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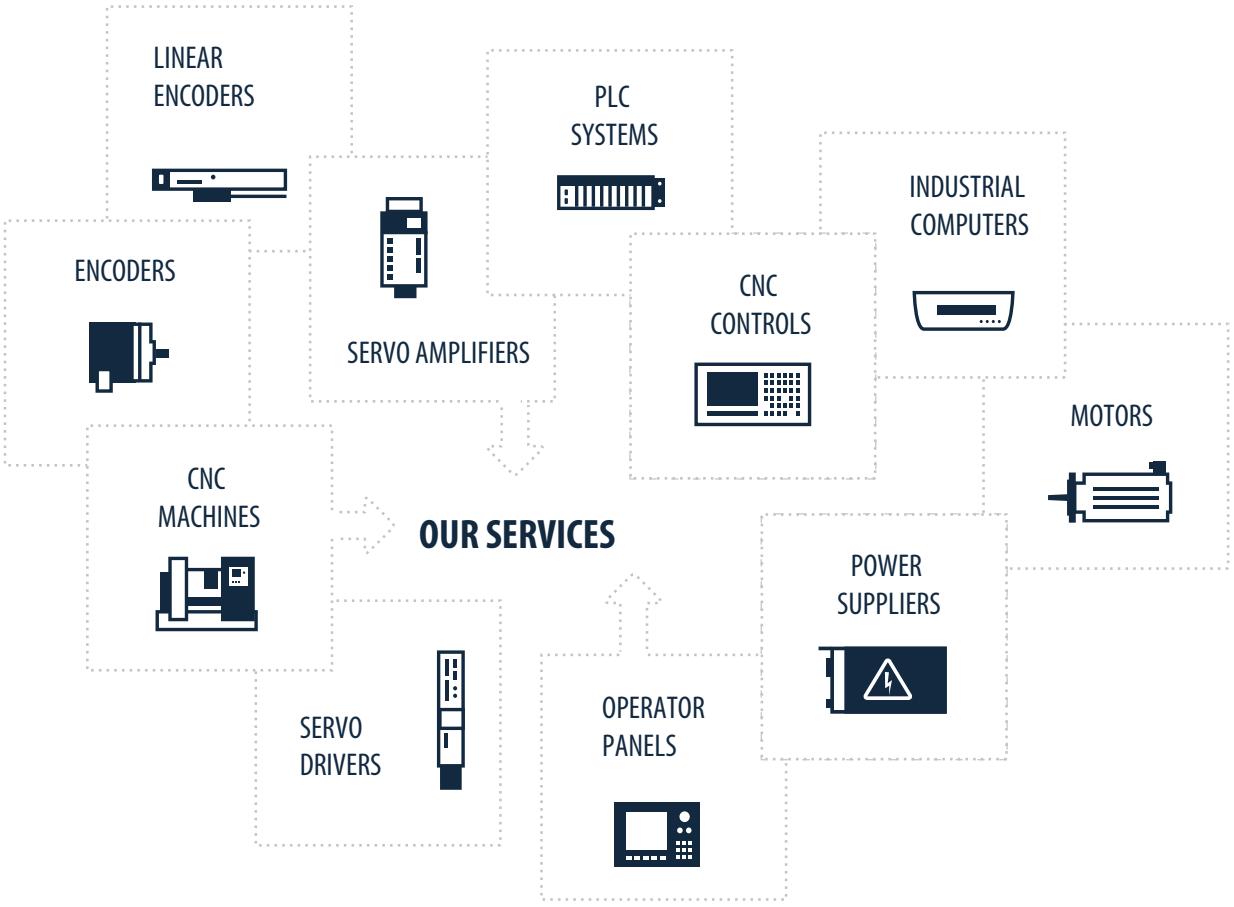

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SIMATIC

ET 200B Distributed I/O Station

Manual

Preface, Contents

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Edition 3

Safety–Related Guidelines

This manual contains notices intended to ensure personal safety, as well as to protect the products and connected equipment against damage. These notices are highlighted by the symbols shown below and graded according to severity by the following texts:

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Note

contains important information about the product, its operation or a part of the document to which special attention is drawn.

Qualified Personnel

A device/system may only be commissioned or operated by **qualified personnel**. Qualified personnel as referred to in the safety guidelines in this document are persons authorized to energize, ground, and tag circuits, equipment and systems in accordance with established safety practice.

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The equipment/system or the system components may only be used for the applications described in the catalog or the technical description, and only in combination with the equipment, components and devices of other manufacturers as far as this is recommended or permitted by Siemens.

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Exclusion of Liability

We have checked the contents of this manual for agreement with the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual is reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are welcomed.

Technical data subject to change.

Preface

Purpose of the Manual

The information contained in this manual will allow you:

- To install, wire and start up the ET 200B distributed I/O station.
- To find module characteristics and technical specifications quickly and easily.

Contents of the Manual

The following explains the structure of the contents of the manual:

What is the ET 200B? → Chap. 1

Which control and display elements does the ET 200B have? → Chap. 2

How is the ET 200B installed? → Chap. 3

How do I configure an ET 200B (with COM ET 200)? → Chap. 4

How do I start up an ET 200B (with COM ET 200)? → Chap. 5

Faults? → Chap. 6

Technical Specifications? → Chap. 7, 8, 9

Scope of the Manual

This manual describes all the ET 200B modules which can be accessed with the **DP Standard** bus protocol. These ET 200B modules all have a 6ES7 Order Number (see Chapters 8 and 9).

This manual is valid for operation of the ET 200B with:

- IM 308-B master interface module and COM ET 200 V4.x
- IM 308-C master interface module and COM ET 200 WINDOWS

Operation with the IM 308-B master interface module and COM ET 200 V4.x is described in detail in this manual.

Scope of the Manual (Continued)

As far as operation of the ET 200B with the IM 308-C master interface module and COM ET 200 WINDOWS is concerned, this manual only explains the parameters which must be set with COM ET 200 WINDOWS. Please refer to the *ET 200 Distributed I/O System* manual (Order No. 6ES5 998-3ES12) for further information about how to use COM ET 200 WINDOWS and for details of the FB IM308C standard function block.

COM ET 200 WINDOWS also provides extensive support for starting up the ET 200B modules through its integrated help system.

Further Sources

This manual is based on the master description *ET 200 Distributed I/O System*.

To understand this manual properly, you require the *ET 200 Distributed I/O System* manual.

Organizational conventions

The following organizational conventions are used in this manual to make it easier for you to find specific information:

- At the front of the manual is a complete table of contents, together with a list of all the figures and tables contained in the manual.
- The left-hand column of each page in the individual chapters has headings to help you find information more quickly.
- The Appendix is followed by a glossary containing definitions of the most important technical terms used in the manual.
- At the end of the manual is a detailed index which you can use to refer to specific sections.

Standards

The ET 200B modules are equivalent to DP Standard slaves in accordance with DIN E 19245, Part 3.

Questions

If you have any questions regarding the ET 200B distributed I/O station, please address them to:

SIMATIC Hotline
Erlangen
Tel.: +49 9131 7-43344

Corrections

At the end of the manual, we have inserted correction forms. Please enter on these your suggestions for corrections and improvements and return the form to us. This will help us to improve the next edition of the manual.

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System Overview

1

In this Chapter

The System Overview gives you information on the following:

- The place of the ET 200B distributed I/O station in the ET 200 distributed I/O system.
- The components that make up the ET 200B.

1.1 What is the ET 200?

Definition

The ET 200 distributed I/O system is based on the PROFIBUS standard (DIN 19245, Part 1) and the PROFIBUS-DP draft standard (DIN 19245, Part 3).

The SIEMENS PROFIBUS is called SINEC L2.

The field bus on which the ET 200 distributed I/O system is based is a variant of SINEC L2 called SINEC L2-DP. This version is designed for communication with distributed I/O at extremely short response times.

Bus Node Described in this Manual

The distributed I/O system consists of active and passive nodes, the SINEC L2-DP field bus and the SINEC L2 network components. The ET 200B distributed I/O station is a passive bus node (slave).

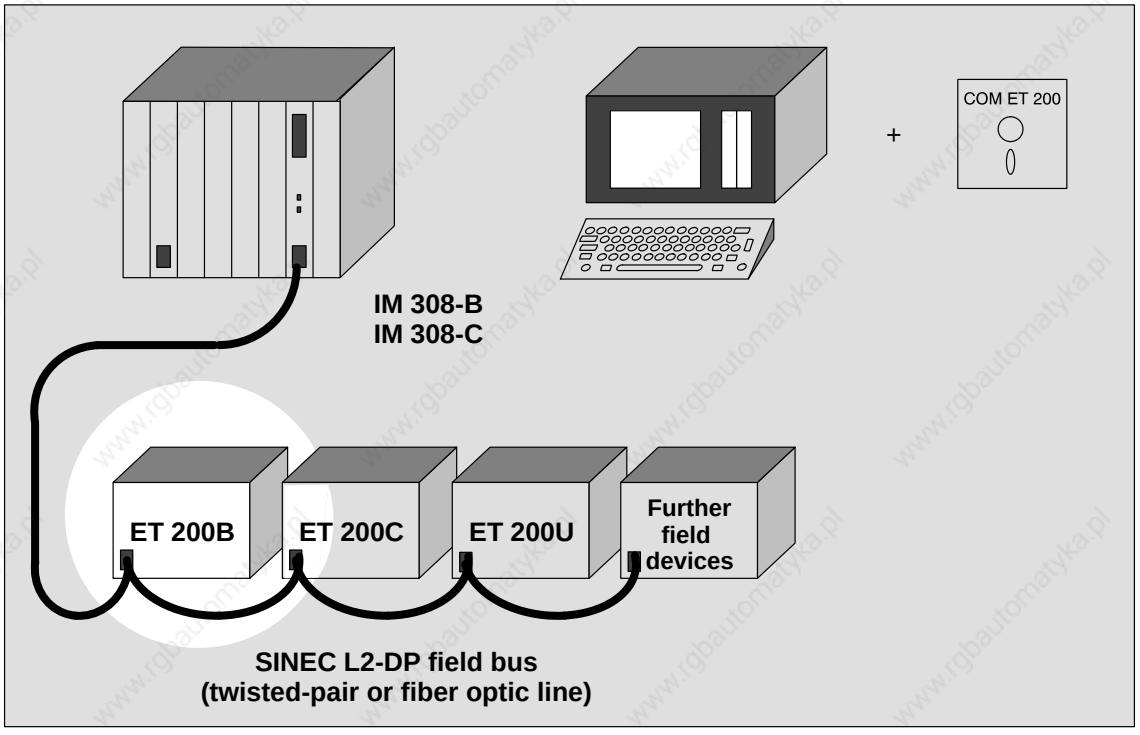


Figure 1-1 ET 200 Bus Node Described in this Manual

1.2 What is the ET 200B?

Definition

The ET 200B distributed I/O station (B for block I/O) belongs to the ET 200 distributed I/O system with the SINEC L2-DP field bus. The ET 200B is a slave station with degree of protection IP 20.

