6ES7531-7QD00-0AB0

Data sheet



SIMATIC S7-1500 Analog input module AI 4xU/I/RTD/TC ST, 16 bit resolution, Accuracy 0.3%, 4 channels in groups of 4; 2 channels for RTD measurement; Common mode voltage 10 V; Diagnostics; Hardware interrupts; Delivery including push-in front connector, infeed element, shield bracket, and shield terminal

Product type designation AI AUJ/RTD/TC ST HW functional status From FS01 Fro	General information		
Firmware version FW update possible FVes Product function IkM data Sectoronous mode Prioritized startup Measuring range scalable And of Measuring range scalable And of Measuring with Step 7 TIA Portal configurable/integrated from version FROFIBUS from GSD version/GSD revision PROFIBUS from GSD version/GSD revision PROFIBUS from GSD version/GSD revision PROFIGURING from GSD version/GSD revision V1.0 / V5.1 V2.3 /- Operating mode Oversampling No Wes CRIC - Configuration in RUN Reparameterization possible in RUN Yes Calibration possible in RUN Yes Calibration possible in RUN Yes Supply voltage Rated value (PCC) Permissible range, lower limit (DC) 19.2 V Permissible range, upper limit (DC) 28.8 V Reverse polarity protection Yes Input current Current consumption, max. 140 mA; with 24 V DC supply Encoder supply Short-circuit protection Yes Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power Power voluble lief from the backplane bus O.7 W Power loss	Product type designation	AI 4xU/I/RTD/TC ST	
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Measuring range scalable Scalable measured values Adjustment of measuring range Requiremental measuring range STEP 7 TIA Portal configurable/integrated from version STEP 7 TIA Portal configurable/integrated from version STEP 7 configurable/integrated from version STEP 7 configurable/integrated from version PROFIBUS from GSD version/GSD revision PROFIBUS from GSD version/GSD revision PROFINET from GSD version/GSD revision PROFINET from GSD version/GSD revision Oversampling No MSI Yes CIR - Configuration in RUN Reparameterization possible in RUN Calibration possible in RUN Yes Calibration possible in RUN Yes Supply voltage Rated value (DC) permissible range, lower limit (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) 28.8 V Reverse polarity protection Yes Input current Current consumption, max. 140 mA; with 24 V DC supply Encoder supply 24 V encoder supply 9 Short-circuit protection Yes Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 0.7 W Power loss	 Isochronous mode 	No	
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Operating mode Oversampling MSI Yes CIR - Configuration in RUN Reparameterization possible in RUN Calibration possible in RUN Yes Supply voltage Rated value (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 140 mA; with 24 V DC supply Encoder supply 4 V encoder supply Short-circuit protection Yes Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power loss	 PROFIBUS from GSD version/GSD revision 	V1.0 / V5.1	
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Reparameterization possible in RUN Calibration possible in RUN Yes Supply voltage Rated value (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 140 mA; with 24 V DC supply Encoder supply 24 V encoder supply 24 V encoder supply • Short-circuit protection • Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 0.7 W	• MSI	Yes	
Calibration possible in RUN Supply voltage Rated value (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 140 mA; with 24 V DC supply Encoder supply 4 V encoder supply • Short-circuit protection • Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 0.7 W Power loss	CiR - Configuration in RUN		
Rated value (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 140 mA; with 24 V DC supply Encoder supply 24 V encoder supply 4 V encoder supply • Short-circuit protection • Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 0.7 W Power loss	Reparameterization possible in RUN	Yes	
Rated value (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 140 mA; with 24 V DC supply Encoder supply 4 V encoder supply Short-circuit protection Output current, max. Power Power available from the backplane bus 0.7 W Power loss	Calibration possible in RUN	Yes	
permissible range, lower limit (DC) permissible range, upper limit (DC) Reverse polarity protection Input current Current consumption, max. Late of the supply 24 V encoder supply Short-circuit protection Output current, max. Power Power available from the backplane bus Power loss 19.2 V 28.8 V 140 mA; with 24 V DC supply 140 mA; with 24 V DC supply Yes 20 mA; Max. 47 mA per channel for a duration < 10 s	Supply voltage		
permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 140 mA; with 24 V DC supply Encoder supply 24 V encoder supply • Short-circuit protection • Output current, max. Power Power available from the backplane bus Power loss 28.8 V Yes 140 mA; with 24 V DC supply Yes 20 mA; Max. 47 mA per channel for a duration < 10 s	Rated value (DC)	24 V	
Reverse polarity protection Input current Current consumption, max. Encoder supply 24 V encoder supply • Short-circuit protection • Output current, max. Power Power available from the backplane bus Power loss Yes 0.7 W Power loss	permissible range, lower limit (DC)	19.2 V	
Input current Current consumption, max. 140 mA; with 24 V DC supply Encoder supply 24 V encoder supply • Short-circuit protection • Output current, max. Power Power available from the backplane bus 0.7 W Power loss	permissible range, upper limit (DC)	28.8 V	
Current consumption, max. 140 mA; with 24 V DC supply Encoder supply 24 V encoder supply Short-circuit protection Output current, max. Power Power available from the backplane bus 0.7 W 140 mA; with 24 V DC supply Yes 20 mA; with 24 V DC supply Yes 20 mA; with 24 V DC supply Yes 20 mA; with 24 V DC supply	Reverse polarity protection	Yes	
Encoder supply 24 V encoder supply Short-circuit protection Output current, max. Power Power available from the backplane bus O.7 W Power loss	Input current		
24 V encoder supply Short-circuit protection Output current, max. Power Power available from the backplane bus O.7 W Power loss	Current consumption, max.	140 mA; with 24 V DC supply	
Short-circuit protection Output current, max. Power Power available from the backplane bus O.7 W Power loss Yes 20 mA; Max. 47 mA per channel for a duration < 10 s 0.7 W	Encoder supply		
Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 0.7 W Power loss			
Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power Power available from the backplane bus 0.7 W Power loss	Short-circuit protection	Yes	
Power available from the backplane bus 0.7 W Power loss	 Output current, max. 	20 mA; Max. 47 mA per channel for a duration < 10 s	
Power loss	Power		
Power loss	Power available from the backplane bus	0.7 W	
		2.3 W	

