MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

SIEMENS

6ES7134-4JD00-0AB0

FOUR-CHANNEL THERMOCOUPLE INPUT MODULE

Used with the applicable SIMATIC ET 200S 4AI TC ST configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: Siemens Analog electronic module 4AI TC ST (6ES7134-4JD00-0AB0), A5E02515312-01, October 2009

SIEMENS

SIMATIC

ET 200S distributed I/O
Analog electronic module 4AI TC ST
(6ES7134-4JD00-0AB0)

Manual

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10/2009
A5E02515312-01

Properties

1

1.1 Analog electronic module 4AI TC ST (6ES7134-4JD00-0AB0)

Properties

- 4 inputs for thermocouple or voltage measurement
- Input ranges:
  - Voltage measurement: ± 80 mV, resolution 15 bits + sign
  - Thermocouples: Type E, N, J, K, L, S, R, B, T, resolution 15 bits + sign
- Isolated from the load voltage L+
- Linearization of the sensor characteristic curves
- Permitted common-mode voltage 5 V AC_{PP}
- Extended temperature range from 0 to 50°C with vertical installation
- supports I&M functions

Note

The 4AI TC ST electronic module can replace the 2AI TC ST module with limitations. For additional information see the Product Information on the 4AI TC ST manual.

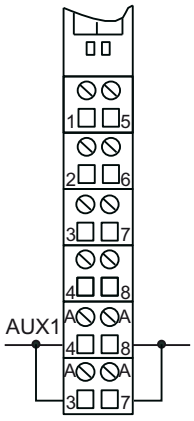
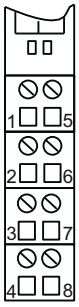
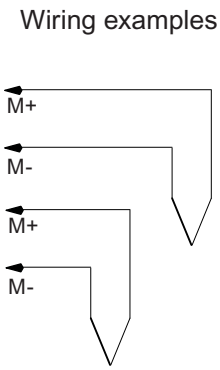
General terminal assignment

Note

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

Terminal assignment for 4AI TC ST (6ES7134-4JD00-0AB0)				
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 • AUX1: Protective-conductor terminal or potential bus (freely usable up to 230 VAC)
2	M_{0-}	**6**	M_{1-}	
3	M_{2+}	**7**	M_{3+}	
4	M_{2-}	**8**	M_{3-}	
A4	AUX1	**A8**	AUX1	
A3	AUX1	**A7**	AUX1	

Usable terminal modules

Usable terminal modules for 4AI TC ST (6ES7134-4JD00-0AB0)		
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
		

Block diagram

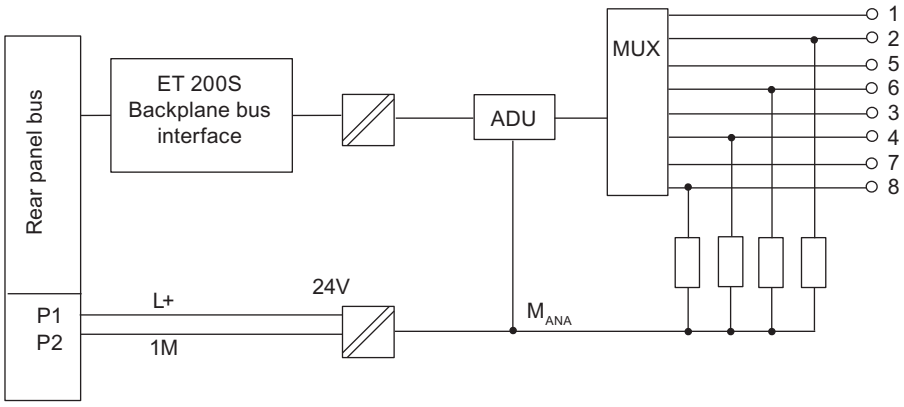


Figure 1-1 Block diagram of the 4AI TC ST

4AI TC ST technical data (6ES7134-4JD00-0AB0)

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	4
Cable length	
• Shielded	Max. 50 m
Parameter length	7 bytes
Address space	8 bytes
Voltages, currents, potentials	
Rated load voltage L+ (from the power module)	24 VDC
• Reverse polarity protection	Yes
Electrical isolation	
• Between the channels and backplane bus	Yes
• Between the channels and load voltage L+	Yes
• Between the channels	No
• Between the channels and 24 V supply voltage	Yes
Permissible potential difference	
• Between the inputs and the central grounding point (U_{iso})	75 VDC / 60 VAC
• between the inputs	5 V AC_{PP}
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 time/conversion 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	55	65
• Additional conversion time for wire break check diagnostics in ms	20	20
• Cycle time in ms	Number of active channels per module x conversion time	
• Resolution (including overrange)	15 bits plus sign	
Suppression of interference, limits of error		
Noise suppression for f = n x (f1 ± 1 %), (f1 = interference frequency)		
• Common-mode interference (U_{SS}) • Common mode interference (peak value of interference < rated value of input range)	Min. 90 dB Min. 70 dB	
Crosstalk between the inputs	Min. -50 dB	
Operational limit (over the entire temperature range, with reference to the input range)[1]	± 0,6 %	
Basic error limit (operational limit at 25°C with reference to input range)[1]	± 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 steady state at 25°C with reference to input range)	± 0,05 %	

