technical specifications (continued)

	6ES7 331-7KF02-0AB0	6ES7 331-7HF01-0AB0	6ES7 331-1KF01-0AB0	6ES7 331-7KB02-0AB0
Integrations and conversion time/resolution per channel (continued)				
• Integration time, parameterizable	Yes; 2.5 / 16.67 / 20 / 100 ms	Yes	Yes; 60 / 50 ms	Yes; 2.5 / 16.67 / 20 / 100 ms
• Basic conversion time, including integration time, ms	3/ 17/ 22/ 102 ms		66 / 55 ms	6/ 34/ 44/ 204 ms
• Basic conversion time, ms		52 μ s per channel	66 / 55 ms	
• Interference voltage suppression for interference frequency f1 in Hz	400 / 60 / 50 / 10 Hz	400 / 60 / 50 / 10 Hz	50 / 60 Hz	400 / 60 / 50 / 10 Hz
Encoder				
Connection of signal encoders				
• for current measurement as 2-wire transducer	Yes	Yes	Yes; with external supply	Yes
• for current measurement as 4-wire transducer	Yes	Yes	Yes	Yes
• for resistance measurement with 2-conductor connection	Yes		Yes	Yes
• for resistance measurement with 3-conductor connection	Yes		Yes	Yes
• for resistance measurement with 4-conductor connection	Yes		Yes	Yes
Errors/accuracies				
Operational limit in overall temperature range				
• Voltage, relative to input area	+/- 1 %; +/-1% (80mV), +/-0.6% (250-1000mV), +/-0.8% (2.5-10mV)	+/- 0.4 %	+/- 0.6 %; +/-0.6% (+/-5V,10V,1-5V,0-10V; +/-0.5% (+/-50 mV, 500 mV, 1 V	+/- 1 %; +/-1% (80mV), +/- 0.6% (250-1000mV), +/- 0.8% (2.5-10V)
• Current, relative to input area	+/- 0.7 %; from 3.2 to 20mA	+/- 0.3 %	+/- 0.5 %; +/-20mA, 0-20mA, 4-20mA	+/- 0.7 %; from 3.2 to 20mA
• Impedance, relative to input area	+/- 0.7 %; 150, 300, 600 Ohm		+/- 0.5 %; 0-6kOhm, 0-600kOhm	+/- 0.7 %; 150, 300, 600 Ohm
• Resistance-type thermometer, relative to input area	+/- 0.7 %; +/-0.7% (Pt100/ Ni100); +/-0.8% (Pt100 climat)			+/- 0.7 %; +/-0.7% (Pt100/ Ni100); +/-0.8% (Pt100 climat)
Basic error limit (operational limit at 25 °C)				
• Voltage, relative to input area	+/- 0.6 %; +/-0.4% (250-1000mV); +/-0.6% (2.5-10mV); +/-0.7% (80mV)	+/- 0.25 %	+/- 0.4 %; 0.4% (+/-5V,10V,1-5V, 0-10V); 0.3% (+/-50mV,500mV,1V)	+/- 0.6 %; +/-0.6% (80mV, 2.5-10V); +/-0.4% (250-1000mV)
• Current, relative to input area	+/- 0.5 %; 3,2 to 20mA	+/- 0.2 %	+/- 0.3 %; +/-20mA, 0-20mA,4-20mA	+/- 0.5 %; 3,2 to 20mA
• Impedance, relative to input area	+/- 0.5 %; 150, 300, 600 Ohm		+/- 0.3 %; 0-6kOhm, 0-600kOhm	+/- 0.5 %; 150, 300, 600 Ohm
• Resistance-type thermometer, relative to input area	+/- 0.6 %; +/-0.5% (Pt100/ Ni100); +/-0.6% (Pt100 climatic)			+/- 0.6 %; +/-0.5% (Pt100/ Ni100); +/-0.6% (Pt100 climatic)
Status information/alarms/diagnostics				
Alarms				
• Diagnostic alarm	Yes; parameterizable channels 0 and 2	Yes; parameterizable	No	Yes
• Limit value alarm	Yes; parameterizable	Yes; parameterizable channels 0 and 2	No	Yes; parameterizable; Channel 0
Diagnoses				
• Diagnostic information readable	Yes	Yes	No	Yes

