Overview

- 4 or 8-channel analog input modules
- Optionally with extremely short conversion times
- For the connection of analog sensors without additional amplifiers
- Even solves more complex automation tasks

Technical specifications

Article number	**6ES7531-7QD00-0AB0** S7-1500, AI 4XU/I/RTD/TC ST	**6ES7531-7KF00-0AB0** S7-1500, AI 8XU/I/RTD/TC ST	**6ES7531-7NF10-0AB0** S7-1500, AI 8XU/I HS	**6ES7531-7NF00-0AB0** S7-1500, AI 8XU/I HF
General information				
Product type designation	AI 4xU/I/RTD/TC ST	AI 8xU/I/RTD/TC ST	AI 8xU/I HS	AI 8xU/I HF
Product function				
• I&M data	Yes; I&M0 to I&M3	Yes; I&M0 to I&M3	Yes; I&M0 to I&M3	Yes; I&M0 to I&M3
• Measuring range scalable	No	No	No	No
• Scalable measured values	No	No	No	Yes
• Adjustment of measuring range	No	No	No	Yes
Engineering with				
• STEP 7 TIA Portal configurable/ integrated as of version	V13 / V13.0.2	V12 / V12	V14 / -	V14 / -
• STEP 7 configurable/integrated as of version	V5.5 SP3 / -	V5.5 SP3 / -	V5.5 SP3 / -	V5.5 SP3 / -
• PROFIBUS as of GSD version/ GSD revision	V1.0 / V5.1	V1.0 / V5.1	V1.0 / V5.1	V1.0 / V5.1
• PROFINET as of GSD version/ GSD revision	V2.3 / -	V2.3 / -	V2.3 / -	V2.3 / -
Operating mode				
• Oversampling	No	No	Yes	No
• MSI	Yes	Yes	Yes	Yes
CiR – Configuration in RUN				
Reparameterization possible in RUN	Yes	Yes	Yes	Yes
Calibration possible in RUN	Yes	Yes	Yes	Yes
Supply voltage				
Type of supply voltage	DC	DC	DC	DC
Rated value (DC)	24 V	24 V	24 V	24 V
Reverse polarity protection	Yes	Yes	Yes	Yes

Technical specifications (continued)

Article number	**6ES7531-7QD00-0AB0** S7-1500, AI 4XU/I/RTD/TC ST	**6ES7531-7KF00-0AB0** S7-1500, AI 8XU/I/RTD/TC ST	**6ES7531-7NF10-0AB0** S7-1500, AI 8XU/I HS	**6ES7531-7NF00-0AB0** S7-1500, AI 8XU/I HF
Analog inputs				
Number of analog inputs	4	8	8	8
• For current measurement	4	8	8	8
• For voltage measurement	4	8	8	8
• For resistance/resistance thermometer measurement	2	4		
• For thermocouple measurement	4	8		
permissible input voltage for voltage input (destruction limit), max.	28.8 V	28.8 V	28.8 V	28.8 V
permissible input current for current input (destruction limit), max.	40 mA	40 mA	40 mA	40 mA
Technical unit for temperature measurement adjustable	Yes; °C/°F/K	Yes; °C/°F/K		
Analog input with oversampling	No			
Standardization of measured values	No			
Input ranges (rated values), voltages				
• 0 to +5 V	No	No	No	No
• 0 to +10 V	No	No	No	No
• 1 V to 5 V	Yes	Yes	Yes	Yes
• -1 V to +1 V	Yes	Yes		
• -10 V to +10 V	Yes	Yes	Yes	Yes
• -2.5 V to +2.5 V	Yes	Yes	No	Yes
• -25 mV to +25 mV	No	No	No	No
• -250 mV to +250 mV	Yes	Yes	No	No
• -5 V to +5 V	Yes	Yes	Yes	Yes
• -50 mV to +50 mV	Yes	Yes	No	No
• -500 mV to +500 mV	Yes	Yes	No	No
• -80 mV to +80 mV	Yes	Yes	No	No
Input ranges (rated values), currents				
• 0 to 20 mA	Yes	Yes	Yes	Yes
• -20 mA to +20 mA	Yes	Yes	Yes	Yes
• 4 mA to 20 mA	Yes	Yes	Yes	Yes
Input ranges (rated values), thermocouples				
• Type B	Yes	Yes	No	No
• Type C	No	No	No	No
• Type E	Yes	Yes	No	No
• Type J	Yes	Yes	No	No
• Type K	Yes	Yes	No	No
• Type L	No	No	No	No
• Type N	Yes	Yes	No	No
• Type R	Yes	Yes	No	No
• Type S	Yes	Yes	No	No
• Type T	Yes	Yes	No	No
• Type U	No			
• Type TXK/TXK(L) to GOST	No	No	No	No