Data for selecting a sensor		
Input range (rated value)/input resistance		
• Voltage	± 80 mV/min. 1 MΩ	
• Thermocouple	Type E, N, J, K, L, S, R, B, T/min. 1 MΩ	
Permitted input voltage (destruction limit)	± 10 V, continuous	
Connection of the sensors		
• For measuring voltage	Supported	
Characteristic curve linearization	Yes, can be assigned parameters for Type E, N, J, K, L, S, R, B, T as per IEC 584	
Temperature compensation		
• Internal temperature compensation	Not supported	
• External temperature compensation by looping a compensating box into the measuring circuit	Possible, one external compensating box per channel	
• External compensation by means of temperature value obtained at an analog module of the same ET 200S station	Yes	
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] For Type N: From -150 C, Type B: from 200 °C, Type T: from -230 C		

Compensation of thermocouples with a compensating box

In addition to the 4AI TC ST electronic module (see Table "Technical data 4AI TC ST (6ES7134-4JD00-0AB0)" in this chapter) you must also take the accuracy of the compensating box into account.

2.2 Parameter description

Group diagnostics

You can generally enable/disable the module diagnostic function by setting this parameter.

- Enable: Parameterizable diagnostics, parameter assignment errors and internal errors will be reported.
- Disable: Parameter assignment errors and internal errors will be reported.

Smoothing

The individual measured values are smoothed by digital filtering. The smoothing can be adjusted in four steps, in which the smoothing factor k multiplied with cycle time of the electronic module equals the time constant of the smoothing filter. The greater the smoothing, the greater the time constant of the filter.

The following diagrams show the step response with the various smoothing factors in relation to the number of module cycles.

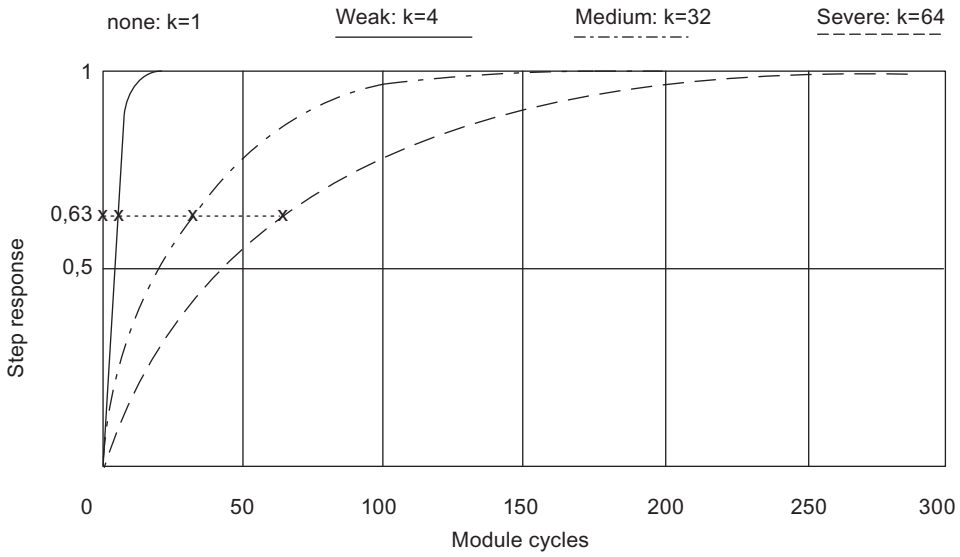


Figure 2-1 Smoothing with the 4AI TC ST

Compensation by means of a resistance thermometer at the 2AI RTD

If thermocouples that are connected to the inputs of the 4AI TC ST have the same reference junction, compensate by means of a 2AI RTD.

For both channels of the 4AI TC ST module, you can select "RTD" or "None" as the reference junction. If you select "RTD," the same reference junction (RTD channel) is always used for both channels.

