Technical specifications

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Technical specifications of the AI 8xU/R/RTD/TC HF

	6ES7531-7PF00-0AB0
General information	
Product type designation	AI 8xU/R/RTD/TC HF
Hardware functional status	FS01
Firmware version	V1.1.0
• FW update possible	Yes
Product function	
I&M data	Yes; I&M0 to I&M3
Measuring range scalable	Yes
Measured values scalable	No
Measuring range adjustment	No
Engineering with	
STEP 7 TIA Portal can be configured/integrated as of version	V14 / -
STEP 7 can be configured/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	
Configuration in RUN possible	Yes
Calibration in RUN possible	Yes
Supply voltage	
Rated value (DC)	24 V
Valid range, low limit (DC)	20.4 V
Valid range, high limit (DC)	28.8 V
Reverse polarity protection	Yes
Input current	
Current consumption, max.	55 mA; with 24 V DC supply
Power	
Power consumption from the backplane bus	0.85 W
Power loss	
Power loss, typ.	1.9 W

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Analog inputs	
Number of analog inputs	8; plus an additional RTD (reference) channel
• For voltage measurement	8; plus an additional RTD (reference) channel
• For resistance/resistance thermometer measurement	8; plus an additional RTD (reference) channel
• for thermocouple measurement	8; plus an additional RTD (reference) channel
Permissible input voltage for voltage input (destruction limit), max.	20 V
Technical unit for temperature measurement, can be set	Yes; °C / °F / K
Input ranges (rated values), voltages	
-1 to +1 V	Yes
Input resistance (-1 to +1 V)	10 MΩ
-25 mV to +25 mV	Yes
Input resistance (-25 mV to +25 mV)	10 MΩ
-250 to +250 mV	Yes
Input resistance (-250 to +250 mV)	10 MΩ
-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), thermocouples	
Type B	Yes
Input resistance (type B)	10 MΩ
Type C	Yes
Input resistance (Type C)	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
Type TXK/TXK(L) according to GOST	Yes

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Input resistance (Type TXK/TXK(L) according to GOST)	10 MΩ
Input ranges (rated values), resistance thermometer	
Cu 10	Yes; Standard/Climatic
Input resistance (Cu 10)	10 MΩ
Cu 10 according to GOST	Yes; Standard/Climatic
Input resistance (Cu 10 according to GOST)	10 MΩ
Cu 50	Yes; Standard/Climatic
Input resistance (Cu 50)	10 MΩ
Cu 50 according to GOST	Yes; Standard/Climatic
Input resistance (Cu 50 according to GOST)	10 MΩ
Cu 100	Yes; Standard/Climatic
Input resistance (Cu 100)	10 MΩ
Cu 100 according to GOST	Yes; Standard/Climatic
Input resistance (Cu 100 according to GOST)	10 MΩ
Ni 10	Yes; Standard/Climatic
Input resistance (Ni 10)	10 MΩ
Ni 10 to GOST	Yes; Standard/Climatic
Input resistance (Ni 10 according to GOST)	10 MΩ
Ni 100	Yes; Standard/Climatic
Input resistance (Ni 100)	10 MΩ
Ni 100 according to GOST	Yes; Standard/Climatic
Input resistance (Ni 100 according to GOST)	10 MΩ
Ni 1000	Yes; Standard/Climatic
Input resistance (Ni 1000)	10 MΩ
Ni 1000 to GOST	Yes; Standard/Climatic
Input resistance (Ni 1000 according to GOST)	10 MΩ
LG-Ni 1000	Yes; Standard/Climatic
Input resistance (LG-Ni 1000)	10 MΩ
Ni 120	Yes; Standard/Climatic
Input resistance (Ni 120)	10 MΩ
Ni 120 to GOST	Yes; Standard/Climatic
Input resistance (Ni 120 according to GOST)	10 MΩ
Ni 200	Yes; Standard/Climatic
Input resistance (Ni 200)	10 MΩ
Ni 200 to GOST	Yes; Standard/Climatic
Input resistance (Ni 200 according to GOST)	10 MΩ
Ni 500	Yes; Standard/Climatic
Input resistance (Ni 500)	10 MΩ
Ni 500 to GOST	Yes; Standard/Climatic
Input resistance (Ni 500 according to GOST)	10 MΩ
Pt 10	Yes; Standard/Climatic
Input resistance (Pt 10)	10 MΩ