Technical specifications (continued)

Article number	**6ES7531-7QD00-0AB0** S7-1500, AI 4XU/I/RTD/TC ST	**6ES7531-7KF00-0AB0** S7-1500, AI 8XU/I/RTD/TC ST	**6ES7531-7NF10-0AB0** S7-1500, AI 8XU/I HS	**6ES7531-7NF00-0AB0** S7-1500, AI 8XU/I HF
Input ranges (rated values), resistance thermometer				
• Cu 10	No	No	No	No
• Cu 10 according to GOST	No	No	No	No
• Cu 50	No	No	No	No
• Cu 50 according to GOST	No	No	No	No
• Cu 100	No	No	No	No
• Cu 100 according to GOST	No	No	No	No
• Ni 10	No	No	No	No
• Ni 10 according to GOST	No	No	No	No
• Ni 100	Yes; Standard/climate	Yes; Standard/climate	No	No
• Ni 100 according to GOST	No	No	No	No
• Ni 1000	Yes; Standard/climate	Yes; Standard/climate	No	No
• Ni 1000 according to GOST	No	No	No	No
• LG-Ni 1000	Yes; Standard/climate	Yes; Standard/climate	No	No
• Ni 120	No	No	No	No
• Ni 120 according to GOST	No	No	No	No
• Ni 200	No		No	No
• Ni 200 according to GOST	No	No	No	No
• Ni 500	No	No	No	No
• Ni 500 according to GOST	No	No	No	No
• Pt 10	No	No	No	No
• Pt 10 according to GOST	No	No	No	No
• Pt 50	No	No	No	No
• Pt 50 according to GOST	No	No	No	No
• Pt 100	Yes; Standard/climate	Yes; Standard/climate	No	No
• Pt 100 according to GOST	No	No	No	No
• Pt 1000	Yes; Standard/climate	Yes; Standard/climate	No	No
• Pt 1000 according to GOST	No	No	No	No
• Pt 200	Yes; Standard/climate	Yes; Standard/climate	No	No
• Pt 200 according to GOST	No	No	No	No
• Pt 500	Yes; Standard/climate	Yes; Standard/climate	No	No
• Pt 500 according to GOST	No	No	No	No
Input ranges (rated values), resistors				
• 0 to 150 ohms	Yes	Yes	No	No
• 0 to 300 ohms	Yes	Yes	No	No
• 0 to 600 ohms	Yes	Yes	No	No
• 0 to 3000 ohms	No	No	No	No
• 0 to 6000 ohms	Yes	Yes	No	No
• PTC	Yes	Yes	No	No
Thermocouple (TC)				
Temperature compensation				
- parameterizable	Yes	Yes		
Cable length				
• shielded, max.	800 m; for U/I, 200 m for R/RTD, 50 m for TC	800 m; for U/I, 200 m for R/RTD, 50 m for TC	800 m	800 m

4

Technical specifications (continued)

