AMIKON TECHNICAL DOCUMENTATION

Installation Instructions

Siemens 6ES7331-7NF10-0AB0

Eight-Channel Analog Input Module

MODULE	INPUTS	RESOLUTION	CONNECTOR
SM 331	8 analog	16 bit	40-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

- Match the 40-pin terminal allocation to the selected voltage or current measurement.
- Provide the separate supply required for two-wire current transmitters.
- Use the documented equipotential bonding and two-channel isolation arrangement.
- Set unused channels to disabled and apply the range-specific terminations on original page 272.
- Check channel mode, settling time and ET 200M interface version before commissioning.

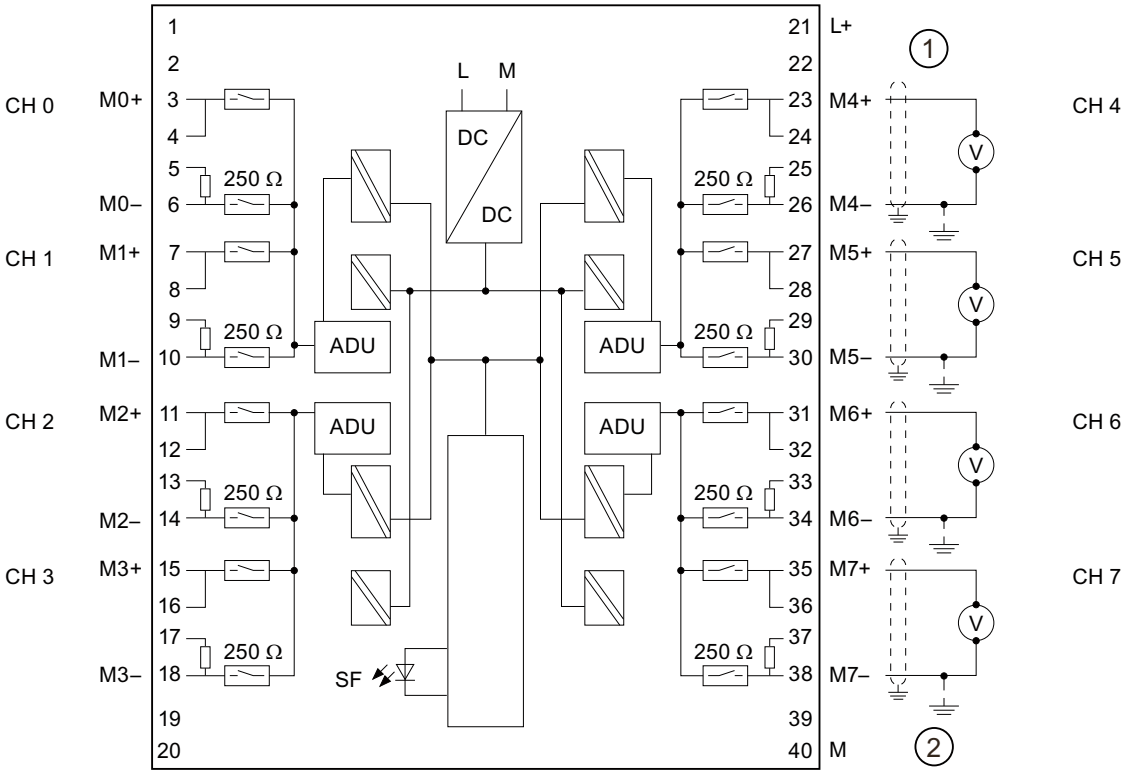
02 ORIGINAL WIRING REFERENCE

Original source PDF pages 265, 266, 272, 273. The following pages retain the original Siemens drawings and printed page numbers.

