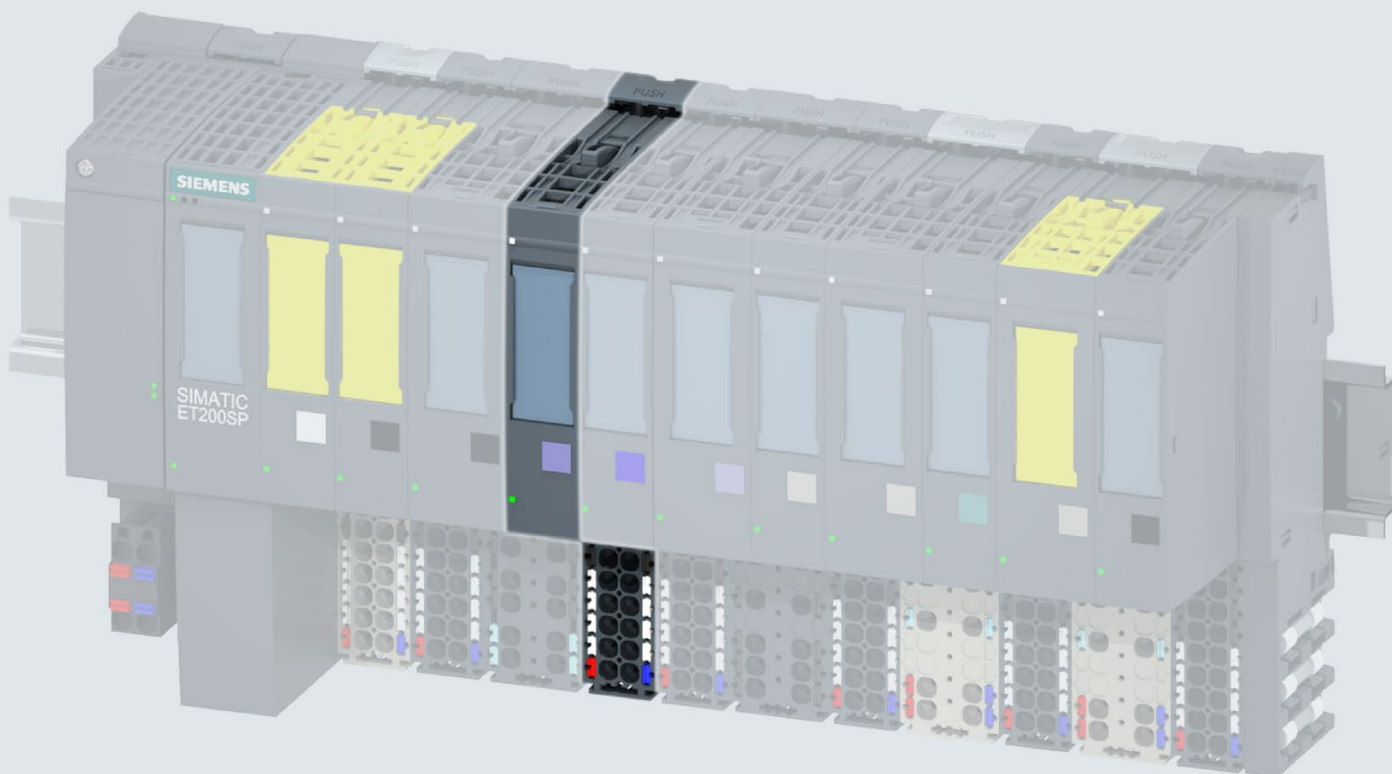# SIEMENS

Manual

SIMATIC

ET 200SP

Analog input module AI 2xI 2-/4-wire ST
(6ES7134-6GB00-0BA1)

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SIMATIC

ET 200SP
Analog input module
AI 2xI 2/4-wire ST
(6ES7134-6GB00-0BA1)

Manual

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

> **⚠ DANGER**
>
> indicates that death or severe personal injury **will** result if proper precautions are not taken.

> **⚠ WARNING**
>
> indicates that death or severe personal injury **may** result if proper precautions are not taken.

> **⚠ CAUTION**
>
> indicates that minor personal injury can result if proper precautions are not taken.

> **NOTICE**
>
> indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

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Note the following:

> **⚠ WARNING**
>
> Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Preface

Purpose of the documentation

This manual supplements the ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293) system manual.

Functions that generally relate to the system are described in this manual.

The information provided in this manual and in the system/function manuals supports you in commissioning the system.

Changes compared to the previous version

Compared to the previous version, this manual contains the following changes:

● Connection diagram has been updated

● Technical specifications have been updated:

● Comments on the previous version of this manual were included in the current edition.

Conventions

CPU: When the term "CPU" is used in this manual, it applies to the CPUs of the S7-1500 automation system as well as to the CPUs/interface modules of the distributed I/O system ET 200SP.

STEP 7: In this documentation, "STEP 7" is used as a synonym for all versions of the configuration and programming software "STEP 7 (TIA Portal)".

Please also observe notes marked as follows:

Note

A note contains important information on the product described in the documentation, on the handling of the product or on the section of the documentation to which particular attention should be paid.

Recycling and disposal

For environmentally friendly recycling and disposal of your old equipment, contact a certified electronic waste disposal company and dispose of the equipment according to the applicable regulations in your country.

Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

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Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customers' exposure to cyber threats.

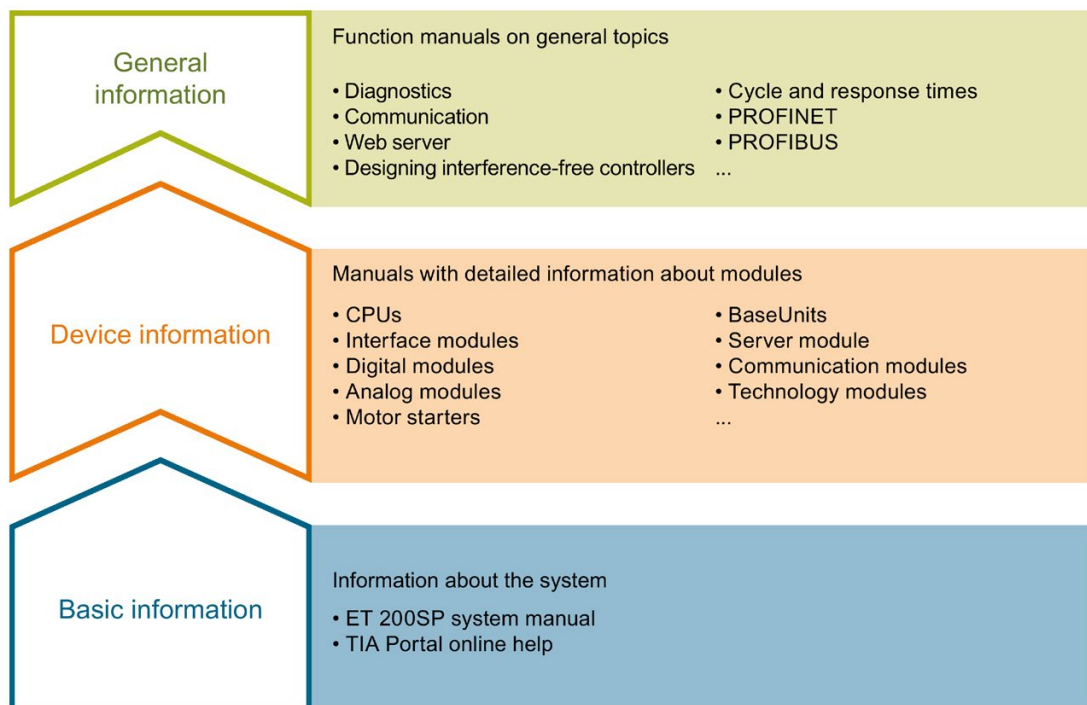To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under (http://www.siemens.com/industrialsecurity).

