Properties

1

1.1 2/4AI RTD ST analog electronic module (6ES7134-4JB51-0AB0)

Properties

- 2 inputs (3- and 4-cable connection) / 4 inputs (2-cable connection) for resistance thermometers or resistance measurement
- Input ranges:
  - Resistance thermometers: Pt100 (α = 0,003851); Ni100 (α = 0,00618); resolution 15 bit + sign
  - Resistance measurement: 150 Ω; 300 Ω; 600 Ω, PTC; resolution max. 15 bit + sign
- Isolated from the load voltage L+
- Linearization of the sensor characteristic curves
- Extended temperature range from 0 to 50°C with vertical installation
- supports I&M functions
- compatible with the 2AI RTD ST (6ES7134-4JB50-0AB50). The wiring does not have to be changed. The additional bridges on the terminal module of the 2AI RTD ST (6ES7134-4JB50-0AB50) do not have to be removed.
- Comparison junction for the 2AI TC ST analog electronic module. Channels 0 and 1 have been used as a comparison junction.

3 methods for measuring resistance

- **4-wire connection: Constant current is fed to the resistance thermometers / resistors by means of connections I**C_{+} **and I**C_{-}. The voltage measured at the resistance thermometer / resistor is measured at the connections M+ and M-. This ensures highly accurate measurement results with the four-wire connection.
- **3-wire connection: Constant current is fed to the resistance thermometers / resistors by means of connections I**C_{+} and M-. The voltage arising at the resistance thermometer / resistor is measured at the connections M + and M -. The line resistance of M- is compensated for. This ensures highly accurate measurement results with the three-wire connection.
- **2-wire connection:** Up to 4 resistance thermometers / resistors can be connected simultaneously. No bridges are required on the terminal module. However, you have to expect a loss of accuracy in the measurement results with 2-wire connections

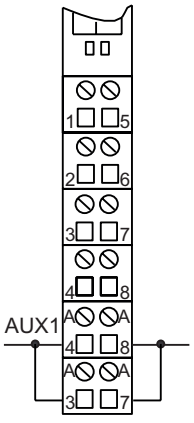
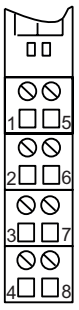
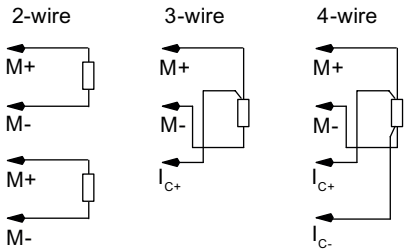
General terminal assignment

Note

Terminals A4, A8, A3, and A7 are only available on certain terminal modules.

2/4AI RTD ST terminal assignment (6ES7134-4JB51-0AB0)				
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_{Cn+}: Constant current line positive, Channel n • I_{Cn-}: 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	M_{2+} / I_{C0+}	**7**	M_{3+} / I_{C1+}	
4	M_{2-} / I_{C0-}	**8**	M_{3-} / I_{C1-}	
A4	AUX1	**A8**	AUX1	
A3	AUX1	**A7**	AUX1	

Usable terminal modules

Usable terminal modules for 2/4AI RTD ST (6ES7134-4JB51-0AB0)		
TM-E15C26-A1 (6ES7193-4CA50-0AA0)	TM-E15C24-01 (6ES7193-4CB30-0AA0)	← Spring terminal
TM-E15S26-A1 (6ES7193-4CA40-0AA0)	TM-E15S24-01 (6ES7193-4CB20-0AA0)	← Screw-type terminal
TM-E15N26-A1 (6ES7193-4CA80-0AA0)	TM-E15N24-01 (6ES7193-4CB70-0AA0)	← Fast Connect
		Connection examples 