Siemens original documentation and product reference

Wiring: Voltage and current measurement

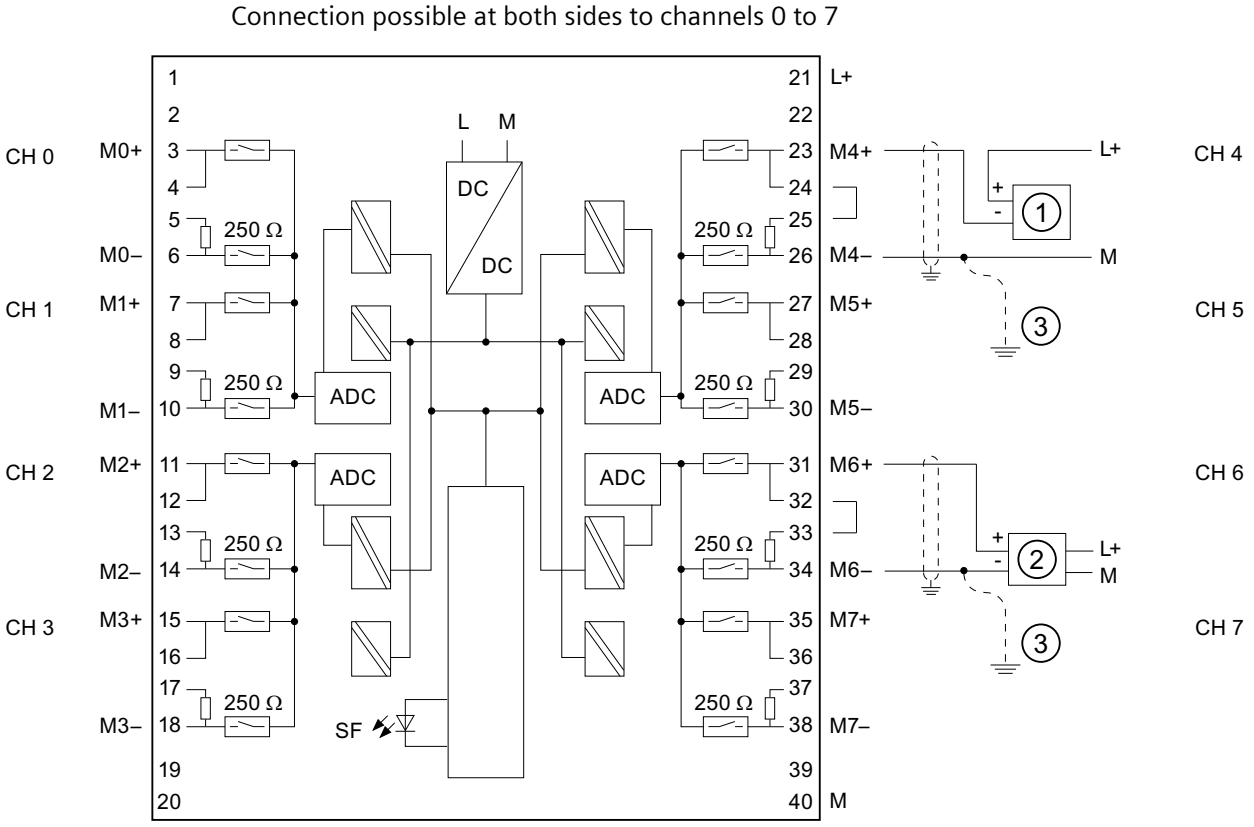
Connection possible at both sides to channels 0 to 7



① Connection for voltage measurement
② Equipotential bonding

Figure 6-3 Wiring and block diagram

Wiring: 2-wire and 4-wire transducer



① 2-wire transducer
② 4-wire transducer
③ Equipotential bonding

Figure 6-4 Wiring and block diagram

Technical specifications

Technical specifications	
Dimensions and weight	
Dimensions W x H x D (mm)	40 x 125 x 117
Weight	ca. 272 g
Module-specific data	
Supports parameter reassignment in RUN	Yes
Response of non-programmed inputs	Return the process value which was valid before configuration
Supports isochronous mode	no
Number of inputs	8
Cable length • shielded	 max. 200 m
Voltages, currents, electrical potentials	
Rated electronics supply voltage L +	24 V DC

4-channel operating mode

In this mode, the module does not change between the channels of the groups. The four ADCs of the module simultaneously convert the channels 0, 2, 4 and 6.