The ET 200B distributed I/O station incorporates a SINEC L2-DP bus interface and digital or analog inputs/outputs.

Range of Modules

The range of modules for the ET 200B includes:

- 24 V DC digital modules
- 120/230 V AC digital modules
- Analog modules

Application

Thanks to its compact and flat design, the ET 200B distributed I/O station is primarily suited to applications where space is a priority.

The ET 200B distributed I/O station can be mounted either on a standard sectional rail or directly onto the wall. Vertical and horizontal installation are both possible.

Components

The ET 200B consists of 2 parts: the terminal block and the electronics block.

The terminal block (TB) incorporates the permanent wiring and does not contain any function-related electrical components. The electronics block is attached to the terminal block. The electronics block (EB) contains the logic circuits.

The terminal block and the electronics block have matching mechanical coding elements to prevent destruction of the electronics block.

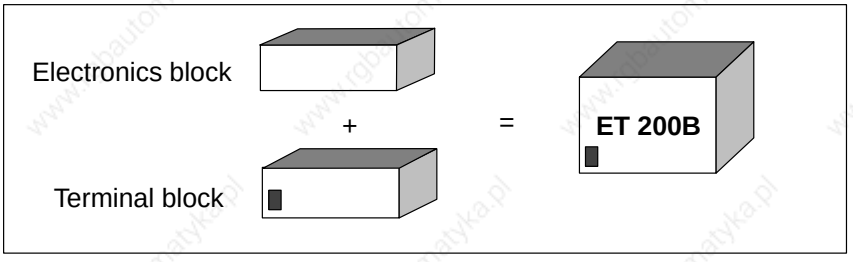


Figure 1-2 ET 200B Components

What is the ET 200B?, continued

Characteristics

All the ET 200B modules can be accessed with the **DP Standard** bus protocol.

Note

The ET 200B can be operated with the following master interface modules and versions of COM ET 200:

- IM 308–B (Version 5 or higher) and COM ET 200 (Version 4.0 or higher, see Chapters 4 and 5)

or

- IM 308–C (Version 1 or higher) and COM ET 200 WINDOWS.

DP Standard

DP Standard is the bus protocol of the ET 200 distributed I/O system in accordance with the Draft Standard DIN 19245, Part 3.

1.2.1 Terminal Block

Definition

The terminal block incorporates the permanent wiring.

Characteristics

The terminal block has the following characteristics:

- The supply voltage for the electronics block (logic) can be switched on/off (except for the TB6/AC terminal block).
- The terminal block can be mounted both on standard sectional rails and on smooth surfaces, that is, direct wall mounting is possible.
- The SINEC L2-DP bus is interfaced via a SINEC L2 bus connector.
- Station numbers between 00 and 99 can be set by means of an implement such as a screwdriver:
  - When operating with an IM 308-B master interface, station numbers 3 to 99 are permissible.
  - When operating with an IM 308-C master interface, station numbers 1 to 99 are permissible.

1.2.2 Electronics Block

Definition

The electronics block contains the logic circuits and is plugged onto the terminal block.

Characteristics

The electronics block has the following characteristics:

- There is galvanic isolation between the SINEC L2-DP bus and the internal electronics.
- The block has LEDs for indicating the following:
  - Voltage supply to the logic circuits (RUN)
  - Bus fault (BF)
  - Group diagnostics: short-circuit, wire break or load voltage failure (DIA, only for electronics blocks which can be diagnosed)
  - Load voltage monitoring (L1+, L2+, L3+, L4+, only for digital electronics blocks (24 V DC) with output channels)
  - Status of the inputs or outputs (for digital electronics blocks only)
- Labelling strips are inserted in the electronics block. Fill in the labelling strips to ensure unambiguous assignment of name, channel and LED.

Technical Description 2

In this Chapter

This chapter contains overviews showing the arrangement of the following:

- Operator controls
- Display elements
- Elements for assembling/dismantling.

2.1 Design of the Terminal Block

Design Principle of the Digital TBs

All digital terminal blocks are built on the same design principle explained below using the TB1/DC terminal block as a typical example:

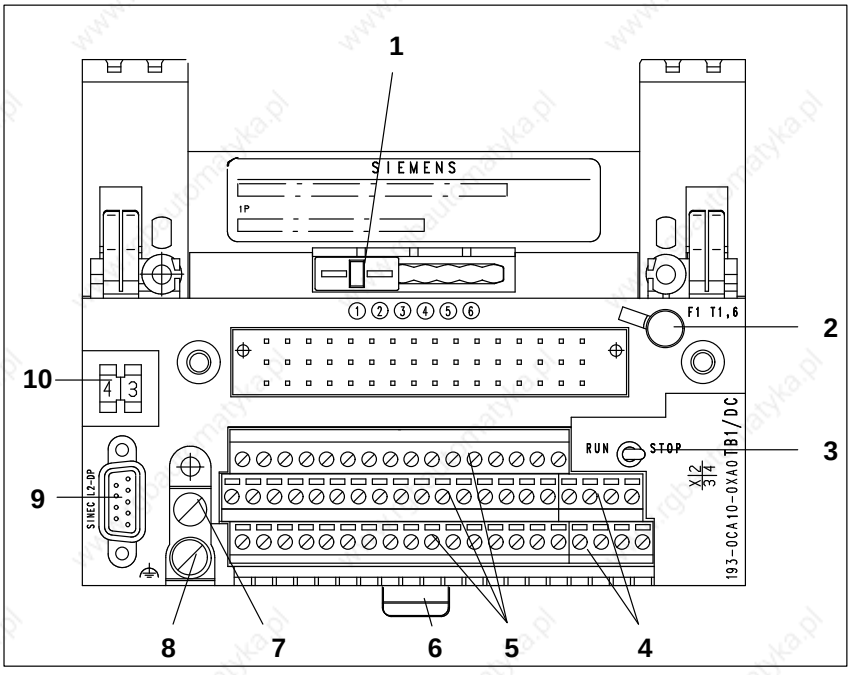


Figure 2-1 TB1/DC Terminal Block

1 Coding slide switch

2 Fuse

3 STOP/RUN switch (not TB6/AC). The power supply for logic circuits in the electronics block can be switched on or off with the STOP/RUN switch. It can also be used to switch the ET 200B distributed I/O station on and off.

4 Terminals for power supplies

5 Terminals for inputs/outputs

6 Slide for removing the terminal block from the standard sectional rail

7 M4 screw (connects chassis with PE)

8 M5 screw for connecting PE

9 SINEC L2-DP interface

10 Switch for setting the station number (the station number is valid only after operation of the STOP/RUN switch (STOP –> RUN)).

Design Principle of the TB8 Analog Block

On the front of the TB8 analog terminal block, there are an additional 5 coding switches:

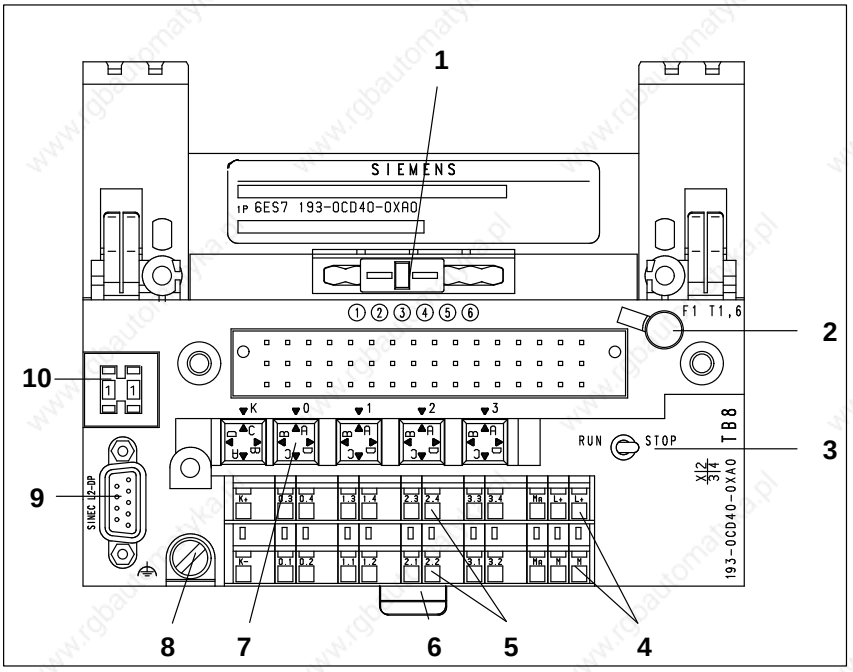


Figure 2-2 TB8 Terminal Block

1 Coding slide switch

2 Fuse

3 STOP/RUN switch. The power supply for logic circuits in the electronics block can be switched on or off with the STOP/RUN switch. It can also be used to switch the ET 200B distributed I/O station on and off.