Block diagram

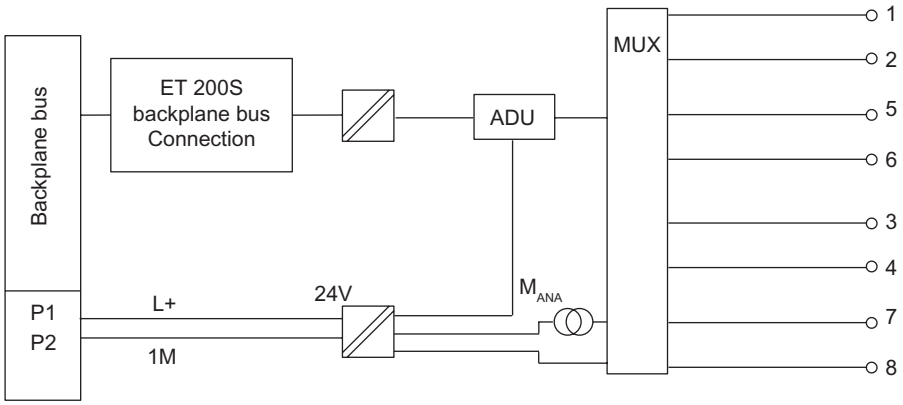


Figure 1-1 2/4AI RTD ST block diagram

2/4AI RTD ST technical specifications (6ES7134-4JB51-0AB0)

Dimensions and weight	
Width (mm)	15
Weight	Approx. 40 g
Module-specific data	
Supports isochronous operation	No
Supports I&M functions	Yes
Number of inputs	2, with 3- and 4-wire connection 4, with 2-wire connection
Cable length	
• Shielded	Max. 200 m
Parameter length	4 bytes, as 6ES7134-4JB50-0AB0 7 bytes, as 6ES7134-4JB51-0AB0
Address space	4 bytes, with 3- and 4-wire connection 8 bytes, with 2-wire connection
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	1.65 mA[1]
• 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

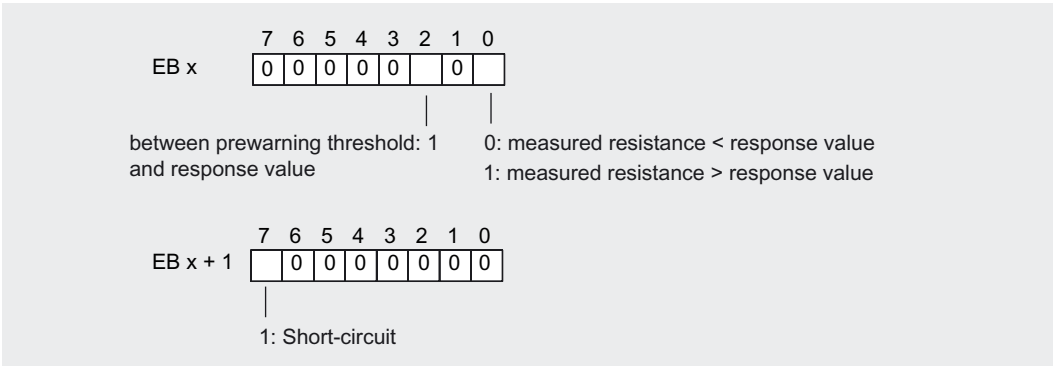
Permissible potential difference		
• Between M_{ANA} and the central grounding point (U_{ISO})	75 VDC / 60 VAC	
Insulation tested	500 VDC	
Current consumption		
• From load voltage L+	Max. 30 mA	
Power dissipation of the module	Typically 0.6 W	
Status, interrupts, diagnostics		
Diagnostics function		
• Group error	Red "SF" LED	
• Diagnostic functions readable	Yes	
Analog value generation		
Measuring principle	Integrative	
Integration and cycle time/resolution per channel:		
• Integration time can be assigned parameters	Yes	
• Interference frequency suppression in Hz	60	50
• Integration time in milliseconds	16,7	20
• Conversion time in ms	67	80
• additional conversion time in ms for diagnosis of wire break in four-wire connections	4	4
• Cycle time in ms	Number of active channels per module x conversion time	
• Resolution (including overshoot range)	Pt100, Ni100/ 15 bits + sign 150 Ω/ 14 bit/ 300 Ω, 600 Ω/ 15 bit PTC[2] / 2 bit	
Suppression of interference, limits of error		
Noise suppression for f = n x (f1 ± 1 %), (f1 = interference frequency)		
• Common-mode interference (U_{SS}) • Series-mode interference (peak interference value < rated value of input range)	Min. 90 dB min. 70 dB	
Crosstalk between the inputs	Min. -50 dB	
Operational limit (in the entire temperature range, with reference to the input range)	± 0,6 %	
Basic error limit (operational limit at 25°C with reference to input range)	± 0,4 %	
Temperature error (with reference to the input range)	±0,005 %/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. 2 MΩ 300 Ω/min. 2 MΩ 600 Ω/min. 2 MΩ PTC min 2 MΩ	
• Resistance thermometer	Pt100/min. 2 MΩ Ni100/min. 2 MΩ	
Permitted input voltage (destruction limit)	Max. 9 V	
Connection of the sensors		
• For measuring resistance – 2-wire connection – 3-wire connection – Four-wire connection	 Yes, Yes, internal compensation of line resistances Yes	
Characteristic curve linearization	Yes, parameters can be assigned for Pt100, Ni100	
Smoothing of the measured values	Yes, can be assigned parameters 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