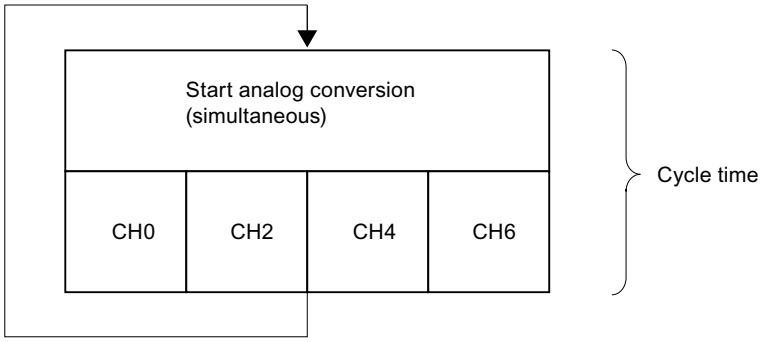


Figure 6-6 4-channel mode cycle time

Module cycle time

The converted value settles to 100% within 80 ms and is updated every 10 ms when 4-channel mode is set. The channel and module cycle times are always identical, because the module does not change between the channels of a group: 10 ms.
Channel conversion time = channel cycle time = module cycle time = 10 ms

Unused channels

Set the "disabled" value at the "measuring method" parameter for unused channels. This setting reduces module cycle times.

As certain programmed inputs may remain unused due to the channel group configuration in 8-channel mode, make allowances for the special features of these inputs outlined below to activate the diagnostics functions at the channels being used:

- **Measuring range 1 V to 5 V:** wire the used input and unused input of the same channel group in parallel.
- **Current measurement, 4 to 20 mA:** Connect unused input in series to the input of the same channel group. A shunt resistor must be connected for each programmed and unused channel.
- **Other measuring ranges:** Short-circuit the plus and minus inputs of the channel.

Line continuity check

The wire break test is available for the voltage measuring range 1 to 5 V and the current measuring range 4 to 20 mA.

When there is a configured measuring range of 1 to 5 V or 4 to 20 mA and the wire break test is **activated**, the analog input module reports a wire break in the diagnostics when underflow (-32768) is reached.

- The module also triggers a diagnostic interrupt if this function is enabled in the program.
- A wire break can only be signaled by means of the lit SF LED and the diagnostic bytes must be evaluated in the user program if diagnostic interrupts are disabled.

Under the following circumstances, wire-break detection can take up to 2 s:

- If a wire break occurs during voltage measurement.
- If a wire break occurs on the front-connector jumpers from shunt (250 Ω) to the inputs during current measurement.

The measured value can go through the entire valid value range during the wire break detection.

When there are configured measuring ranges ± 10 V, ± 5 V, 1 to 5 V or 4 to 20 mA, the wire break test is **not activated** and a diagnostic interrupt is enabled, the module triggers a diagnostic interrupt when the underflow is reached. The module detect the underflow when the input signal is below 0.296 V or 1.185 mA.

Overflow, underflow and hardware interrupt limits

The limits in diagnostics response to overflow and underflow in certain measuring ranges differ compared to the listed ranges starting at the chapter*Analog value representation for analog input channels* of the manual. In certain situations the numerical methods of the module software used to evaluate the process variables do not return values up to 32511.

Do not set any hardware interrupt limits higher than the lowest possible overflow or underflow response limits. End of cycle interrupt starting at the chapter *Analog value representation for analog input channels*.

End of cycle interrupt

You can synchronize a process with the conversion cycle of the module by enabling the end of cycle interrupt. The interrupt is set when enabled channels have been converted.

The table below shows the contents of the 4 bytes of additional OB40 information during process or end of cycle interrupts.

Content of the 4 bytes of additional information		27	26	25	24	23	2^2	2^1	2^0	Byte
Special analog flags	2 bits per channel to identify the range									
	High limit exceeded at channel	7	6	5	4	3	2	1	0	0
	Low limit exceeded at channel	7	6	5	4	3	2	1	0	1
	End of cycle event						X			2
	Free bit									3

Operation of the module on the ET 200M Distributed IO devices

Operation of SM 331; AI 8 x 16 Bit on ET 200M requires one of the following IM 153 x:

- IM 153-1; as of 6ES7153-1AA03-0XB0, E 01
- IM 153-2; as of 6ES7153-2AA02-0XB0; E 05
- IM 153-2; as of 6ES7153-2AB01-0XB0; E 04

Programming restrictions when operating SM 331; AI 8 x 16 Bit on PROFIBUS masters which only support DPV0

Certain parameters are not supported when operating an electrically isolated SM 331; AI 8 16 Bit analog input module on an ET200M PROFIBUS slave system in combination with a PROFIBUS master which is not an S7 master. Non-S7 masters do not support hardware interrupts. All parameters associated with these functions are disabled for this reason. This includes hardware interrupt enable, hardware restrictions and end the enabling of cycle interrupts. All other parameters are allowed.