

AMIKON TECHNICAL DOCUMENTATION

Installation Instructions

Siemens 6ES7331-7KF01-0AB0

Configurable Analog Input Module

MODULE	INPUTS	REFERENCE	CONNECTOR
SM 331	8 analog	Historical edition	20-pin

For qualified personnel only. Isolate the equipment and follow the complete manufacturer and site safety procedures. This reference does not replace the approved project design or the full installation manual.

01

PREPARATION AND WIRING CHECKS

- Check the exact module identity before using the twenty-terminal wiring diagram.
- Match range position D to two-wire current inputs and C to four-wire current inputs.
- Reserve the paired resistance channel for current injection; observe the two-wire load-isolation exception.
- Select the specified thermocouple compensation arrangement before temperature measurement.
- Follow original page 187 for unused-input, COMP and two-wire diagnostic termination conditions.

02

ORIGINAL WIRING REFERENCE

Original source PDF pages 183, 187, 188, 190, 191. The following pages retain the original Siemens drawings and printed page numbers.

[Amikon-hosted original Siemens manual pages](#)

Terminal Connection Diagram

Figure 4-22 shows the module view and the block diagram of the SM 331; AI 8 × 12 Bit. The input resistances depend on the measuring range selected (see Technical Specifications). You will find the detailed technical specifications of the analog input module SM 331; AI 8 × 12 Bit on the following page.