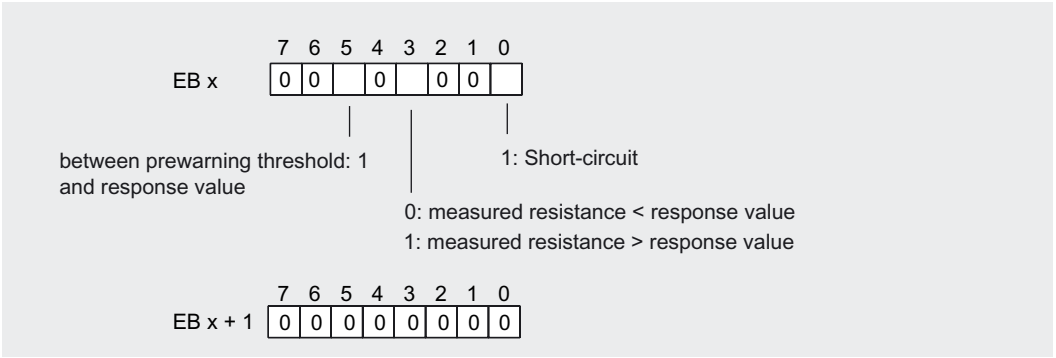
[1] with PTC: max. 1.65 mA

[2]In accordance with VDE 0660 Part 302/303, Type A, no diagnostics for overrun/underrun