Analog inputs	
Number of analog inputs	4
For current measurement	4
For voltage measurement	4
For resistance/resistance thermometer	2
measurement	
For thermocouple measurement	4
permissible input voltage for voltage input (destruction limit), max.	28.8 V
permissible input current for current input (destruction	40 mA
limit), max.	150 Ohm 200 Ohm 600 Ohm Bt100 Bt200 Ni100: 1.25 mA: 6.000
Constant measurement current for resistance-type transmitter, typ.	150 Ohm, 300 Ohm, 600 Ohm, Pt100, Pt200, Ni100: 1.25 mA; 6 000 Ohm, Pt500, Pt1000, Ni1000, LG-Ni1000: 0.625 mA; PTC: 0.472 mA
Technical unit for temperature measurement adjustable	Yes; °C/°F/K
Analog input with oversampling	No
Standardization of measured values	No
Input ranges (rated values), voltages	
• 0 to +5 V	No
• 0 to +10 V	No
• 1 V to 5 V	Yes
— Input resistance (1 V to 5 V)	100 kΩ
• -1 V to +1 V	Yes
— Input resistance (-1 V to +1 V)	10 ΜΩ
• -10 V to +10 V	Yes
— Input resistance (-10 V to +10 V)	100 kΩ
• -2.5 V to +2.5 V	Yes
— Input resistance (-2.5 V to +2.5 V)	10 ΜΩ
• -25 mV to +25 mV	No
• -250 mV to +250 mV	Yes
— Input resistance (-250 mV to +250 mV)	10 ΜΩ
• -5 V to +5 V	Yes
— Input resistance (-5 V to +5 V)	100 kΩ
● -50 mV to +50 mV	Yes
— Input resistance (-50 mV to +50 mV)	10 ΜΩ
• -500 mV to +500 mV	Yes
— Input resistance (-500 mV to +500 mV)	10 ΜΩ
• -80 mV to +80 mV	Yes
— Input resistance (-80 mV to +80 mV)	10 ΜΩ
Input ranges (rated values), currents	
• 0 to 20 mA	Yes
— Input resistance (0 to 20 mA)	25 Ω; Plus approx. 42 ohms for overvoltage protection by PTC
• -20 mA to +20 mA	Yes
— Input resistance (-20 mA to +20 mA)	25 Ω; Plus approx. 42 ohms for overvoltage protection by PTC
• 4 mA to 20 mA	Yes
— Input resistance (4 mA to 20 mA)	25 Ω; Plus approx. 42 ohms for overvoltage protection by PTC
Input ranges (rated values), thermocouples	V
• Type B	Yes
— Input resistance (Type B)	10 ΜΩ
• Type C	No V
• Type E	Yes
— Input resistance (Type E)	10 ΜΩ
• Type J	Yes
— Input resistance (type J)	10 ΜΩ
• Type K	Yes
— Input resistance (Type K)	10 ΜΩ
• Type L	No
• Type N	Yes
 Input resistance (Type N) 	10 ΜΩ
• Type R	Yes
Type R— Input resistance (Type R)Type S	