Table of contents

Documentation guide

The documentation for the SIMATIC ET 200SP distributed I/O system is arranged into three areas.
This arrangement enables you to access the specific content you require.

Basic information

The system manual describes in detail the configuration, installation, wiring and commissioning of the SIMATIC ET 200SP. distributed I/O system. The STEP 7 online help supports you in the configuration and programming.

Device information

Product manuals contain a compact description of the module-specific information, such as properties, wiring diagrams, characteristics and technical specifications.

General information

The function manuals contain detailed descriptions on general topics regarding the SIMATIC ET 200SP distributed I/O system, e.g. diagnostics, communication, Web server, motion control and OPC UA.

You can download the documentation free of charge from the Internet (https://support.industry.siemens.com/cs/ww/en/view/109742709).

Changes and supplements to the manuals are documented in a Product Information.

You can download the product information free of charge from the Internet (https://support.industry.siemens.com/cs/us/en/view/73021864).

Manual Collection ET 200SP

The Manual Collection contains the complete documentation on the SIMATIC ET 200SP distributed I/O system gathered together in one file.

You can find the Manual Collection on the Internet (http://support.automation.siemens.com/WW/view/en/84133942).

"mySupport"

With "mySupport", your personal workspace, you make the most of your Industry Online Support.

In "mySupport" you can store filters, favorites and tags, request CAx data and put together your personal library in the Documentation area. Furthermore, your data is automatically filled into support requests and you always have an overview of your current requests.

You need to register once to use the full functionality of "mySupport".

You can find "mySupport" in the Internet (https://support.industry.siemens.com/My/ww/en).

"mySupport" - Documentation

In the Documentation area of "mySupport", you have the possibility to combine complete manuals or parts of them to make your own manual.
You can export the manual in PDF format or in an editable format.

You can find "mySupport" - Documentation in the Internet (http://support.industry.siemens.com/My/ww/en/documentation).

"mySupport" - CAx Data

In the CAx Data area of "mySupport", you can have access the latest product data for your CAx or CAe system.

You configure your own download package with a few clicks.

In doing so you can select:

- Product images, 2D dimension drawings, 3D models, internal circuit diagrams, EPLAN macro files
- Manuals, characteristics, operating manuals, certificates
- Product master data

You can find "mySupport" - CAx Data in the Internet (http://support.industry.siemens.com/my/ww/en/CAxOnline).

Application examples

The application examples support you with various tools and examples for solving your automation tasks. Solutions are shown in interplay with multiple components in the system - separated from the focus in individual products.

You can find the application examples on the Internet (https://support.industry.siemens.com/sc/ww/en/sc/2054).

TIA Selection Tool

With the TIA Selection Tool, you can select, configure and order devices for Totally Integrated Automation (TIA).
This tool is the successor of the SIMATIC Selection Tool and combines the known configurators for automation technology into one tool.
With the TIA Selection Tool, you can generate a complete order list from your product selection or product configuration.

You can find the TIA Selection Tool on the Internet (http://w3.siemens.com/mcms/topics/en/simatic/tia-selection-tool).

SIMATIC Automation Tool

You can use the SIMATIC Automation Tool to run commissioning and maintenance activities simultaneously on various SIMATIC S7 stations as a bulk operation independently of the TIA Portal.

The SIMATIC Automation Tool provides a multitude of functions:

● Scanning of a PROFINET/Ethernet network and identification of all connected CPUs

● Address assignment (IP, subnet, gateway) and station name (PROFINET device) to a CPU

● Transfer of the data and the programming device/PC time converted to UTC time to the module

● Program download to CPU

● Operating mode switchover RUN/STOP

● Localization of the CPU by means of LED flashing

● Reading out CPU error information

● Reading the CPU diagnostic buffer

● Reset to factory settings

● Updating the firmware of the CPU and connected modules

You can find the SIMATIC Automation Tool on the Internet (https://support.industry.siemens.com/cs/ww/en/view/98161300).

PRONETA

With SIEMENS PRONETA (PROFINET network analysis), you analyze the plant network during commissioning. PRONETA features two core functions:

● The topology overview independently scans PROFINET and all connected components.

● The IO check is a fast test of the wiring and the module configuration of a system.

You can find SIEMENS PRONETA on the Internet (https://support.industry.siemens.com/cs/ww/en/view/67460624).

SINETPLAN

SINETPLAN, the Siemens Network Planner, supports you in planning automation systems and networks based on PROFINET. The tool facilitates professional and predictive dimensioning of your PROFINET installation as early as in the planning stage. In addition, SINETPLAN supports you during network optimization and helps you to exploit network resources optimally and to plan reserves. This helps to prevent problems in commissioning or failures during productive operation even in advance of a planned operation. This increases the availability of the production plant and helps improve operational safety.

The advantages at a glance

- Network optimization thanks to port-specific calculation of the network load

- Increased production availability thanks to online scan and verification of existing systems

- Transparency before commissioning through importing and simulation of existing STEP 7 projects

- Efficiency through securing existing investments in the long term and optimal exploitation of resources

You can find SINETPLAN on the Internet (https://www.siemens.com/sinetplan).

