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 HW functional status From FS01 From FS01 From FS01 From FS01 From FS01 V1.0.0 • FW update possible Product function • I&M data • Isochronous mode • Prioritized startup No • Measuring range scalable • Scalable measured values • Adjustment of measuring range • Adjustment of measuring range Fegineering with • 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 • STEP 7 ton floration SD version/GSD revision • PROFIBLIS from GSD version/GSD revision • PROFINET from GSD version/GSD revision • Oversampling • Oversampling No • MSI GIR - Configuration in RUN Reparameterization possible in RUN Yes Calibration possible in RUN Yes Calibration possible in RUN Yes Supply voltage Rated value (DC) permissible range, lower limit (DC) permissible range, upper limi	General information	
Firmware version V1.0.0 • FW update possible Yes Product function • I&M data Yes; I&M0 to I&M3 • Isochronous mode No • Prioritized startup No • Measuring range scalable No • Scalable measured values No • Adjustment of measuring range No Engineering with • STEP 7 TIA Portal configurable/integrated from version V13 / V13.0.2 • STEP 7 TIA Portal configurable/integrated from version STEP 7 configurable/integrated from version V1.0 / V5.1 • PROFIBUS from GSD version/GSD revision V1.0 / V5.1 • PROFINET from GSD version/GSD revision V2.3 / - Operating mode • Oversampling No • MSI Yes Calibration in RUN Reparameterization possible in RUN Yes Calibration possible in RUN Yes Calibration possible in RUN Yes Rated value (DC) 24 V permissible range, lower limit (DC) 19.2 V permissible range, lower limit (DC) 28.8 V Reverse polarity protection Yes Input curront Current consumption, max. 165 mA Encoder supply 24 V encoder supply • Short-circuit protection Yes • Over oss, Yp. Power loss, Yp. Power loss, Yp. Analog linputs	Product type designation	AI 4xU/I/RTD/TC ST
FW update possible Product function I &M data Secritorious mode No Prioritized startup No Measuring range scalable No Adjustment of measuring range No Engineering with STEP 7 TIAP Portal configurable/integrated from version Y13 / V13.0.2 STEP 7 ton Priority of the Washington Y0.0 / V5.5 SP3 / - PROFIBUS from GSD version/GSD revision V1.0 / V5.1 PROFIBUS from GSD version/GSD revision V2.3 / - Operating mode Oversampling No NSI Yes Origination in RUN Yes CiR - Configuration in RUN Yes Supply voltage RUN Yes Rated value (DC) 24 V permissible range, lower limit (DC) 19.2 V permissible range, upper limit (DC) 28.8 V Reverse polarity protection Yes Prover (or year purply Ves Power (or year purply Ves Ves Power (or year purply Ves Ves Ves Power (or year purply Ves Ves Ves Power (or year purply Ves Ves Ves Ves Power (or year purply Ves Ves Ves Ves Ves Power (or year purply Ves Ve	HW functional status	From FS01
Product function I&M data	Firmware version	V1.0.0
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• Isochronous mode • Prioritized startup • Measuring range scalable • Scalable measured values • Adjustment of measuring range • Adjustment of measuring range • No Engineering with • STEP 7 TIA Portal configurable/integrated from version • Y13 / V13 0.2 • STEP 7 Configurable/integrated from version • V10 / V5.1 • PROFIBUS from GSD version/GSD revision • V2.3 /- Operating mode • Oversampling • No • MSI • Oversampling • No • MSI • Yes Calibration possible in RUN Reparameterization possible in RUN Yes Supply voltage Rated value (DC) 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. • 165 mA Encoder supply • 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 • O.7 W Power loss, typ. Power loss, typ. Analog inputs	Product function	
 Prioritized startup Measuring range scalable Scalable measured values Adjustment of measuring range No STEP 7 TIA Portal configurable/integrated from version STEP 7 TO FO Transpale/integrated from version STEP 7 TO Transpale/integrated from version V13 / V13 .0.2 STEP 7 TO Transpale/integrated from version V5.5 SP3 / - PROFIBET from GSD version/GSD revision V2.3 / - Operating mode Oversampling No MSI Yes CIR-Configuration in RUN Reparameterization possible in RUN Yes Calibration possible in RUN Yes Supply voltage Rated value (DC) 24 V permissible range, lower limit (DC) 28.8 V Reverse polarity protection Yes Input current Current consumption, max. 165 mA Encoder supply Short-circuit protection Yes Output current, max. 20 mA; Max. 47 mA per channel for a duration < 10 s Power loss, typ. Power loss, typ. Analog inputs 	I&M data	Yes; I&M0 to I&M3
