

# Siemens 6ES7431-1KF10-0AB0 Manual

|                |              |
|----------------|--------------|
| Brand          | Siemens      |
| Product Series | Siemens      |
| Product Type   | transmitter, |

## Description

6ES7431-1KF10-0AB0

SIMATIC S7-400, analog input SM 431, isolated 8 AI, resolution 14 bit,  
U/I/Resistor/Thermocouple/Pt100

Supply voltage

Load voltage L+

- Rated value (DC) 24 V; Only required for supplying 2-wire transmitters
- Reverse polarity protection Yes

Input current

from load voltage L+ (without load), max. 200 mA; for 8 connected, fully controlled 2-wire transmitters

from backplane bus 5 V DC, max. 600 mA

Power loss

Power loss, typ. 3.5 W

Analog inputs

Number of analog inputs 8

- For voltage/current measurement 8
- For resistance measurement 4

permissible input voltage for voltage input (destruction limit),  
max.

18 V; 18 V continuous, 75 V for 1 ms (mark to space ratio 1:20)

permissible input current for current input (destruction limit),  
max.

40 mA; Permanent

Constant measurement current for resistance-type transmitter,  
typ.

1.67 mA

Input ranges

- Voltage Yes
- Current Yes
- Thermocouple Yes
- Resistance thermometer Yes
- Resistance Yes

Input ranges (rated values), voltages

- 1 V to 5 V Yes

— Input resistance (1 V to 5 V) 1 M $\Omega$

- -1 V to +1 V Yes

— Input resistance (-1 V to +1 V) 1 M $\Omega$

- -10 V to +10 V Yes

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- Input resistance (-10 V to +10 V) 1 M $\Omega$
- -2.5 V to +2.5 V Yes
- Input resistance (-2.5 V to +2.5 V) 1 M $\Omega$
- -250 mV to +250 mV Yes
- Input resistance (-250 mV to +250 mV) 1 M $\Omega$
- -5 V to +5 V Yes
- Input resistance (-5 V to +5 V) 1 M $\Omega$
- -500 mV to +500 mV Yes
- Input resistance (-500 mV to +500 mV) 1 M $\Omega$

- -80 mV to +80 mV Yes
- Input resistance (-80 mV to +80 mV) 1 M $\Omega$

Input ranges (rated values), currents

- 0 to 20 mA Yes
- Input resistance (0 to 20 mA) 50  $\Omega$
- 4 mA to 20 mA Yes
- Input resistance (4 mA to 20 mA) 50  $\Omega$

Input ranges (rated values), thermocouples

- Type B Yes
  - Input resistance (Type B) 1 M $\Omega$
  - Type E Yes
  - Input resistance (Type E) 1 M $\Omega$
  - Type J Yes
  - Input resistance (type J) 1 M $\Omega$
  - Type K Yes
  - Input resistance (Type K) 1 M $\Omega$
  - Type L Yes
  - Input resistance (Type L) 1 M $\Omega$
  - Type N Yes
  - Input resistance (Type N) 1 M $\Omega$
  - Type R Yes
  - Input resistance (Type R) 1 M $\Omega$
  - Type S Yes
  - Input resistance (Type S) 1 M $\Omega$
  - Type T Yes
  - Input resistance (Type T) 1 M $\Omega$
  - Type U Yes
  - Input resistance (Type U) 1 M $\Omega$
- Input ranges (rated values), resistance thermometer
- Ni 100 Yes
  - Input resistance (Ni 100) 1 M $\Omega$
  - Ni 1000 Yes
  - Input resistance (Ni 1000) 1 M $\Omega$
  - Pt 100 Yes
  - Input resistance (Pt 100) 1 M $\Omega$
  - Pt 1000 Yes
  - Pt 10000 Yes
  - Pt 200 Yes
  - Input resistance (Pt 200) 1 M $\Omega$
  - Pt 500 Yes
  - Input resistance (Pt 500) 1 M $\Omega$

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## Input ranges (rated values), resistors

- 0 to 48 ohms Yes
- Input resistance (0 to 48 ohms) 1 M $\Omega$
- 0 to 150 ohms Yes
- Input resistance (0 to 150 ohms) 1 M $\Omega$
- 0 to 300 ohms Yes
- Input resistance (0 to 300 ohms) 1 M $\Omega$
- 0 to 600 ohms Yes
- Input resistance (0 to 600 ohms) 1 M $\Omega$
- 0 to 6000 ohms Yes; Usable up to 5000 Ohm
- Input resistance (0 to 6000 ohms) 1 M $\Omega$

## Thermocouple (TC)

## Temperature compensation

- parameterizable Yes
- internal temperature compensation No
- external temperature compensation with Pt100 Yes
- external temperature compensation with compensations socket