Product overview

<div style="text-align:right; font-size:3em;">2</div>

2.1   Properties

Article number

6ES7134-6GB00-0BA1

View of the module

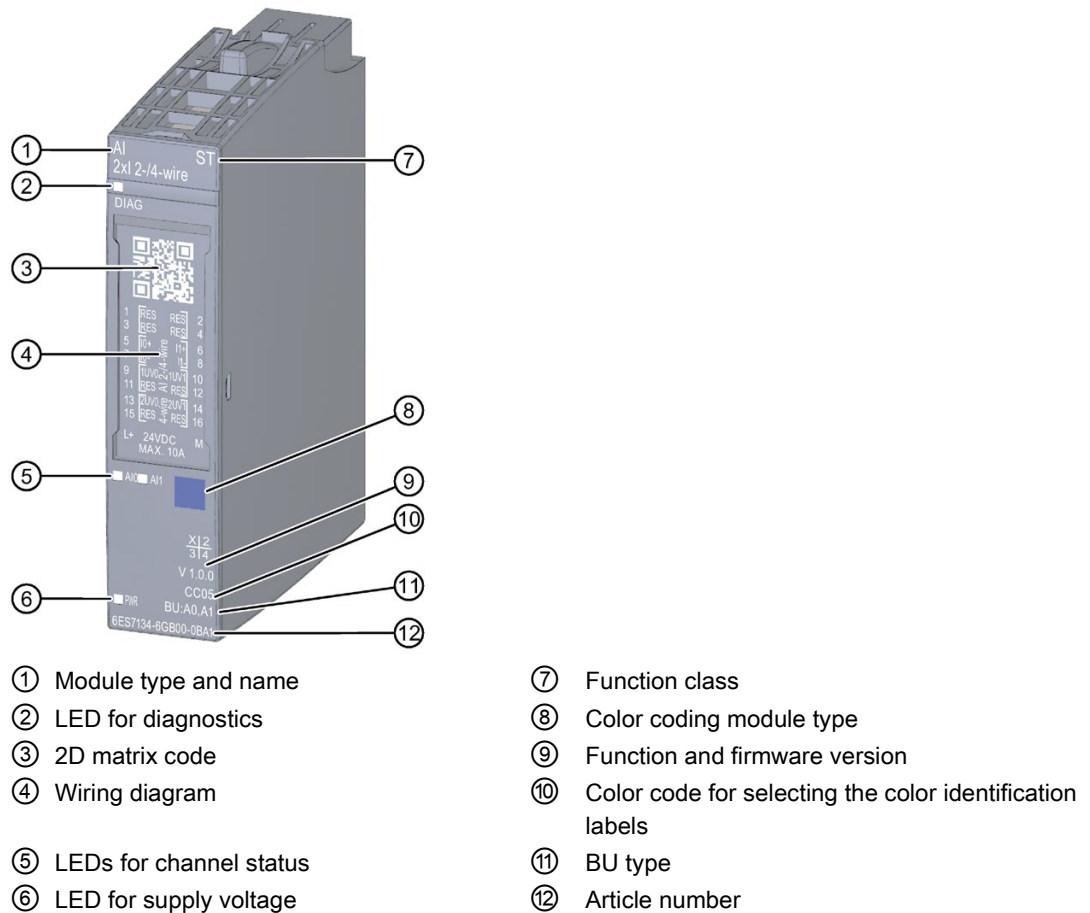|			
①	Module type and name	⑦	Function class
②	LED for diagnostics	⑧	Color coding module type
③	2D matrix code	⑨	Function and firmware version
④	Wiring diagram	⑩	Color code for selecting the color identification labels
⑤	LEDs for channel status	⑪	BU type
⑥	LED for supply voltage	⑫	Article number

Figure 2-1   View of the module AI 2×I 2-/4-wire ST

Properties

The module has the following technical properties:

- Analog input module with 2 inputs

- Measuring type current for 2- and 4-wire transducers

- Input ranges for current measurement:

  – 0 mA to 20 mA, resolution 15 bits

  – 4 to 20 mA, resolution 15 bits

  – ± 20 mA, resolution 16 bit incl. sign

- Electrically isolated from supply voltage L+

- Permitted common mode voltage: 10 V_{pp}/3.5 V_{rms}

- Configurable diagnostics (per module)

- Constant cycle time for processing measured values

  – 500 µs, regardless of the number of channels used and the configuration

The module supports the following functions:

Table 2- 1   Version dependencies of the functions

Function	HW version	FW version	STEP 7		GSD file	
			TIA Portal	V5.x	PROFINET IO	PROFIBUS DP
Firmware update	FS01	V1.0.0 or higher	V13 SP1 or higher	as of V5.5 SP4 with HSP 0227 V6.0 or higher	X	X
Identification data I&M0 to I&M3	FS01	V1.0.0 or higher	V13 SP1 or higher	as of V5.5 SP4 with HSP 0227 V6.0 or higher	X	X
Configuration in RUN	FS01	V1.0.0 or higher	V13 SP1 or higher	as of V5.5 SP4 with HSP 0227 V6.0 or higher	X	X
Value status	FS01	V1.0.0 or higher	V13 SP1 or higher	as of V5.5 SP4 with HSP 0227 V6.0 or higher	X	
PROFIenergy	FS01	V1.0.0 or higher	V13 SP1 or higher	as of V5.5 SP4 with HSP 0227 V6.0 or higher	X	X

You can configure the module with STEP 7 and with GSD file.

Accessories

The following accessories must be ordered separately:

- Labeling strips
- Color identification labels
- Reference identification label
- Shield connector

See also

You can find additional information on the accessories in the ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293) system manual.

Wiring

3

3.1 Wiring and block diagram

This section includes the block diagram of the AI 2xI 2-/4-wire ST module with the various terminal assignments for a 2- und 4-wire connection.

You can find information on wiring the BaseUnit in the ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293) system manual.

Note

You can use and combine the different wiring options for all channels.

Note

The load group of the module must begin with a light-colored BaseUnit. Keep this in mind also during the configuration.

Analog input module AI 2xI 2/4-wire ST (6ES7134-6GB00-0BA1)

Manual, 04/2018, A5E36104399-AB

Wiring: Current measurement 2-wire and 4-wire connection (2-wire and 4-wire transducer)

The following figure shows the block diagram and an example of the terminal assignment of the analog input module AI 2xI 2-/4-wire ST on the BaseUnit BU type A0/A1.
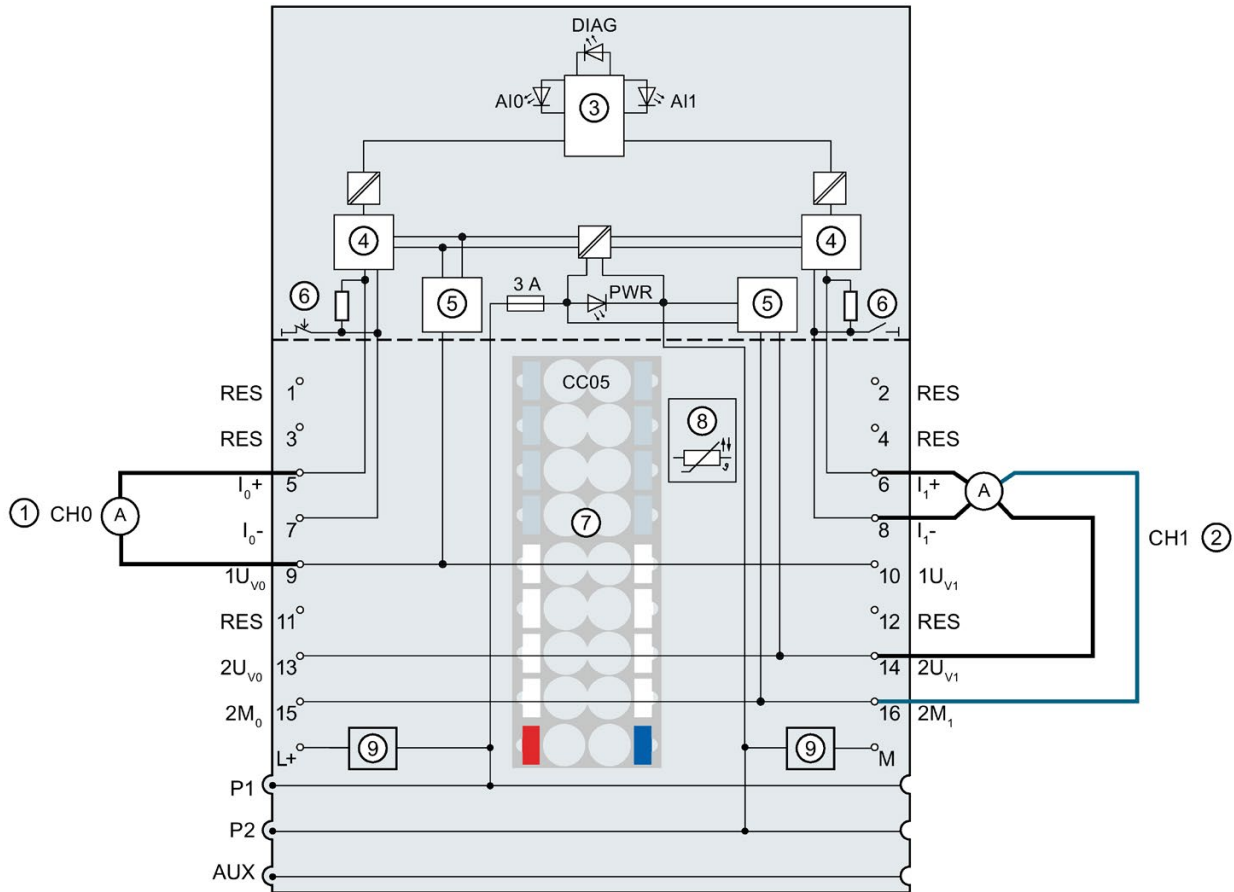
①	2-wire connection for current measurement (2-wire transducer)	I_n+ Current input positive, channel n
②	4-wire connection for current measurement (4-wire transducer)	I_n- Current input negative, channel n
③	Backplane bus interface	$1U_{Vn}$ Supply voltage (2-wire transducer), channel n
④	Analog-to-digital converter (ADC)	$2U_{Vn}$ Supply voltage (4-wire transducer), channel n
⑤	Current limitation	$2M_n$ Reference potential (4-wire transducer)
⑥	Switchover 2-wire / 4-wire	RES Reserve, must remain unused for future function extensions
⑦	Color-coded label with color code CC05 (optional)	L+ 24 V DC (infeed only with light-colored BaseUnit)
⑧	Temperature recording for BU type A1 only (function cannot be used for this module)	P1, P2, AUX Internal self-assembling voltage buses
		Connection to left (dark-colored BaseUnit)
		Connection to left interrupted (light-colored BaseUnit)
⑨	Filter connection supply voltage (only when light-colored BaseUnit is present)	DIAG Diagnostics LED (green, red)
		AI0, AI1 Channel status LED (green)
		PWR Power LED (green)