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	6ES7 331-7KF02-0AB0	6ES7 331-7HF01-0AB0	6ES7 331-1KF01-0AB0	6ES7 331-7KB02-0AB0
Isolation				
Isolation checked with	500 V DC	500 V DC	500 V DC	500 V DC
Isolation				
Isolation, analog inputs				
• between the channels	Yes	No	No	No
• between the channels, in groups of 2	2			
• between the channels and the backplane bus	Yes	Yes	Yes	Yes
Dimensions and weight				
Width	40 mm	40 mm	40 mm	40 mm
Height	125 mm	125 mm	125 mm	125 mm
Depth	120 mm	120 mm	117 mm	120 mm
Weights				
Weight, approx.	250 g	200 g	250 g	250 g
	6ES7 331-7PF01-0AB0	6ES7 331-7PF11-0AB0	6ES7 331-7NF00-0AB0	6ES7 331-7NF10-0AB0
Voltages and currents				
Load voltage L+				
• Rated value (DC)	24 V	24 V		24 V
• reverse polarity protection	Yes	Yes		Yes
Current consumption				
from load voltage L+ (without load), max.	240 mA	200 mA		200 mA
from backplane bus DC 5 V, max.	100 mA	100 mA	130 mA	100 mA
Power loss, typ.	4.6 W	3 W	0.6 W	3 W
Connection point				
required front connectors	40-pin	40-pin	40-pin	40-pin
Isochronous mode				
Isochronous mode	No	No	No	No
Analog inputs				
Number of analog inputs	8	8	8	8
Number of analog inputs for resistance measurement	8			
Cable length, shielded, max.	200 m	100 m	200 m	200 m
permissible input frequency for voltage input (destruction limit), max.	75 V; 35 V continuous, 75 V for max. 1 s (mark to space ratio 1:20)	75 V; 20 V DC permanent, 75 V DC for max. 1 s (pulse duty factor 1:20)	50 V; permanent	75 V; 35 V continuous, 75 V for max. 1 s (mark to space ratio 1:20)
permissible input current for current input (destruction limit), max.			32 mA	40 mA
Input ranges (rated values), voltages				
• 1 to 5 V			Yes	Yes
• -10 V to +10 V			Yes	Yes
• -5 V to +5 V			Yes	Yes
Input ranges (rated values), currents				
• 0 to 20 mA			Yes	Yes
• -20 to +20 mA			Yes	Yes
• 4 to 20 mA			Yes	Yes

Technical specifications (continued)

	6ES7 331-7PF01-0AB0	6ES7 331-7PF11-0AB0	6ES7 331-7NF00-0AB0	6ES7 331-7NF10-0AB0
Input ranges (rated values), thermoelements				
• Type B		Yes		
• Type E		Yes		
• Type J		Yes		
• Type K		Yes		
• Type L		Yes		
• Type N		Yes		
• Type R		Yes		
• Type S		Yes		
• Type T		Yes		
• Type U		Yes		
• Typ TXK/TXK(L) to GOST		Yes		
Input ranges (rated values), resistors				
• 0 to 150 Ohm	Yes			
• 0 to 300 Ohm	Yes			
• 0 to 600 Ohm	Yes			
Input ranges (rated values), resistance thermometers				
• Cu 10	Yes			
• Ni 100	Yes			
• Ni 1000	Yes			
• Ni 120	Yes			
• Ni 200	Yes			
• Ni 500	Yes			
• Pt 100	Yes			
• Pt 1000	Yes			
• Pt 200	Yes			
• Pt 500	Yes			
Characteristic linearization				
• programmable	Yes	Yes		
• for thermoelements		Type B, E, J, K, L, N, R, S, T, U, C		
• for thermoresistor	Pt 100, Pt 200, Pt 500, Pt 1000, Ni 100, Ni 120, Ni 200, Ni 500, Ni 1000, Cu 10 (Standard/AirCon)			
Temperature compensation				
• programmable		Yes		
• external temperature compensation with compensations socket		Yes		
• external temperature compensation with Pt100		Yes		
• internal temperature compensation		Yes		