- Assignment in the process input image (PII) in the case of SIMATIC S7



- Assignment in the process input image (PII) in the case of SIMATIC S5

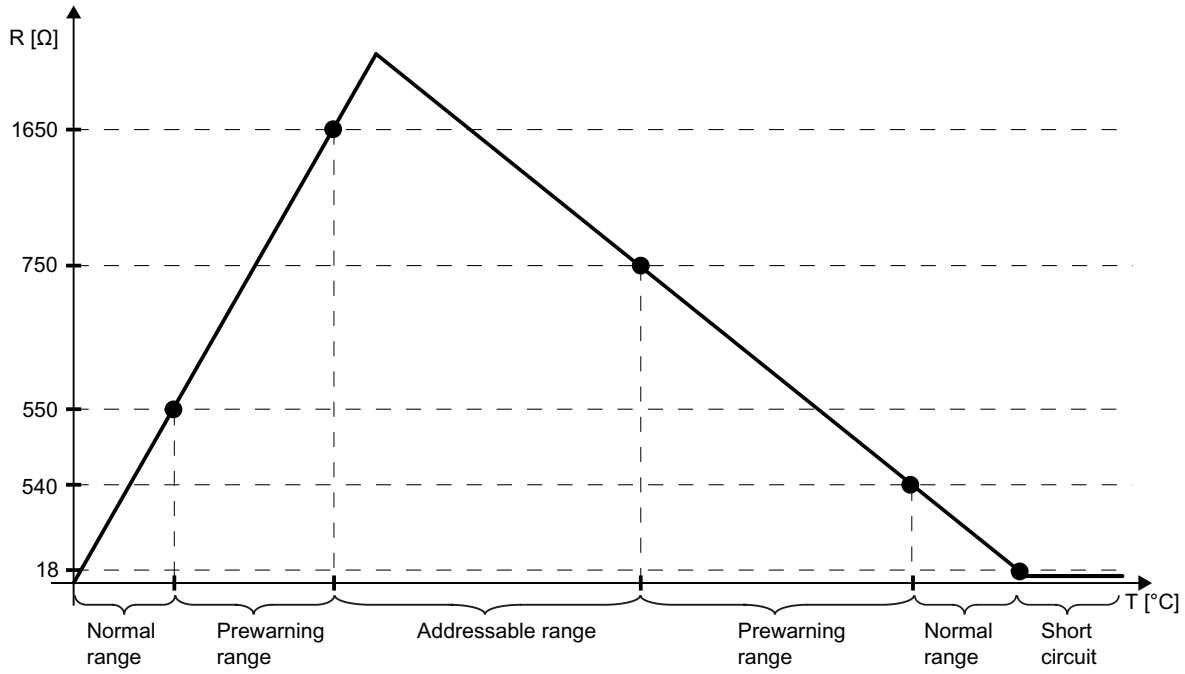


- Notes on programming

NOTICE
Only the bits 0+2 or 3+5 are relevant for the purposes of evaluation in the process input image. You can use bits 0+2 or 3+5 to monitor the temperature of a motor, for example. Bits 0+2 or 3+5 in the process input image does not have a retentive function. Make sure at parameter assignment that motor start-up is controlled (by means of an acknowledgment), for example. Bits 0+2 or 3+5 cannot be set at the same time, but set one after the other. For safety reasons, always evaluate the diagnostic inputs of the 2/4AI RTD ST, because measurement is not possible when the EM is removed, when the power supply to the EM has failed, or in the event of a wire break or short-circuit of the measuring lines.

Example

The diagram below shows the temperature pattern and the switching points belonging to it.



I&M functions

The interface modules identified in the table below (as of order number) can be used to read and write I&M data from the module and for the firmware update:

Interface module	as of order number
IM151-1 STANDARD	6ES7151-1AA05-0AB0
IM151-1 HIGH FEATURE	6ES7151-1BA02-0AB0
IM151-3 PN	6ES7151-3AA22-0AB0
IM151-3 PN HIGH FEATURE	6ES7151-3BA22-0AB0
IM151-3 PN FO	6ES7151-3BB22-0AB0
IM151-7 CPU	6ES7151-7AA20-0AB0

1.2 Compatibility with the predecessor module

Compatible with 2AI RTD ST analog electronic module (6ES7134-4JB50-0AB0)

If you configure the 2/4AI RTD ST (6ES7134-4JB51-0AB0) as predecessor module (6ES7134-4JB50-0AB0), then it behaves as if it is compatible.

The following technical specifications of the 2/4AI RTD ST (6ES7134-4JB51-0AB0) have changed values:

2/4AI RTD ST technical specifications 6ES7134-4JB51-0AB0			**configured as 6ES7134-4JB50-0AB0**	
Conversion time in ms (per module)	60 Hz	50 Hz	60 Hz	50 Hz
	67 ms	80 ms	67 ms	80 ms

Diagnostics data record 1 (DS1)

2AI RTD ST (6ES7134-4JB50-0AB0) plugged in:

- Length of the DS1: 16 bytes
- Number of channels specified in the DS1: 2

2/4AI RTD ST (6ES7134-4JB50-0AB0) plugged in to compatibility mode:

- Length of the DS1: 24 bytes
- Number of channels specified in the DS1: 4

Measuring ranges for measuring resistance

With 2/4AI RTD ST (6ES7134-4JB51-0AB0) there is no undershoot range and underflow with the measuring ranges for the resistors 150 Ω, 300 Ω and 600 Ω.

2/4AI RTD STANDARD with IM151-1 BASIC, IM151-1 COMPACT or IM151-1 FO STANDARD

If you use the electronics module 2/4AI RTD STANDARD with the interface modules IM151-1 BASIC, IM151-1 COMPACT or IM151-1 FO STANDARD, then the electronics module can be operated only as 2AI RTD STANDARD.

Parameters

2

2.1 Parameters

Table 2- 1 Parameters for the 2/4AI RTD ST analog electronic module

Parameter	Range of values	Default setting	Applicability
Group diagnostics	• locking • enabling	locking	Module
Diagnostics: overflow/underflow	• locking • enabling	locking	Module
Diagnostics: Wire break	• disable[1] • Enable	Disable	Channel
Smoothing	• None • Weak • Medium • Strong	None	Channel
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	4-wire thermal resistor	Channel
Measurement range	• 150 Ω • 300 Ω • 600 Ω • PTC • Pt100 Climatic • Ni100 Climatic Range • Pt100 Standard • Ni100 Standard	Pt100 Standard	Channel
[1] Wire break diagnostic is disabled if - type of measurement = "deactivated" or measuring range = "PTC" was assigned.			