



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
<ul style="list-style-type: none"> FW update possible 	Yes
Product function	
<ul style="list-style-type: none"> I&M data 	Yes; I&M0 to I&M3
<ul style="list-style-type: none"> Isochronous mode 	No
<ul style="list-style-type: none"> Prioritized startup 	Yes
<ul style="list-style-type: none"> Measuring range scalable 	Yes
<ul style="list-style-type: none"> Scalable measured values 	No
<ul style="list-style-type: none"> Adjustment of measuring range 	No
Engineering with	
<ul style="list-style-type: none"> STEP 7 TIA Portal configurable/integrated from version 	V14 / -
<ul style="list-style-type: none"> STEP 7 configurable/integrated from version 	V5.5 SP3 / -
<ul style="list-style-type: none"> PROFIBUS from GSD version/GSD revision 	V1.0 / V5.1
<ul style="list-style-type: none"> PROFINET from GSD version/GSD revision 	V2.3 / -
Operating mode	
<ul style="list-style-type: none"> Oversampling 	No
<ul style="list-style-type: none"> 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

<ul style="list-style-type: none"> • For voltage measurement 	8; Plus one additional RTD (reference) channel
<ul style="list-style-type: none"> • For resistance/resistance thermometer measurement 	8; Plus one additional RTD (reference) channel
<ul style="list-style-type: none"> • For thermocouple measurement 	8; Plus one additional RTD (reference) channel
permissible input voltage for voltage input (destruction limit), max.	20 V
Constant measurement current for resistance-type transmitter, typ.	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
Technical unit for temperature measurement adjustable	Yes; °C/°F/K
Input ranges (rated values), voltages	
<ul style="list-style-type: none"> • 0 to +5 V 	No
<ul style="list-style-type: none"> • 0 to +10 V 	No
<ul style="list-style-type: none"> • 1 V to 5 V 	No
<ul style="list-style-type: none"> • -1 V to +1 V 	Yes
<ul style="list-style-type: none"> — Input resistance (-1 V to +1 V) 	10 MΩ
<ul style="list-style-type: none"> • -10 V to +10 V 	No
<ul style="list-style-type: none"> • -2.5 V to +2.5 V 	No
<ul style="list-style-type: none"> • -25 mV to +25 mV 	Yes
<ul style="list-style-type: none"> — Input resistance (-25 mV to +25 mV) 	10 MΩ
<ul style="list-style-type: none"> • -250 mV to +250 mV 	Yes
<ul style="list-style-type: none"> — Input resistance (-250 mV to +250 mV) 	10 MΩ
<ul style="list-style-type: none"> • -5 V to +5 V 	No
<ul style="list-style-type: none"> • -50 mV to +50 mV 	Yes
<ul style="list-style-type: none"> — Input resistance (-50 mV to +50 mV) 	10 MΩ
<ul style="list-style-type: none"> • -500 mV to +500 mV 	Yes
<ul style="list-style-type: none"> — Input resistance (-500 mV to +500 mV) 	10 MΩ
<ul style="list-style-type: none"> • -80 mV to +80 mV 	Yes
<ul style="list-style-type: none"> — Input resistance (-80 mV to +80 mV) 	10 MΩ
Input ranges (rated values), currents	
<ul style="list-style-type: none"> • 0 to 20 mA 	No
<ul style="list-style-type: none"> • -20 mA to +20 mA 	No
<ul style="list-style-type: none"> • 4 mA to 20 mA 	No
Input ranges (rated values), thermocouples	
<ul style="list-style-type: none"> • Type B 	Yes
<ul style="list-style-type: none"> — Input resistance (Type B) 	10 MΩ
<ul style="list-style-type: none"> • Type C 	Yes
<ul style="list-style-type: none"> — Input resistance (Type C) 	10 MΩ
<ul style="list-style-type: none"> • Type E 	Yes
<ul style="list-style-type: none"> — Input resistance (Type E) 	10 MΩ
<ul style="list-style-type: none"> • Type J 	Yes
<ul style="list-style-type: none"> — Input resistance (type J) 	10 MΩ
<ul style="list-style-type: none"> • Type K 	Yes
<ul style="list-style-type: none"> — Input resistance (Type K) 	10 MΩ
<ul style="list-style-type: none"> • Type L 	No
<ul style="list-style-type: none"> • Type N 	Yes
<ul style="list-style-type: none"> — Input resistance (Type N) 	10 MΩ
<ul style="list-style-type: none"> • Type R 	Yes
<ul style="list-style-type: none"> — Input resistance (Type R) 	10 MΩ
<ul style="list-style-type: none"> • Type S 	Yes
<ul style="list-style-type: none"> — Input resistance (Type S) 	10 MΩ
<ul style="list-style-type: none"> • Type T 	Yes
<ul style="list-style-type: none"> — Input resistance (Type T) 	10 MΩ
<ul style="list-style-type: none"> • Type TXK/TXK(L) to GOST 	Yes
<ul style="list-style-type: none"> — Input resistance (Type TXK/TXK(L) to GOST) 	10 MΩ
Input ranges (rated values), resistance thermometer	
<ul style="list-style-type: none"> • Cu 10 	Yes; Standard/climate
<ul style="list-style-type: none"> — Input resistance (Cu 10) 	10 MΩ
<ul style="list-style-type: none"> • 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	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 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	
<ul style="list-style-type: none"> • Voltage, relative to input range, (+/-) • Resistance, relative to input range, (+/-) • Resistance thermometer, relative to input range, (+/-) • Thermocouple, relative to input range, (+/-) 	0.1 % 0.1 % 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 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)	
<ul style="list-style-type: none"> • Voltage, relative to input range, (+/-) • Resistance, relative to input range, (+/-) • Resistance thermometer, relative to input range, (+/-) • Thermocouple, relative to input range, (+/-) 	0.05 % 0.05 % 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 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 $f = n \times (f_1 \pm 1 \%)$, $f_1 =$ interference frequency	
<ul style="list-style-type: none"> • Series mode interference (peak value of interference < rated value of input range), min. • Common mode voltage, max. • Common mode interference, min. 	80 dB; in the Standard operating mode, 40 dB in the Fast operating mode 60 V DC/30 V AC 80 dB
Interrupts/diagnostics/status information	
Diagnostics function	Yes
Alarms	
<ul style="list-style-type: none"> • Diagnostic alarm • Limit value alarm 	Yes Yes; two upper and two lower limit values in each case
Diagnoses	
<ul style="list-style-type: none"> • Monitoring the supply voltage • Wire-break • Overflow/underflow 	Yes Yes; Only with TC, R, RTD Yes
Diagnostics indication LED	
<ul style="list-style-type: none"> • RUN LED • ERROR LED • Monitoring of the supply voltage (PWR-LED) • Channel status display • for channel diagnostics • for module diagnostics 	Yes; green LED Yes; red LED Yes; green LED Yes; green LED Yes; red LED Yes; red LED
Potential separation	
Potential separation channels	
<ul style="list-style-type: none"> • between the channels • between the channels, in groups of • between the channels and backplane bus • between the channels and the power supply of the electronics 	Yes 1 Yes Yes
Permissible potential difference	
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
Isolation	
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
Standards, approvals, certificates	

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
Ambient conditions	
Ambient temperature during operation	
<ul style="list-style-type: none"> • horizontal installation, min. • horizontal installation, max. • vertical installation, min. • vertical installation, max. 	<ul style="list-style-type: none"> 0 °C 60 °C 0 °C 40 °C
Dimensions	
Width	35 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	290 g
Other	
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:

4/29/2021 