Measuring range scalable Scalable measured values Adjustment of measuring range No Engineering with STEP 7 TIA Portal configurable/integrated from version STEP 7 TIA Portal configurable/integrated from version STEP 7 Configurable/integrated from version PROFIBUS from GSD version/GSD revision ProfIBUS from GSD revision ProfIBUS from STOM ProfIBUS from ProfIBUS from ProfIBUS from ProfIBUS from	 Isochronous mode 	No
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Adjustment of measuring range Regineering with	 Measuring range scalable 	No
Engineering with STEP 7 TIA Portal 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 PV2.3 / - Operating mode Oversampling No Separameterization possible in RUN Pes Calibration possible in RUN Pes Supply voltage Rated value (DC) Permissible range, lover limit (DC) Permissible range, upper limit (DC)	 Scalable measured values 	No
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STEP 7 configurable/integrated from version PROFIBUS from GSD version/GSD revision PROFINET from GSD version/GSD revision V2.3 /- Operating mode Oversampling No MSI Yes CIR - Configuration in RUN Reparameterization possible in RUN Pes Calibration possible in RUN Yes Supply voltage Rated value (DC) Permissible range, lower limit (DC) Permissible range, upper limit (DC) Permissible ra	Engineering with	
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CiR - Configuration in RUN Reparameterization possible in RUN Yes Supply voltage 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. 165 mA Encoder supply 24 V vencoder supply • 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 Power loss Power loss, typ. Analog inputs	 Oversampling 	No
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. 165 mA Encoder supply 24 V encoder supply • Short-circuit protection • Output current, max. Power Power available from the backplane bus Power loss, typ. Analog inputs	• MSI	Yes
Calibration possible in RUN Supply voltage Rated value (DC) 24 V 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. 165 mA Encoder supply 24 V encoder supply • 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, typ. 2.3 W Analog inputs	CiR - Configuration in RUN	
Rated value (DC) Permissible range, lower limit (DC) Permissible range, upper limit (DC) Reverse polarity protection Pes Input current Current consumption, max. 165 mA 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 Power loss, typ. Analog inputs	Reparameterization possible in RUN	Yes
Rated value (DC) permissible range, lower limit (DC) permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 165 mA Encoder supply 24 V encoder supply 9 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, typ. 2.3 W Analog inputs	Calibration possible in RUN	Yes
permissible range, lower limit (DC) permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 165 mA 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 Power loss Power loss, typ. 2.3 W Analog inputs	Supply voltage	
permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 165 mA Encoder supply 24 V encoder supply • Short-circuit protection • Output current, max. Power Power available from the backplane bus Power loss Power loss, typ. 28.8 V Yes 165 mA 165 mA 20 mA; Max. 47 mA per channel for a duration < 10 s Power loss Power loss, typ. 2.3 W Analog inputs	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 Power loss, typ. Analog inputs	permissible range, lower limit (DC)	19.2 V
Input current Current consumption, max. Encoder supply 24 V encoder supply Short-circuit protection Output current, max. Output current, max. Power Power available from the backplane bus Power loss Power loss, typ. Analog inputs	permissible range, upper limit (DC)	28.8 V
Current consumption, max. Encoder supply 24 V encoder supply Short-circuit protection Output current, max. Power Power available from the backplane bus Power loss Power loss, typ. Analog inputs	Reverse polarity protection	Yes
Encoder supply 24 V encoder supply Short-circuit protection Output current, max. Power Power available from the backplane bus Power loss Power loss, typ. Analog inputs	Input current	
24 V encoder supply Short-circuit protection Output current, max. Power Power available from the backplane bus Power loss Power loss, typ. Analog inputs	Current consumption, max.	165 mA
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 Power loss, typ. 2.3 W Analog inputs	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 Power loss, typ. 2.3 W Analog inputs	24 V encoder supply	
