



SIMATIC S7-1500 analog input module AI 8xU//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

| General information | |
|--|---|
| Product type designation | AI 8xU//RTD/TC ST |
| HW functional status | FS04 |
| Firmware version | V2.0.0 |
| <ul style="list-style-type: none"> FW update possible | Yes |
| Product function | |
| <ul style="list-style-type: none"> I&M data | Yes; I&M0 to I&M3 |
| <ul style="list-style-type: none"> Isochronous mode | No |
| <ul style="list-style-type: none"> Prioritized startup | No |
| <ul style="list-style-type: none"> Measuring range scalable | No |
| <ul style="list-style-type: none"> Scalable measured values | No |
| <ul style="list-style-type: none"> Adjustment of measuring range | No |
| Engineering with | |
| <ul style="list-style-type: none"> STEP 7 TIA Portal configurable/integrated from version | V12 / V12 |
| <ul style="list-style-type: none"> STEP 7 configurable/integrated from version | V5.5 SP3 / - |
| <ul style="list-style-type: none"> PROFIBUS from GSD version/GSD revision | V1.0 / V5.1 |
| <ul style="list-style-type: none"> PROFINET from GSD version/GSD revision | V2.3 / - |
| Operating mode | |
| <ul style="list-style-type: none"> Oversampling | No |
| <ul style="list-style-type: none"> 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 | |
| <ul style="list-style-type: none"> Short-circuit protection | Yes |
| <ul style="list-style-type: none"> 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 |
| <ul style="list-style-type: none"> • For current measurement • For voltage measurement • For resistance/resistance thermometer measurement • For thermocouple measurement | 8 8 4 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 | |
| <ul style="list-style-type: none"> • 0 to +5 V • 0 to +10 V • 1 V to 5 V <ul style="list-style-type: none"> — Input resistance (1 V to 5 V) • -1 V to +1 V <ul style="list-style-type: none"> — Input resistance (-1 V to +1 V) • -10 V to +10 V <ul style="list-style-type: none"> — Input resistance (-10 V to +10 V) • -2.5 V to +2.5 V <ul style="list-style-type: none"> — Input resistance (-2.5 V to +2.5 V) • -25 mV to +25 mV • -250 mV to +250 mV <ul style="list-style-type: none"> — Input resistance (-250 mV to +250 mV) • -5 V to +5 V <ul style="list-style-type: none"> — Input resistance (-5 V to +5 V) • -50 mV to +50 mV <ul style="list-style-type: none"> — Input resistance (-50 mV to +50 mV) • -500 mV to +500 mV <ul style="list-style-type: none"> — Input resistance (-500 mV to +500 mV) • -80 mV to +80 mV <ul style="list-style-type: none"> — Input resistance (-80 mV to +80 mV) | No No Yes 100 kΩ Yes 10 MΩ Yes 100 kΩ Yes 10 MΩ Yes 10 MΩ No Yes 10 MΩ Yes 100 kΩ Yes 10 MΩ Yes 10 MΩ Yes 10 MΩ |
| Input ranges (rated values), currents | |
| <ul style="list-style-type: none"> • 0 to 20 mA <ul style="list-style-type: none"> — Input resistance (0 to 20 mA) • -20 mA to +20 mA <ul style="list-style-type: none"> — Input resistance (-20 mA to +20 mA) • 4 mA to 20 mA <ul style="list-style-type: none"> — Input resistance (4 mA to 20 mA) | Yes 25 Ω; Plus approx. 42 ohms for overvoltage protection by PTC Yes 25 Ω; Plus approx. 42 ohms for overvoltage protection by PTC Yes 25 Ω; Plus approx. 42 ohms for overvoltage protection by PTC |
| Input ranges (rated values), thermocouples | |
| <ul style="list-style-type: none"> • Type B <ul style="list-style-type: none"> — Input resistance (Type B) • Type C • Type E <ul style="list-style-type: none"> — Input resistance (Type E) • Type J <ul style="list-style-type: none"> — Input resistance (type J) • Type K <ul style="list-style-type: none"> — Input resistance (Type K) • Type L • Type N <ul style="list-style-type: none"> — Input resistance (Type N) • Type R <ul style="list-style-type: none"> — Input resistance (Type R) • Type S <ul style="list-style-type: none"> — Input resistance (Type S) • Type T | Yes 10 MΩ No Yes 10 MΩ Yes 10 MΩ Yes 10 MΩ No Yes 10 MΩ Yes 10 MΩ Yes 10 MΩ 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 | 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 MΩ |
| • Ni 100 according to GOST | No |
| • Ni 1000 | Yes; Standard/climate |
| — Input resistance (Ni 1000) | 10 MΩ |
| • Ni 1000 according to GOST | No |
| • LG-Ni 1000 | Yes; Standard/climate |
| — Input resistance (LG-Ni 1000) | 10 MΩ |
| • 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 according to GOST | No |
| • Pt 50 | No |
| • Pt 50 according to GOST | No |