Input registance (Type S)	10 ΜΩ
— Input resistance (Type S)	Yes
• Type T	
— Input resistance (Type T)	10 ΜΩ
• Type U	No
Type TXK/TXK(L) to GOST	No
Input ranges (rated values), resistance thermometer • Cu 10	No
	No
Cu 10 according to GOST	
• Cu 50	No
Cu 50 according to GOST Cu 100	No
• Cu 100	No
Cu 100 according to GOST	No
• Ni 10	No
Ni 10 according to GOST	No
• Ni 100	Yes; Standard/climate
— Input resistance (Ni 100)	10 ΜΩ
Ni 100 according to GOST	No
• Ni 1000	Yes; Standard/climate
— Input resistance (Ni 1000)	10 ΜΩ
Ni 1000 according to GOST	No
• LG-Ni 1000	Yes; Standard/climate
— Input resistance (LG-Ni 1000)	10 ΜΩ
• Ni 120	No
 Ni 120 according to GOST 	No
• Ni 200	No
 Ni 200 according to GOST 	No
● Ni 500	No
 Ni 500 according to GOST 	No
● Pt 10	No
 Pt 10 according to GOST 	No
● Pt 50	No
 Pt 50 according to GOST 	No
• Pt 100	Yes; Standard/climate
— Input resistance (Pt 100)	10 ΜΩ
 Pt 100 according to GOST 	No
• Pt 1000	Yes; Standard/climate
— Input resistance (Pt 1000)	10 ΜΩ
 Pt 1000 according to GOST 	No
• Pt 200	Yes; Standard/climate
— Input resistance (Pt 200)	10 ΜΩ
 Pt 200 according to GOST 	No
• Pt 500	Yes; Standard/climate
— Input resistance (Pt 500)	10 ΜΩ
Pt 500 according to GOST	No
Input ranges (rated values), resistors	
• 0 to 150 ohms	Yes
— Input resistance (0 to 150 ohms)	10 ΜΩ
• 0 to 300 ohms	Yes
— Input resistance (0 to 300 ohms)	10 ΜΩ
• 0 to 600 ohms	Yes
— Input resistance (0 to 600 ohms)	10 ΜΩ
• 0 to 3000 ohms	No
• 0 to 6000 ohms	Yes
 Input resistance (0 to 6000 ohms) 	10 ΜΩ
• PTC	Yes
— Input resistance (PTC)	10 ΜΩ
Thermocouple (TC)	
Temperature compensation	
— parameterizable	Yes
internal temperature compensation	Yes
- F	

