



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

| General information | |
|--|---|
| Product type designation | AI 4xU/I/RTD/TC ST |
| HW functional status | From FS01 |
| Firmware version | V1.0.0 |
| <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 | V13 / V13.0.2 |
| <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. | 165 mA |
| 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. | 2.3 W |
| Analog inputs | |

| | |
|---|---|
| Number of analog inputs | 4 |
| • For current measurement | 4 |
| • 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 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 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 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 | 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 | No |
| 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 |

| | |
|---|--|
| <ul style="list-style-type: none"> • Integration time, parameterizable • Integration time (ms) • 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 • Interference voltage suppression for interference frequency f1 in Hz • Time for offset calibration (per module) | <p>Yes</p> <p>2,5 / 16,67 / 20 / 100 ms</p> <p>9 / 23 / 27 / 107 ms</p> <p>9 ms (to be considered in R/RTD/TC measurement)</p> <p>150 ohm, 300 ohm, 600 ohm, Pt100, Pt200, Ni100: 2 ms, 6000 ohm, Pt500, Pt1000, Ni1000, LG-Ni1000, PTC: 4 ms</p> <p>400 / 60 / 50 / 10</p> <p>Basic conversion time of the slowest channel</p> |
| Smoothing of measured values | |
| <ul style="list-style-type: none"> • parameterizable • Step: None • Step: low • Step: Medium • Step: High | <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> |
| Encoder | |
| Connection of signal encoders | |
| <ul style="list-style-type: none"> • for voltage measurement • for current measurement as 2-wire transducer <ul style="list-style-type: none"> — 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 | <p>Yes</p> <p>Yes</p> <p>820 Ω</p> <p>Yes</p> <p>Yes; Only for PTC</p> <p>Yes; All measuring ranges except PTC; internal compensation of the cable resistances</p> <p>Yes; All measuring ranges except PTC</p> |
| 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 note regarding accuracy | ±6 °C at temperatures below 0 °C, the figures for operating error and temperature error are doubled |
| Operational error limit in overall temperature range | |
| <ul style="list-style-type: none"> • 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, (+/-) | <p>0.3 %</p> <p>0.3 %</p> <p>0.3 %</p> <p>0.3 %; Ptxxx standard: ±1.5 K, Ptxxx climate: ±0.5 K, Nixxx standard: ±0.5 K, Nixxx climate: ±0.3 K</p> <p>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</p> |
| Basic error limit (operational limit at 25 °C) | |
| <ul style="list-style-type: none"> • 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, (+/-) | <p>0.1 %</p> <p>0.1 %</p> <p>0.1 %</p> <p>0.1 %; Ptxxx standard: ±0.7 K, Ptxxx climate: ±0.2 K, Nixxx standard: ±0.3 K, Nixxx climate: ±0.15 K</p> <p>0.1 %; 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</p> |
| 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. • Common mode voltage, max. • Common mode interference, min. | <p>40 dB</p> <p>10 V</p> <p>60 dB</p> |
| Interrupts/diagnostics/status information | |
| Diagnostics function | Yes |
| Alarms | |
| <ul style="list-style-type: none"> • Diagnostic alarm • Limit value alarm | <p>Yes</p> <p>Yes; two upper and two lower limit values in each case</p> |

| Diagnoses | |
|--|--|
| <ul style="list-style-type: none"> 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 | |
| <ul style="list-style-type: none"> 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 | |
| <ul style="list-style-type: none"> 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 4 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) |
| Ambient conditions | |
| Ambient temperature during operation | |
| <ul style="list-style-type: none"> horizontal installation, min. horizontal installation, max. vertical installation, min. vertical installation, max. | -25 °C; From FS03 60 °C -25 °C; From FS03 40 °C |
| Altitude during operation relating to sea level | |
| <ul style="list-style-type: none"> 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 |

last modified:

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