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Pt 10 according to GOST	Yes; Standard/Climatic
Input resistance (Pt 10 according to GOST)	10 MΩ
Pt 50	Yes; Standard/Climatic
Input resistance (Pt 50)	10 MΩ
Pt 50 according to GOST	Yes; Standard/Climatic
Input resistance (Pt 50 according to GOST)	10 MΩ
Pt 100	Yes; Standard/Climatic
Input resistance (Pt 100)	10 MΩ
Pt 100 according to GOST	Yes; Standard/Climatic
Input resistance (Pt 100 according to GOST)	10 MΩ
Pt 1000	Yes; Standard/Climatic
Input resistance (Pt 1000)	10 MΩ
Pt 1000 according to GOST	Yes; Standard/Climatic
Input resistance (Pt 1000 according to GOST)	10 MΩ
Pt 200	Yes; Standard/Climatic
Input resistance (Pt 200)	10 MΩ
Pt 200 according to GOST	Yes; Standard/Climatic
Input resistance (Pt 200 according to GOST)	10 MΩ
Pt 500	Yes; Standard/Climatic
Input resistance (Pt 500)	10 MΩ
Pt 500 according to GOST	Yes; Standard/Climatic
Input resistance (Pt 500 according to GOST)	10 MΩ
Input ranges (rated values), resistors	
0 to 150 ohm	Yes
Input resistance (0 to 150 ohm)	10 MΩ
0 to 300 ohm	Yes
Input resistance (0 to 300 ohm)	10 MΩ
0 to 600 ohm	Yes
Input resistance (0 to 600 ohm)	10 MΩ
0 to 6000 ohm	Yes
Input resistance (0 to 6000 ohm)	10 MΩ
PTC	Yes
Input resistance (PTC)	10 MΩ

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Thermocouple (TC)	
Temperature compensation	
• Configurable	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; 9th channel that can be used regardless of the parameterization of the other channels than as the genuine 9th RTD channel or for compensation for TC measurement
Cable length	
shielded, max.	800 m; with U; 200 m with R/RTD/TC
Analog value generation for the inputs	
Integration and conversion time/resolution per channel	
Resolution with overrange (bit including sign), max.	16 bit
Configurable integration time	Yes
Integration time (ms)	Fast mode: 2.5 / 16.67 / 20 / 100 ms; standard mode: 7.5 / 50 / 60 / 300 ms
Basic conversion time, including integration time (ms)	Fast mode: 4 / 18 / 22 / 102 ms; standard mode: 9 / 52 / 62 / 302 ms
• Additional conversion time for wire break monitoring	Thermocouples. 150 Ohm, 300 Ohm, 600 Ohm, Cu10, Cu50, Cu100, Ni10, Ni50, Ni100, Ni120, Ni200, Pt10, Pt50, Pt100, Pt200: 4 ms; 6 kilohm, Ni500, Ni1000, LG-Ni1000, Pt500, Pt1000: 13 ms
Interference voltage suppression for interference frequency f1 in Hz	400 / 60 / 50 / 10 Hz
Basic execution time of the module (all channels enabled)	Corresponds to the channel with the highest basic conversion time
Smoothing of the measured values	
Configurable	Yes
Level: None	Yes
Level: Weak	Yes
Level: Medium	Yes
Level: Strong	Yes
Encoders	
Connection of the signal encoders	
For voltage measurement	Yes
for resistance measurement with two-wire connection	Yes
for resistance measurement with three-wire connection	Yes; all measuring ranges except PTC; internal compensation of line resistance
For resistance measurement with four-wire connection	Yes; all measuring ranges except PTC

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Errors/accuracies	
Linearity error (in relation to input range), (+/-)	0.02%
Temperature error (in relation to input range), (+/-)	0.005%/K
Crosstalk between the inputs, max.	-80 dB
Repeat accuracy in settled state at 25 °C (in relation to input range), (+/-)	0.02%
Temperature errors of internal compensation	+/-1.5 °C
Operational limit in overall temperature range	
Voltage in relation to input range, (+/-)	0.1%
Resistance in relation to input range, (+/-)	0.1%
Resistance thermometer in relation to input range, (+/-)	Cuxxx Standard: ±0.5 K, Cuxxx Climatic: ±0.5 K, Ptxxx Standard: ±1 K, Ptxxx Climatic: ±0.5 K, Nixxx Standard: ±0.5 K, Nixxx Climatic: ±0.3 K
Thermocouple, relative to input range, (+/-)	Type B: > 600 °C ±2 K, Type E: > -200 °C ±1 K, Type J: > -210 °C ±1 K, Type K: > -200 °C ±2 K, Type N: > -200 °C ±2 K, Type R: > 0 °C ±2 K, Type S: > 0 °C ±2 K, Type T: > -200 °C ±1 K, Type C: ±4 K, Type TXK/TXK(L): ±1 K
Basic error limit (operational limit at 25 °C)	
Voltage in relation to input range, (+/-)	0.05%
Resistance in relation to input range, (+/-)	0.05%
Resistance thermometer in relation to input range, (+/-)	Cuxxx Standard: ±0.3 K, Cuxxx Climatic: ±0.2 K, Ptxxx Standard: ±0.5 K, Ptxxx Climatic: ±0.2 K, Nixxx Standard: ±0.3 K, Nixxx Climatic: ±0.15 K
Thermocouple, relative to input range, (+/-)	Type B: > 600 °C ±1 K, Type E: > -200 °C ±0.5 K, Type J: > -210 °C ±0.5 K, Type K: > -200 °C ±1 K, Type N: > -200 °C ±1 K, Type R: > 0 °C ±1 K, Type S: > 0 °C ±1 K, Type T: > -200 °C ±0.5 K, Type C: ±2 K, Type TXK/TXK(L): ±0.5 K
Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interference frequency	
Series-mode interference (peak of the interference < rated value of the input range), min.	80 dB; in Standard mode, 40 dB in Fast mode
Common mode voltage, max.	60 V DC / 30 V AC
Common mode interference, min.	80 dB
Isochronous mode	
Isochronous mode (application synchronized up to terminal)	No
Interrupts/diagnostics/status information	
Diagnostics function	Yes
Interrupts	
Diagnostic interrupt	Yes
Limit interrupt	Yes; two high limits and two low limits each
Diagnostics alarms	
Monitoring of supply voltage	Yes
Wire break	Yes; only for TC. R. RTD
Overflow/underflow	Yes