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	6ES7 331-7PF01-0AB0	6ES7 331-7PF11-0AB0	6ES7 331-7NF00-0AB0	6ES7 331-7NF10-0AB0
Analog value creation				
Measurement principle	integrating	integrating	integrating	integrating
Integrations and conversion time/resolution per channel				
<ul style="list-style-type: none"> Resolution with overload area (bit including sign), max. 	16 Bit; Two's complement	16 Bit; Two's complement	16 Bit; unipolar: 15 / 15 / 15 / 15 bit, bipolar: 15 + sign/15 + sign/ 15 + sign/15 + sign	16 Bit; unipolar: 15 / 15 / 15 / 15 bit, bipolar: 15 + sign/15 + sign/ 15 + sign/15 + sign
<ul style="list-style-type: none"> Integration time, parameterizable 	Yes	Yes	Yes; 10 / 16.67 / 20 / 100 ms	Yes; 23 / 72 / 83 / 95 ms
<ul style="list-style-type: none"> Basic conversion time, ms 	up to 4 channels: 10 ms per module, over 5 channels: 190 ms per module, 8 channels: 80 ms	up to 4 channels: 10 ms per module, as of 5 channels: 190 ms per module		10 ms (4-channel mode) 95 / 83/ 72/ 23 ms (8-channel mode)
<ul style="list-style-type: none"> Interference voltage suppression for interference frequency f_1 in Hz 	400 / 60 / 50 Hz	400 / 60 / 50 Hz	400 / 60 / 50 / 10 Hz	400 / 60 / 50 Hz, combinations of 400, 60, 50 Hz
Encoder				
Connection of signal encoders				
<ul style="list-style-type: none"> for current measurement as 2-wire transducer 			Yes; with external transmitter; possible with separate supply for transmitter	Yes; with external transmitter, current supply; possible with separate supply for transmitter
<ul style="list-style-type: none"> for current measurement as 4-wire transducer 			Yes	Yes
<ul style="list-style-type: none"> for resistance measurement with 2-conductor connection 	Yes; without resistance correction			
<ul style="list-style-type: none"> for resistance measurement with 3-conductor connection 	Yes			
<ul style="list-style-type: none"> for resistance measurement with 4-conductor connection 	Yes			
Errors/accuracies				
Operational limit in overall temperature range				
<ul style="list-style-type: none"> Voltage, relative to input area 		+/- 1 K	+/- 0.1 %; +/-0.7%	+/- 0.1 %
<ul style="list-style-type: none"> Current, relative to input area 			+/- 0.3 %; +/-0.9%	+/- 0.1 %
<ul style="list-style-type: none"> Impedance, relative to input area 	+/- 0.1 %			
Basic error limit (operational limit at 25 °C)				
<ul style="list-style-type: none"> Voltage, relative to input area 		+/- 0.5 K	+/- 0.05 %	+/- 0.05 %
<ul style="list-style-type: none"> Current, relative to input area 			+/- 0.05 %	+/- 0.05 %
<ul style="list-style-type: none"> Impedance, relative to input area 	+/- 0.05 %			

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	6ES7 331-7PF01-0AB0	6ES7 331-7PF11-0AB0	6ES7 331-7NF00-0AB0	6ES7 331-7NF10-0AB0
Status information/alarms/diagnostics				
Alarms				
• Diagnostic alarm	Yes; parameters can be set per group	Yes; parameters can be set per group	Yes; parameterizable	Yes; parameterizable
• Limit value alarm	Yes; parameterizable	Yes; parameterizable	Yes; parameterizable channels 0 and 2	Yes; parameterizable all channels (end of cycle interrupt is also supported across modules)
Diagnoses				
• Diagnostic information readable	Yes	Yes	Yes	Yes
Isolation				
Isolation checked with	500 V DC	500 V DC	500 V DC	500 V AC
Isolation				
Isolation, analog inputs				
• between the channels	Yes	Yes		Yes
• between the channels, in groups of	2	2		2
• between the channels and the backplane bus	Yes	Yes	Yes	Yes
Dimensions and weight				
Width	40 mm	40 mm	40 mm	40 mm
Height	125 mm	125 mm	125 mm	125 mm
Depth	120 mm	120 mm	120 mm	120 mm
Weights				
Weight, approx.	272 g	272 g	272 g	272 g

