

SIEMENS

SIMATIC

ET 200S distributed I/O
2AI RTD HF analog electronic
module (6ES7134-4NB51-0AB0)

Manual

Preface

Properties

1

Parameters

2

Diagnostics

3

Analog value representation

4

Connecting

5

05/2007

A5E01076876-02

Properties

1.1 2AI RTD HF analog electronic module (6ES7134-4NB51-0AB0)

Properties

- 2 inputs for resistance thermometer or resistance measurement
- Input ranges
 - Resistance thermometers: Pt100; Ni100; Ni120; Pt200; Ni200; Pt500; Ni500; Pt1000; Ni1000; Cu10; resolution max. 15 bits + sign
 - Resistance measurement: 150 Ω ; 300 Ω ; 600 Ω ; 3000 Ω ; PTC; resolution max. 15 bits
- Automatic compensation of line resistances in the case of a three-wire connection
- Temperature coefficient can be assigned parameters for resistance-type sensors
- High accuracy
- Isolated from the load voltage
- Linearization of the sensor characteristic curves
- Permitted common-mode voltage 5 Vss AC
- Recording of reference junction temperature (together with the Electronic Module 2AI TC ST)
- Compatible with the 2AI RTD ST (6ES7134-4JB50-0AB50)

Note

The EM 2AI RTD HF can replace a 2AI RTD ST in an existing system.

- The wiring does not have to be changed. The additional bridges on the terminal module of the 2AI RTD ST do not have to be removed.
 - The configuration (in HW Config or the GSD file) does not have to be changed. Only the new functions of the 2AI RTD HF cannot be assigned parameters in this instance.
-

General terminal assignment

Note

Terminals 4, 8, A4, A8, A3 and A7 are only available at specified terminal modules.

Terminal assignment for 2AI RTD HF (6ES7134-4NB51-0AB0)				
Terminal	Assignment	Terminal	Assignment	Notes
1	M ₀₊	5	M ₁₊	- M_{n+}: Measuring line positive, Channel n - M_{n-}: Measuring line negative, Channel n - I_{C0+}: Constant current line positive, Channel n - I_{C0-}: Measuring line negative, Channel n - AUX1: Protective-conductor terminal or potential bus (freely usable up to 230 VAC)
2	M ₀₋	6	M ₁₋	
3	I _{C0+}	7	I _{C1+}	
4	I _{C0-}	8	I _{C1-}	
A4	AUX1	A8	AUX1	
A3	AUX1	A7	AUX1	

Usable terminal modules

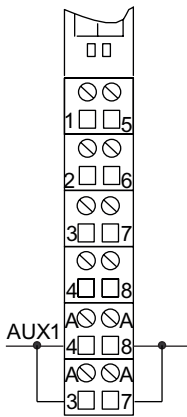
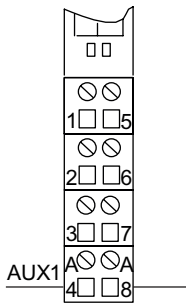
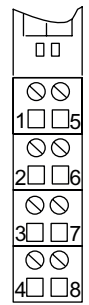
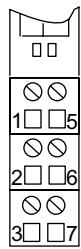
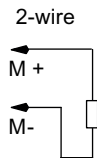
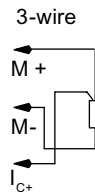
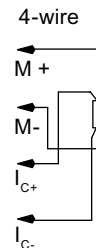
Usable terminal modules for 2AI RTD HF (6ES7134-4NB51-0AB0)				
TM-E15C26-A1 (6ES7193-4CA50-0AA0)	TM-E15C24-A1 (6ES7193-4CA30-0AA0)	TM-E15C24-01 (6ES7193-4CB30-0AA0)	TM-E15C23-01 (6ES7193-4CB10-0AA0)	← Spring terminal
TM-E15S26-A1 (6ES7193-4CA40-0AA0)	TM-E15S24-A1 (6ES7193-4CA20-0AA0)	TM-E15S24-01 (6ES7193-4CB20-0AA0)	TM-E15S23-01 (6ES7193-4CB00-0AA0)	← Screw-type terminal
TM-E15N26-A1 (6ES7193-4CA80-0AA0)	TM-E15N24-A1 (6ES7193-4CA70-0AA0)	TM-E15N24-01 (6ES7193-4CB70-0AA0)	TM-E15N23-01 (6ES7193-4CB60-0AA0)	← Fast Connect
    Wiring examples 2-wire  3-wire  4-wire 				