Figure 3-1   Wiring and block diagram for current measurement 2-wire and 4-wire connection (2-wire and 4-wire transducer)

Parameters/address space 4

4.1 Measurement types and measuring ranges

The analog input module AI 2×I 2-/4-wire ST has the following measuring ranges:

Table 4- 1   Measuring ranges

Measurement type	Measuring range	Resolution
Current (2-wire transducer)	0 to 20 mA	15 bits
	4 mA to 20 mA	15 bits
Current (4-wire transducer)	0 mA to 20 mA	15 bit
	4 mA to 20 mA	15 bits
	± 20 mA	16 bits incl. sign

You can find the tables of measuring ranges and overflow, overrange, etc. in the section Representation of analog values in the current measuring ranges (Page 38) and the "Analog value processing" function manual.

4.2 Parameters

Parameters of AI 2xI 2-/4-wire ST

During configuration of the module with STEP 7, define the properties of the module via various parameters. The following table lists the configurable parameters. The effective range of the configurable parameters depends on the type of configuration. The following configurations are possible:

● Central operation with an ET 200SP CPU

● Distributed operation on PROFINET IO in an ET 200SP system

● Distributed operation on PROFIBUS DP in an ET 200SP system

When assigning parameters in the user program, use the "WRREC" instruction to transfer the parameters to the module using the data records; refer to section Parameter assignment and structure of the parameter data record (Page 32).

The following parameter settings are possible:

Table 4- 2   Configurable parameters and their defaults (GSD file)

Parameter	Range of values	Default	Configuration in RUN	Effective range with configuration software, e.g. STEP 7 (TIA Portal)	
				GSD file PROFINET IO	GSD file PROFIBUS DP
Diagnostics: No supply voltage L+	● Disable ● Enable	Disable	Yes	Channel	Channel
Diagnostics: Short-circuit to ground	● Disable ● Enable	Disable	Yes	Channel	Channel
Diagnostics: Overflow [1]	● Disable ● Enable	Disable	Yes	Channel	Channel [1]
Diagnostics: Underflow [1]	● Disable ● Enable	Disable	Yes	Channel	
Diagnostics: Wire break	● Disable ● Enable	Disable	Yes	Channel	Channel

Parameter	Range of values	Default	Configuration in RUN	Effective range with configuration software, e.g. STEP 7 (TIA Portal)	
				GSD file PROFINET IO	GSD file PROFIBUS DP
Measurement type/measuring range	• Deactivated • Current (4-wire transducer) 0 to 20 mA • Current (4-wire transducer) 4 to 20 mA • Current (4-wire transducer) +/- 20 mA • Current (2-wire transducer) 0 to 20 mA • Current (2-wire transducer) 4 to 20 mA	Current (4-wire transducer) 4 to 20 mA	Yes	Channel	Channel
Smoothing	• None • Weak • Medium • Strong	None	Yes	Channel	Channel
Interference frequency suppression [2]	• 60 Hz (50 ms) • 50 Hz (60 ms) [3] • 16.6 Hz (180 ms) • None	• 50 Hz (60 ms)	Yes	Channel	Module
Potential group	• Use potential group of the left module (module plugged into a dark-colored BaseUnit) • Enable new potential group (module plugged into light-colored BaseUnit)	Use potential group of the left module	No	Module	Module

[1]   Due to the limited number of parameters at a maximum of 244 bytes per ET 200SP station with a PROFIBUS GSD configuration, the configuration options are restricted. The parameter length of the I/O module is 4 bytes for PROFIBUS GSD configuration. If necessary, you can set this parameter by using the data record 128, see the appendix "Parameter data record".

[2] The settings in the "Interference frequency suppression" parameter have a direct effect on the conversion time of the channel. The analog value is therefore also affected by additionally set filtering via the "Smoothing" parameter.

[3] Interference frequency suppression: Noise at 400 Hz is automatically included in the filtering at 50 Hz.

Note

Unused channels

"Deactivate" the unused channels in the parameter assignment.

A deactivated channel always returns the value 7FFF$_H$.

4.3 Description of parameters

Diagnostics: No supply voltage L+

Enabling of the diagnostics alarm for no or insufficient supply voltage L+.

Diagnostics: Short-circuit to ground

Enabling of the diagnostics in the event of a short-circuit of the encoder supply to ground or of an input to the encoder supply.

The short-circuit and underflow diagnostics can be activated simultaneously. If both diagnostics events occur simultaneously, the short-circuit diagnostics is output.

Diagnostics: Overflow

Enabling of the diagnostics when the measured value exceeds the overrange.

Diagnostics: Underflow

Enabling of the diagnostics when the measured value falls below the underrange.

Diagnostics: Wire break

Enabling of the diagnostics if the module has no current flow or has too little current for the measurement in the range of 4 mA to 20 mA.

The wire break and underflow diagnostics can be activated simultaneously. If both diagnostics events occur simultaneously, the wire break diagnostics is output.

Measurement type/measuring range

See the section Measurement types and measuring ranges (Page 16).

Smoothing

The individual measured values are smoothed by filtering. The smoothing can be set in 4 levels.