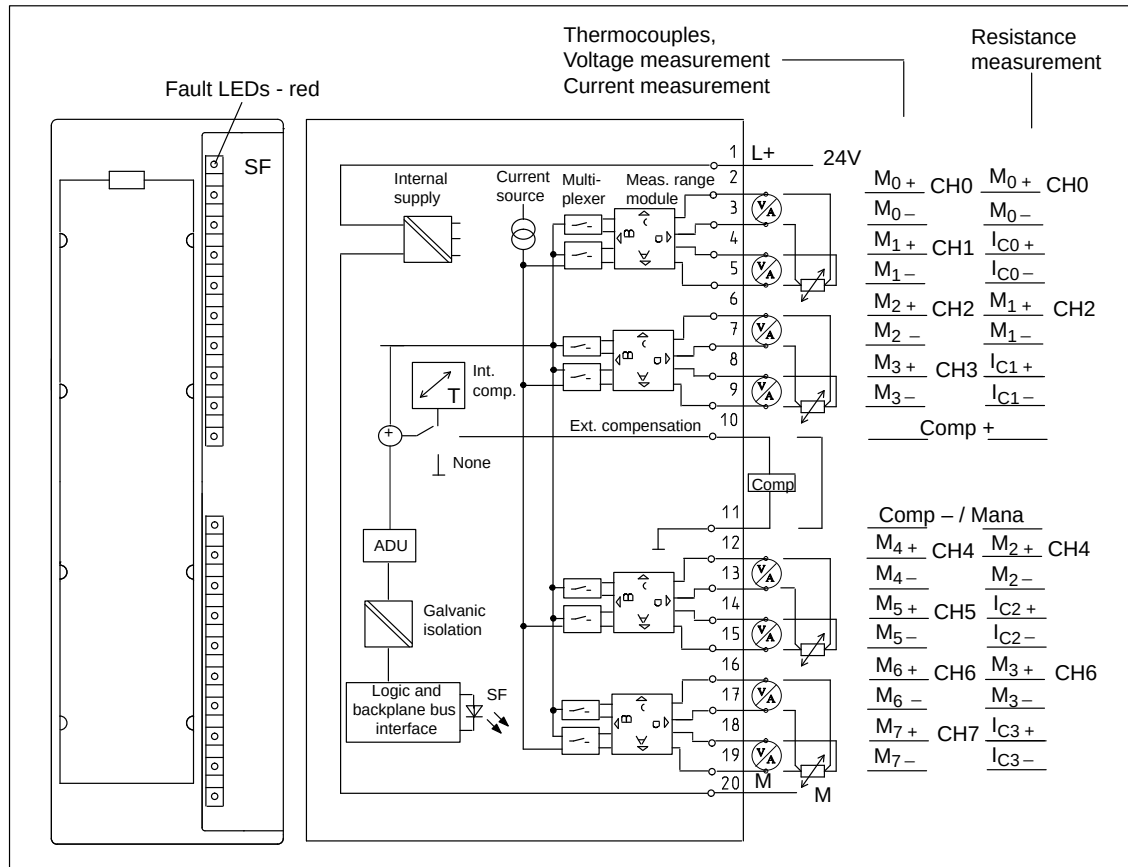


Figure 4-22 Module View and Block Diagram of the Analog Input Module SM 331; AI 8 × 12 Bit

Resistance Measurement

If you use the resistance measurement method, there is only one channel per channel group. The “2nd” channel of each group is used for current injection (I_C).

The measured value is obtained by accessing the “1st” channel of the group. The “2nd” channel of the group has the default carry value “7FFF_H”.

Unused Input Channels

You must short-circuit unused channels of the analog input module SM 331; AI 8 × 12 Bit and you should connect them to M_{ANA} . In this way, you obtain an optimum interference immunity for the analog input module. Also deactivate the unused channels using *STEP 7* (see Section 4.3.4), in order to reduce the module's cycle time.

If you do not use the COMP input, you must short-circuit it also.

Since configured inputs can remain unused, because of the channel group generation, you should note the following points for these inputs:

- Measuring range 1 to 5 V: Connect the unused input in parallel with a used input of the same channel group.
- Current measurement, 2-wire transducer: There are two ways to use the channels:
 - a) Leave the unused input open and do not enable diagnostics for this channel group. If diagnostics is enabled, the analog module triggers a diagnostics interrupt once and the group fault LED of the analog module flashes.
 - b) Connect a 1.5 to 3.3 k Ω resistance to the unused input. You may then enable diagnostics for this channel group.
- Current measurement 4 to 20 mA, 4-wire transducer: Connect the unused input in series with an input of the same channel group.

Special Feature of De-Activated Input Channels

If you de-activate **all** input channels and enable diagnostics when parameterizing the analog input module SM 331; AI 8 × 12 Bit, the analog input module does **not** indicate that the “external auxiliary voltage” is missing.

Measuring Range Modules

Some of the parameters of the analog input module SM 331; AI 8 × 12 Bit can be assigned directly on the module with measuring range modules.

The measuring range modules can be set to the following positions: "A", "B", "C" and "D".

They are set to the "B" position in the factory.

Tables 4-30 to 4-33 in Section 4.4.3. tell you which setting you have to select for which measuring method and measuring range. The settings for the various measuring ranges are also printed on the module.

Default Settings for Measuring Range Module

In the individual measuring range module positions, you can use the following measuring methods and measuring ranges without re-initializing the analog input module SM 331; AI 8 × 12 Bit with *STEP 7*:

Table 4-29 Default Settings of the Analog Input Module SM 331; AI 8 × 12 Bit Using Measuring Range Modules

Measuring Range Module Setting	Measuring Method	Measuring Range
A	Voltage	± 1000 mV
B	Voltage	± 10 V
C	Current, 4-wire transducer	4 to 20 mA
D	Current, 2-wire transducer	4 to 20 mA

These measuring methods and measuring ranges are the default settings on the module. You only have to insert the measuring range module to the required setting (see Section 4.3).

Special Feature of Process Interrupts

You can set process interrupts in *STEP 7* for the 1st and 2nd channel group. Note that a process interrupt is set only for the 1st channel of the channel group, i.e. for channel 0 or channel 2, respectively.

Measuring Ranges for Voltage Measurements

Table 4-30 shows all of the measuring ranges or the sensor type for voltage measurements, as well as the relevant measuring range module settings.