Yes

- dynamic reference temperature value Yes

## Characteristic linearization

- parameterizable Yes
- for thermocouples Type B, E, J, K, L, N, R, S, T, U
- for resistance thermometer Pt100, Pt200, Pt500, Pt1000, Ni100, Ni1000

## Cable length

- shielded, max. 200 m; 50 m with thermocouples and input ranges  $\leq 80$  mV

## Analog value generation for the inputs

## Integration and conversion time/resolution per channel

- Resolution with overrange (bit including sign), max. 14 bit; with activated filtering: 16 bit
- Integration time, parameterizable Yes
- Basic conversion time (ms) 20.1 / 23.5 ms
- Integration time (ms) 16,7 / 20 ms
- Interference voltage suppression for interference

## frequency f1 in Hz

50 / 60 Hz

- Basic execution time of the module (all channels released)

161 ms; 161 / 188 ms

## Encoder

## Connection of signal encoders

- for voltage measurement Yes; possible
- for current measurement as 2-wire transducer Yes
- for current measurement as 4-wire transducer Yes
- for resistance measurement with two-wire connection Yes; Line resistances are also measured
- for resistance measurement with three-wire connection Yes
- for resistance measurement with four-wire connection Yes

## Errors/accuracies

Temperature error (relative to input range), (+/-) 0.004 %/K

## Operational error limit in overall temperature range

- Voltage, relative to input range, (+/-) 0.38 %;  $\pm 0.38$  % at  $\pm 80$  mV;  $\pm 0.35$  % at  $\pm 250$  mV,  $\pm 500$  mV,  $\pm 1$  V,  $\pm 2,5$  V,  $\pm 5$  V,

1 to 5 V,  $\pm 10$  V

- Current, relative to input range, (+/-) 0.35 %;  $\pm 20$  mA, 0 to 20 mA, 4 to 20 mA
- Resistance, relative to input range, (+/-) 0.5 %
- Resistance thermometer, relative to input range, (+/-) 0.5 %
- Thermocouple, relative to input range, (+/-) TC Type B ( $\pm 14.8$  K), TC Type R ( $\pm 9.4$  K), TC Type S ( $\pm 10.6$  K), TC Type T ( $\pm 2.2$  K), TC Type E ( $\pm 4.0$  K), TC Type J ( $\pm 5.2$  K), TC Type K ( $\pm 7.6$  K), TC Type U ( $\pm 3.5$  K), TC Type L ( $\pm 5.1$  K), TC Type N ( $\pm 5.5$  K)

Basic error limit (operational limit at 25 °C)

- Voltage, relative to input range, (+/-) 0.15 %;  $\pm 0.15$  % ( $\pm 250$  mV,  $\pm 500$  mV,  $\pm 1$  V,  $\pm 2.5$  V,  $\pm 5$  V, 1 to 5 V,  $\pm 10$  V);  $\pm 0.17$  % ( $\pm 80$  mV)
- Current, relative to input range, (+/-) 0.15 %;  $\pm 20$  mA, 0 to 20 mA, 4 to 20 mA
- Resistance, relative to input range, (+/-) 0.15 %;  $\pm 0.15$  % at 0 to 48 ohms (4-conductor measurement), 0 to 150 ohms (4-conductor measurement), 0 to 300 ohms (4-conductor measurement), 0 to 5000 ohms (4-conductor measurement, in range of 6000 ohms);  $\pm 0.3$  % at 0 to 300 ohms (3-conductor measurement), 0 to 600 ohms (3-conductor measurement), 0 to 5000 ohms (3-conductor measurement, in range of 6000 ohms)
- Resistance thermometer, relative to input range, (+/-) 0.3 %
- Thermocouple, relative to input range, (+/-) TC Type B ( $\pm 8.2$  K), TC Type R ( $\pm 5.2$  K), TC Type S ( $\pm 5.9$  K), TC Type T ( $\pm 1.2$  K), TC Type E ( $\pm 1.8$  K), TC Type J ( $\pm 2.3$  K), TC Type K ( $\pm 3.4$  K), TC Type U ( $\pm 1.8$  K), TC Type L ( $\pm 2.3$  K), TC Type N ( $\pm 2.9$  K)

Interrupts/diagnostics/status information

Diagnostics function No

Potential separation

Potential separation analog inputs

- Potential separation analog inputs Yes; internal/external
- between the channels No
- between the channels and backplane bus Yes
- Between the channels and load voltage L+ Yes

Isolation

Isolation tested with 2 120 V DC between bus and L+/M; 2 120 V DC between bus and analog section; 500 V DC between bus and local ground; 500 V DC between analog section and L+/M; 2 120 V DC between analog section and local ground; 2 120 V DC between L+/M and local ground

Dimensions

Width 25 mm

Height 290 mm

Depth 210 mm

Weights

Weight, approx. 500 g

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