Smoothing time = Number of conversion cycles (k) x conversion time ($\triangleq$ of the integration time set in the "Interference frequency suppression" parameter) of the channel.

The following figure shows how many conversion cycles it takes for the smoothed analog value to approach 100%, depending on the configured smoothing. This applies to every signal change at the analog input.
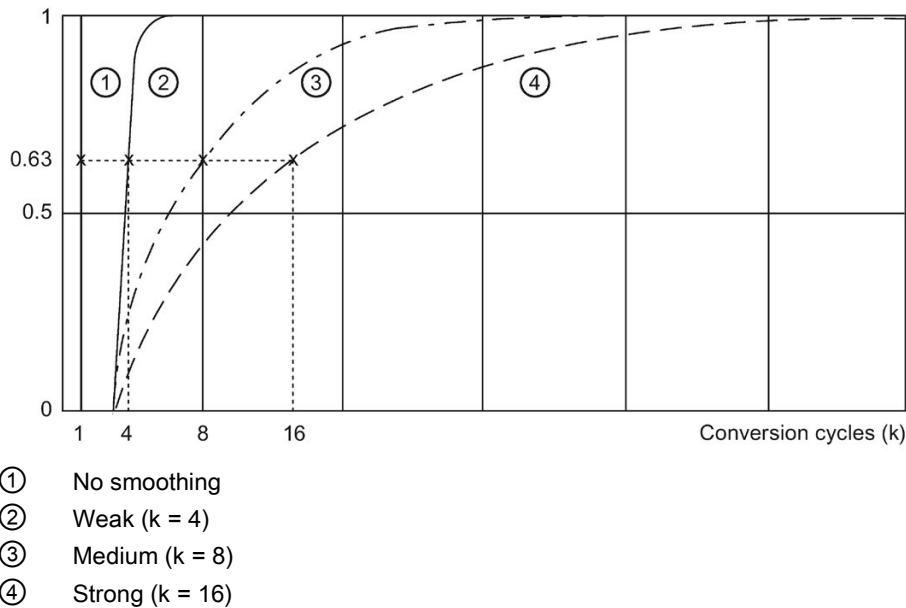

①   No smoothing
②   Weak (k = 4)
③   Medium (k = 8)
④   Strong (k = 16)

Figure 4-1   Smoothing for AI 2×I 2-/4-wire ST

Interference frequency suppression

Suppresses the interference affecting analog input modules that is caused by the frequency of the AC voltage network used.

The frequency of the AC voltage network can negatively affect the measured value, in particular when measuring in the low voltage range and with thermocouples. With this parameter, the user specifies the line frequency that is predominant in the plant.

Note:

The interference frequency suppression works parallel to the sampling of channels 0 and 1. The cycle time of the module is 500 µs regardless of the number of channels used and the configured interference frequency suppression.

Potential group

A potential group consists of a group of directly adjacent I/O modules within an ET 200SP station, which are supplied via a common supply voltage.

A potential group begins with a light-colored BaseUnit through which the required voltage is supplied for all modules of the potential group. The light-colored BaseUnit interrupts the three self-assembling voltage buses P1, P2 and AUX to the left neighbor.

All additional I/O modules of this potential group are plugged into dark-colored BaseUnits. You take the potential of the self-assembling voltage buses P1, P2 and AUX from the left neighbor.

A potential group ends with the dark-colored BaseUnit, which follows a light-colored BaseUnit or server module in the station configuration.

See also

You can find additional information in the system manual ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293).

4.4   Address space

Configuration options

The following configurations are possible:

- Configuration 1: Without value status
- Configuration 2: With value status

Evaluating the value status

If you enable the value status for the analog module, an additional byte is occupied in the input address space. Bits 0 to 1 in this byte are assigned to a channel. They provide information about the validity of the analog value.

Bit = 1: There are no errors on the module.

Bit = 0: Channel is deactivated or there is a fault on the module.

If a fault occurs on a channel with this module, the value status for all channels is 0.

Address space

The following figure shows the assignment of the address space for the AI 2xI 2-/4-wire ST with value status (Quality Information (QI)). The addresses for the value status are only available if the value status is enabled.

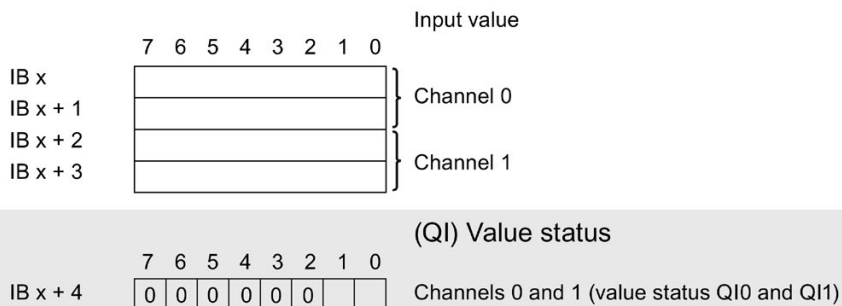Assignment in the process image of the inputs (PII)

Input value

```
           7  6  5  4  3  2  1  0
IB x       ┌──────────────────────┐ ⎫
IB x + 1   │                      │ ⎬ Channel 0
           ├──────────────────────┤ ⎭
IB x + 2   │                      │ ⎫
IB x + 3   └──────────────────────┘ ⎬ Channel 1
                                     ⎭
```

(QI) Value status

```
           7  6  5  4  3  2  1  0
IB x + 4   │ 0│ 0│ 0│ 0│ 0│ 0│  │  │   Channels 0 and 1 (value status QI0 and QI1)
```

Figure 4-2   Address space of the AI 2xI 2-/4-wire ST with value status

Interrupts/diagnostics alarms

<div style="text-align: right; font-size: 3em;">5</div>

5.1 Status and error displays

LED displays

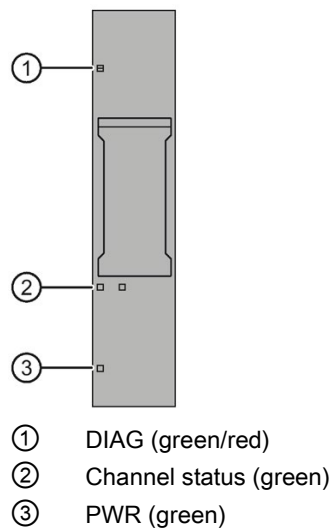The following figure shows you the LED display of the AI 2×I 2-/4-wire ST.

①   DIAG (green/red)
②   Channel status (green)
③   PWR (green)

Figure 5-1   LED displays

Meaning of the LEDs

The following tables show the meaning of the status and error displays. Corrective measures for diagnostics alarms can be found in section Diagnostics alarms (Page 26).

DIAG LED

Table 5- 1   Error display of the DIAG LED

DIAG	Meaning
□ Off	Backplane bus supply of the ET 200SP not OK
☼ Flashes	Module parameters not assigned
■ On	Module parameters assigned and no module diagnostics
☼ Flashes	Module parameters assigned and module diagnostics

Channel status LED

Table 5- 2   Status display of the channel status LED

Channel status	Meaning
□ Off	Channel disabled
■ On	Channel activated

PWR LED

Table 5- 3   Status display of the PWR LED

PWR	Meaning
□ Off	Missing supply voltage L+
■ On	Supply voltage L+ present

5.2   Interrupts

The AI 2×I 2-/4-wire ST analog input module supports diagnostics interrupts.

