

SIPLUS S7-1500 AI 8xU//RTD/TC -40°C ... +70°C with conformal coating based on 6ES7531-7KF00-0AB0 . Analog input module 16 bit resolution, Accuracy 0.3%, 8 channels in "groups of 8, ""Common mode" "voltage 10 V;"" ""diagnostics;" "hardware interrupts"" incl." infeed element, Shield bracket and shield terminal



Figure similar

General information	
Product type designation	AI 8xU//RTD/TC ST
Product function	
• I&M data	Yes; I&M0 to I&M3
CiR - Configuration in RUN	
Reparameterization possible in RUN	Yes
Calibration possible in RUN	Yes
Supply voltage	
Type of supply voltage	DC
Rated value (DC)	24 V
permissible range, lower limit (DC)	20.4 V
permissible range, upper limit (DC)	28.8 V
Encoder supply	
24 V encoder supply	
• Short-circuit protection	Yes
• Output current, max.	53 mA

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; > +60 °C max. 2x ±20 mA or 4x ±10 V or 4x RTD permissible
<ul style="list-style-type: none"> <li>• For current measurement</li> </ul>	8
<ul style="list-style-type: none"> <li>• For voltage measurement</li> </ul>	8
<ul style="list-style-type: none"> <li>• For resistance/resistance thermometer measurement</li> </ul>	4
<ul style="list-style-type: none"> <li>• For thermocouple measurement</li> </ul>	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	
<ul style="list-style-type: none"> <li>• 1 V to 5 V</li> </ul>	Yes
<ul style="list-style-type: none"> <li>— Input resistance (1 V to 5 V)</li> </ul>	100 kΩ
<ul style="list-style-type: none"> <li>• -1 V to +1 V</li> </ul>	Yes
<ul style="list-style-type: none"> <li>— Input resistance (-1 V to +1 V)</li> </ul>	10 MΩ
<ul style="list-style-type: none"> <li>• -10 V to +10 V</li> </ul>	Yes
<ul style="list-style-type: none"> <li>— Input resistance (-10 V to +10 V)</li> </ul>	100 kΩ
<ul style="list-style-type: none"> <li>• -2.5 V to +2.5 V</li> </ul>	Yes
<ul style="list-style-type: none"> <li>— Input resistance (-2.5 V to +2.5 V)</li> </ul>	10 MΩ
<ul style="list-style-type: none"> <li>• -250 mV to +250 mV</li> </ul>	Yes
<ul style="list-style-type: none"> <li>— Input resistance (-250 mV to +250 mV)</li> </ul>	10 MΩ
<ul style="list-style-type: none"> <li>• -5 V to +5 V</li> </ul>	Yes
<ul style="list-style-type: none"> <li>— Input resistance (-5 V to +5 V)</li> </ul>	100 kΩ
<ul style="list-style-type: none"> <li>• -50 mV to +50 mV</li> </ul>	Yes
<ul style="list-style-type: none"> <li>— Input resistance (-50 mV to +50 mV)</li> </ul>	10 MΩ
<ul style="list-style-type: none"> <li>• -500 mV to +500 mV</li> </ul>	Yes
<ul style="list-style-type: none"> <li>— Input resistance (-500 mV to +500 mV)</li> </ul>	10 MΩ
<ul style="list-style-type: none"> <li>• -80 mV to +80 mV</li> </ul>	Yes
<ul style="list-style-type: none"> <li>— Input resistance (-80 mV to +80 mV)</li> </ul>	10 MΩ
Input ranges (rated values), currents	
<ul style="list-style-type: none"> <li>• 0 to 20 mA</li> </ul>	Yes
<ul style="list-style-type: none"> <li>— Input resistance (0 to 20 mA)</li> </ul>	25 Ω; Plus approx. 42 ohms for overvoltage protection by PTC
<ul style="list-style-type: none"> <li>• -20 mA to +20 mA</li> </ul>	Yes
<ul style="list-style-type: none"> <li>— Input resistance (-20 mA to +20 mA)</li> </ul>	25 Ω; Plus approx. 42 ohms for overvoltage protection by PTC

