Data sheet

6ES7531-7KF00-0AB0



SIMATIC S7-1500 analog input module AI 8xU/I/RTD/TC ST, 16 bit resolution, accuracy 0.3%, 8 channels in groups of 8; 4 channels for RTD measurement, common mode voltage 10 V; Diagnostics; Hardware interrupts; Delivery including infeed element, shield bracket and shield terminal: Front connector (screw terminals or push-in) to be ordered separately

Product type designation HW functional status FS04 Firmware version • FW update possible Product function • I&M data • Isochronous mode • Prioritized startup • No • No • Scalable measured values • Adjustment of measuring range • Adjustment of measuring range • STEP 7 TIA Portal configurable/integrated from version • STEP 7 TONGIngurable/integrated from version • STEP 7 TONGIngurable/integrated from version • STEP 7 TONGINGURABLE/INTEGRATED V12 / V12 • STEP 7 TONGINGURABLE/INTEGRATED V13 / V15 / V16 / V16 / V16 / V16 / V17 / V17 / V17 / V17 / V17 / V18	General information		
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FW update possible Product function I&M data	HW functional status	FS04	
Product function • i&M data	Firmware version	V2.0.0	
Is M data Isochronous mode Isochronous mode Prioritized startup No Measuring range scalable Scalable measured values Adjustment of measuring range No Adjustment of measuring range No STEP 7 TonGigurable/integrated from version PROFIGURATION PROFIGURATION PROFIGURATION PROFIGURATION SUBJURATION STEP 7 TonGigurable/integrated from version PROFIGURATION PROFIGURATION PROFIGURATION PROFIGURATION SUBJURATION PROFIGURATION PROFIGURAT	FW update possible	Yes	
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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 version/GSD revision PROFIBUT from GSD version/GSD revision Operating mode Oversampling MS MS Ves CIR- Configuration in RUN Reparameterization possible in RUN Yes Calibration possible in RUN Yes Supply voltage Rated value (DC) Permissible range, lower limit (DC) Permissible range, upper li	 Isochronous mode 	No	
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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 PROFINET from GSD version/GSD revision V1.0 / V5.1 PROFINET 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) Permissible range, lower limit (DC) Permissible range, lower limit (DC) Permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 240 mA; with 24 V DC supply 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 loss Power loss Power loss Power loss, typ. 2.7 W Analog inputs	Adjustment of measuring range	No	
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Oversampling	PROFINET from GSD version/GSD revision	V2.3 / -	
MSI CiR - Configuration in RUN Reparameterization possible in RUN Yes Calibration possible in RUN Yes Supply voltage Rated value (DC) Permissible range, lower limit (DC) Permissible range, upper limit (DC) Permissible range, upper limit (DC) Permissible range, upper limit (DC) Permissible range, with total care and total care	Operating mode		
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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. 240 mA; with 24 V DC supply 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 Power loss, typ. 2.7 W Analog inputs	CiR - Configuration in RUN		
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. 240 mA; with 24 V DC supply 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. 2.7 W 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. 240 mA; with 24 V DC supply Encoder supply 24 V encoder supply 24 V 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. 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. 240 mA; with 24 V DC supply Encoder supply 24 V encoder supply Short-circuit protection Output current, max. 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. 2.7 W Analog inputs	Supply voltage		
permissible range, upper limit (DC) Reverse polarity protection Yes Input current Current consumption, max. 240 mA; with 24 V DC supply Encoder supply 24 V encoder supply Short-circuit protection Output current, max. 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. 2.7 W Analog inputs	Rated value (DC)	24 V	
Reverse polarity protection Input current Current consumption, max. 240 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 Power loss, typ. Analog inputs	permissible range, lower limit (DC)	19.2 V	
Input current Current consumption, max. 240 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 Power loss Power loss, typ. Analog inputs	permissible range, upper limit (DC)	28.8 V	
Current consumption, max. 240 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 Power loss, typ. 2.7 W 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. 2.7 W Analog inputs	Current consumption, max.	240 mA; with 24 V DC supply	
Short-circuit protection Output current, max. Power Power available from the backplane bus Power loss Power loss, typ. Analog inputs Yes 20 mA; Max. 47 mA per channel for a duration < 10 s 0.7 W 2.7 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. 2.7 W Analog inputs	24 V encoder supply		
Power available from the backplane bus O.7 W Power loss Power loss, typ. 2.7 W Analog inputs	Short-circuit protection	Yes	
Power available from the backplane bus O.7 W Power loss Power loss, typ. 2.7 W Analog inputs	 Output current, max. 	20 mA; Max. 47 mA per channel for a duration < 10 s	
Power loss Power loss, typ. 2.7 W Analog inputs	Power		
Power loss, typ. 2.7 W Analog inputs	Power available from the backplane bus	0.7 W	
Analog inputs	Power loss		
	Power loss, typ.	2.7 W	
Number of analog inputs 8	Analog inputs		
	Number of analog inputs	8	