Table 4-30 Measuring Ranges for Voltage Measurement

Measuring Method Selected	Description	Measuring Range (Type of Sensor)	Measuring Range Module Setting
Voltage	You will find the digitized analog values in Section 4.1.2, Tables 4-4 and 4-6 in the voltage measuring range.	+/- 80 mV +/- 250 mV +/- 500 mV +/- 1000 mV	A
		+/- 2,5 V +/- 5 V 1 to 5 V +/- 10 V	B
Thermocouples + internal compensation (thermoelectric voltage measurement)	You will find the digitized analog values in Section 4.1.2, Table 4-4 in the voltage measuring range ± 80 mV.	Typ N [NiCrSi-NiSi] Type E [NiCr-CuNi] Type J [Fe-CuNi] Type K [NiCr-Ni] Type L [Fe-CuNi]	A
Thermocouples + external compensation (thermoelectric voltage measurement)	You will find the digitized analog values in Section 4.1.2, Table 4-4 in the voltage measuring range ± 80 mV.	Type N [NiCrSi-NiSi] Type E [NiCr-CuNi] Type J [Fe-CuNi] Type K [NiCr-Ni] Type L [Fe-CuNi]	A

Measuring Ranges for Current Measurement

Table 4-31 lists all of the measuring ranges for current measurement with 2-wire and 4-wire transducers, as well as the relevant measuring range module settings.

Table 4-31 Measuring Ranges for 2-Wire and 4-Wire Transducers

Measuring Method Selected	Description	Measuring Range	Measuring Range Module Setting
2-wire transducers	You will find the digitized analog values in Section 4.1.2, Table 4-6 in the current measuring range.	4 to 20 mA	D
4-wire transducers	You will find the digitized analog values in Section 4.1.2, Table 4-5 and 4-6 in the current measuring range.	+/- 3.2 mA +/- 10 mA 0 to 20 mA 4 to 20 mA +/- 20 mA	C

Measuring Ranges for Resistance Measurements

Table 4-32 lists all of the measuring ranges for resistance measurements and the relevant measuring range module settings.

Table 4-32 Measuring Ranges for Resistance Measurements

Measuring Method Selected	Description	Measuring Range	Measuring Range Module Setting
Resistance, 4-wire connection	You will find the digitized analog values in Section 4.1.2, Table 4-7, under the resistance measuring range.	150 Ohm 300 Ohm 600 Ohm	A

Measuring Ranges for Temperature Measurement

Table 4-33 lists the measuring ranges (or the sensor type) and the measuring range module settings for temperature measurement. The characteristics are linearized:

- for Pt 100 according to DIN IEC 751
- for Ni 100 to IEC DIN 43760
- for thermocouples to DIN 584, type L to DIN 43710.

Table 4-33 Measuring Ranges for Temperature Measurement

Measuring Method Selected	Description	Measuring Range (Type of Sensor)	Measuring Range Module Setting
Thermocouples + linearization, internal compensation (thermal e.m.f. measurement)	The digitized analog values are listed in Section 4.1.2, Tables 4-12 to 4-15, under the temperature range.	Type N [NiCrSi-NiSi] Type E [NiCr-CuNi] Type J [Fe-CuNi] Type K [NiCr-Ni] Type L [Fe-CuNi]	A
Thermocouples + linearization, external compensation (thermal e.m.f. measurement)	The digitized analog values are listed in Section 4.1.2, Tables 4-12 to 4-15, under the temperature range.	Type N [NiCrSi-NiSi] Type E [NiCr-CuNi] Type J [Fe-CuNi] Type K [NiCr-Ni] Type L [Fe-CuNi]	A
Resistance-type thermometer + linearization, 4-wire connection (temperature measurement)	You will find the digitized analog values in Section 4.1.2, Tables 4-8 and 4-9, under the temperature range.	Pt 100 standard range, climate range Ni 100 standard range, climate range	A