



SIMATIC S7-1500 analog input module AI 8xU/R/RTD/TC HF, 16 bit resolution, up to 21 bit Resolution at RT and TC, accuracy 0.1%, 8 channels in groups of 1; common mode voltage: 30 V AC/60 V DC, Diagnostics; Hardware interrupts Scalable temperature measuring range, thermocouple type C, Calibrate in RUN; Delivery including infeed element, shield bracket and shield terminal: Front connector (screw terminals or push-in) to be ordered separately

### General information

Product type designation	AI 8xU/R/RTD/TC HF
HW functional status	FS01
Firmware version	V1.1.0
• FW update possible	Yes

### Product function

• I&M data	Yes; I&M0 to I&M3
• Isochronous mode	No
• Prioritized startup	Yes
• Measuring range scalable	Yes
• Scalable measured values	No
• Adjustment of measuring range	No

### Engineering with

• STEP 7 TIA Portal configurable/integrated from version	V14 / -
• 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.	55 mA; with 24 V DC supply
---------------------------	----------------------------

### Power

Power available from the backplane bus	0.85 W
--	--------

### Power loss

Power loss, typ.	1.9 W
------------------	-------

### Analog inputs

Number of analog inputs	8; Plus one additional RTD (reference) channel
• For voltage measurement	8; Plus one additional RTD (reference) channel
• For resistance/resistance thermometer measurement	8; Plus one additional RTD (reference) channel
• For thermocouple measurement	8; Plus one additional RTD (reference) channel

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

Constant measurement current for resistance-type transmitter, typ.

Technical unit for temperature measurement adjustable

20 V

150 Ohm, 300 Ohm, 600 Ohm, Cu10, Cu50, Cu100, Ni10, Ni100, Ni120, Ni200, Pt10, Pt50, Pt100, Pt200 climate: 1 mA; 6 kOhm, Ni500, Ni1000, LG-Ni1000, Pt200 standard, Pt500, Pt1000, PTC: 0.25 mA  
Yes; °C/°F/K

#### Input ranges (rated values), voltages

• 0 to +5 V	No
• 0 to +10 V	No
• 1 V to 5 V	No
• -1 V to +1 V	Yes
— Input resistance (-1 V to +1 V)	10 MΩ
• -10 V to +10 V	No
• -2.5 V to +2.5 V	No
• -25 mV to +25 mV	Yes
— Input resistance (-25 mV to +25 mV)	10 MΩ
• -250 mV to +250 mV	Yes
— Input resistance (-250 mV to +250 mV)	10 MΩ
• -5 V to +5 V	No
• -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	No
• -20 mA to +20 mA	No
• 4 mA to 20 mA	No

#### 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 L	No
• 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) to GOST	Yes
— Input resistance (Type TXK/TXK(L) to GOST)	10 MΩ

#### Input ranges (rated values), resistance thermometer

• Cu 10	Yes; Standard/climate
— Input resistance (Cu 10)	10 MΩ
• Cu 10 according to GOST	Yes; Standard/climate
— Input resistance (Cu 10 according to GOST)	10 MΩ
• Cu 50	Yes; Standard/climate
— Input resistance (Cu 50)	10 MΩ
• Cu 50 according to GOST	Yes; Standard/climate
— Input resistance (Cu 50 according to GOST)	10 MΩ
• Cu 100	Yes; Standard/climate
— Input resistance (Cu 100)	10 MΩ
• Cu 100 according to GOST	Yes; Standard/climate
— Input resistance (Cu 100 according to GOST)	10 MΩ
• Ni 10	Yes; Standard/climate

— Input resistance (Ni 10)	10 MΩ
• Ni 10 according to GOST	Yes; Standard/climate
— Input resistance (Ni 10 according to GOST)	10 MΩ
• Ni 100	Yes; Standard/climate
— Input resistance (Ni 100)	10 MΩ
• Ni 100 according to GOST	Yes; Standard/climate
— Input resistance (Ni 100 according to GOST)	10 MΩ
• Ni 1000	Yes; Standard/climate
— Input resistance (Ni 1000)	10 MΩ
• Ni 1000 according to GOST	Yes; Standard/climate
— Input resistance (Ni 1000 according to GOST)	10 MΩ
• LG-Ni 1000	Yes; Standard/climate
— Input resistance (LG-Ni 1000)	10 MΩ
• Ni 120	Yes; Standard/climate
— Input resistance (Ni 120)	10 MΩ
• Ni 120 according to GOST	Yes; Standard/climate
— Input resistance (Ni 120 according to GOST)	10 MΩ
• Ni 200	Yes; Standard/climate
— Input resistance (Ni 200)	10 MΩ
• Ni 200 according to GOST	Yes; Standard/climate
— Input resistance (Ni 200 according to GOST)	10 MΩ
• Ni 500	Yes; Standard/climate
— Input resistance (Ni 500)	10 MΩ
• Ni 500 according to GOST	Yes; Standard/climate
— Input resistance (Ni 500 according to GOST)	10 MΩ
• Pt 10	Yes; Standard/climate
— Input resistance (Pt 10)	10 MΩ
• Pt 10 according to GOST	Yes; Standard/climate
— Input resistance (Pt 10 according to GOST)	10 MΩ
• Pt 50	Yes; Standard/climate
— Input resistance (Pt 50)	10 MΩ
• Pt 50 according to GOST	Yes; Standard/climate
— Input resistance (Pt 50 according to GOST)	10 MΩ
• Pt 100	Yes; Standard/climate
— Input resistance (Pt 100)	10 MΩ
• Pt 100 according to GOST	Yes; Standard/climate
— Input resistance (Pt 100 according to GOST)	10 MΩ
• Pt 1000	Yes; Standard/climate
— Input resistance (Pt 1000)	10 MΩ
• Pt 1000 according to GOST	Yes; Standard/climate
— Input resistance (Pt 1000 according to GOST)	10 MΩ
• Pt 200	Yes; Standard/climate
— Input resistance (Pt 200)	10 MΩ
• Pt 200 according to GOST	Yes; Standard/climate
— Input resistance (Pt 200 according to GOST)	10 MΩ
• Pt 500	Yes; Standard/climate
— Input resistance (Pt 500)	10 MΩ
• Pt 500 according to GOST	Yes; Standard/climate
— Input resistance (Pt 500 according to GOST)	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 3000 ohms	No
• 0 to 6000 ohms	Yes
— Input resistance (0 to 6000 ohms)	10 MΩ
• PTC	Yes
— Input resistance (PTC)	10 MΩ
Thermocouple (TC)	
Temperature compensation	
— parameterizable	Yes