Article number	**6ES7531-7QD00-0AB0** S7-1500, AI 4XU/I/RTD/TC ST	**6ES7531-7KF00-0AB0** S7-1500, AI 8XU/I/RTD/TC ST	**6ES7531-7NF10-0AB0** S7-1500, AI 8XU/I HS	**6ES7531-7NF00-0AB0** S7-1500, AI 8XU/I HF
Analog value generation for the inputs				
Integration and conversion time/ resolution per channel				
• Resolution with overrange (bit including sign), max.	16 bit	16 bit	16 bit	24 bit; When using the function "Scaling of the measured values" or "Measuring range adaptation" (32-bit REAL format); 16 bits when using the S7 format (16-bit INTEGER)
• Integration time, parameterizable	Yes	Yes		Yes
• Integration time (ms)	2,5 / 16,67 / 20 / 100 ms	2,5 / 16,67 / 20 / 100 ms		Fast mode: 2.5 / 16.67 / 20 / 100 ms, standard mode: 7.5 / 50 / 60 / 300 ms
• Basic conversion time, including integration time (ms)	9 / 23 / 27 / 107 ms	9 / 23 / 27 / 107 ms		Fast mode: 4 / 18 / 22 / 102 ms; Standard mode: 9 / 52 / 62 / 302 ms
- additional conversion time for wire-break monitoring	9 ms (to be considered in R/RTD/TC measurement)	9 ms (to be considered in R/RTD/TC measurement)		
- additional conversion time for resistance measurement	150 ohm, 300 ohm, 600 ohm, Pt100, Pt200, Ni100: 2 ms, 6000 ohm, Pt500, Pt1000, Ni1000, LG-Ni1000, PTC: 4 ms	150 ohm, 300 ohm, 600 ohm, Pt100, Pt200, Ni100: 2 ms, 6000 ohm, Pt500, Pt1000, Ni1000, LG-Ni1000, PTC: 4 ms		
• Interference voltage suppression for interference frequency f1 in Hz	400 / 60 / 50 / 10	400 / 60 / 50 / 10 Hz		400 / 60 / 50 / 10 Hz
• Basic execution time of the module (all channels released)				Corresponds to the channel with the highest basic conversion time
• Basic execution time of the module (all channels released)			62.5 µs; independent of number of activated channels	
Smoothing of measured values				
• parameterizable	Yes	Yes	Yes	Yes
Encoder				
Connection of signal encoders				
• for voltage measurement	Yes	Yes	Yes	Yes
• for current measurement as 2-wire transducer	Yes	Yes	Yes	Yes; with external transmitter supply
- Burden of 2-wire transmitter, max.	820 Ω	820 Ω	820 Ω	
• for current measurement as 4-wire transducer	Yes	Yes	Yes	Yes
• for resistance measurement with two-wire connection	Yes; Only for PTC	Yes; Only for PTC	No	No
• for resistance measurement with three-wire connection	Yes; All measuring ranges except PTC; internal compensation of the cable resistances	Yes; All measuring ranges except PTC; internal compensation of the cable resistances	No	No
• for resistance measurement with four-wire connection	Yes; All measuring ranges except PTC	Yes; All measuring ranges except PTC	No	No

Technical specifications (continued)

Article number	**6ES7531-7QD00-0AB0** S7-1500, AI 4XU/I/RTD/TC ST	**6ES7531-7KF00-0AB0** S7-1500, AI 8XU/I/RTD/TC ST	**6ES7531-7NF10-0AB0** S7-1500, AI 8XU/I HS	**6ES7531-7NF00-0AB0** S7-1500, AI 8XU/I HF
Errors/accuracies				
Basic error limit (operational limit at 25 °C)				
• Voltage, relative to input range, (+/-)	0.1 %	0.1 %	0.2 %	0.05 %
• Current, relative to input range, (+/-)	0.1 %	0.1 %	0.2 %	0.05 %
• Resistance, relative to input range, (+/-)	0.1 %	0.1 %		
• Resistance thermometer, relative to input range, (+/-)	0.1 %; Ptxxx standard: ±0.7 K, Ptxxx climate: ±0.2 K, Nixxx standard: ±0.3 K, Nixxx climate: ±0.15 K	Ptxxx standard: ±0.7 K, Ptxxx climate: ±0.2 K, Nixxx standard: ±0.3 K, Nixxx climate: ±0.15 K		
• Thermocouple, relative to input range, (+/-)	0.1 %; Type B: > 600 °C ±1.7 K, type E: > -200 °C ±0.7 K, type J: > -210 °C ±0.8 K, type K: > -200 °C ±1.2 K, type N: > -200 °C ±1.2 K, type R: > 0 °C ±1.9 K, type S: > 0 °C ±1.9 K, type T: > -200 °C ±0.8 K	Type B: > 600 °C ±1.7 K, type E: > -200 °C ±0.7 K, type J: > -210 °C ±0.8 K, type K: > -200 °C ±1.2 K, type N: > -200 °C ±1.2 K, type R: > 0 °C ±1.9 K, type S: > 0 °C ±1.9 K, type T: > -200 °C ±0.8 K		
Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interference frequency				
• Series mode interference (peak value of interference < rated value of input range), min.	40 dB	40 dB		80 dB; in the Standard operating mode, 40 dB in the Fast operating mode
• Common mode voltage, max.	10 V	10 V	10 V	60 V DC/30 V AC
• Common mode interference, min.	60 dB	60 dB	50 dB at 400 Hz; 60 dB at 60 / 50 / 10 Hz	80 dB
Isochronous mode				
Isochronous operation (application synchronized up to terminal)	No	No	Yes	No
Filtering and processing time (TCI), min.			80 µs	
Bus cycle time (TDP), min.			250 µs	
Interrupts/diagnostics/ status information				
Diagnostics function	Yes	Yes	Yes	Yes
Alarms				
• Diagnostic alarm	Yes	Yes	Yes	Yes
• Limit value alarm	Yes; two upper and two lower limit values in each case	Yes; two upper and two lower limit values in each case	Yes; two upper and two lower limit values in each case	Yes; two upper and two lower limit values in each case
Diagnostic messages				
• Monitoring the supply voltage	Yes	Yes	Yes	Yes
• Wire-break	Yes; Only for 1 to 5 V, 4 to 20 mA, TC, R, and RTD	Yes; Only for 1 to 5 V, 4 to 20 mA, TC, R, and RTD	Yes; only for 1 ... 5 V and 4 ... 20 mA	Yes; only for 1 ... 5 V and 4 ... 20 mA
• Overflow/underflow	Yes	Yes	Yes	Yes
Diagnostics indication LED				
• RUN LED	Yes; Green LED	Yes; Green LED	Yes; Green LED	Yes; Green LED
• ERROR LED	Yes; Red LED	Yes; Red LED	Yes; Red LED	Yes; Red LED
• Monitoring of the supply voltage (PWR-LED)	Yes; Green LED	Yes; Green LED	Yes; Green LED	Yes; Green LED
• Channel status display	Yes; Green LED	Yes; Green LED	Yes; Green LED	Yes; Green LED
• for channel diagnostics	Yes; Red LED	Yes; Red LED	Yes; Red LED	Yes; Red LED
• for module diagnostics	Yes; Red LED	Yes; Red LED	Yes; Red LED	Yes; Red LED
Potential separation				
Potential separation channels				
• between the channels and backplane bus	Yes	Yes	Yes	Yes