<ul style="list-style-type: none"> <li>• 4 mA to 20 mA               <ul style="list-style-type: none"> <li>— Input resistance (4 mA to 20 mA)</li> </ul> </li> </ul>	Yes 25 Ω; Plus approx. 42 ohms for overvoltage protection by PTC
<b>Input ranges (rated values), thermocouples</b>	
<ul style="list-style-type: none"> <li>• Type B               <ul style="list-style-type: none"> <li>— Input resistance (Type B)</li> </ul> </li> <li>• Type E               <ul style="list-style-type: none"> <li>— Input resistance (Type E)</li> </ul> </li> <li>• Type J               <ul style="list-style-type: none"> <li>— Input resistance (type J)</li> </ul> </li> <li>• Type K               <ul style="list-style-type: none"> <li>— Input resistance (Type K)</li> </ul> </li> <li>• Type N               <ul style="list-style-type: none"> <li>— Input resistance (Type N)</li> </ul> </li> <li>• Type R               <ul style="list-style-type: none"> <li>— Input resistance (Type R)</li> </ul> </li> <li>• Type S               <ul style="list-style-type: none"> <li>— Input resistance (Type S)</li> </ul> </li> <li>• Type T               <ul style="list-style-type: none"> <li>— Input resistance (Type T)</li> </ul> </li> </ul>	Yes 10 MΩ Yes 10 MΩ Yes 10 MΩ Yes 10 MΩ Yes 10 MΩ Yes 10 MΩ Yes 10 MΩ Yes 10 MΩ
<b>Input ranges (rated values), resistance thermometer</b>	
<ul style="list-style-type: none"> <li>• Ni 100               <ul style="list-style-type: none"> <li>— Input resistance (Ni 100)</li> </ul> </li> <li>• Ni 1000               <ul style="list-style-type: none"> <li>— Input resistance (Ni 1000)</li> </ul> </li> <li>• LG-Ni 1000               <ul style="list-style-type: none"> <li>— Input resistance (LG-Ni 1000)</li> </ul> </li> <li>• Pt 100               <ul style="list-style-type: none"> <li>— Input resistance (Pt 100)</li> </ul> </li> <li>• Pt 1000               <ul style="list-style-type: none"> <li>— Input resistance (Pt 1000)</li> </ul> </li> <li>• Pt 200               <ul style="list-style-type: none"> <li>— Input resistance (Pt 200)</li> </ul> </li> <li>• Pt 500               <ul style="list-style-type: none"> <li>— Input resistance (Pt 500)</li> </ul> </li> </ul>	Yes; Standard/climate 10 MΩ Yes; Standard/climate 10 MΩ Yes; Standard/climate 10 MΩ Yes; Standard/climate 10 MΩ Yes; Standard/climate 10 MΩ Yes; Standard/climate 10 MΩ
<b>Input ranges (rated values), resistors</b>	
<ul style="list-style-type: none"> <li>• 0 to 150 ohms               <ul style="list-style-type: none"> <li>— Input resistance (0 to 150 ohms)</li> </ul> </li> <li>• 0 to 300 ohms               <ul style="list-style-type: none"> <li>— Input resistance (0 to 300 ohms)</li> </ul> </li> <li>• 0 to 600 ohms               <ul style="list-style-type: none"> <li>— Input resistance (0 to 600 ohms)</li> </ul> </li> </ul>	Yes 10 MΩ Yes 10 MΩ Yes 10 MΩ

<ul style="list-style-type: none"> <li>• 0 to 6000 ohms <ul style="list-style-type: none"> <li>— Input resistance (0 to 6000 ohms)</li> </ul> </li> <li>• PTC <ul style="list-style-type: none"> <li>— Input resistance (PTC)</li> </ul> </li> </ul>	<p>Yes</p> <p>10 MΩ</p> <p>Yes</p> <p>10 MΩ</p>
<b>Thermocouple (TC)</b>	
<b>Temperature compensation</b>	
<ul style="list-style-type: none"> <li>— external temperature compensation via RTD</li> <li>— Compensation for 0 °C reference point temperature</li> </ul>	<p>Yes</p> <p>Yes; fixed value can be set</p>
<b>Cable length</b>	
<ul style="list-style-type: none"> <li>• shielded, max.</li> </ul>	800 m; for U/I, 200 m for R/RTD, 50 m for TC
<b>Analog value generation for the inputs</b>	
<b>Integration and conversion time/resolution per channel</b>	
<ul style="list-style-type: none"> <li>• Resolution with overrange (bit including sign), max.</li> </ul>	16 bit
<b>Encoder</b>	
<b>Connection of signal encoders</b>	
<ul style="list-style-type: none"> <li>• for voltage measurement</li> <li>• for current measurement as 2-wire transducer <ul style="list-style-type: none"> <li>— Burden of 2-wire transmitter, max.</li> </ul> </li> <li>• for current measurement as 4-wire transducer</li> <li>• for resistance measurement with two-wire connection</li> <li>• for resistance measurement with three-wire connection</li> <li>• for resistance measurement with four-wire connection</li> </ul>	<p>Yes</p> <p>Yes</p> <p>820 Ω</p> <p>Yes</p> <p>Yes; Only for PTC</p> <p>Yes; All measuring ranges except PTC; internal compensation of the cable resistances</p> <p>Yes; All measuring ranges except PTC</p>
<b>Errors/accuracies</b>	
Linearity error (relative to input range), (+/-)	0.02 %
Temperature error (relative to input range), (+/-)	0.005 %/K; With TC type T 0.02 ± % / K
Crosstalk between the inputs, min.	-80 dB
Repeat accuracy in steady state at 25 °C (relative to input range), (+/-)	0.02 %
<b>Operational error limit in overall temperature range</b>	
<ul style="list-style-type: none"> <li>• Voltage, relative to input range, (+/-)</li> <li>• Current, relative to input range, (+/-)</li> <li>• Resistance, relative to input range, (+/-)</li> <li>• Resistance thermometer, relative to input range, (+/-)</li> </ul>	<p>0.5 %</p> <p>0.5 %</p> <p>0.5 %</p> <p>Ptxxx standard: ±1.5 K, Ptxxx climate: ±0.5 K, Nixxx standard: ±0.5 K, Nixxx climate: ±0.3 K</p>