| • Pt 100 | Yes; Standard/climate |
| — Input resistance (Pt 100) | 10 MΩ |
| • Pt 100 according to GOST | No |
| • Pt 1000 | Yes; Standard/climate |
| — Input resistance (Pt 1000) | 10 MΩ |
| • Pt 1000 according to GOST | No |
| • Pt 200 | Yes; Standard/climate |
| — Input resistance (Pt 200) | 10 MΩ |
| • Pt 200 according to GOST | No |
| • Pt 500 | Yes; Standard/climate |
| — Input resistance (Pt 500) | 10 MΩ |
| • Pt 500 according to GOST | No |
| Input ranges (rated values), resistors | |
| • 0 to 150 ohms | Yes |
| — Input resistance (0 to 150 ohms) | 10 MΩ |
| • 0 to 300 ohms | Yes |
| — Input resistance (0 to 300 ohms) | 10 MΩ |
| • 0 to 600 ohms | Yes |
| — Input resistance (0 to 600 ohms) | 10 MΩ |
| • 0 to 3000 ohms | No |
| • 0 to 6000 ohms | Yes |
| — Input resistance (0 to 6000 ohms) | 10 MΩ |
| • PTC | Yes |
| — Input resistance (PTC) | 10 MΩ |
| 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 | |
| <ul style="list-style-type: none"> 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 | |
| <ul style="list-style-type: none"> Resolution with overrange (bit including sign), max. | 16 bit |
| <ul style="list-style-type: none"> Integration time, parameterizable | Yes |
| <ul style="list-style-type: none"> Integration time (ms) | 2,5 / 16,67 / 20 / 100 ms |
| <ul style="list-style-type: none"> Basic conversion time, including integration time (ms) <ul style="list-style-type: none"> — additional conversion time for wire-break monitoring — additional conversion time for resistance measurement | 9 / 23 / 27 / 107 ms 9 ms (to be considered in R/RTD/TC measurement) |
| <ul style="list-style-type: none"> Interference voltage suppression for interference frequency f1 in Hz | 150 ohm, 300 ohm, 600 ohm, Pt100, Pt200, Ni100: 2 ms, 6000 ohm, Pt500, Pt1000, Ni1000, LG-Ni1000, PTC: 4 ms |
| <ul style="list-style-type: none"> Time for offset calibration (per module) | 400 / 60 / 50 / 10 Hz Basic conversion time of the slowest channel |
| Smoothing of measured values | |
| <ul style="list-style-type: none"> parameterizable | Yes |
| <ul style="list-style-type: none"> Step: None | Yes |
| <ul style="list-style-type: none"> Step: low | Yes |
| <ul style="list-style-type: none"> Step: Medium | Yes |
| <ul style="list-style-type: none"> Step: High | Yes |
| Encoder | |
| Connection of signal encoders | |
| <ul style="list-style-type: none"> for voltage measurement | Yes |
| <ul style="list-style-type: none"> for current measurement as 2-wire transducer <ul style="list-style-type: none"> — Burden of 2-wire transmitter, max. | Yes 820 Ω |
| <ul style="list-style-type: none"> for current measurement as 4-wire transducer | Yes |
| <ul style="list-style-type: none"> for resistance measurement with two-wire connection | Yes; Only for PTC |
| <ul style="list-style-type: none"> for resistance measurement with three-wire connection | Yes; All measuring ranges except PTC; internal compensation of the cable resistances |
| <ul style="list-style-type: none"> 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 | |
| <ul style="list-style-type: none"> Voltage, relative to input range, (+/-) | 0.3 % |
| <ul style="list-style-type: none"> Current, relative to input range, (+/-) | 0.3 % |
| <ul style="list-style-type: none"> Resistance, relative to input range, (+/-) | 0.3 % |
| <ul style="list-style-type: none"> 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 |
| <ul style="list-style-type: none"> 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) | |
| <ul style="list-style-type: none"> Voltage, relative to input range, (+/-) | 0.1 % |
| <ul style="list-style-type: none"> Current, relative to input range, (+/-) | 0.1 % |
| <ul style="list-style-type: none"> Resistance, relative to input range, (+/-) | 0.1 % |
| <ul style="list-style-type: none"> 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 |
| <ul style="list-style-type: none"> Thermocouple, relative to input range, (+/-) | 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 | |
| <ul style="list-style-type: none"> Series mode interference (peak value of interference < rated value of input range), min. | 40 dB |
| <ul style="list-style-type: none"> Common mode voltage, max. | 10 V |

| | |
|--|--|
| • 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 | 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 |
| 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: 4/29/2021 