Diagnostics interrupts

The module generates a diagnostic interrupt at the following events:

- Short-circuit (encoder supply)
- Wire break (current 4 to 20 mA)
- High limit violated
- Low limit violated
- Error
- Parameter assignment error
- Supply voltage missing
- Channel temporarily unavailable

5.3   Diagnostics alarms

A diagnostics alarm is generated and the DIAG-LED flashes on the module for each diagnostics event. You can read out the diagnostics alarms, for example, in the diagnostics buffer of the CPU. You can evaluate the error codes with the user program.

Table 5- 4   Diagnostics alarms, their meaning and corrective measures

Diagnostics alarm	Error code	Meaning	Solution
Short-circuit (encoder supply) [1]	1_H	Encoder supply to ground	Correct interplay between module and encoder
		Input after encoder supply	
Wire break (current 4 to 20 mA)	6_H	Impedance of encoder circuit too high	Use a different encoder type or modify the wiring, e.g. use cables with larger cross-section
		Wire break between the module and sensor	Connect the cable
		Channel not connected (open)	• Deactivate channel • Connect the encoder contacts
High limit violated	7_H	Value is above the overrange.	Correct interplay between module and encoder
Low limit violated	8_H	Value is below the underrange.	Correct interplay between module and encoder
Error	9_H	Internal module error has occurred (diagnostics alarm on channel 0 applies for the entire module).	Replace the module
Parameter assignment error	10_H	• The module cannot evaluate parameters for the channel. • Incorrect parameter assignment.	Correct the parameter assignment (wire break diagnostics set only with the permitted measuring ranges).
Supply voltage missing	11_H	Missing or insufficient supply voltage L+	• Check supply voltage L+ on the BaseUnit • Check BaseUnit type
Channel temporarily unavailable	$1F_H$	Firmware update in progress or update has been canceled. The module does not read any process values in this state.	• Wait for firmware update. • Restart the firmware update.

[1]   Since the module has no encoder supply for separate channels, a short-circuit in a channel has a permanent effect on the other channel.

Technical specifications

6.1 Technical specifications

Technical specifications of AI 2xI 2-/4-wire ST

Article number	6ES7134-6GB00-0BA1
General information	
Product type designation	AI 2xI 2-/4-wire ST
Firmware version	V1.0
• FW update possible	Yes
usable BaseUnits	BU type A0, A1
Color code for module-specific color identification plate	CC05
Product function	
• I&M data	Yes; I&M0 to I&M3
• Measuring range scalable	No
Engineering with	
• STEP 7 TIA Portal configurable/integrated as of version	V13 SP1
• STEP 7 configurable/integrated as of version	V5.5 SP3
• PROFIBUS as of GSD version/GSD revision	GSD Revision 5
• PROFINET as of GSD version/GSD revision	V2.3 / -
Operating mode	
• Oversampling	No
• MSI	No
CiR – Configuration in RUN	
Reparameterization possible in RUN	Yes
Calibration possible in RUN	No
Supply voltage	
Rated value (DC)	24 V
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Input current	
Current consumption, max.	45 mA; without sensor supply

Article number	6ES7134-6GB00-0BA1
24 V encoder supply	
• 24 V	Yes
• Short-circuit protection	Yes
• Output current, max.	50 mA; Total current for both channels (two-wire)
Additional 24 V encoder supply	
• 24 V	Yes
• Short-circuit protection	Yes; Module-wise
• Output current, max.	200 mA; Total current for both channels (four-wire)
Power loss	
Power loss, typ.	1.1 W
Address area	
Address space per module	
• Address space per module, max.	4 byte; + 1 byte for QI information
Analog inputs	
Number of analog inputs	2
• For current measurement	2
permissible input current for current input (destruction limit), max.	50 mA
Cycle time (all channels), min.	500 µs
Input ranges (rated values), currents	
• 0 to 20 mA	Yes; 15 bit
• Input resistance (0 to 20 mA)	130 Ω; 90 ohms with two wires
• -20 mA to +20 mA	Yes; 16 bit incl. sign
• Input resistance (-20 mA to +20 mA)	130 Ω
• 4 mA to 20 mA	Yes; 15 bit
• Input resistance (4 mA to 20 mA)	130 Ω; 90 ohms with two wires
Cable length	
• shielded, max.	1 000 m
Analog value generation for the inputs	
Measurement principle	Sigma Delta
Integration and conversion time/resolution per channel	
• Resolution with overrange (bit including sign), max.	16 bit
• Integration time, parameterizable	Yes
• Interference voltage suppression for interference frequency f1 in Hz	16.6 / 50 / 60 Hz / off

Article number	6ES7134-6GB00-0BA1
Smoothing of measured values	
• Number of smoothing levels	4
• parameterizable	Yes
• Step: None	Yes; 1x conversion time
• Step: low	Yes; 4x conversion time
• Step: Medium	Yes; 8x conversion time
• Step: High	Yes; 16x conversion time
Encoder	
Connection of signal encoders	
• for current measurement as 2-wire trans-ducer	Yes
– Burden of 2-wire transmitter, max.	650 Ω
• for current measurement as 4-wire trans-ducer	Yes
Errors/accuracies	
Linearity error (relative to input range), (+/-)	0.01 %
Temperature error (relative to input range), (+/-)	0.005 %/K
Crosstalk between the inputs, min.	-50 dB
Repeat accuracy in steady state at 25 °C (relative to input range), (+/-)	0.05 %
Operational error limit in overall temperature range	
• Current, relative to input range, (+/-)	0.5 %
Basic error limit (operational limit at 25 °C)	
• Current, relative to input range, (+/-)	0.3 %
Interference voltage suppression for f = n x (f1 +/- 1 %), f1 = interference frequency	
• Series mode interference (peak value of interference < rated value of input range), min.	70 dB
• Common mode voltage, max.	10 V
• Common mode interference, min.	90 dB
Isochronous mode	
Isochronous operation (application synchro-nized up to terminal)	No
Interrupts/diagnostics/status information	
Diagnostics function	Yes

Article number	6ES7134-6GB00-0BA1
Alarms	
• Diagnostic alarm	Yes
• Limit value alarm	No
Diagnostic messages	
• Monitoring the supply voltage	Yes
• Wire-break	Yes; at 4 to 20 mA
• Short-circuit	Yes; Short-circuit of the encoder supply
• Group error	Yes
• Overflow/underflow	Yes
Diagnostics indication LED	
• Monitoring of the supply voltage (PWR-LED)	Yes; green PWR LED
• Channel status display	Yes; Green LED
• for channel diagnostics	No
• for module diagnostics	Yes; green/red DIAG LED
Potential separation	
Potential separation channels	
• between the channels	No
• between the channels and backplane bus	Yes
• between the channels and the power supply of the electronics	Yes
Permissible potential difference	
between the inputs (UCM)	10 Vpp
Isolation	
Isolation tested with	707 V DC (type test)
Dimensions	
Width	15 mm
Height	73 mm
Depth	58 mm
Weights	
Weight, approx.	32 g

Dimension drawing

See manual ET 200SP BaseUnits
(http://support.automation.siemens.com/WW/view/en/59753521)

Parameter data record

<div style="text-align: right; font-size: 2em;">A</div>

A.1 Dependencies when configuring with GSD file

When configuring the module with a GSD file, remember that the settings of some parameters are dependent on each other.

