MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

SIEMENS

6ES7153-4AA01-0XB0

ET 200M INTERFACE MODULE

Used with the applicable PLC System configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: Siemens official manufacturer documentation

6.11.2 Programmable parameters

Adjustable parameters

For general information on programming analog modules, refer to the section titled Programming analog modules (Page 244).

Parameters	Range of values	Default	Type of parameter	Scope
Diagnostics • Group diagnostics • With wirebreak monitoring	 Yes/no Yes/no	 No No	Static	Channel
Enable • Diagnostic interrupt • Hardware interrupt when limit exceeded • Auto-calibration	 Yes/no Yes/no Yes/no	 No No Yes	Dynamic	Module
• Temperature unit	Degrees Celsius; degrees Fahrenheit; Kelvin	degrees Celsius	Dynamic	Module
• Interference frequency suppression	400 Hz; 60 Hz; 50 Hz; 10 Hz	50 Hz	Dynamic	Module
Measurement • Measurement type	 disabled TC-IL thermocouple (linear, internal comparison) TC-EL thermocouple (linear, external comparison) TC-L00C thermocouple (linear, 0 °C reference temperature) TC-L50C thermocouple (linear, 50 °C reference temperature)	TC-IL:	Dynamic	Channel
• Measuring range	See chapter Measurement types and measuring ranges (Page 352)	Type K		
• Response to open thermocouple	Overflow; underflow	Overflow	Dynamic	Channel
• Smoothing	None Low Average High	None	Dynamic	Channel
• External reference junction	Local thermoresistor	Local thermoresistor	Dynamic	Channel
• Temperature coefficient	0.003850 (IPTS-68) 0.003850 (ITS-90) 0.003916 0.003902 0.003920 0.003910 (GOST)	0.003850 (IPTS-68)	Dynamic	Module
Hardware-interrupt trigger • High limit • Low limit	 32511 to -32512 From - 32512 to 32511	 32767 -32768	Dynamic	Channel

6.11.3 Additional information relating to SM 331; AI 6 x TC

Using the module

The following hardware and software requirements must be met to use the SM 331; AI 6 x TC isolated S7-300 analog input module:

- If the module is to be used centrally in S7-300, all CPUs must have firmware version 2.6 or higher (with the exception of 6ES7318-2AJ00-0AB0).
- If the module is to be used on a distributed basis in ET 200M, the following IM 153 modules are suitable:
  6ES7153-1AA03-0XB0, product version 12 or higher
  6ES7153-2BA02-0XB0
  6ES7153-2BA82-0XB0
  6ES7153-4BA00-0XB0
  6ES7153-4AA01-0XB0
- A GSD file must be used if the module is part of a distributed installation and controlled by a master produced by a third-party manufacturer with DPV1 support (operation with DPV0 is not supported). The GSD file for the selected IM 153 is available for download from the Internet (http://www.siemens.com/automation/service&support).
- STEP 7 V5.4 SP4 (HSP0158) or higher
- For user calibration:
  SIMATIC PDM V6.0 + SP3 + HF2 (HSP0158) or PDM V6.0 + SP4 or higher
  and EDD for ET 200M "DP_IOSystem_Siemens_ET200M_Module.Device" V1.1.10 or higher.

Unused channels

Set the "disabled" value at the "measurement type" parameter for unused channels. Unused channels should also be short-circuited at the connection plug.
Effect of this measure:

- You prevent measurement errors at the unused channels.
- You suppress diagnostic messages from the unused channels.

Short-circuit to M or L

The module does not suffer any damage if you short-circuit an input channel to M or L. The channel continues to output valid data and does not report a diagnostics event.

Special features of channel groups with respect to hardware interrupts when limit is exceeded

You can set the high and low limits triggering hardware interrupts separately for each channel in STEP 7.

Hardware interrupt

The table below shows the contents of the 4 bytes of additional OB40 information during a hardware interrupt.

Content of the 4 bytes with additional information		**2^7**	**2^6**	**2^5**	**2^4**	**2^3**	**2^2**	**2^1**	**2^0**	**Byte**
Special analog	**2 bits per channel to identify the range**									
	High limit exceeded at channel			5	4	3	2	1	0	0

Content of the 4 bytes with additional information		2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Byte
flags	Low limit undershot at channel			5	4	3	2	1	0	1
	Free byte									2
	Free byte									3

Startup characteristics and compensation time monitoring (watchdog) for external cold spot compensation via remote thermoresistor

When the module starts up, all inputs report an overflow (32767). Once a compensation value has been received via data record 2, the module starts to read the TC inputs and to output correct data. If the module does not receive any data from data record 2 within 5 minutes of startup, a reference channel fault is reported in the standard channel diagnostics data. If enabled, a diagnostic interrupt is sent.

The module features time monitoring (watchdog) set to 5 minutes, which is reset when a new compensation value is received via data record 2. If the module does not receive any data from data record 2 within the 5 minute interval set for the time-monitoring function in normal operation, a reference channel fault is reported in the standard channel diagnostics data. If enabled, a diagnostic interrupt is sent.

Internal calibration while the process is running

The module can compensate most of the internal temperature-drift errors. Internal calibration while the process is running is always executed after startup, when parameters are reassigned, and when the power is switched on/off. Once the relevant parameters have been activated, internal calibration while the process is running is also performed if the ambient temperature at the module changes by 5 degrees Celsius. Enabling calibration while the process is running interrupts the module I/O cycle until calibration is complete. The duration of the interruption depends on the programmed interference frequency; see the table below for information about this relationship.

Duration of interruption caused by calibration while the process is running

Interference frequency	Duration of interruption
10 Hz	600 ms
50 Hz	120 ms
60 Hz	100 ms
400 Hz (100 Hz)	60 ms

Calibration while the process is running should be activated to ensure measuring accuracy over a long period of time. Some applications do not permit an interruption of the I/O cycle. In such cases, you can disable the parameter for calibration while the process is running, although this will result in less accurate measurements over time. The parameter for calibration is activated as standard while the process is running.

Compensation of the reference junction

If the measuring point is exposed to a different temperature than the free ends of the thermocouple (connection point), a voltage known as the thermoelectric voltage arises between the free ends.

The level of the thermoelectric voltage depends on the difference between the temperature at the measuring point and that at the free ends, as well as on the type of materials combined