<ul style="list-style-type: none"> <li>• Thermocouple, relative to input range, (+/-)</li> </ul>	Type B: > 600 °C ±4.6 K, type E: > -200 °C ±1.5 K, type J: > -210 °C ±1.9 K, type K: > -200 °C ±2.4 K, type N: > -200 °C ±2.9 K, type R: > 0 °C ±4.7 K, type S: > 0 °C ±4.6 K, type T: > -200 °C ±2.4 K
<b>Basic error limit (operational limit at 25 °C)</b>	
<ul style="list-style-type: none"> <li>• Voltage, relative to input range, (+/-)</li> <li>• Current, relative to input range, (+/-)</li> <li>• Resistance, relative to input range, (+/-)</li> <li>• Resistance thermometer, relative to input range, (+/-)</li> <li>• Thermocouple, relative to input range, (+/-)</li> </ul>	0.1 % 0.1 % 0.1 % Ptxxx standard: ±0.7 K, Ptxxx climate: ±0.2 K, Nixxx standard: ±0.3 K, Nixxx climate: ±0.15 K Type B: > 600 °C ±1.7 K, type E: > -200 °C ±0.7 K, type J: > -210 °C ±0.8 K, type K: > -200 °C ±1.2 K, type N: > -200 °C ±1.2 K, type R: > 0 °C ±1.9 K, type S: > 0 °C ±1.9 K, type T: > -200 °C ±0.8 K
<b>Interference voltage suppression for <math>f = n \times (f_1 \pm 1 \%)</math>, <math>f_1</math> = interference frequency</b>	
<ul style="list-style-type: none"> <li>• Series mode interference (peak value of interference &lt; rated value of input range), min.</li> <li>• Common mode voltage, max.</li> <li>• Common mode interference, min.</li> </ul>	40 dB 10 V 60 dB
<b>Interrupts/diagnostics/status information</b>	
Diagnostics function	Yes
<b>Alarms</b>	
<ul style="list-style-type: none"> <li>• Diagnostic alarm</li> <li>• Limit value alarm</li> </ul>	Yes Yes; two upper and two lower limit values in each case
<b>Diagnoses</b>	
<ul style="list-style-type: none"> <li>• Monitoring the supply voltage</li> <li>• Wire-break</li> <li>• Overflow/underflow</li> </ul>	Yes Yes; Only for 1 to 5 V, 4 to 20 mA, TC, R, and RTD Yes
<b>Diagnostics indication LED</b>	
<ul style="list-style-type: none"> <li>• RUN LED</li> <li>• ERROR LED</li> <li>• Monitoring of the supply voltage (PWR-LED)</li> <li>• Channel status display</li> <li>• for channel diagnostics</li> <li>• for module diagnostics</li> </ul>	Yes; green LED Yes; red LED Yes; green LED Yes; green LED Yes; red LED Yes; red LED
<b>Potential separation</b>	
<b>Potential separation channels</b>	
<ul style="list-style-type: none"> <li>• between the channels</li> <li>• between the channels, in groups of</li> <li>• between the channels and backplane bus</li> <li>• between the channels and the power supply of the electronics</li> </ul>	No 8 Yes Yes

