



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 infed element, shield bracket and shield terminal: Front connector (screw terminals or push-in) to be ordered separately

General information	
Product type designation	AI 8xU/I/RTD/TC ST
HW functional status	FS04
Firmware version	V2.0.0
• 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	V12 / V12
• STEP 7 configurable/integrated from version	V5.5 SP3 / -
• PROFIBUS 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)	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	
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 MΩ
• -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
• -25 mV to +25 mV	No
• -250 mV to +250 mV	Yes
— Input resistance (-250 mV to +250 mV)	10 MΩ
• -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 MΩ
• -500 mV to +500 mV	Yes
— Input resistance (-500 mV to +500 mV)	10 MΩ
• -80 mV to +80 mV	Yes
— Input resistance (-80 mV to +80 mV)	10 MΩ
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 MΩ
• Type C	No
• Type E	Yes
— Input resistance (Type E)	10 MΩ
• Type J	Yes
— Input resistance (type J)	10 MΩ
• Type K	Yes
— Input resistance (Type K)	10 MΩ
• Type L	No
• Type N	Yes
— Input resistance (Type N)	10 MΩ
• Type R	Yes
— Input resistance (Type R)	10 MΩ
• Type S	Yes
— Input resistance (Type S)	10 MΩ
• Type T	Yes
— Input resistance (Type T)	10 MΩ
• Type TXK/TXK(L) to GOST	No
Input ranges (rated values), resistance thermometer	
• Cu 10	No

- Cu 10 according to GOST
- Cu 50
- Cu 50 according to GOST
- Cu 100
- Cu 100 according to GOST
- Ni 10
- Ni 10 according to GOST
- Ni 100
 - Input resistance (Ni 100)
- Ni 100 according to GOST
- Ni 1000
 - Input resistance (Ni 1000)
- Ni 1000 according to GOST
- LG-Ni 1000
 - Input resistance (LG-Ni 1000)
- Ni 120
- Ni 120 according to GOST
- Ni 200 according to GOST
- Ni 500
- Ni 500 according to GOST
- Pt 10
- Pt 10 according to GOST
- Pt 50
- Pt 50 according to GOST
- Pt 100
 - Input resistance (Pt 100)
- Pt 100 according to GOST
- Pt 1000
 - Input resistance (Pt 1000)
- Pt 1000 according to GOST
- Pt 200
 - Input resistance (Pt 200)
- Pt 200 according to GOST
- Pt 500
 - Input resistance (Pt 500)
- Pt 500 according to GOST

No

No

No

No

No

No

No

Yes; Standard/climate

10 MΩ

No

Yes; Standard/climate

10 MΩ

No

Yes; Standard/climate

10 MΩ

No

No

No

No

No

No

No

No

Yes; Standard/climate

10 MΩ

No

Yes; Standard/climate

10 MΩ

No

Yes; Standard/climate

10 MΩ

No

Yes; Standard/climate

10 MΩ

No

Input ranges (rated values), resistors

- 0 to 150 ohms
 - Input resistance (0 to 150 ohms)
- 0 to 300 ohms
 - Input resistance (0 to 300 ohms)
- 0 to 600 ohms
 - Input resistance (0 to 600 ohms)
- 0 to 3000 ohms
- 0 to 6000 ohms
 - Input resistance (0 to 6000 ohms)
- PTC
 - Input resistance (PTC)

Yes

10 MΩ

Yes

10 MΩ

Yes

10 MΩ

No

Yes

10 MΩ

Yes

10 MΩ

Thermocouple (TC)

Temperature compensation

- parameterizable
- internal temperature compensation
- external temperature compensation via RTD
- Compensation for 0 °C reference point temperature
- Reference channel of the module

Yes

Yes

Yes

Yes; fixed value can be set

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.
- Integration time, parameterizable

16 bit

Yes

- Integration time (ms) - Basic conversion time, including integration time (ms) — additional conversion time for wire-break monitoring — additional conversion time for resistance measurement - Interference voltage suppression for interference frequency f_1 in Hz - Time for offset calibration (per module)	2,5 / 16,67 / 20 / 100 ms 9 / 23 / 27 / 107 ms 9 ms (to be considered in R/RTD/TC measurement) 150 ohm, 300 ohm, 600 ohm, Pt100, Pt200, Ni100: 2 ms, 6000 ohm, Pt500, Pt1000, Ni1000, LG-Ni1000, PTC: 4 ms 400 / 60 / 50 / 10 Hz Basic conversion time of the slowest channel
Smoothing of measured values	
- parameterizable - Step: None - Step: low - Step: Medium - Step: High	Yes Yes Yes Yes Yes
Encoder	
Connection of signal encoders	
- for voltage measurement - for current measurement as 2-wire transducer — Burden of 2-wire transmitter, max. - for current measurement as 4-wire transducer - for resistance measurement with two-wire connection - for resistance measurement with three-wire connection - for resistance measurement with four-wire connection	Yes Yes 820 Ω Yes Yes; Only for PTC Yes; All measuring ranges except PTC; internal compensation of the cable resistances 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 $\pm$ % / 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, (+/-) - Current, relative to input range, (+/-) - Resistance, relative to input range, (+/-) - Resistance thermometer, relative to input range, (+/-) - Thermocouple, relative to input range, (+/-)	0.3 % 0.3 % 0.3 % Ptxxx standard: ± 1.5 K, Ptxxx climate: ± 0.5 K, Nixxx standard: ± 0.5 K, Nixxx climate: ± 0.3 K 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, (+/-) - Current, relative to input range, (+/-) - Resistance, relative to input range, (+/-) - Resistance thermometer, relative to input range, (+/-) - Thermocouple, relative to input range, (+/-)	0.1 % 0.1 % 0.1 % Ptxxx standard: ± 0.7 K, Ptxxx climate: ± 0.2 K, Nixxx standard: ± 0.3 K, Nixxx climate: ± 0.15 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 $f = n \times (f_1 \pm 1 \%)$, f_1 = interference frequency	
- Series mode interference (peak value of interference < rated value of input range), min. - Common mode voltage, max. - Common mode interference, min.	40 dB 10 V 60 dB
Interrupts/diagnostics/status information	
Diagnostics function	Yes
Alarms	
- Diagnostic alarm - Limit value alarm	Yes Yes; two upper and two lower limit values in each case
Diagnoses	
- Monitoring the supply voltage - Wire-break - Overflow/underflow	Yes Yes; Only for 1 to 5 V, 4 to 20 mA, TC, R, and RTD Yes
Diagnostics indication LED	

• RUN LED • ERROR LED • Monitoring of the supply voltage (PWR-LED) • Channel status display • for channel diagnostics • for module diagnostics	Yes; green LED Yes; red LED Yes; green LED Yes; green LED Yes; red LED Yes; red LED
Potential separation	
Potential separation channels	
• between the channels • between the channels, in groups of • between the channels and backplane bus • between the channels and the power supply of the electronics	No 8 Yes 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. • horizontal installation, max. • vertical installation, min. • vertical installation, max.	0 °C 60 °C 0 °C 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 