- internal temperature compensation
- external temperature compensation via RTD
- Compensation for 0 °C reference point temperature
- Reference channel of the module

Yes  
 Yes  
 Yes; fixed value can be set  
 Yes; 9th channel that can be used as a genuine 9th RTD channel regardless of the parameterization of the other channels, or that can be used for compensation in the case of TC measurement

#### Cable length

- shielded, max. 800 m; at U; 200 m at R/RTD/TC

#### Analog value generation for the inputs

##### Integration and conversion time/resolution per channel

- Resolution with overrange (bit including sign), max. 21 bit; For measuring mode RTC and TC when using the function "Scalable temperature measuring range" (32 bit REAL format); 16 bit for measuring mode R and U; 16 bit for all measuring modes when using the S7 format (16 bit INTEGER)
- Integration time, parameterizable 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, Ni100, Ni120, Ni200, Pt10, Pt50, Pt100: 4 ms; 6 kOhm, Ni500, Ni1000, LG-Ni1000, Pt200, 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 released) Corresponds to the channel with the highest basic conversion time

##### 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 No
- for current measurement as 4-wire transducer No
- for resistance measurement with two-wire connection Yes
- 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
- 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 ±1,5 °C

##### Operational error limit in overall temperature range

- Voltage, relative to input range, (+/-) 0.1 %
- Resistance, relative to input range, (+/-) 0.1 %
- Resistance thermometer, relative to input range, (+/-) Cuxxx Standard: ±0.5 K, Cuxxx Klima: ±0.5 K, Ptxxx Standard: ±1 K, Ptxxx Klima: ±0.5 K, Nixxx Standard: ±0.5 K, Nixxx Klima: ±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, relative to input range, (+/-) 0.05 %
- Resistance, relative to input range, (+/-) 0.05 %
- Resistance thermometer, relative to input range, (+/-) Cuxxx Standard: ±0.3 K, Cuxxx Klima: ±0.2 K, Ptxxx Standard: ±0.5 K, Ptxxx Klima: ±0.2 K, Nixxx Standard: ±0.3 K, Nixxx Klima: ±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): $\pm 0.5\text{ K}$
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.	80 dB; in the Standard operating mode, 40 dB in the Fast operating mode
• Common mode voltage, max.	60 V DC/30 V AC
• Common mode interference, min.	80 dB
<b>Interrupts/diagnostics/status information</b>	
Diagnostics function	Yes
<b>Alarms</b>	
• Diagnostic alarm	Yes
• Limit value alarm	Yes; two upper and two lower limit values in each case
<b>Diagnoses</b>	
• Monitoring the supply voltage	Yes
• Wire-break	Yes; Only with TC, R, RTD
• Overflow/underflow	Yes
<b>Diagnostics indication LED</b>	
• 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
<b>Potential separation</b>	
Potential separation channels	
• between the channels	Yes
• between the channels, in groups of	1
• between the channels and backplane bus	Yes
• between the channels and the power supply of the electronics	Yes
<b>Permissible potential difference</b>	
between different circuits	60 V DC/30 V AC; insulation rated for 120 V AC basic insulation: between the channels and the supply voltage L+; between the channels and the backplane bus; between the channels
<b>Isolation</b>	
Isolation tested with	2 000 V DC between the channels and the supply voltage L+; 2 000 V DC between the channels and the backplane bus; 2 000 V DC between the channels; 707 V DC (type test) between the supply voltage L+ and the backplane bus
<b>Standards, approvals, certificates</b>	
Suitable for applications according to AMS 2750	Yes; Declaration of Conformity, see online support entry 109757262
Suitable for applications according to CQI-9	Yes; Based on AMS 2750 E
<b>Ambient conditions</b>	
Ambient temperature during operation	
• horizontal installation, min.	0 °C
• horizontal installation, max.	60 °C
• vertical installation, min.	0 °C
• vertical installation, max.	40 °C
<b>Dimensions</b>	
Width	35 mm
Height	147 mm
Depth	129 mm
<b>Weights</b>	
Weight, approx.	290 g
<b>Other</b>	
Note:	for the R/RDT three-wire measurement, the conductor compensation is made alternating with the measurement; this then requires two module cycles for a measured value

last modified:

4/11/2022 