

Siemens 6ES7531-7QD00-0AB0 Manual

Brand	Siemens
Product Series	Siemens
Product Type	designation AI 4xU/I/RTD/TC ST

Description

6ES7531-7QD00-0AB0

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

- 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 V13 / V13.0.2

- 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. 165 mA

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. 2.3 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 k Ω
- -1 V to +1 V Yes
- Input resistance (-1 V to +1 V) 10 M Ω
- -10 V to +10 V Yes
- Input resistance (-10 V to +10 V) 100 k Ω
- -2.5 V to +2.5 V Yes
- Input resistance (-2.5 V to +2.5 V) 10 M Ω
- -25 mV to +25 mV No
- -250 mV to +250 mV Yes
- Input resistance (-250 mV to +250 mV) 10 M Ω
- -5 V to +5 V Yes
- Input resistance (-5 V to +5 V) 100 k Ω
- -50 mV to +50 mV Yes
- Input resistance (-50 mV to +50 mV) 10 M Ω
- -500 mV to +500 mV Yes
- Input resistance (-500 mV to +500 mV) 10 M Ω
- -80 mV to +80 mV Yes
- Input resistance (-80 mV to +80 mV) 10 M Ω

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

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— 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 M Ω

- Type C No

- Type E Yes

— Input resistance (Type E) 10 M Ω

- Type J Yes

— Input resistance (type J) 10 M Ω

- Type K Yes

— Input resistance (Type K) 10 M Ω

- Type L No

- Type N Yes

— Input resistance (Type N) 10 M Ω

- Type R Yes

— Input resistance (Type R) 10 M Ω

- Type S Yes

— Input resistance (Type S) 10 M Ω

- Type T Yes

— Input resistance (Type T) 10 M Ω

- 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 M Ω

- Ni 100 according to GOST No

- Ni 1000 Yes; Standard/climate

— Input resistance (Ni 1000) 10 M Ω

- Ni 1000 according to GOST No

- LG-Ni 1000 Yes; Standard/climate

— Input resistance (LG-Ni 1000) 10 M Ω

- 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

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- Pt 50 according to GOST No
- Pt 100 Yes; Standard/climate
- Input resistance (Pt 100) 10 M Ω
- Pt 100 according to GOST No
- Pt 1000 Yes; Standard/climate
- Input resistance (Pt 1000) 10 M Ω
- Pt 1000 according to GOST No
- Pt 200 Yes; Standard/climate
- Input resistance (Pt 200) 10 M Ω
- Pt 200 according to GOST No
- Pt 500 Yes; Standard/climate
- Input resistance (Pt 500) 10 M Ω
- Pt 500 according to GOST No

Input ranges (rated values), resistors

- 0 to 150 ohms Yes
- Input resistance (0 to 150 ohms) 10 M Ω
- 0 to 300 ohms Yes
- Input resistance (0 to 300 ohms) 10 M Ω
- 0 to 600 ohms Yes
- Input resistance (0 to 600 ohms) 10 M Ω
- 0 to 3000 ohms No
- 0 to 6000 ohms Yes
- Input resistance (0 to 6000 ohms) 10 M Ω

- PTC Yes

— Input resistance (PTC) 10 M Ω

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
- 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 wire-break monitoring 9 ms (to be considered in R/RTD/TC measurement)
- 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

- Time for offset calibration (per module) Basic conversion time of the slowest channel

Smoothing of measured values

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- 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 $\pm$ % / 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

note regarding accuracy at temperatures below 0 °C, the figures for operating error and temperature error are doubled

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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, (+/-) 0.3 %; 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, (+/-) 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

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, (+/-) 0.1 %; 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, (+/-) 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

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.

40 dB

- 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 4
- 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)

Ambient conditions

Ambient temperature during operation

- horizontal installation, min. -25 °C; From FS03
- horizontal installation, max. 60 °C
- vertical installation, min. -25 °C; From FS03
- 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 25 mm

Height 147 mm

Depth 129 mm

Weights

Weight, approx. 210 g

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