4 Terminals for power supplies

5 Terminals for inputs/outputs

6 Slide for removing the terminal block from the standard sectional rail

7 Coding connectors. You use the coding connectors for setting the wiring of the TB8 for analog value processing.

8 M5 screw for connecting PE

9 SINEC L2-DP interface

10 Switch for setting the station number (the station number is valid only after operation of the STOP/RUN switch (STOP –> RUN)).

2.2 Design of the Electronics Block

Design Principle

All types of electronics block are built on the same design principle which is explained below using the ET 200B-16DI electronics block as a typical example:

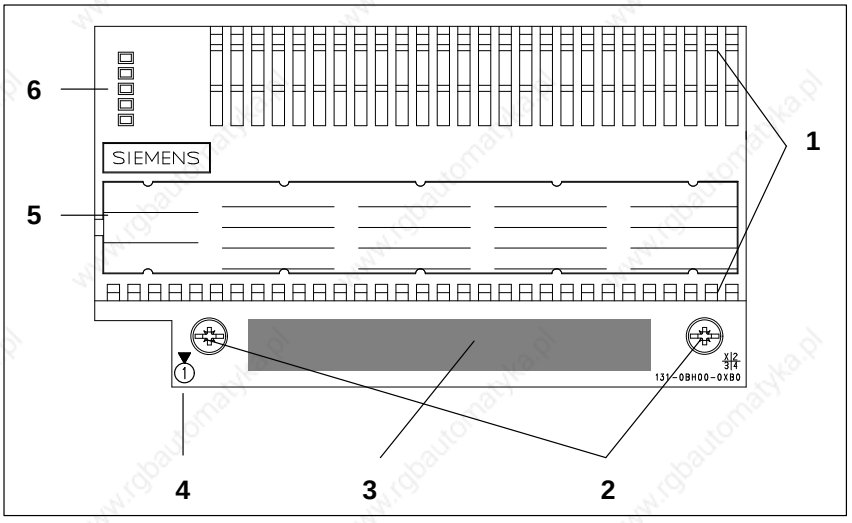


Figure 2-3 ET 200B-16DI Electronics Block

1 Ventilation slots

2 Screws for mounting the electronics block on the terminal block

3 Printed schematic diagram

4 Indication of the coding slide switch setting on the top of the terminal block

5 Labelling strip; for indicating the status of the inputs or outputs in the case of digital electronics blocks with LEDs

6 LEDs for

- Voltage supply to the logic circuits (RUN)
- Bus fault (BF)
- Group diagnostics; short-circuit, wire break or load voltage failure (DIA, only for electronics blocks which can be diagnosed)
- Monitoring the load voltage (L1+ for ET 200B-8DI/8DO, ET 200B-24DI/8DO and ET 200B-24DI/8DO 0.2 ms; L1+, L2+ for ET 200B-16DQ; L1+/L2+, L3+/L4+ for ET 200B-32DO and ET 200B-16DO/2A).

Coding

The electronics blocks are coded by the manufacturer. Some types of electronics blocks have a recess at the bottom. This recess ensures that the terminal block is assigned safely to the correct electronics block.

Mechanical and Electrical Installation 3

In this Chapter

In this chapter, you will find out

- How to install the terminal block and the electronics block.
- The settings to be made on the terminal block.
- How to perform the electrical wiring on the terminal block.

You will find a detailed description of the technical specifications of the ET 200B modules in Chapters 7, 8 and 9.

3.1 Installing and Setting the Terminal Block

Two Methods

You can install the terminal block either

- on a standard sectional rail (35 x 15 mm or 35 x 7.5 mm to DIN EN 50022)

  or

- on smooth surfaces, that is, direct wall mounting (for dimensions of the mounting holes see Dimension Drawings in Chapters 8 and 9).

Installation Clearances

Figure 3-1 shows you the minimum clearances that are required to hang the electronics block on the standard sectional rail:

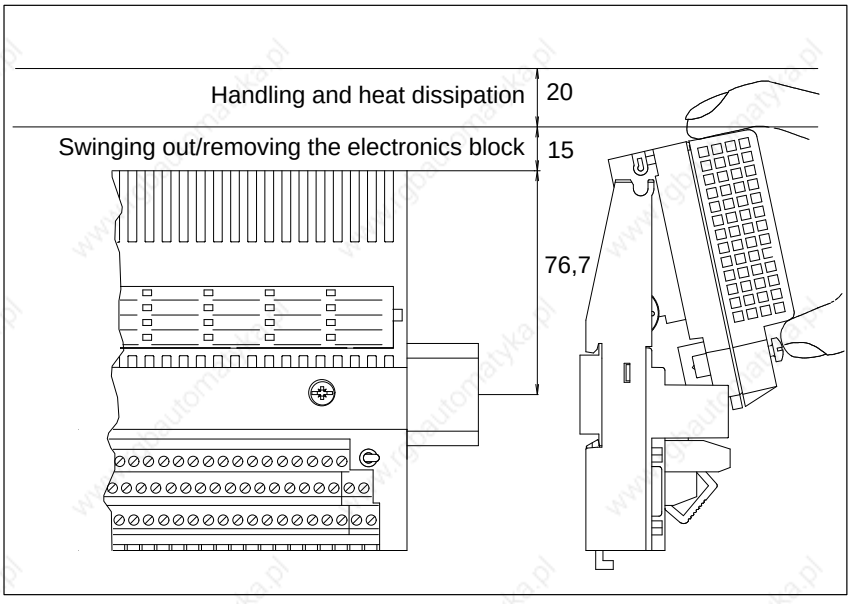


Figure 3-1 Clearances Required for Installation of the Electronics Block

Shield Connecting Element for TB8

In the case of analog value processing, we recommend that the cable shielding of the signal lines is applied directly at terminal block TB8.

For this application, you can hang the TB8 onto a shield connecting element after first mounting the shield connecting element on a standard sectional rail (35 x 15 or 35 x 7.5 mm to DIN EN 50022) or a smooth surface.

To apply the shield braiding, install metal terminal elements on the shield connecting element.

You can order the shield connecting element and the terminal elements under the following numbers:

- Shield connecting element → Order no. 6ES7 193-0CD40-7XA0
- Terminal elements (1 pair each):
  - Single version → Order no. 6ES7 390-5BA00-0AA0
    (one shield cable per terminal element with a diameter of 3 to 8 mm to be clamped)
  - Double version → Order no. 6ES7 390-5BA00-0AA0
    (two shield cables per terminal element with a diameter of 2 to 6 mm to be clamped)

Note

If you mount the TB8 with shield connecting element on a standard sectional rail, you must install the ET 200B horizontally.

Installing and Setting the Terminal Block, continued

Mounting on a Standard Sectional Rail

If you mount the terminal block on a standard sectional rail...

1. Hang the terminal block on the standard sectional rail (**1**) and
2. Swing it back until the slide on the module snaps into place (**2**).

Note:

The meanings of the coding switch settings are explained in Table 3-1.

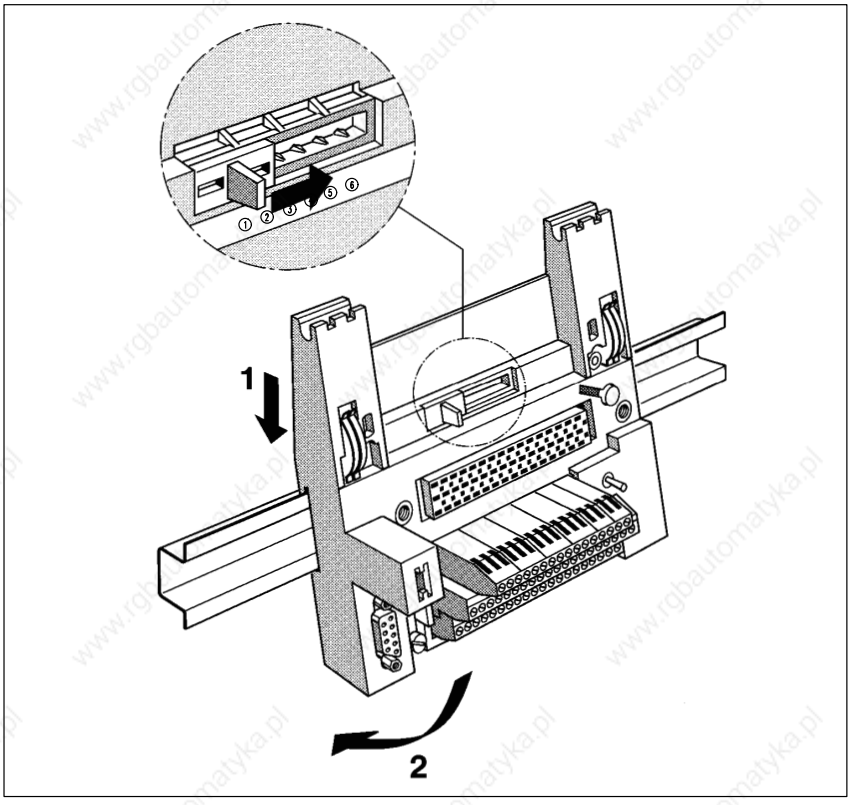


Figure 3-2 Hanging the Terminal Block on the Standard Sectional Rail and Setting the Coding Slide Switch

Mounting with Shield Connecting Element on a Standard Sectional Rail

If you mount the terminal block with shield connecting element on a standard sectional rail...