Configuring with a PROFINET GSD file

The table lists the properties and their dependencies on the measurement type and measuring range for PROFINET.

Measurement type	Measuring range	Diagnostics				
		No supply voltage L+	Short-circuit to ground	Overflow	Underflow	Wire break
Deactivated		*	*	*	*	*
Current (4-wire transducer)	0 mA to 20 mA	x	x	x	x	-
	4 mA to 20 mA	x	x	x	x	x
	±20 mA	x	x	x	x	-
Current (2-wire transducer)	0 mA to 20 mA	x	x	x	-	-
	4 mA to 20 mA	x	x	x	x	x

x = Property is allowed, - = Property is **not allowed**, * = Property is not relevant

Configuring with a PROFIBUS GSD file

The table lists the properties and their dependencies on the measurement type and measuring range for PROFIBUS.

Measurement type	Measuring range	Diagnostics			
		No supply voltage L+	Short-circuit to ground	Overflow/underflow	Wire break
Deactivated		*	*	*	*
Current (4-wire transducer)	0 mA to 20 mA	x	x	x	-
	4 mA to 20 mA	x	x	x	x
	+/- 20 mA	x	x	x	-
Current (2-wire transducer)	0 mA to 20 mA	x	x	x	-
	4 mA to 20 mA	x	x	x	x

x = Property is allowed, - = Property is **not allowed**, * = Property is not relevant

A.2 Parameter assignment and structure of the parameter data record

Parameter assignment in the user program

You can reassign the module parameters in RUN. For example, the voltage or current values of selected channels can be changed in RUN without having an effect on the other channels.

Changing parameters in RUN

The "WRREC" instruction is used to transfer the parameters to the module using data record 128. The parameters set in STEP 7 are not changed in the CPU, which means that the parameters set in STEP 7 will be valid again after a restart.

Output parameter STATUS

The module ignores errors that occur during the transfer of parameters with the "WRREC" instruction and continues operation with the previous parameter assignment. The STATUS output parameter contains a corresponding error code.

You will find a description of the "WRREC" instruction and the error codes in the STEP 7 online help.

Structure of data record 128 for entire module

> **Note**
>
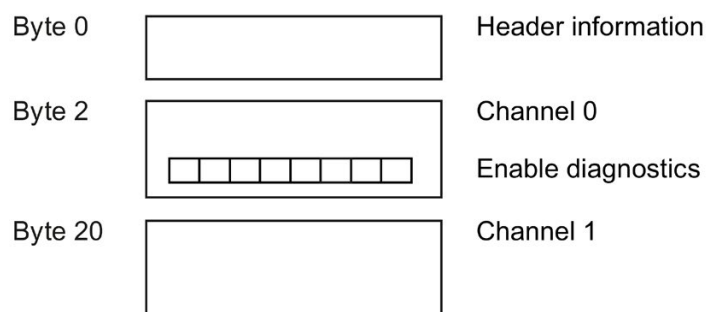> Channel 0 includes the diagnostics enable for the entire module.

Figure A-1   Structure of data record 128 for entire module

Header information

The figure below shows the structure of the header information.
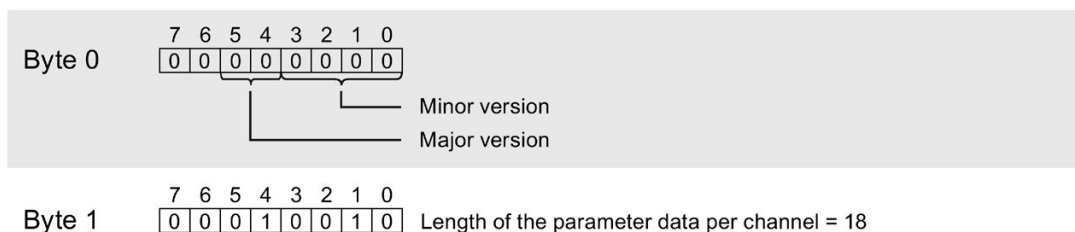
Figure A-2   Header information

Parameters

The following figure shows the structure of the parameters for channels 0 and 1.

You enable a parameter by setting the corresponding bit to "1".
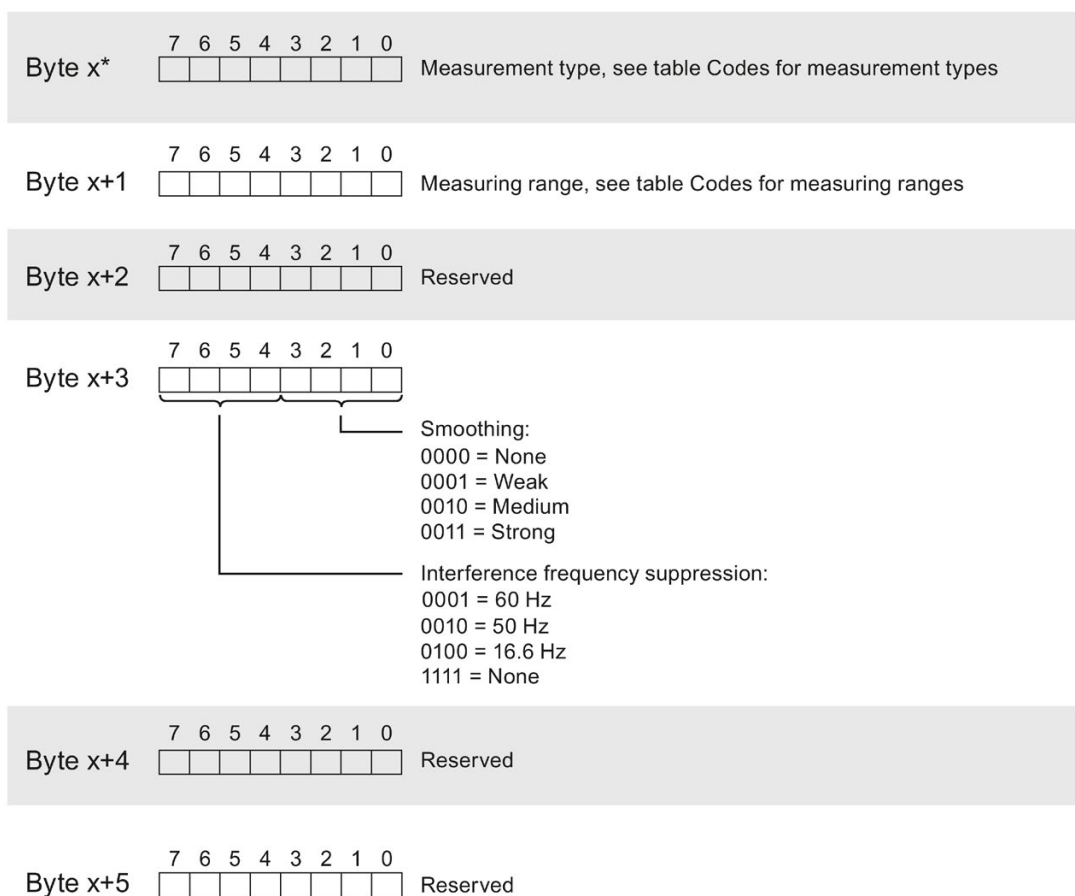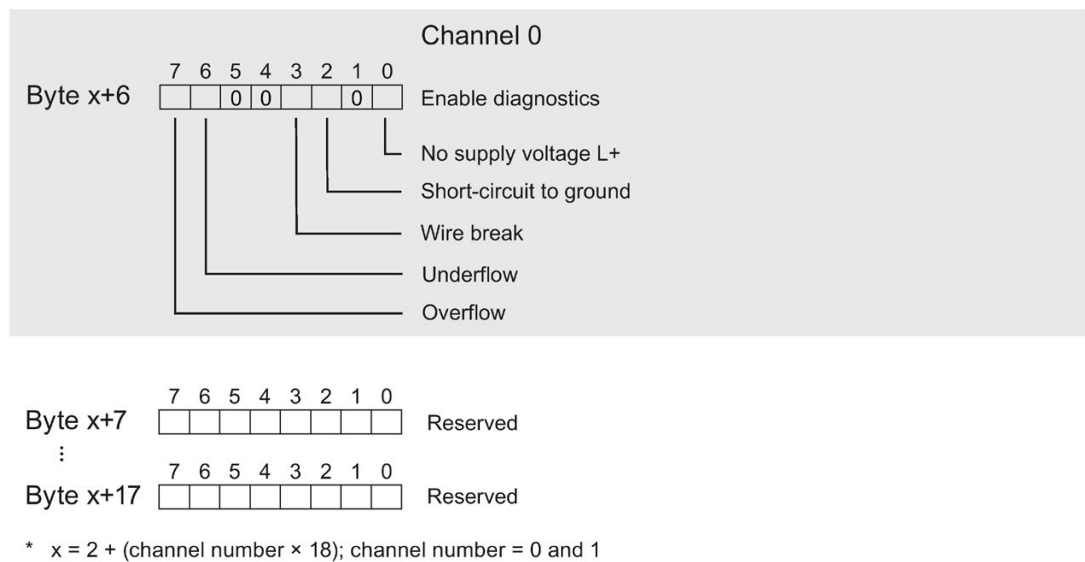
Figure A-3   Structure of bytes x to x+17 for channels 0 and 1