Figure 1-1 Block diagram of the 2AI RTD HF

Dimensions and weight	
Width (mm)	15
Weight	Approx. 40 g
Module-specific data	
Supports isochronous operation	No
Number of inputs	2
Cable length	
• Shielded	Max. 200 m
Parameter length	7 bytes (4 bytes when used as 2AI RTD ST)
Address space	4 byte
Voltages, currents, potentials	
Rated load voltage L+ (from the power module)	24 VDC
• Reverse polarity protection	Yes
Power supply of the transducers	Yes
• Constant-current supply for resistance-type sensors	Approx. 1.25 mA
• Short-circuit protection	Yes
Electrical isolation	
• Between the channels and backplane bus	Yes
• Between the channels and load voltage L+	Yes
• Between the channels	No
Permissible potential difference	
• Between M _{ANA} and the central grounding point (U _{ISO})	75 VDC / 60 VAC
Insulation tested	500 VDC

Properties

1.1 2AI RTD HF analog electronic module (6ES7134-4NB51-0AB0)

Current consumption		
• From load voltage L+	Max. 30 mA	
Power dissipation of the module	Typically 0.6 W	
Status, interrupts, diagnostics		
Diagnostics function		
• Group error	Red LED "SF"	
• Diagnostic functions readable	Yes	
Analog value generation		
Measuring principle	Integrating (sigma-delta)	
Integration and cycle time/resolution per channel:		
• Integration time can be assigned parameters	Yes	
• Interference frequency suppression in Hz	60	50
• Integration time in ms	16,7	20
• Basic conversion time incl. integration time in ms	50	60
• Additional conversion time for wire break check diagnosis in ms	5	5
• Additional conversion time in ms for line compensation in three-wire connections	50	60
• Cycle time in ms	Number of active channels per module x conversion time	
• Resolution (including overshoot range)	Pt 100; Ni 100; Ni120; Pt 200; Ni 200; Pt 500; Ni 500; Pt 1000; Ni 1000; Cu 10 / 15 bits + sign 150 Ω; 300 Ω; 600 Ω; 3000 Ω; / 15 bits PTC ¹ / 1 bit	
Suppression of interference, limits of error		
Noise suppression for f = n x (f1 ± 1%), (f1 = interference frequency)		
• Common-mode interference (U _{ss})	Min. 90 dB	
• Series-mode interference (peak interference value < rated value of input range)	min. 70 dB	
Crosstalk between the inputs	Min. -50 dB	
Operational limit (in the entire temperature range, with reference to the input range)		
• Resistance-type sensor	± 0,1 %	
• Pt100, Pt200, Pt500, Pt1000 Standard	± 1.0 K	
• Pt100, Pt200, Pt500, Pt1000 Climatic	± 0.25 K	
• Ni100, Ni120, Ni200, Ni500, Ni 1000 Standard and Climatic	± 0.4 K	
• Cu10	± 1.5 K	

Basic error limit for resistance-type sensors (operational limit at 25°C with reference to input range)		
• Resistance-type sensor	± 0,05 %	
• Pt100, Pt200, Pt500, Pt1000 Standard	± 0.6 K	
• Pt100, Pt200, Pt500, Pt1000 Climatic	± 0.13 K	
• Ni100, Ni120, Ni200, Ni500, Ni 1000 Standard and Climatic	± 0.2 K	
• Cu10	± 1.0 K	
Temperature error (with reference to the input range)	± 0.0009 %/K	
Linearity error (with reference to the input range)	± 0,01 %	
Repeatability (in transient state at 25°C, in relation to input range)	± 0,05 %	
Data for selecting a sensor		
Input range (rated value)/input resistance		
• Resistance-type sensor	150 Ω/min. 10 MΩ 300 Ω/min. 10 MΩ 600 Ω/min. 10 MΩ 3000 Ω/min. 10 MΩ PTC min 10 MΩ	
• Resistance thermometer	Pt100/min. 10 MΩ Ni100/min. 10 MΩ Ni120/min. 10 MΩ Pt200/min. 10 MΩ Ni200/min. 10 MΩ Pt500/min. 10 MΩ Ni500/min. 10 MΩ Pt1000/min. 10 MΩ Ni1000/min. 10 MΩ Cu10/min. 10 MΩ	
Permitted input voltage (destruction limit)	Max. 9 V	
Connection of the sensors		
• For measuring resistance	Yes, Yes, internal compensation of line resistances Yes	
– Two-wire connection		
– Three-wire connection		
– Four-wire connection		
Characteristic curve linearization	Yes, can be assigned parameters for Ptxxx, Nixxx	
Smoothing of the measured values	Yes, parameters can be assigned in 4 steps by means of digital filtering	
	Step	Time constant
	None	1 x cycle time
	Weak	4 x cycle time
	Medium	32 x cycle time
	Strong	64 x cycle time
¹In accordance with VDE 0660 Part 302/303, Type A, no diagnostics for overrun/underrun		