1. Hang the shield connecting element on the standard sectional rail from below (**1**) and swing it back (**2**).
2. Secure the shield connecting element on the standard sectional rail by tightening the screws (**3**).

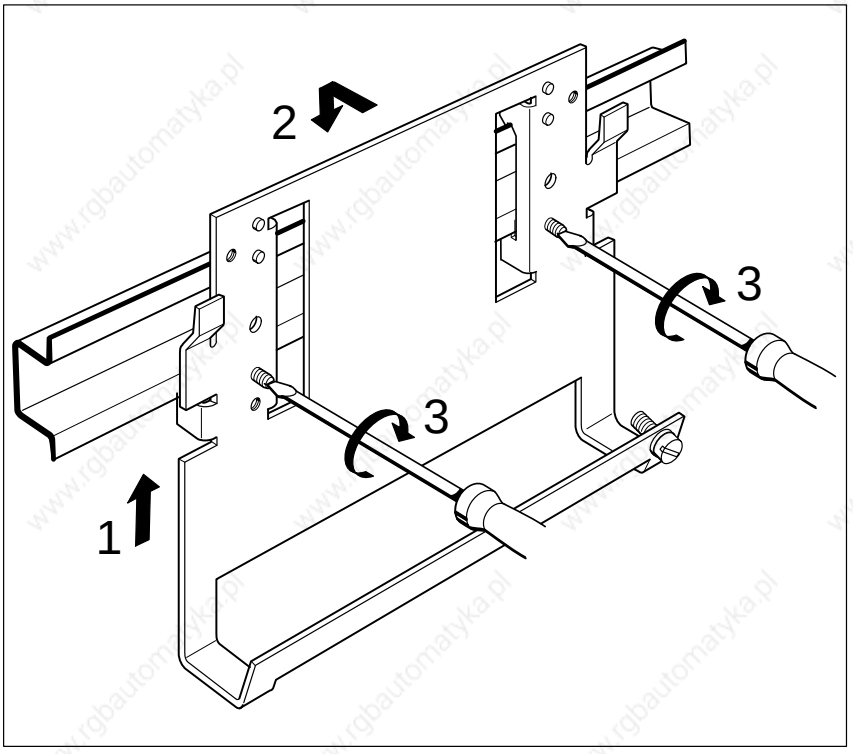


Figure 3-3 Mounting the Shield Connecting Element on the Standard Sectional Rail

Installing and Setting the Terminal Block, continued

3. Hang the terminal block on the supporting lugs of the shield connecting element (**4**).
4. Secure the terminal block on the shield connecting element by tightening the screws (**5**).

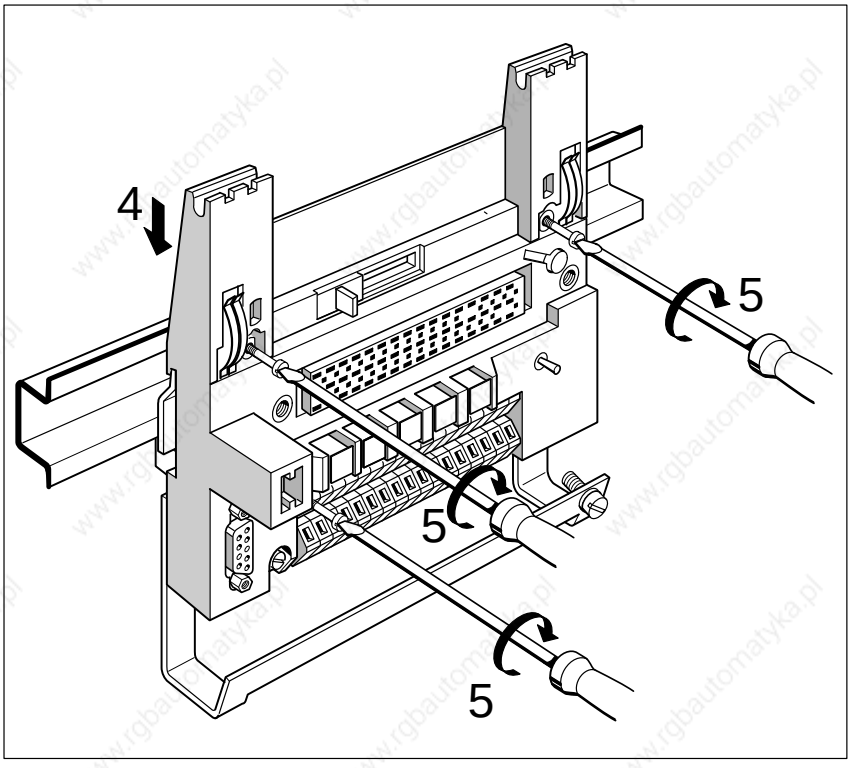


Figure 3-4 Mounting the Terminal Block on the Shield Connecting Element

Setting the Coding Slide Switch

In order to prevent the wrong electronics block being plugged in, the terminal block has a coding slide switch (see Section 2.1, Figure 2-1, **1**).

The coding switch can be engaged in 6 settings. Each setting is assigned to a module class of the ET 200B distributed I/O station:

Table 3-1 Assignment of the Electronics Blocks to the Coding Slide Switch

Setting	Module Class
1	24 V digital modules
2	24 V special modules
3	Analog modules
4	Reserved
5	Reserved
6	230 V digital modules

Setting the Station Number

Any station number from 00 to 99 can be set using an object such as a screwdriver (see Section 2.1, Figure 2-1, **10**):

- Station numbers 3 to 99 are permissible when operating with the IM 308-B master interface.
- Station numbers 1 to 99 are permissible when operating with the IM 308-C master interface.

The station number becomes valid only after a STOP/RUN transition of the ET 200B slave station.

Setting the Coding Plugs

In the case of analog modules, you can set the necessary defaults for analog value measurement or analog value output for each channel via coding plugs (see Section 2.1, Figure 2-2, **7**).

See Section 9 “Analog Modules” for a description of the possible settings and their meanings.

Installing and Setting the Terminal Block, continued

Changing the Fuse

The fuse in the terminal block is a protection against overcurrent of the sensor supply and the supply to the internal logic circuits. If the fuse blows, the internal logic circuits of the module receive no voltage.

Use only the following fuses for replacement purposes:

Table 3-2 Permissible Fuses in the Terminal Block

Terminal Block	Fuse
TB1/DC	Minature fuse TR5-T 1.6; 125 V
TB1-4/DC	Minature fuse TR5-T 1.6; 125 V
TB2/DC	Minature fuse TR5-T 2.5; 250 V
TB2-4/DC	Minature fuse TR5-T 2.5; 250 V
TB3/DC	Minature fuse TR5-T 1.6; 125 V
TB4/DC	Minature fuse TR5-T 2.5; 250 V
TB8 analog	Minature fuse TR5-T 1.6; 125 V
TB6/AC	Miniature fuse TR5-T 1; 250 V AC

Proceed as follows when changing the fuse:

1. Switch the STOP/RUN switch to the “STOP” position.
2. Pull the electronics block off the terminal block.
3. Lever the fuse out of its base using a screwdriver.
4. Insert the new fuse.
5. Attach the electronics block to the terminal block.
6. Switch the RUN/STOP switch to “RUN”.

Note

The TB6/AC terminal block has no STOP/RUN switch. Make sure that the external power supply is switched off before removing the electronics block and changing the fuse.

3.2 Installing the Electronics Block

Hanging the Electronics Block on the Terminal Block

After having coded the terminal block via the coding slide switch, you can hang the electronics block on the terminal block:

Warning

Avoid electrical destruction of the electronics block.

The electronics block may only be hung onto the terminal block when the STOP/RUN switch of the terminal block is in the “STOP” position!

The TB6/DC terminal block has no STOP/RUN switch. Always switch off the external power supply before attempting to hang an electronics block (120/230 V AC) onto the TB6/DC.

1. Hang the electronics block on the terminal block. (**1**).
2. Press the electronics block onto the terminal block (**2**).
3. Secure the electronics block by tightening the screws (**3**).