For current measurement	8
 For voltage measurement 	8
 For resistance/resistance thermometer measurement 	4
For thermocouple measurement	8
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
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 MΩ
- Input resistance (-2.5 V to +2.5 V) • -25 mV to +25 mV	No No
• -250 mV to +250 mV	Yes
● -250 mV to +250 mV — Input resistance (-250 mV to +250 mV)	7es 10 MΩ
- input resistance (-250 mV to +250 mV) • -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	
• 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
— Input resistance (Type R)	10 MΩ
Type S	Yes
**	10 MΩ
— Input resistance (Type S)	
• Type T	Yes
— Input resistance (Type T)	10 MΩ
Type TXK/TXK(L) to GOST Type TXK/TXK(L) to GOST Type TXK/TXK(L) to GOST Type TXK/TXK(L) to GOST	No
Input ranges (rated values), resistance thermometer	N-
	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
Ni 120 according to GOST	No
Ni 200 according to GOST	No
• Ni 500	No
Ni 500 according to GOST	No
• Pt 10	No
Pt 10 Pt 10 according to GOST	No
• Pt 50	No
Pt 50 according to GOST Pt 400	No Vac: Standard (elimete
• 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
external temperature compensation via RTD	Yes
Compensation for 0 °C reference point temperature	Yes; fixed value can be set
Reference channel of the module	Yes
Cable length	
• 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, parametenzable	100

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 	150 ohm, 300 ohm, 600 ohm, Pt100, Pt200, Ni100: 2 ms, 6000 ohm, Pt500,
measurement	Pt1000, Ni1000, LG-Ni1000, PTC: 4 ms
 Interference voltage suppression for interference frequency f1 in Hz 	400 / 60 / 50 / 10 Hz
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
Encoder	
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
	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
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, (+/-)	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, (+/-)	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, (+/-)	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, (+/-)	Type B: > $600 ^{\circ}\text{C} \pm 1.7 \text{K}$, type E: > $-200 ^{\circ}\text{C} \pm 0.7 \text{K}$, type J: > $-210 ^{\circ}\text{C} \pm 0.8 \text{K}$, type K: > $-200 ^{\circ}\text{C} \pm 1.2 \text{K}$, type N: > $-200 ^{\circ}\text{C} \pm 1.2 \text{K}$, type R: > $0 ^{\circ}\text{C} \pm 1.9 \text{K}$, type S: > $0 ^{\circ}\text{C} \pm 1.9 \text{K}$, type T: > $-200 ^{\circ}\text{C} \pm 0.8 \text{K}$
Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interfe	
Series mode interference (peak value of interference <	40 dB
rated value of input range), min.	
 Common mode voltage, max. 	10 V
• Common mode interference, min.	60 dB
Interrupts/diagnostics/status information	
Diagnostics function	Yes
	165
Alarms	165
Alarms ● Diagnostic alarm	Yes
Diagnostic alarm	Yes
Diagnostic alarm Limit value alarm	Yes
Diagnostic alarm Limit value alarm Diagnoses	Yes Yes; two upper and two lower limit values in each case
 Diagnostic alarm Limit value alarm Diagnoses Monitoring the supply voltage 	Yes Yes; two upper and two lower limit values in each case Yes

• 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 	8
 between the channels and backplane bus 	Yes
 between the channels and the power supply of the electronics 	Yes
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)
Standards, approvals, certificates	
Suitable for applications according to AMS 2750	Yes; Declaration of Conformity, see online support entry 109757262
Suitable for applications according to CQI-9	Yes; Based on AMS 2750 E
Ambient conditions	
Ambient temperature during operation	
 horizontal installation, min. 	0 °C
 horizontal installation, max. 	60 °C
 vertical installation, min. 	0 °C
 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	35 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	310 g
Other	
Note:	Additional basic error and noise for integration time = 2.5 ms: Voltage: ± 250 mV ($\pm 0.02\%$), ± 80 mV ($\pm 0.05\%$), ± 50 mV ($\pm 0.05\%$); resistance: 150 ohms $\pm 0.02\%$; 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

last modified:

9/7/2023