Use of Cu10 sensors

- Select "Three-wire thermal resistor" and "Cu10" at parameter assignment.
- Wire the Cu10 sensor in accordance with the three-wire connection method.
- Automatic, internal compensation of line resistance for the missing measuring line occurs during operation.

Note

Please note the following to ensure optimum line compensation in the case of Cu10:

- The sum of the cable resistance and measurement resistance must not exceed 31 Ω .
 - The cable must have a resistance of no more than 8 Ω if you want to use the temperature range up to and above 312 °C.
Example: A 200 m Cu cable with a 0.5 mm² conductor cross-section has approximately 7 Ω . A smaller cross-section shortens the permissible cable length accordingly.
-

Parameters

2.1 Parameters

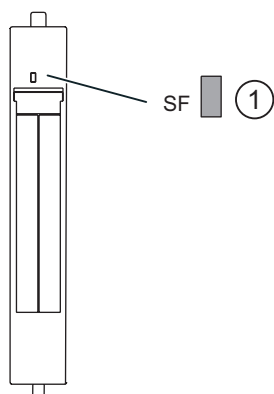
Table 2-1 Parameters for Analog Input Module 2AI RTD HF

Parameters	Range of values	Default setting	Applicability
Group diagnostics	• Disable • Enable	Disable	Module
Diagnostics: overflow/underflow	• Disable • Enable	Disable	Module
Diagnostics: Wire break	• Disable¹ • Enable	Disable	Channel
Smoothing	• None • Weak • Medium • Strong	None	Channel
Temperature unit	• Celsius • Fahrenheit	Celsius	Module
Type of measurement	• De-activated • Four-wire resistor • Three-wire resistor • Two-wire resistor • Four-wire thermal resistor • Three-wire thermal resistor • Two-wire thermal resistor	Four-wire thermal resistor	Channel
Temperature coefficient	• Pt 0.003850 • Pt 0.003916 • Pt 0.003902 • Pt 0.003920 • Pt 0.003851 • Ni 0.006180 • Ni 0.006720 • Ni 0.005000 • Cu 0.00427	Pt 0.003851	Channel

Diagnostics

3.1 Diagnostics using LED display

LED display



① Batch error (red)

Status and error displays

Event (LED)	Cause	Remedy
SF		
On	No configuration or incorrect module plugged in. No load voltage present. There is a diagnostic message.	Check the parameter assignment. Check the load voltage. Evaluate the diagnostics.

5.2 Wiring unused channels of the analog input modules

Rules

Pay attention to the following instructions when wiring unused channels:

- "Disable" unused input channels when setting parameters.
- A disabled channel always returns the value 7FFF_H.
- The module cycle time is halved with the 2AI RTD HF standard module.
- To adhere to the permissible potential differences, you must wire jumpers on the terminal module for the unused channels.

Analog input module	TM connection terminal							
	Channel 0				Channel 1			
	1	2	3	4	5	6	7	8
2AI RTD HF								

5.3 Using the shield connection

Rules

To prevent interference we recommend the following with the analog electronic modules:

- Use shielded wires to the sensors and actuators.
- Lay out the wire shields on the shield connection.
- Connect the shield connection with low impedance to the ground bus.