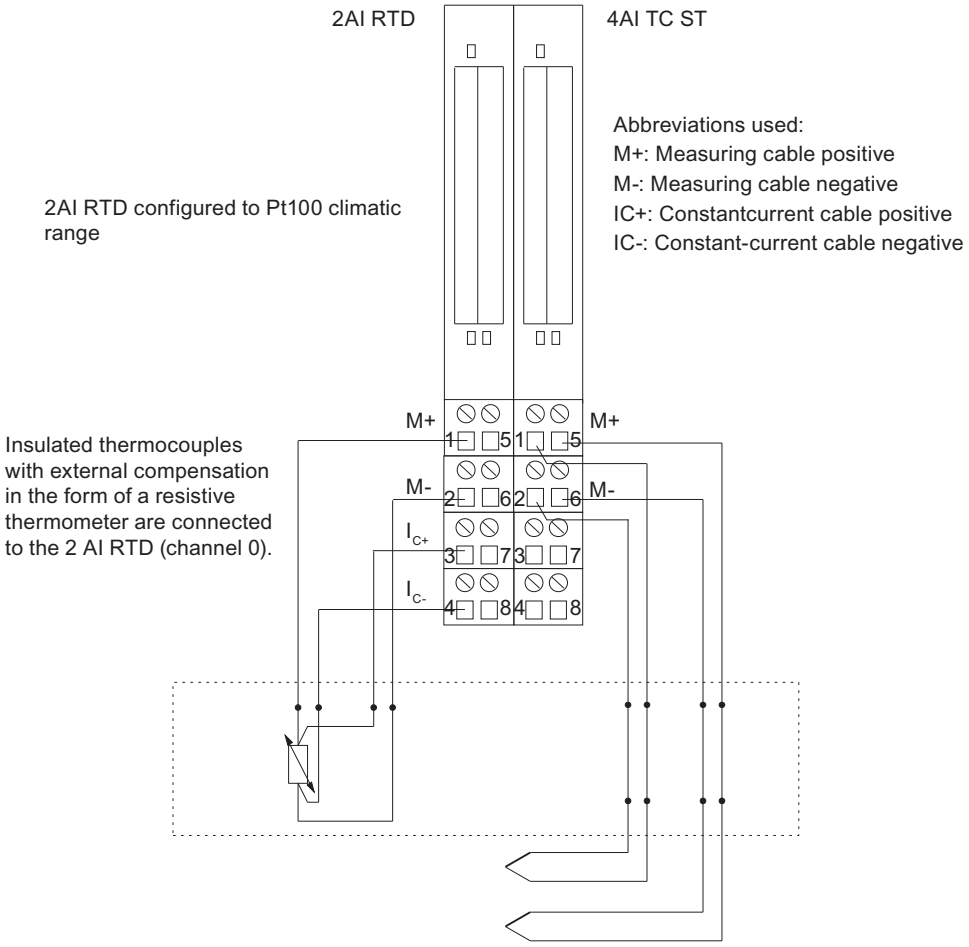


Figure 5-1 Compensation by means of the 2AI RTD

Note

In the case of 2/4AI RTD ST analog electronic module, use the channels 0 and 1 for compensation.

Parameter assignment of the reference junction for the 4AI TC ST and the interface module

You set the reference junctions for the 4AI TC ST electronic modules by means of the following parameters:

Table 5- 2 Reference junction parameters

Parameters	Module	Range of values	Explanation
Reference junction slot	IM 151	None, 2 to 12 (IM151-1 BASIC) None, 2 to 13 (IM151-1 COMPACT) none, 2 to 63 (IM151-1 HIGH FEATURE, IM151-1 STANDARD, IM151-1 FO STANDARD)	A slot with the channel for measuring the reference temperature (determining the compensation value) can be assigned with this parameter.
Reference junction input	IM 151	RTD at Channel 0 RTD at Channel 1	This parameter can be used to set the channel (0/1) for measuring the reference temperature (calculation of the compensation value) for the assigned slot
Reference junction E0, E1, E2 and E3	AI TC	None, RTD	This parameter allows you to enable the use of the reference junction.
Reference junction number	AI TC	1	With this parameter, you assign the reference junction (1) containing the reference temperature (compensation value).

Example of assigning parameters of reference junctions

Setup: For simplification, only RTD and TC modules are shown in the following figure:

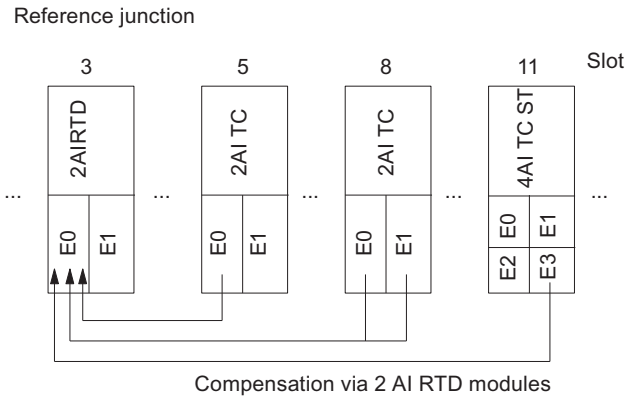


Figure 5-2 Example of assigning parameters of reference junctions

Relevant parameters to be set for the interface module:

Parameters	Value
Reference junction slot	3
Reference junction input	RTD at Channel 0

Relevant parameters to be set for the 2AI TC/ 4AI TC ST:

Slot	Parameters	Value
5 (2AI TC)	Reference junction E0	RTD
	Reference junction E1	None
	Reference junction number	1
	Type/range of measurement E0	TC-EL Type...
	Type/range of measurement E1	(any)
8 (2AI TC)	Reference junction E0	RTD
	Reference junction E1	RTD
	Reference junction number	1
	Type/range of measurement E0	TC-EL Type...
	Type/range of measurement E1	TC-EL Type...
11 (4AI TC ST)	Reference junction E0	None
	Reference junction E1	None
	Reference junction E2	None
	Reference junction E3	RTD
	Reference junction number	1
	Type/range of measurement E0	(any)
	Type/range of measurement E1	TC-EL Type...

Non-isolated thermocouples

When you use non-isolated thermocouples, you must comply with the permitted common-mode voltage.