Power available from the backplane bus O.7 W Power loss Power loss, typ. Analog inputs 2.3 W	Short-circuit protection	Yes
Power available from the backplane bus O.7 W Power loss Power loss, typ. Analog inputs	Output current, max.	20 mA; Max. 47 mA per channel for a duration < 10 s
Power loss Power loss, typ. 2.3 W Analog inputs	Power	
Power loss, typ. 2.3 W Analog inputs	Power available from the backplane bus	0.7 W
Analog inputs	Power loss	
Analog inputs	Power loss, typ.	2.3 W
-		
		4

• For current measurement	1
For current measurement For voltage measurement	4
For voltage measurement For voltage measurement	4
For resistance/resistance thermometer measurement	2
For thermocouple measurement	4
permissible input voltage for voltage input (destruction limit), max.	28.8 V
permissible input current for current input (destruction limit), max.	40 mA
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
	100 kΩ
— Input resistance (-5 V to +5 V)	
• -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)	$25~\Omega;$ Plus approx. 42 ohms for overvoltage protection by PTC
Input ranges (rated values), thermocouples	
• Type B	Yes
— Input resistance (Type B)	10 ΜΩ
• Type C	No
● 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
**	10 ΜΩ
— Input resistance (Type R)	
• Type S	Yes
— Input resistance (Type S)	10 ΜΩ
• Type T	Yes
— 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
 Cu 10 according to GOST 	No
• Cu 50	No
 Cu 50 according to GOST 	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 No
Ni 120 according to GOST Ni 200	No No
Ni 200 Ni 200 according to COST.	No No
Ni 200 according to GOST Ni 500	No No
Ni 500 Ni 500 according to GOST	No No
Ni 500 according to GOSTPt 10	No
Pt 10 Pt 10 according to GOST	No
Pt 10 according to GOS1 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	Von
— parameterizable	Yes
internal temperature compensation	Yes
 external temperature compensation via RTD temperature compensation / at the analog input module / parameterizable / for 0 °C reference junction 	Yes Yes; fixed value can be set
temperature — Reference channel of the module	No

Cable length	
• shielded, max.	800 m; for U/I, 200 m for R/RTD, 50 m for TC
nalog 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
ncoder	
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 connection	Yes; Only for PTC
for resistance measurement with three-wire connection	Yes; All measuring ranges except PTC; internal compensation of the cable
for resistance measurement with four-wire connection	resistances Yes; All measuring ranges except PTC
rrors/accuracies	res, All measuring ranges except FTC
	0.00.0/
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, (+/-) 	0.3 %
 Resistance, 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 ±4.5 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: ±0.7 K, Ptxxx climate: ±0.2 K, Nixxx standard: ±0.3 K,
Thermocouple, relative to input range, (+/-)	Nixxx climate: ±0.15 K 0.1 %; Type B: > 600 °C ±1.7 K, type E: > -200 °C ±0.7 K, type J: > -210 °C
	\pm 0.8 K, type K: > -200 °C \pm 1.2 K, type N: > -200 °C \pm 1.2 K, type R: > 0 °C \pm 1.5 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	erence frequency
Series mode interference (peak value of interference < rated value of input range), min.	40 dB
Common mode voltage, max.	10 V
Common mode interference, min.	60 dB
terrupts/diagnostics/status information	

Diagnostic alarm Limit value alarm	Yes
I imit value alarm	100
- 2	Yes; two upper and two lower limit values in each case
Diagnoses	
 Monitoring the supply voltage 	Yes
Wire-break	Yes; Only for 1 to 5 V, 4 to 20 mA, TC, R, and RTD
Overflow/underflow	Yes
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
otential 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	
ermissible potential difference	
between the inputs (UCM)	20 V DC
Between the inputs and MANA (UCM)	10 V DC
olation	
Isolation tested with	707 V DC (type test)
roduct functions / security / header	
signed firmware update	No
data integrity	No
mbient conditions	
Ambient temperature during operation	
horizontal installation, min.	-25 °C; From FS03
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
imensions	,
Width	25 mm
Height	147 mm
Depth	129 mm
leights	120 (1)111
<u> </u>	210 g
Weight, approx.	210 g
ther	Overalliant to an an area in forest
Note:	Supplied incl. 40-pole push-in front connectors. Additional basic error and nois 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

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