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Diagnostics indicator LED	
RUN LED	Yes; green LED
ERROR LED	Yes; red LED
Monitoring of 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
Electrical isolation	
Electrical isolation of channels	
Between the channels	Yes
Between the channels, in groups of	1
Between the channels and backplane bus	Yes
Between the channels and power supply of the electronics	Yes
Permitted potential difference	
Between different circuits	60 V DC / 30 V AC; Isolation measured for 120 V AC basic isolation: Between the channels and supply voltage L+, between the channels and the backplane bus, between the channels
Isolation	
Isolation tested with	2000 V DC between the channels and the supply voltage L+, 2000 V DC between the channels and the backplane bus, 2000 V DC between the channels, 707 V DC (type test) between the supply voltage L+ and the backplane bus
Ambient conditions	
Ambient temperature during operation	
Horizontal mounting position, min.	0 °C
Horizontal mounting position, max.	60 °C
Vertical mounting position, min.	0 °C
Vertical mounting position, max.	40 °C
Distributed mode	
Prioritized startup	Yes
Dimensions	
Width	35 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	290 g
Miscellaneous	
Note:	Cable compensation is performed alternately to measurement with the R/RTD three-wire measurement. Two module cycles are thus required for a measured value.

Additional information

You can learn how to calculate the cycle time of the module with an example provided on the Internet (https://support.industry.siemens.com/cs/ww/en/view/109037127).

Dimensional drawing

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The dimensional drawing of the module on the mounting rail, as well as a dimensional drawing with open front panel are provided in the appendix. Always adhere to the specified dimensions for installations in cabinets, control rooms, etc.

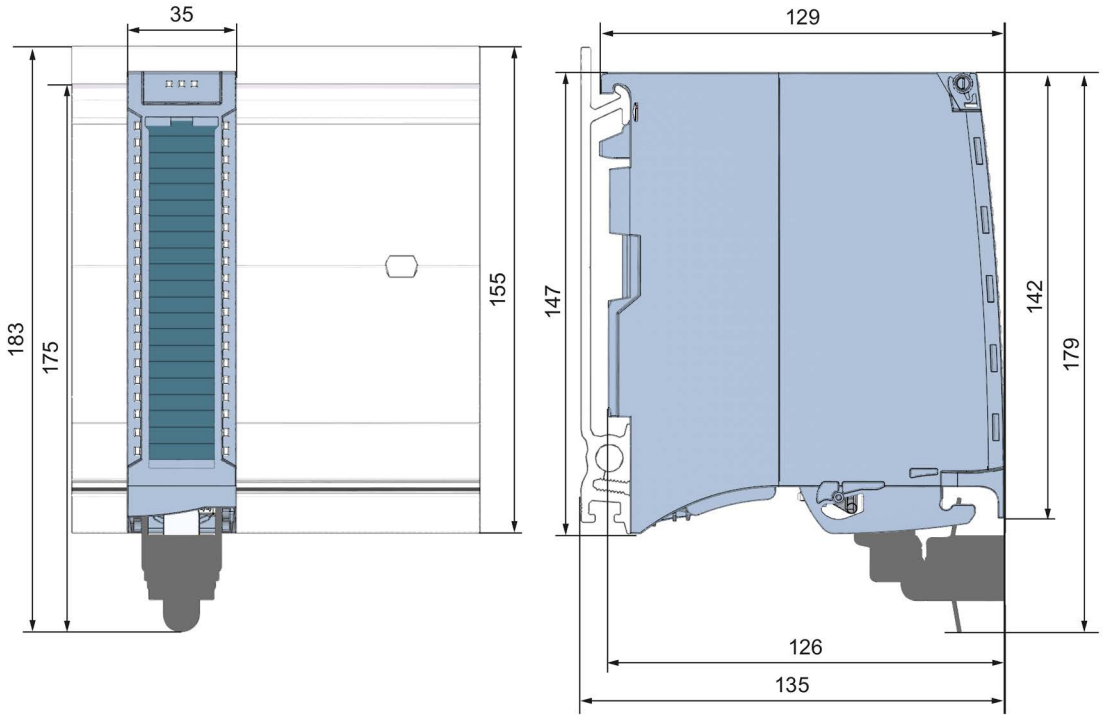


Figure A-1 Dimension drawing of the AI 8xU/R/RTD/TC HF module



Figure A-2 Dimension drawing of the AI 8xU/R/RTD/TC HF module, side view with open front cover