 external temperature compensation via RTD 	Yes
 Compensation for 0 °C reference point 	Yes; fixed value can be set
temperature — Reference channel of the module	No
Cable length	INU
shielded, max.	800 m; for U/I, 200 m for R/RTD, 50 m for TC
Analog value generation for the inputs	,
Integration and conversion time/resolution per channel	
Resolution with overrange (bit including sign), max.	16 bit
 Integration time, parameterizable 	Yes
Integration time (ms)	2,5 / 16,67 / 20 / 100 ms
 Basic conversion time, including integration time (ms) 	9 / 23 / 27 / 107 ms
 additional conversion time for wire-break monitoring 	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
 Interference voltage suppression for interference frequency f1 in Hz 	400 / 60 / 50 / 10
Time for offset calibration (per module)	Basic conversion time of the slowest channel
Smoothing of measured values	
parameterizable	Yes
• Step: None	Yes
• Step: low	Yes
Step: Medium	Yes
• Step: High	Yes
Connection of signal angeders	
Connection of signal encoders • for voltage measurement	Yes
for current measurement as 2-wire transducer	Yes
Burden of 2-wire transmitter, max.	820 Ω
for current measurement as 4-wire transducer	Yes
for resistance measurement with two-wire	Yes; Only for PTC
connection • for resistance measurement with three-wire	Yes; All measuring ranges except PTC; internal compensation of the
connection	cable resistances
 for resistance measurement with four-wire connection 	Yes; All measuring ranges except PTC
Errors/accuracies	
Linearity error (relative to input range), (+/-)	0.02 %
Temperature error (relative to input range), (+/-)	0.005 %/K; With TC type T 0.02 ± % / K
Crosstalk between the inputs, max.	-80 dB
Repeat accuracy in steady state at 25 °C (relative to input range), (+/-)	0.02 %
Temperature error of internal compensation	±6 °C
note regarding accuracy	at temperatures below 0 °C, the figures for operating error and temperature error are doubled
Operational error limit in overall temperature range	
Voltage, relative to input range, (+/-)	0.3 %
Current, relative to input range, (+/-) Designating a relative to input range, (+/-)	0.3 %
Resistance, relative to input range, (+/-) Resistance thermometer, relative to input range (+/-)	0.3 %
 Resistance thermometer, relative to input range, (+/-) 	0.3 %; Ptxxx standard: ±1.5 K, Ptxxx climate: ±0.5 K, Nixxx standard: ±0.5 K, Nixxx climate: ±0.3 K
 Thermocouple, relative to input range, (+/-) 	0.3 %; Type B: > 600 °C ±4.6 K, type E: > -200 °C ±1.5 K, type J: > -210 °C ±1.9 K, type K: > -200 °C ±2.4 K, type N: > -200 °C ±2.9 K, type R: > 0 °C ±4.7 K, type S: > 0 °C ±4.6 K, type T: > -200 °C ±2.4 K
Basic error limit (operational limit at 25 °C)	
Voltage, relative to input range, (+/-)	0.1 %
 Current, relative to input range, (+/-) 	0.1 %
 Resistance, relative to input range, (+/-) 	0.1 %
 Resistance thermometer, relative to input range, (+/-) 	0.1 %; Ptxxx standard: \pm 0.7 K, Ptxxx climate: \pm 0.2 K, Nixxx standard: \pm 0.3 K, Nixxx climate: \pm 0.15 K
• Thermocouple, relative to input range, (+/-)	0.1 %; Type B: $> 600 ^{\circ}\text{C} \pm 1.7 ^{\circ}\text{K}$, type E: $> -200 ^{\circ}\text{C} \pm 0.7 ^{\circ}\text{K}$, type J: $> -210 ^{\circ}\text{C}$

0 °C \pm 1.9 K, type S: > 0 °C \pm 1.9 K, type T: > -200 °C \pm 0.8 K Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interference frequency • Series mode interference (peak value of 40 dB interference < rated value of input range), min. 10 V · Common mode voltage, max. • Common mode interference, min. 60 dB Interrupts/diagnostics/status information Diagnostics function Yes Alarms • Diagnostic alarm Yes Limit value alarm Yes; two upper and two lower limit values in each case Diagnoses Monitoring the supply voltage Wire-break Yes; Only for 1 to 5 V, 4 to 20 mA, TC, R, and RTD Overflow/underflow Diagnostics indication LED • RUN LED Yes; green LED ERROR LED Yes: red LED • Monitoring of the supply voltage (PWR-LED) Yes; green LED Channel status display Yes: green LED • for channel diagnostics Yes: red LED • for module diagnostics Yes; red LED **Potential separation** Potential separation channels • between the channels No • between the channels, in groups of 4 • between the channels and backplane bus Yes • between the channels and the power supply of the Yes electronics Permissible potential difference between the inputs (UCM) 20 V DC Between the inputs and MANA (UCM) 10 V DC Isolation Isolation tested with 707 V DC (type test) **Ambient conditions** Ambient temperature during operation -25 °C; From FS03 · horizontal installation, min. · horizontal installation, max. 60 °C · vertical installation, min. -25 °C; From FS03 · vertical installation, max. 40 °C Altitude during operation relating to sea level • Installation altitude above sea level, max. 5 000 m; Restrictions for installation altitudes > 2 000 m, see manual **Dimensions** Width 25 mm Height 147 mm Depth 129 mm Weights Weight, approx. 210 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

 $^{\circ}$ C ±0.8 K, type K: > -200 $^{\circ}$ C ±1.2 K, type N: > -200 $^{\circ}$ C ±1.2 K, type R: >

last modified:

9/20/2021