Technical specifications (continued)

Article number	**6ES7531-7QD00-0AB0** S7-1500, AI 4XU/I/RTD/TC ST	**6ES7531-7KF00-0AB0** S7-1500, AI 8XU/I/RTD/TC ST	**6ES7531-7NF10-0AB0** S7-1500, AI 8XU/I HS	**6ES7531-7NF00-0AB0** S7-1500, AI 8XU/I HF
Isolation				
Isolation tested with	707 V DC (type test)	707 V DC (type test)	707 V DC (type test)	2 000 V DC between the channels and the supply voltage L+; 2 000 V DC between the channels and the backplane bus; 2 000 V DC between the channels; 707 V DC (type test) between the supply voltage L+ and the backplane bus
Ambient conditions				
Ambient temperature during operation				
• horizontal installation, min.	0 °C	0 °C	0 °C	0 °C
• horizontal installation, max.	60 °C	60 °C	60 °C	60 °C
• vertical installation, min.	0 °C	0 °C	0 °C	0 °C
• vertical installation, max.	40 °C	40 °C	40 °C	40 °C
Decentralized operation				
Prioritized startup	No	No	Yes	Yes
Dimensions				
Width	25 mm	35 mm	35 mm	35 mm
Height	147 mm	147 mm	147 mm	147 mm
Depth	129 mm	129 mm	129 mm	129 mm
Weights				
Weight, approx.	210 g	310 g	300 g	280 g
Other				
Note:	Supplied incl. 40-pole push-in front connectors. Additional basic error and noise for integration time = 2.5 ms: Voltage: ±250 mV (±0.02%), ±80 mV (±0.05%), ±50 mV (±0.05%); resistance: 150 Ohms (±0.02%); resistance thermometer: Pt100 climate: ±0.08 K, Ni100 climate: ±0.08 K; thermoelement: Type B, R, S: ±3 K, type E, J, K, N, T: ±1 K	Additional basic error and noise for integration time = 2.5 ms: Voltage: ±250 mV (±0.02%), ±80 mV (±0.05%), ±50 mV (±0.05%); resistance: 150 ohms ±0.02%; resistance thermometer: Pt100 climate: ±0.08 K, Ni100 climate: ±0.08 K; thermocouple: Type B, R, S: ±3 K, type E, J, K, N, T: ±1 K		