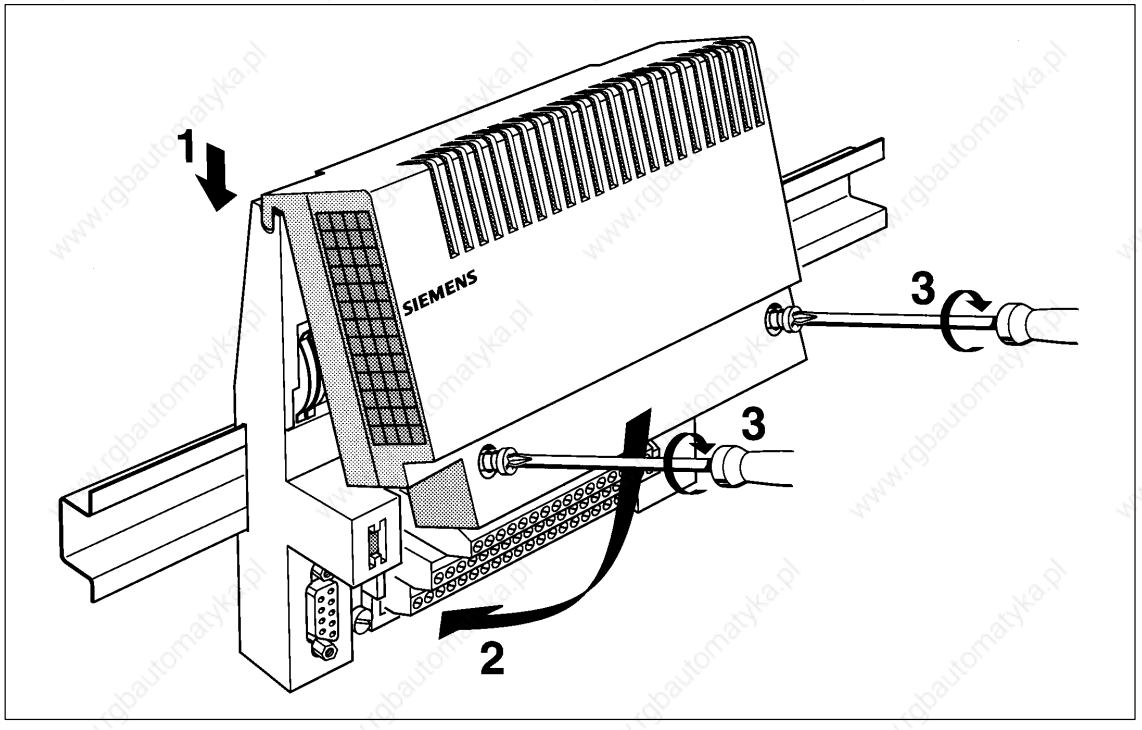


Figure 3-5 Hanging the Electronics Block on the Terminal Block

Installing the Electronics Block, continued

Labelling the Electronics Block

A labelling strip is inserted in the electronics block.

Individual DIN A4 sheets consisting of several labelling strips can be additionally ordered. Please refer to **Catalog ST 54.2** for order numbers.

Versions:

- For electronics blocks with 16DI, 16DQ, 8DI/8DO, 8RO:

  10 labelling strips on one DIN A4 sheet

- For electronics blocks with 16DI-AC, 16DO-AC, 32 DI, 16DO/2A, 32DO, 24DI/8DO, 16RO-AC, 8DI/8RO-AC:

  7 large labelling strips and 9 small labelling strips on one DIN A4 sheet.

3.3 Dismantling the Terminal Block and the Electronics Block

Dismantling (from the Standard Sectional Rail)

Proceed according to the following steps:

1. Remove the electronics block in the reverse sequence to that described in Figure 3-5.
2. Press the slide (**1**) on the bottom of the terminal block down using a screwdriver and
3. Swing the terminal block out of the standard sectional rail (**2**).

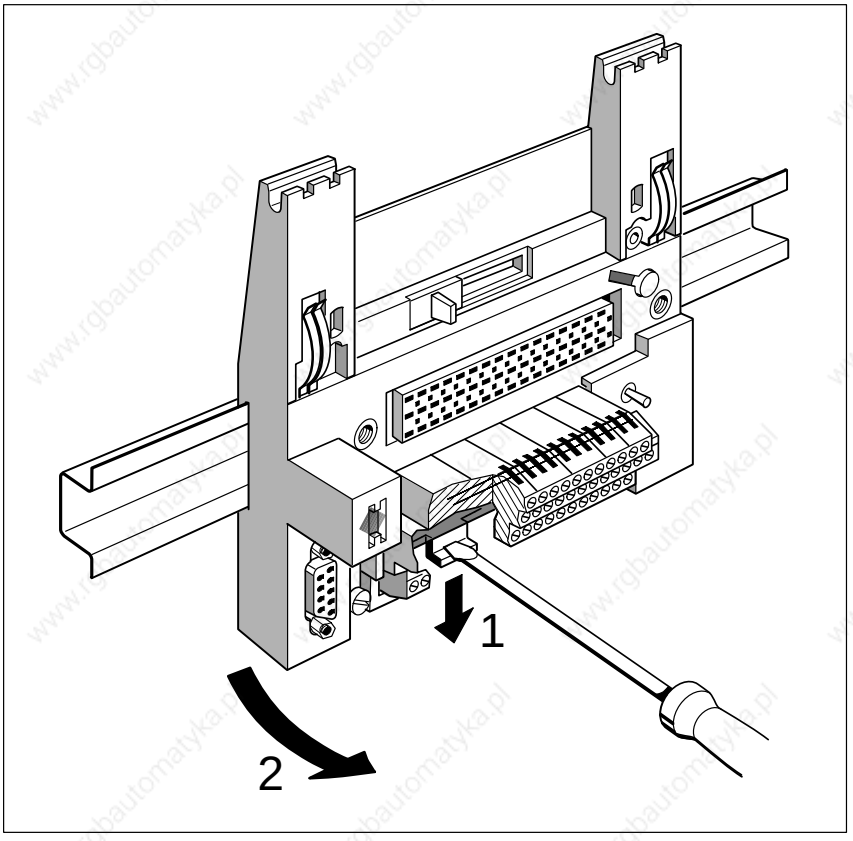


Figure 3-6 Dismantling the ET 200B

Dismantling (from the Shield Connecting Element)

Proceed according to the following steps:

1. Remove the electronics block in the reverse sequence to that described in Figure 3-5.
2. Remove the terminal block and the shield connecting element in the reverse sequence to that described in Figures 3-3 and 3-4.

3.4 Electrical Installation

Introduction

The ET 200B distributed I/O station allows both **grounded and ungrounded** configurations.

The Following Chapters

The following two chapters explain the configuration rules and give circuit examples for

- Grounded configuration
- Ungrounded configuration

The text contains numbers referring to their counterparts in the associated figures.

3.4.1 Grounded Configuration

Definition

In a grounded configuration, the reference potential of the ET 200B logic circuits and the protective ground conductor (PE) are connected to each other galvanically.

Rules

You must note the following points for a grounded configuration:

- You must provide a main switch (**1**) in accordance with DIN VDE 0100 for the ET 200B modules, the signal sensors and the actuators.
- If the spur lines are a maximum of 3 m long and are ground-fault-resistant and short-circuit-proof, the supply connection for the ET 200B and the load circuit requires no additional fuse (**2**).
- Use a Siemens load power supply unit (**3**) in the 6EV1 series (**Catalog ET 1**) for supplying the 24 V DC to the ET 200B.

  If you connect another load power supply unit (24 V DC), please note that the voltage must be in the range 20 to 30 V (including ripple). The load power supply unit must generate a functional low voltage with safe electrical isolation in accordance with DIN VDE 0106. In the case of non-stabilized load power supply units, you require a back-up capacitor (rating 200 µF per 1 A load current).
- Provide a detachable connection to the protective ground conductor (**4**) in the secondary circuit of the load power supply unit (M terminal).
- A fuse (**5**) is required for fusing the supply voltage.
- For both grounded and ungrounded configurations, the PE terminal ⏚ of the ET 200B must have a low-impedance connection to the protective ground conductor or the cabinet ground (machine parts) (**6**).
- Use a minimum cross-section of 4 mm^2 and a maximum of 10 mm^2 for equipotential bonding and ground connections.
- All machine parts must be grounded.

Grounded Configuration, continued

Connecting the Reference Potential of the Logic Circuits to PE

For a grounded configuration, you must also do the following at the digital terminal blocks:

1. Connect the PE terminal to the lower screw.
2. Tighten the upper screw. The upper screw connects the ground potential to PE.

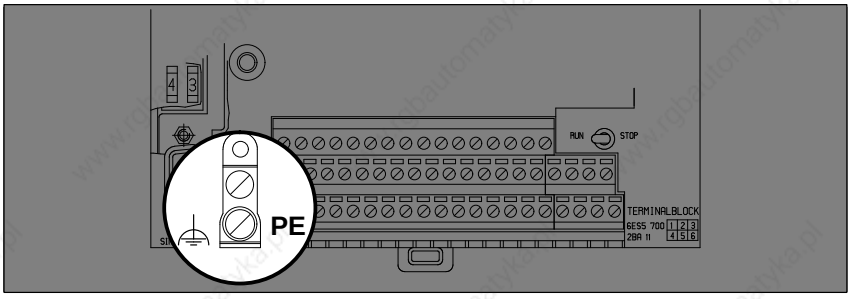


Figure 3-7 Both Screws Tightened in a Grounded Configuration

Electrical Configuration

Figure 3-8 shows the grounded configuration for 24 V DC digital modules of the ET 200B:

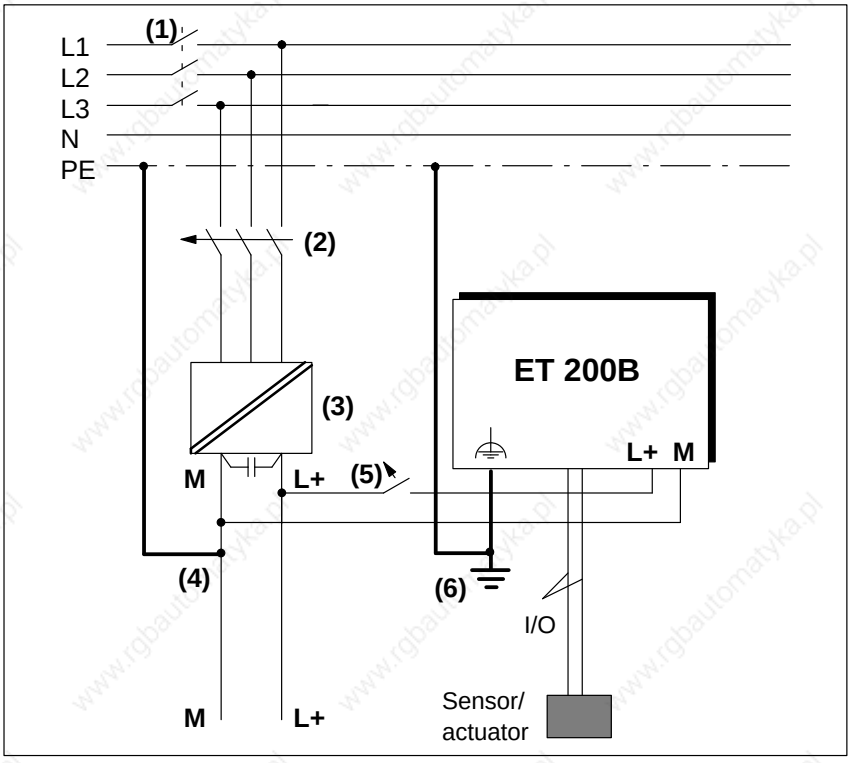


Figure 3-8 Grounded Configuration for 24 V DC Digital Modules of the ET 200B

Electrical Configuration, continued

Fig. 3-9 shows the grounded configuration for 120/230 V AC digital modules of the ET 200B:

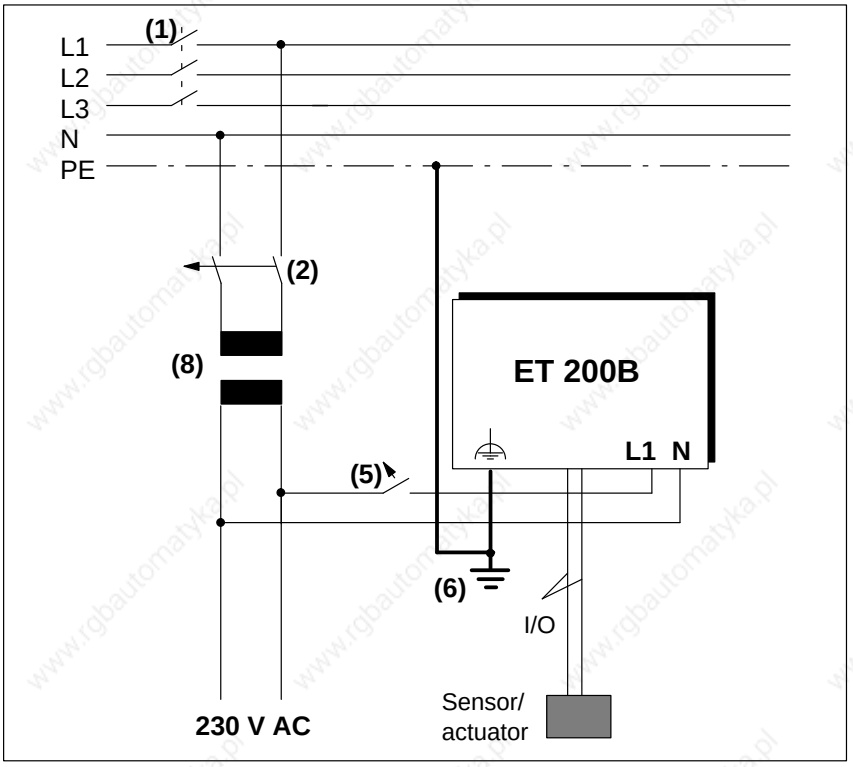


Figure 3-9 Grounded Configuration for 120/230 V AC Digital Modules of the ET 200B

3.4.2 Ungrounded Configuration

Definition

In an ungrounded configuration, there is no galvanic connection between the reference potential of the ET 200B logic circuits and the protective ground conductor (PE).

Rules

You must note the following points for an ungrounded configuration:

- You must provide a main switch (**1**) in accordance with DIN VDE 0100 for the ET 200B modules, the signal sensors and the actuators.
- If the spur lines are a maximum of 3 m long and are ground-fault-resistant and short-circuit-proof, the supply connection for the ET 200B and the load circuit requires no additional fuse (**2**).
- Use a Siemens load power supply unit (**3**) in the 6EV1 series (**Catalog ET 1**) for supplying the 24 V DC to the ET 200B.

  If you connect another load power supply unit (24 V DC), please note that the voltage must be in the range 20 to 30 V (including ripple). The load power supply unit must generate a functional low voltage with safe electrical isolation in accordance with DIN VDE 0106. In the case of non-stabilized load power supply units, you require a back-up capacitor (rating 200 µF per 1 A load current).
- A fuse (**5**) is required for fusing the supply voltage.
- For both grounded and ungrounded configurations, the PE terminal ⏚ of the ET 200B must have a low-impedance connection to the protective ground conductor or the cabinet ground (machine parts) (core cross-section of PE min. 4 mm^2 and max. 10 mm^2) (**6**).
- Provide an insulation monitoring circuit against ground with voltage limitation in accordance with the regulations applying to the system, for example DIN VDE 0160 (**7**).

Warning

The ungrounded configuration can be cancelled out by grounded machine parts and grounded electrical equipment.

Example: A grounded sensor or a grounded actuator connects the PE to the reference potential (M terminal) of the controller.

Disconnecting the Reference Potential of the Logic Circuits from PE

For an ungrounded configuration, you must also do the following at the digital terminal blocks:

1. Connect the PE terminal to the lower screw.
2. Remove the upper screw for an ungrounded configuration.

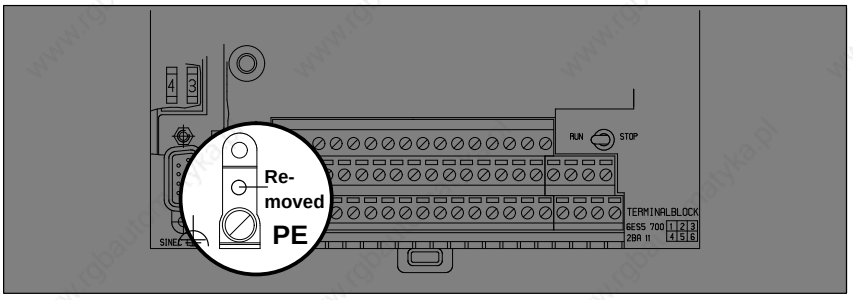


Figure 3-10 Upper Screw Removed in an Ungrounded Configuration

Electrical Configuration

Figure 3-11 shows the ungrounded configuration for 24 V DC digital modules of the ET 200B:

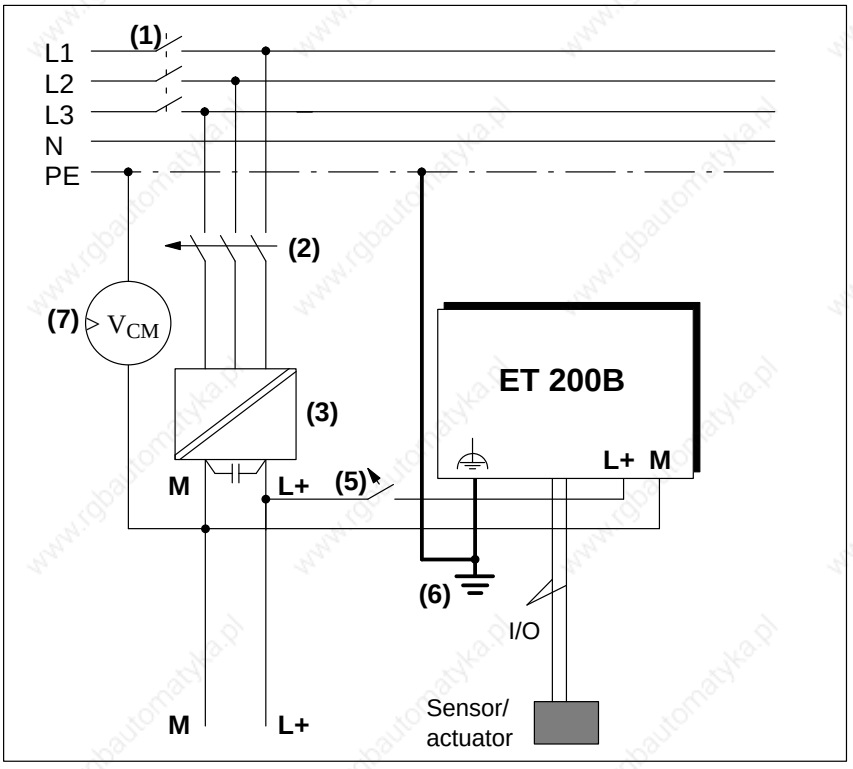


Figure 3-11 Ungrounded Configuration for 24 V DC Digital Modules of the ET 200 B

3.5 Wiring the Terminal Block

Introduction

Connect the following to the terminal block:

- Supply voltage for internal logic circuits
- Sensor supply for input channels
- Load voltage supply for output channels
- Sensors/loads

Wiring

The wiring of the terminal block is dependent on the electronics block used.

A distinction is made between **floating** and **non-floating electronics blocks**.

Floating Electronics Block

In floating electronics blocks, the internal logic circuits and the load current circuit are galvanically isolated from each other.

Floating electronics blocks include:

- All analog electronics blocks
- All 120/230 V AC electronics blocks
- Floating 24 V DC electronics blocks.

Note

You can use floating electronics blocks regardless of whether the reference potential of the supply voltage for the internal logic circuits is grounded or not.

Non-Floating Electronics Blocks

In non-floating electronics blocks, the internal logic circuits and the load current circuit share a common reference potential (M ground).

Non-floating electronics blocks include:

- Non-floating 24 V DC electronics blocks.

Pin Assignments

In Chapter 8 “Range of Modules”, you will find the pin assignments of each electronics block. Table 3-3 will help you.

