

# Siemens 6ES7531-7KF00-0AB0 Manual

|                |                                |
|----------------|--------------------------------|
| Brand          | Siemens                        |
| Product Series | Siemens                        |
| Product Type   | designation AI 8xU/I/RTD/TC ST |

## Description

6ES7531-7KF00-0AB0

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 incl. infeed element, Shield bracket and shield terminal

General information

Product type designation AI 8xU/I/RTD/TC ST

HW functional status FS01

Firmware version V2.0.0

- FW update possible Yes

Product function

- I&M data Yes; I&M0 to I&M3
- Measuring range scalable No
- Scalable measured values No
- Adjustment of measuring range No

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

- 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) 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. 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

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

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- 4 mA to 20 mA Yes
- Input resistance (4 mA to 20 mA) 25  $\Omega$ ; Plus approx. 42 ohms for overvoltage protection by PTC

Input ranges (rated values), thermocouples

- Type B Yes
- Input resistance (Type B) 10 M $\Omega$
- Type C No
- Type E Yes
- Input resistance (Type E) 10 M $\Omega$
- Type J Yes
- Input resistance (type J) 10 M $\Omega$
- Type K Yes
- Input resistance (Type K) 10 M $\Omega$
- Type L No
- Type N Yes
- Input resistance (Type N) 10 M $\Omega$
- Type R Yes
- Input resistance (Type R) 10 M $\Omega$
- Type S Yes
- Input resistance (Type S) 10 M $\Omega$
- Type T Yes
- Input resistance (Type T) 10 M $\Omega$
- 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 $\Omega$
- Ni 100 according to GOST No
- Ni 1000 Yes; Standard/climate
- Input resistance (Ni 1000) 10 M $\Omega$
- Ni 1000 according to GOST No
- LG-Ni 1000 Yes; Standard/climate
- Input resistance (LG-Ni 1000) 10 M $\Omega$
- 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 M $\Omega$

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

Input ranges (rated values), resistors

- 0 to 150 ohms Yes
- Input resistance (0 to 150 ohms) 10 M $\Omega$
- 0 to 300 ohms Yes

- Input resistance (0 to 300 ohms) 10 M $\Omega$
- 0 to 600 ohms Yes
- Input resistance (0 to 600 ohms) 10 M $\Omega$
- 0 to 3000 ohms No
- 0 to 6000 ohms Yes
- Input resistance (0 to 6000 ohms) 10 M $\Omega$
- PTC Yes
- Input resistance (PTC) 10 M $\Omega$

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

- 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

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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  $f_1$  in Hz

400 / 60 / 50 / 10 Hz

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

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.  $820 \Omega$

• 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  $\pm 6^\circ\text{C}$

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, (+/-)

Ptxxx standard:  $\pm 1.5 \text{ K}$ , Ptxxx climate:  $\pm 0.5 \text{ K}$ , Nixxx standard:

$\pm 0.5 \text{ K}$ , Nixxx climate:  $\pm 0.3 \text{ K}$

• Thermocouple, relative to input range, (+/-) Type B:  $> 600^\circ\text{C} \pm 4.6 \text{ K}$ , type E:  $> -200^\circ\text{C} \pm 1.5 \text{ K}$ , type J:  $> -210$

$^\circ\text{C} \pm 1.9 \text{ K}$ , type K:  $> -200^\circ\text{C} \pm 2.4 \text{ K}$ , type N:  $> -200^\circ\text{C} \pm 2.9 \text{ K}$ ,

type R:  $> 0^\circ\text{C} \pm 4.7 \text{ K}$ , type S:  $> 0^\circ\text{C} \pm 4.6 \text{ K}$ , type T:  $> -200^\circ\text{C}$

$\pm 2.4 \text{ K}$

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, (+/-)

Ptxxx standard:  $\pm 0.7$  K, Ptxxx climate:  $\pm 0.2$  K, Nixxx standard:  $\pm 0.3$  K, Nixxx climate:  $\pm 0.15$  K

- Thermocouple, relative to input range, (+/-) Type B:  $> 600$  °C  $\pm 1.7$  K, type E:  $> -200$  °C  $\pm 0.7$  K, type J:  $> -210$  °C  $\pm 0.8$  K, type K:  $> -200$  °C  $\pm 1.2$  K, type N:  $> -200$  °C  $\pm 1.2$  K, type R:  $> 0$  °C  $\pm 1.9$  K, type S:  $> 0$  °C  $\pm 1.9$  K, type T:  $> -200$  °C  $\pm 0.8$  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

Isochronous mode

Isochronous operation (application synchronized up to terminal)

No

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

Diagnostic messages

- 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

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)

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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

Decentralized operation

Prioritized startup No

Dimensions

Width 35 mm

Height 147 mm

Depth 129 mm

Weights

Weight, approx. 310 g

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