SIEMENS

## Data sheet 6ES7531-7KF00-0AB0

SIMATIC S7-1500, ANALOG INPUT MODULE AI 8 X U/I/RTD/TC, 16 BITS OF RESOLUTION, ACCURACY 0.3 %; 8 CHANNELS IN GROUPS OF 8; 4 CHANNNELS FOR RTD MEASURING, COMMON MODE VOLTAGE APPR. 10 V; DIAGNOSIS, PROCESSALARMS INCL. INFEED ELEMENT, SHIELD CLAMP AND SHIELD TERMINAL

| Product type designation | |
|---|---|
| **General information** | |
| HW functional status | E01 |
| Firmware version | V2.0.0 |
| Product function | |
| • I&M data | Yes; I&M0 to I&M3 |
| Engineering with | |
| • STEP 7 TIA Portal configurable/integrated as of version | V12 / V12 |
| • STEP 7 configurable/integrated as of version | V5.5 SP3 / - |
| • PROFIBUS as of GSD version/GSD revision | V1.0 / V5.1 |
| • PROFINET as of GSD version/GSD revision | V2.3 / - |
| Operating mode | |
| • 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) | 20.4 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. | 53 mA |
| **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 |
| Technical unit for temperature measurement adjustable | Yes |
| Input ranges (rated values), voltages | |
| • 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 |
| • -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 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 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 |
| Input ranges (rated values), resistance thermometer | |
| • Ni 100 | Yes; Standard/climate |
| • Input resistance (Ni 100) | 10 MΩ |
| • Ni 1000 | Yes; Standard/climate |
| • Input resistance (Ni 1000) | 10 MΩ |
| • LG-Ni 1000 | Yes; Standard/climate |
| • Input resistance (LG-Ni 1000) | 10 MΩ |
| • Pt 100 | Yes; Standard/climate |
| • Input resistance (Pt 100) | 10 MΩ |
| • Pt 1000 | Yes; Standard/climate |
| • Input resistance (Pt 1000) | 10 MΩ |
| • Pt 200 | Yes; Standard/climate |
| • Input resistance (Pt 200) | 10 MΩ |
| • Pt 500 | Yes; Standard/climate |
| • Input resistance (Pt 500) | 10 MΩ |
| 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 6000 ohms | Yes |
| • Input resistance (0 to 6000 ohms) | 10 MΩ |
| • PTC | Yes |
| • Input resistance (PTC) | 10 MΩ |
| Thermocouple (TC) | |
| • Technical unit for temperature measurement | °C/°F/K |
| 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 |
| Resistance thermometer (RTD) | |
| • Technical unit for temperature measurement | °C/°F/K |
| 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 (ms) | 2,5 / 16,67 / 20 / 100 ms |
| • Basic conversion time, including integration time (ms) | 9 / 23 / 27 / 107 ms |
| — 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 Hz |
| 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 area), (+/-) | 0.02 % |
| Temperature error of internal compensation | +/-6 °C |
| Operational error limit in overall temperature range | |
| • Voltage, relative to input area, (+/-) | 0.3 % |
| • Current, relative to input area, (+/-) | 0.3 % |
| • Resistance, relative to input area, (+/-) | 0.3 % |
| • Resistance thermometer, relative to input area, (+/-) | Pt xxx standard: ±1.5 K, Pt xxx climate: ±0.5 K, Ni xxx standard: ±0.5 K, Ni xxx climate: ±0.3 K |
| • Thermocouple, relative to input area, (+/-) | 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 area, (+/-) | 0.1 % |
| • Current, relative to input area, (+/-) | 0.1 % |
| • Resistance, relative to input area, (+/-) | 0.1 % |
| • Resistance thermometer, relative to input area, (+/-) | Pt xxx standard: ±0.7 K, Pt xxx climate: ±0.2 K, Ni xxx standard: ±0.3 K, Ni xxx climate: ±0.15 K |
| • Thermocouple, relative to input area, (+/-) | 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 x (f1 +/- 1 %), f1 = interference 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 |

| Interrupts/diagnostics/status information |
|---|
| Alarms |

| | |
|---|---|
| • Diagnostic alarm | Yes |
| • Limit value alarm | Yes; two upper and two lower limit values in each case |
| **Diagnostic messages** | |
| • Diagnostics | Yes |
| • 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 the backplane bus | Yes |
| • between the channels and the supply voltage of the electronics | Yes |
| **Permissible potential difference** | |
| between the inputs (UCM) | 20 V DC |
| Between the inputs and MANA (UCM) | 10 V DC |
| between M internally and the inputs | 75 V DC/60 V AC (base isolation) |
| **Isolation** | |
| Isolation tested with | 707 V DC (type test) |
| **Decentralized operation** | |
| Prioritized startup | No |
| **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 (±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; thermocouple: Type B, R, S: ±3 K, type E, J, K, N, T: ±1 K |
| **last modified:** | 10.06.2015 |