Permissible potential difference	
between the inputs (UCM)	20 V DC
Between the inputs and MANA (UCM)	10 V DC
between M internally and the inputs	75 V DC/60 V AC (base isolation)
Isolation	
Isolation tested with	707 V DC (type test)
Ambient conditions	
Ambient temperature during operation	
<ul style="list-style-type: none"> <li>horizontal installation, min.</li> </ul>	-40 °C; = Tmin (incl. condensation/frost)
<ul style="list-style-type: none"> <li>horizontal installation, max.</li> </ul>	70 °C; = Tmax
<ul style="list-style-type: none"> <li>vertical installation, min.</li> </ul>	-40 °C; = Tmin
<ul style="list-style-type: none"> <li>vertical installation, max.</li> </ul>	40 °C; = Tmax
Altitude during operation relating to sea level	
<ul style="list-style-type: none"> <li>Installation altitude above sea level, max.</li> </ul>	5 000 m
<ul style="list-style-type: none"> <li>Ambient air temperature-barometric pressure-altitude</li> </ul>	Tmin ... Tmax at 1 140 hPa ... 795 hPa (-1 000 m ... +2 000 m) // Tmin ... (Tmax - 10 K) at 795 hPa ... 658 hPa (+2 000 m ... +3 500 m) // Tmin ... (Tmax -20 K) at 658 hPa ... 540 hPa (+3 500 m ... +5 000 m)
Relative humidity	
<ul style="list-style-type: none"> <li>With condensation, tested in accordance with IEC 60068-2-38, max.</li> </ul>	100 %; RH incl. condensation/frost (no commissioning under condensation conditions)
Resistance	
Coolants and lubricants	
<ul style="list-style-type: none"> <li>Resistant to commercially available coolants and lubricants</li> </ul>	Yes; Incl. diesel and oil droplets in the air
Use in stationary industrial systems	
<ul style="list-style-type: none"> <li>to biologically active substances according to EN 60721-3-3</li> </ul>	Yes; Class 3B2 mold, fungus and dry rot spores (with the exception of fauna); Class 3B3 on request
<ul style="list-style-type: none"> <li>to chemically active substances according to EN 60721-3-3</li> </ul>	Yes; Class 3C4 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *
<ul style="list-style-type: none"> <li>to mechanically active substances according to EN 60721-3-3</li> </ul>	Yes; Class 3S4 incl. sand, dust, *
Use on ships/at sea	
<ul style="list-style-type: none"> <li>to biologically active substances according to EN 60721-3-6</li> </ul>	Yes; Class 6B2 mold and fungal spores (excluding fauna); Class 6B3 on request
<ul style="list-style-type: none"> <li>to chemically active substances according to EN 60721-3-6</li> </ul>	Yes; Class 6C3 (RH < 75 %) incl. salt spray acc. to EN 60068-2-52 (severity degree 3); *
<ul style="list-style-type: none"> <li>to mechanically active substances according to EN 60721-3-6</li> </ul>	Yes; Class 6S3 incl. sand, dust; *
Usage in industrial process technology	
<ul style="list-style-type: none"> <li>Against chemically active substances acc. to EN 60654-4</li> </ul>	Yes; Class 3 (excluding trichlorethylene)

— Environmental conditions for process, measuring and control systems acc. to ANSI/ISA-71.04

Yes; Level GX group A/B (excluding trichlorethylene; harmful gas concentrations up to the limits of EN 60721-3-3 class 3C4 permissible); level LC3 (salt spray) and level LB3 (oil)

#### Remark

— Note regarding classification of environmental conditions acc. to EN 60721, EN 60654-4 and ANSI/ISA-71.04

\* The supplied plug covers must remain in place over the unused interfaces during operation!

#### Conformal coating

- Coatings for printed circuit board assemblies acc. to EN 61086
- Protection against fouling acc. to EN 60664-3
- Military testing according to MIL-I-46058C, Amendment 7
- Qualification and Performance of Electrical Insulating Compound for Printed Board Assemblies according to IPC-CC-830A

Yes; Class 2 for high reliability

Yes; Type 1 protection

Yes; Discoloration of coating possible during service life

Yes; Conformal coating, Class A

#### Dimensions

Width	35 mm
Height	147 mm
Depth	129 mm

#### Weights

Weight, approx.	200 g
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#### Other

Note:

Additional basic error and noise for integration time = 2.5 ms:  
Voltage:  $\pm 250$  mV ( $\pm 0.02\%$ ),  $\pm 80$  mV ( $\pm 0.05\%$ ),  $\pm 50$  mV ( $\pm 0.05\%$ ); resistance: 150 ohms  $\pm 0.02\%$ ; resistance thermometer: Pt100 climate:  $\pm 0.08$  K, Ni100 climate:  $\pm 0.08$  K; thermocouple: Type B, R, S:  $\pm 3$  K, type E, J, K, N, T:  $\pm 1$  K

last modified:

10/13/2020