Codes for measurement types

The following table contains the codes for the measuring types of the analog input module. You must enter these codes in byte x (see channel parameter block figure).

Table A- 1   Codes for measurement types

Measurement type	Code
Deactivated	0000 0000
Current, 4-wire transducer	0000 0010
Current, 2-wire transducer	0000 0011

Codes for measuring ranges

The following table contains the codes for the measuring ranges of the analog input module. You must enter these codes in byte x+1 (see channel parameter block figure).

Table A- 2   Codes for measuring ranges

Measuring range	Coding
Current	
0 mA to 20 mA	0000 0010
4 mA to 20 mA	0000 0011
±20 mA	0000 0100

Error transmitting the data record

The module always checks all values of the transmitted data record. The module applies the values from the data record only when all values have been transmitted without errors.

The WRREC instruction for writing data records returns the appropriate error codes if there are errors in the STATUS parameter.

The following table shows the module-specific error codes and their meaning for parameter data record 128.

Error code in the STATUS parameter (hexadecimal)				Meaning	Solution
Byte 0	Byte 1	Byte 2	Byte 3		
DF	80	B0	xx	Number of the data record unknown	Enter valid number for data record.
DF	80	B1	xx	Length of the data record incorrect	Enter valid value for data record length.
DF	80	B2	xx	Slot invalid or unavailable	• Check the station to determine if the module is plugged in or pulled. • Check assigned values for the parameters of the WREC instruction.
DF	80	I0	xx	Incorrect version or error in the header information	Correct the version, length and number of parameter blocks.
DF	80	I1	xx	Parameter error	Check the parameters of the module.

Representation of analog values

<div style="text-align: right; font-size: 2em;">B</div>

B.1 Representation of analog values for analog inputs

This appendix shows the analog values for all measuring ranges that you can use with the analog module.

Measured value resolution

The resolution of the analog values differs depending on the analog module and its parameter assignment.

The table below shows the representation of binary analog values and of the associated decimal and hexadecimal units of the analog values.

Each analog value is written left aligned to the tags. The bits marked with "x" are set to "0".

Table B- 1   Resolution of the analog values

Resolution in bits including sign	Values		Analog value	
	Decimal	Hexadecimal	High byte	Low byte
15	2	2_H	Sign 0 0 0 0 0 0 0	0 0 0 0 0 0 1 x
16	1	1_H	Sign 0 0 0 0 0 0 0	0 0 0 0 0 0 0 1

B.2 Representation of input ranges

In the following tables, you can find the digitized representation of the bipolar and unipolar input ranges. The resolution is 16 bits.

Table B- 2 Bipolar input ranges

Dec. value	Measured value in %	Data word																Range
		2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
32767	>117.589	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Overflow
32511	117.589	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	Overrange
27649	100.004	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	1	
27648	100.000	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	Nominal range
1	0.003617	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
-1	-0.003617	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
-27648	-100.000	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	
-27649	-100.004	1	0	0	1	0	0	1	1	1	1	1	1	1	1	1	1	Underrange
-32512	-117.593	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
-32768	<-117.593	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Underflow

Table B- 3 Unipolar input ranges

Dec. value	Measured value in %	Data word																Range
		2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
32767	>117.589	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Overflow
32511	117.589	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	Overrange
27649	100.004	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	1	
27648	100.000	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	Nominal range
1	0.003617	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
-1	-0.003617	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Underrange
-4864	-17.593	1	1	1	0	1	1	0	1	0	0	0	0	0	0	0	0	
-32768	<-17.593	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Underflow

B.3 Representation of analog values in the current measuring ranges

The following tables list the decimal and hexadecimal values (codes) of the possible current measuring ranges.

Table B- 4   Current measuring range ±20 mA

Values		Current measuring range	Range
Dec.	Hex.	±20 mA	
32767	7FFF	> 23.52 mA	Overflow
32511	7EFF	23.52 mA	Overrange
27649	6C01		
27648	6C00	20 mA	Nominal range
20736	5100	15 mA	
1	1	723.4 nA	
0	0	0 mA	
-1	FFFF		
-20736	AF00	-15 mA	
-27648	9400	-20 mA	
-27649	93FF		Underrange
-32512	8100	-23.52 mA	
-32768	8000	< -23.52 mA	Underflow

Table B- 5   Current measuring ranges 0 to 20 mA and 4 to 20 mA

Values		Current measuring range		Range
Dec.	Hex.	0 to 20 mA*	4 to 20 mA	
32767	7FFF	> 23.52 mA	> 22.81 mA	Overflow
32511	7EFF	23.52 mA	22.81 mA	Overrange
27649	6C01			
27648	6C00	20 mA	20 mA	Nominal range
20736	5100	15 mA	16 mA	
1	1	723.4 nA	4 mA + 578.7 nA	
0	0	0 mA	4 mA	
-1	FFFF			Underrange
-4864	ED00	-3.52 mA	1.185 mA	
-32768	8000	< -3.52 mA	< 1.185 mA	Underflow

* For measurement type "2-wire transducer", negative values are not possible for the range "0 to 20 mA". Therefore, no underrange or underflow exists here.