Ordering data

	Article No.
SM 531 analog input modules	
4 x U/I/RTD/TC 4 analog inputs, ±10 V, ±5 V, ±2.5 V, ±1 V, ±500 mV, ±250 mV, ±80 mV, ±50 mV, 1 ... 5 V, 0/4 ... 20 mA, ±20 mA, thermocouples type B, E, J, K, N, R, S, T, resistance thermometers Ni 100, Ni 1000, LG-Ni 1000, Pt 100, Pt 1000, Pt 250, Pt 500, resistors 0...150/300/600/ 6000 ohms; 16 bit; incl. infeed element, shield bracket, shield terminal, labeling strips, U connector, printed front door	**6ES7531-7QD00-0AB0**
8 x U/I HS 8 analog inputs, ±10 V, ±5 V, 1 ... 5 V or 0/4 ... 20 mA, ±20 mA, 16 bit + sign; incl. infeed element, shield bracket, shield terminal, labeling strips, U connector, printed front door	**6ES7531-7NF10-0AB0**
8 x U/I/RTD/TC 8 analog inputs ±10 V, ±5 V, ±2.5 V, ±1 V, ±500 mV, ±250 mV, ±80 mV, ±50 mV, 1 ... 5 V, 0/4 ... 20 mA, ±20 mA, thermocouples type B, E, J, K, N, R, S, T, resistance thermometers Ni 100, Ni 1000, LG-Ni 1000, Pt 100, Pt 1000, Pt 250, Pt 500, resistors 0...150/300/600/ 6000 ohms, 16 bit; incl. infeed element, shield bracket, shield terminal, labeling strips, U connector, printed front door	**6ES7531-7KF00-0AB0**
8 x U/I HF 8 analog inputs, ±10 V, ±5 V, 1 ... 5 V or 0/4 ... 20 mA, ±20 mA, 16 bit + sign; incl. infeed element, shield bracket, shield terminal, labeling strips, U connector, printed front door	**6ES7531-7NF00-0AB0**
8 x U/R/RTD/TC 8 analog inputs, ±1 V, ±500 mV, ±250 mV, ±80 mV, ±50 mV, ±25 mV; thermocouples type B, E, J, K, N, R, S, T, TXK/TXK(L) according to GOST; resistance thermometers Cu 10, Cu 50, Cu 100, Ni 10, Ni 100, Ni 120, Ni 200, Ni 500, Ni 1000, LG-Ni 1000, Pt 10, Pt 50, Pt 100, Pt 200, Pt500, Pt 1000; resistors 0...150/300/600/ 6000 ohms, PTC; 16 bit; incl. infeed element, shield bracket, shield terminal, labeling strips, U connector, printed front door	**6ES7531-7PF00-0AB0**

	Article No.
Accessories	
Front connectors	
For 35 mm modules; including four potential bridges, cable ties and individual labeling strips, 40-pin	
• Screw terminals	**6ES7592-1AM00-0XB0**
• Push-in	**6ES7592-1BM00-0XB0**
For 25 mm modules; including cable ties and individual labeling strips; push-in terminal 40-pin; spare part	**6ES7592-1BM00-0XA0**
DIN A4 labeling sheets	
For 35 mm modules; 10 sheets with 10 labeling strips each for I/O modules; perforated, Al gray	**6ES7592-2AX00-0AA0**
For 25 mm modules; 10 sheets with 20 labeling strips each for I/O modules; perforated, Al gray	**6ES7592-1AX00-0AA0**
U connector 5 units; spare part	**6ES7590-0AA00-0AA0**
Universal front door for I/O modules	
For 35 mm modules; 5 front doors; with 5 labeling strips (front) and 5 cabling diagrams per front door; spare part	**6ES7528-0AA00-7AA0**
For 25 mm modules; 5 front doors; with 5 labeling strips (front) and 5 cabling diagrams per front door; spare part	**6ES7528-0AA00-0AA0**
Shielding set I/O	
For 35 mm modules; infeed element, shield bracket, and shield terminal; 5 units, spare part (one shield set supplied with the module).	**6ES7590-5CA00-0AA0**
For 25 mm modules; infeed element, shield bracket, and shield terminal; 4 units, spare part (one shield set supplied with the module).	**6ES7590-5CA10-0XA0**
Shield terminal element 10 units; spare part	**6ES7590-5BA00-0AA0**
SIMATIC Manual Collection Electronic manuals on DVD, multi-language: LOGO!, SIMADYN, SIMATIC bus components, SIMATIC C7, SIMATIC distributed I/O, SIMATIC HMI, SIMATIC Sensors, SIMATIC NET, SIMATIC PC Based Automation, SIMATIC PCS 7, SIMATIC PG/PC, SIMATIC S7, SIMATIC Software, SIMATIC TDC	**6ES7998-8XC01-8YE0**
SIMATIC Manual Collection update service for 1 year Current "Manual Collection" DVD and the three subsequent updates	**6ES7998-8XC01-8YE2**