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SM 331 analog input modules

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Ordering data	Order No.	Order No.
SM 331 analog input modules		
Including labeling strips, bus connector, measuring range modules		
8 inputs, 13-bit resolution	6ES7 331-1KF01-0AB0	6ES7 392-2XY00-0AA0
8 inputs, resolution 9/12/14 bits	6ES7 331-7KF02-0AB0	
2 inputs, resolution 9/12/14 bits A)	6ES7 331-7KB02-0AB0	
8 inputs, enhanced resolution 16 bits A)	6ES7 331-7NF00-0AB0	
8 inputs, enhanced resolution 16 bits, 4-channel mode A)	6ES7 331-7NF10-0AB0	
8 inputs, resolution 14 bits, for isochronous mode	6ES7 331-7HF01-0AB0	
8 inputs, for thermal resistors A)	6ES7 331-7PF01-0AB0	
8 inputs, for thermoelements	6ES7 331-7PF11-0AB0	
Measuring range module for analog inputs	6ES7 974-0AA00-0AA0	
1 module for 2 analog inputs; 2 units (spare part)		
Front connectors		
1 unit		
20-pin, with screw contacts		
• 1 unit	6ES7 392-1AJ00-0AA0	
• 100 units	6ES7 392-1AJ00-1AB0	
20-pin, with cage clamp terminals		
• 1 unit	6ES7 392-1BJ00-0AA0	
• 100 units	6ES7 392-1BJ00-1AB0	
40-pin, with screw contacts		
• 1 unit	6ES7 392-1AM00-0AA0	
• 100 units	6ES7 392-1AM00-1AB0	
40-pin, with cage clamp terminals		
• 1 unit	6ES7 392-1BM01-0AA0	
• 100 units	6ES7 392-1BM01-1AB0	
Front door, elevated design A)	6ES7 328-0AA00-7AA0	
e.g. for 32-channel modules; for connecting 1.3 mm ² /16 AWG wires		
SIMATIC TOP connect	See page 4/225; Information about which components can be used for the respective module, see A&D Mall or Catalog KT 10.2	
Bus connectors	6ES7 390-0AA00-0AA0	
1 unit (spare part)		
Shield connecting element	6ES7 390-5AA00-0AA0	
80 mm wide, with 2 rows for 4 shielding connection clamps each		
Shielding connection clamps		
2 units		
For 2 cables with 2 mm to 6 mm diameter	6ES7 390-5AB00-0AA0	
For 1 cable with 3 mm to 8 mm diameter	6ES7 390-5BA00-0AA0	
For 1 cable with 4 mm to 13 mm diameter	6ES7 390-5CA00-0AA0	
		Label cover
		10 units (spare part), for modules with 20-pin front connector
		Labeling strips
		10 units (spare part), for modules with 20-pin front connector
		S7 SmartLabel
		Software for automatic labeling of modules based on data of the STEP 7 project
		Labeling sheets for machine labeling
		For 16-channel signal modules, DIN A4, for printing with laser printer; 10 units
		petrol
		6ES7 392-2AX00-0AA0
		light-beige
		6ES7 392-2BX00-0AA0
		yellow
		6ES7 392-2CX00-0AA0
		red
		6ES7 392-2DX00-0AA0
		For 32-channel signal modules, DIN A4, for printing with laser printer; 10 units
		petrol
		6ES7 392-2AX10-0AA0
		light-beige
		6ES7 392-2BX10-0AA0
		yellow
		6ES7 392-2CX10-0AA0
		red
		6ES7 392-2DX10-0AA0
		SIMATIC Manual Collection D)
		6ES7 998-8XC01-8YE0
		Electronic manuals on DVD, multilingual: S7-200, S7-300, C7, S7-400, SIMATIC DP (Distributed I/O), SIMATIC PC, SIMATIC PG, STEP 7, Engineering Tools, Runtime Software, SIMATIC PCS 7, SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication), SIMATIC Machine Vision, SIMATIC Sensors
		SIMATIC Manual Collection update service for 1 year D)
		6ES7 998-8XC01-8YE2
		Current S7 Manual Collection DVD and the three subsequent updates
		S7-300 manual
		Design, CPU data, module data, instruction list
		German
		6ES7 398-8FA10-8AA0
		English
		6ES7 398-8FA10-8BA0
		French
		6ES7 398-8FA10-8CA0
		Spanish
		6ES7 398-8FA10-8DA0
		Italian
		6ES7 398-8FA10-8EA0

A) Subject to export regulations: AL: N and ECCN: EAR99H

D) Subject to export regulations: AL: N and ECCN: 5D992B1