Table 3-3 Pin Assignments of the Terminal Block

Pin Assignments of the ...	For Electronics Block ...	Described in ...
TB1/DC, TB1-4/DC and TB3/DC	ET 200B-16DI	Table 8-3
	ET 200B-16DO	Table 8-5
	ET 200B-8DI/8DO	Table 8-9
	ET 200B-8RO	Table 8-8
TB2/DC, TB2-4/DC and TB4/DC	ET 200B-16DO/2A	Table 8-6
	ET 200B-32DI, ET 200B-32DI 0.2ms	Table 8-4
	ET 200B-32DO	Table 8-7
	ET 200B-24DI/8DO, ET 200B-24DI/8DO 0.2ms	Table 8-10
TB6/AC	ET 200B-16DI-AC	Table 8-11
	ET 200B-16DO-AC	Table 8-12
	ET 200B-16RO-AC	Table 8-13
	ET 200B-8DI/8RO-AC	Table 8-14
TB8 analog	ET 200B-4/8DI	Table 9-14
	ET 200B-4AI	Table 9-26
	ET 200B-4AO	Table 9-31

Wire Cross-Section

The following cross-sections are permissible for all power and signal lines:

- Line **with** connector sleeve: max. 1.5 mm^2
- Line **without** connector sleeve: max. 2.5 mm^2 (min 0.08 mm^2 for TB3, TB4, TB8) (min 0.14 mm^2 for TB1, TB1-4, TB2, TB2-4)

Use the following cross-section for the protective ground conductor PE to the terminal block of the TB1-4/DC or the TB2-4/DC:

- Line **with** connector sleeve: max. 2.5 mm^2.

Wiring the Terminal Block, continued

Connections

The wires are secured either in screw connections or spring-loaded connections, depending on the terminal block (see Fig. 3-12).

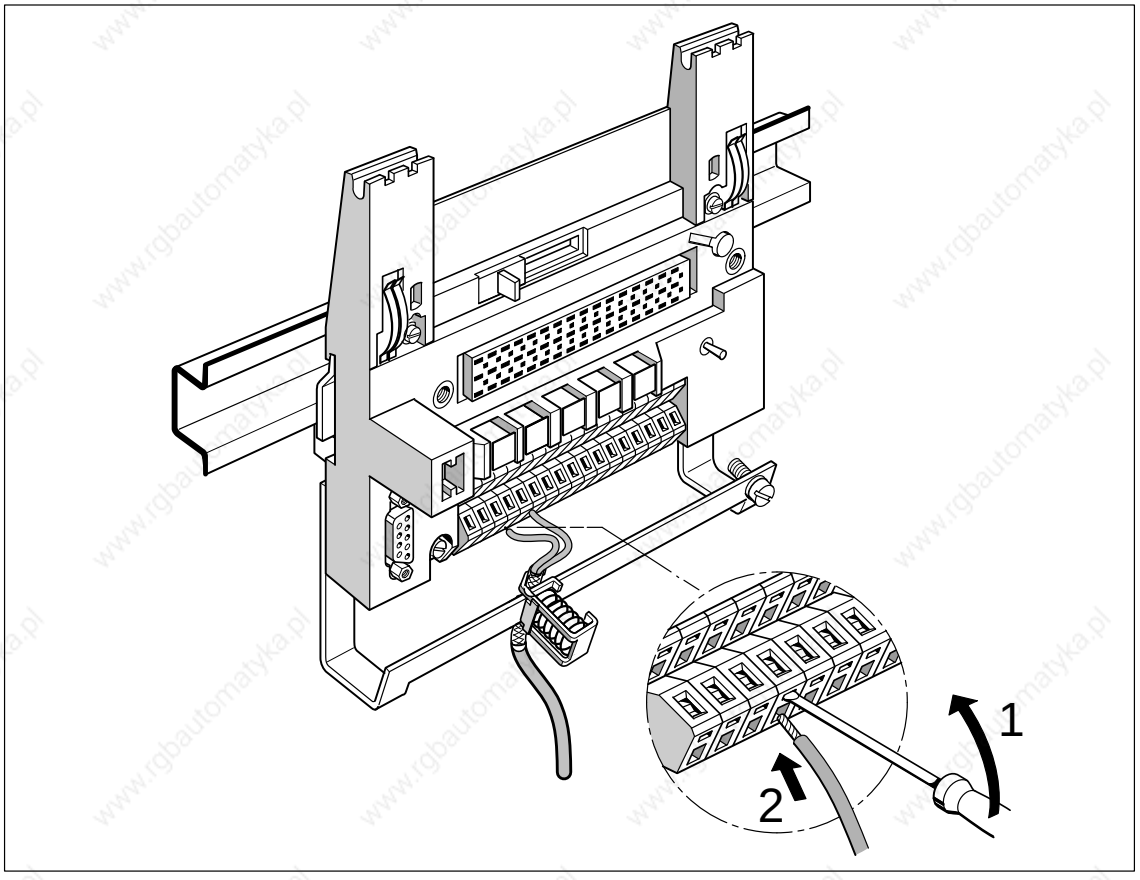


Figure 3-12 Securing the Wire in a Spring-Loaded Connection

Shielding for Analog Value Processing

For analog value processing, connect the cable shields of the signal lines directly at the TB8 to the shield connecting element (Order No.: 6ES7 193-0CD40-7XA0).

How to Proceed when Applying the Shielding

Follow the steps listed below:

1. Hang the TB8 terminal block on the shield connecting element after first mounting the shield connecting element on the standard sectional rail or a smooth surface (wall) (see Section 3.1).
2. Mount metallic terminal elements (see Section 3.1) on the bottom edge of the shield connecting element (**1** and **2**).
3. Strip the insulation of the signal lines.
4. Secure the bare cable ends to the terminal elements (**3** and **4**).
5. Connect the shield connecting element to the protective ground conductor (PE). The cross-section of PE must be a minimum of 4 mm^2 and a maximum of 10 mm^2.
6. Connect the shield of the bus cable in such a way that the maximum bend radius when bent once (10 x d_O; d_O = outer diameter of the cable) is not exceeded.

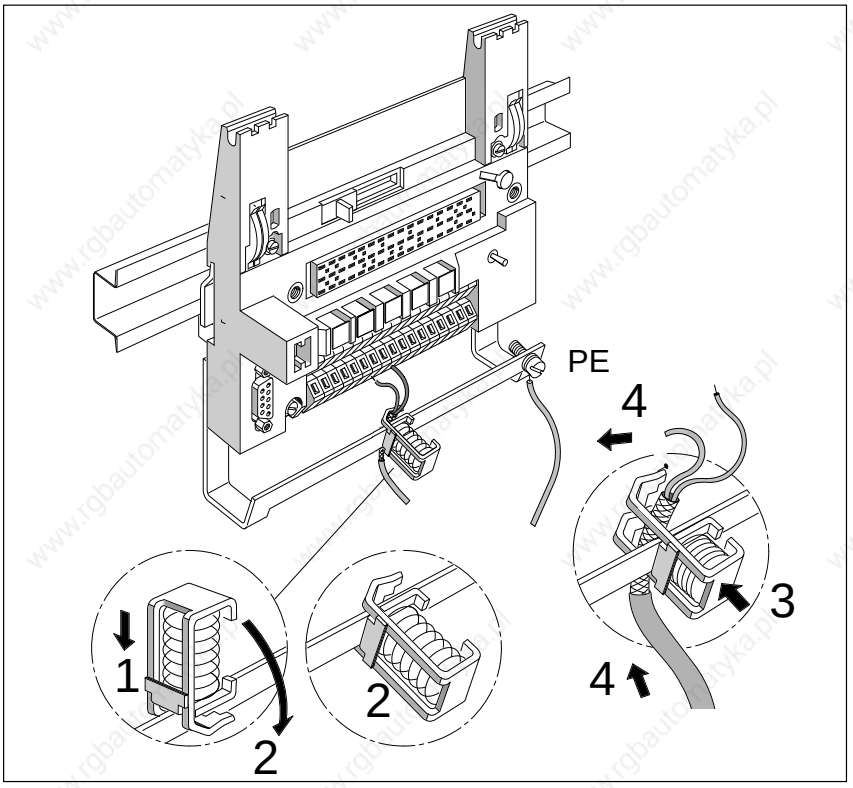


Figure 3-13 Shield Connecting Element on Terminal Block TB8

3.6 Wiring the Bus Interface

Bus Interface

The SINEC L2-DP bus is connected via bus connectors.

Bus Connectors

There are bus connectors in various installation sizes available for the ET 200B.

The previous SINEC L2 bus connectors (Order No.: 6ES5 ...) exceeded the installation height of the ET 200B. For this reason, new SINEC L2 bus connectors have been developed which **do not** exceed the installation height of the ET 200B when plugged in (Order No.: 6ES7 ...).

You can find the precise installation heights of the different SINEC L2 bus connectors in the Dimension Drawings in Section 8.1.1.

For the ET 200B, use one of the following SINEC L2 bus connectors with degree of protection IP 20:

Table 3-4 SINEC L2 Bus Connectors

Version	Order No.
Without programmer port	6ES7 972-0BA00-0XA0
With programmer port	6ES7 972-0BB00-0XA0
Without programmer port	6ES5 762-2AA12
With programmer port	6ES5 762-2AA21

Address Assignment and Parameterization with COM ET 200

4

Fundamentals

This chapter is based on the *ET 200 Distributed I/O System* manual.

The fundamentals of COM ET 200 are described in the *ET 200 Distributed I/O System* manual.

Address assignment is an important component of COM ET 200. The *ET 200 Distributed I/O System* manual contains useful information about the address assignment methods (linear and dual-port RAM addressing).

In this Chapter

In this chapter, you will learn how to use the ‘‘CONFIGURING” screen form of the **COM ET 200** software package **V4.x** to configure and parameterize the ET 200B distributed I/O station.

You can define the following for each ET 200B slave station with this mask:

- The station number (see Section 4.1.1)
- The address range and the type of the station (see Section 4.1.2)
- The addresses of the inputs and outputs (see Section 4.1.3)
- The parameters for analog modules (see Section 4.2).

COM ET 200 WINDOWS

If you are operating the ET 200B with **COM ET 200 WINDOWS**, you do not need to study this chapter.

The simple procedure for configuring and parameterizing slave stations with COM ET 200 WINDOWS is identical for all the ET 200 slaves and is not described in this manual. Please refer to the *ET 200 Distributed I/O System* manual (Order No. 6ES5 998-3ES12) for further details about how to use COM ET 200 WINDOWS.

COM ET 200 WINDOWS also provides extensive support for starting up the ET 200B modules through its integrated help system.

Chapter 9 ‘‘Analog Modules” lists all the parameters which you can set for the analog modules of the ET 200B with COM ET 200 WINDOWS.

4.1 Address Assignment with COM ET 200 V4.x

In this Section

In this section, you will learn how to use the “CONFIGURING” screen form of the COM ET 200 software package V4.x to configure the ET 200B distributed I/O station.

Type Files

To start up an ET 200B with COM ET 200 V4.x, you must ensure that the type file of the ET 200B module has been installed in the COM ET 200 directory. The type files have the following designations:

Table 4-1 Designation of the Type Files for the ET 200B

Station Type		Order Number	Type File
B-16DI	DP	6ES7 131-0BH00-0XB0	SI0001TD.200
B-32DI	DP	6ES7 131-0BL00-0XB0	SI0004TD.200
B-32DI.2	DP	6ES7 131-0BL10-0XB0	SI000CTD.200
B-16DO	DP	6ES7 132-0BH00-0XB0	SI0002TD.200
B-16DO/2A	DP	6ES7 132-0BH10-0XB0	SI0005TD.200
B-32DO	DP	6ES7 132-0BL00-0XB0	SI000DTD.200
B-8DI/8DO	DP	6ES7 133-0BH00-0XB0	SI000BTD.200
B-24DI/8DO	DP	6ES7 133-0BN00-0XB0	SI000FTD.200
B-24DI/8DO.2	DP	6ES7 133-0BN10-0XB0	SI000ETD.200
B-16DI-AC	DP	6ES7 131-0HF00-0XB0	SI0019TD.200
B-16DO-AC	DP	6ES7 132-0HF00-0XB0	SI001ATD.200
B-16RO-AC	DP	6ES7 132-0HH00-0XB0	SI001CTD.200
B-8DI/8RO-AC	DP	6ES7 133-0HH00-0XB0	SI001DTD.200
B-8RO	DP	6ES7 132-0GF00-0XB0	SI0003TD.200
B-4/8AI	DP	6ES7 134-0KH00-0XB0	SI801ATD.200
B-4AI	DP	6ES7 134-0HF00-0XB0	SI8019TD.200
B-4AO	DP	6ES7 135-0HF00-0XB0	SI8018TD.200

Availability of Type Files

All the type files are made available centrally in the Interface Center, from where you can pick them up by modem under the following mailbox number:

Tel.: (Germany) 0911/73-7972

The contents of the type files are reproduced in Appendix A of this manual. If any of the files are missing, you can thus create them yourself if necessary using an ASCII editor.

Installing the Type Files

Copy the files into the COM ET 200 directory as follows:

Installation under S5-DOS/ST (MS-DOS):

Copy the type files into the COM ET 200 directory with
`PCOPY 0A:*.200 C:\COMET200`

Installation under S5-DOS/ST (PCP/M):

Copy the type files into the user area of the programmer containing COM ET 200 with
`PIP C:=A:*.200[g0rvw`

4.1.1 Entering the Station Number

Starting Point

You have edited the ET 200 system parameters in the “ET 200 SYSTEM PARAMETERS” screen form of COM ET 200 (see *ET 200 Distributed I/O System* manual).

Rules

Please note the following when editing the station number:

- An ET 200B station must have a station number in the range 3 to 99. (Only two-digit station numbers can be set on the ET 200B slave station.)

How to Proceed When Entering the Station Number

To enter the station number, execute the following steps:

1. Press <F2> in the “FUNCTIONS” screen form to branch to the “CONFIGURING” screen form.
2. Correct the station number here if necessary.

   Valid Entries:

   Possible station numbers for ET 200B: 3 to 99

   Help:

   Press <F7> (HELP) to see a window with all previously assigned station numbers and station types. You can select a station and display its configuration. If no station numbers have yet been assigned, the message “`No stations configured`” appears.
3. Confirm the entry with <F6> (ENTER).

Result

If the station whose number you have entered has already been configured, the configuration appears on the screen after you have made your entry.

If the station has not yet been configured, two further input fields appear in the “CONFIGURING” screen form. These are “Area” and “Station type” (see Section 4.1.2).

Example In our example, we assign the station number “5” to the station

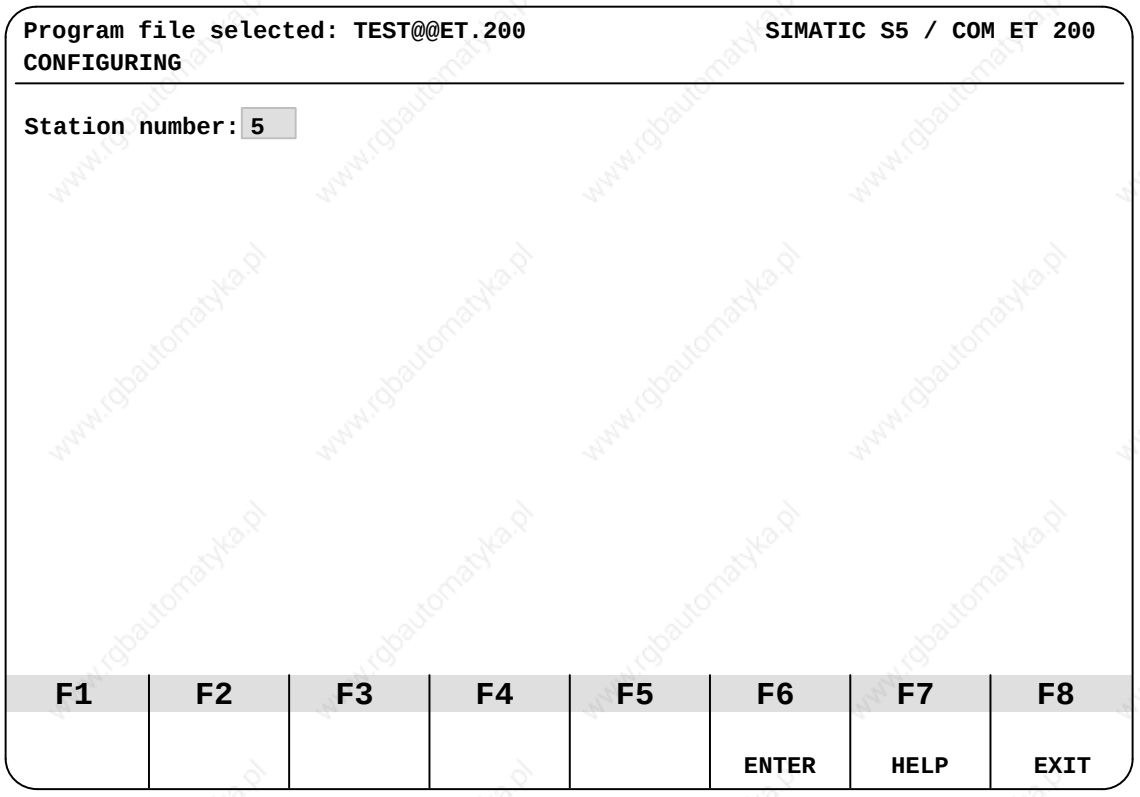


Figure 4-1 “CONFIGURING” Screen Form (1)

4.1.2 Entering the Address Area and the Station Type

Starting Point

If the station has not yet been configured, two further input fields appear in the "CONFIGURING" screen form after the station number has been confirmed. These are "Area" and "Station type" (see Section 4.1.1).

How to Proceed When Entering the Address Area and the Station Type

Execute the following steps to define the address area and the station type of the ET 200B:

1. Enter the address area of the station in the "Area" input field.

   Valid Entries:

   If you have set the ET 200 system parameter "Dual-port RAM addressing"(paging) with a default of "Y" (yes), enter the abbreviation of the I/O area with the page number here (example: "P3" for page no. 3 in the P area).

   If you have set the ET 200 system parameter "Dual-port RAM addressing)" (paging) with a default of "N" (no), enter one of the permissible areas here (P or Q for linear addressing).

   Fundamentals:

   The fundamentals of addressing for the ET 200 (linear addressing or dual-port RAM addressing (paging)) are described in the *ET 200 Distributed I/O System* manual.

2. Enter the relevant designation for your ET 200B station in the "Station type" input field.

   Help:

   Press <F7> (HELP) to see a window showing all the station types you can enter in the input field.

   If the desired station does not appear, check to see if the relevant type file is located in a directory known to COM ET 200 (see Table 4-1).

3. Confirm the entry with <F6> (ENTER).

Result

After the entries have been made, further input fields appear for configuring the inputs and outputs in the "CONFIGURING" screen form (see Section 4.1.3).

Example

In our example, the ET 200B-24DI/8DO (6ES7 133-0BN00-0XB0) slave station is to be configured. The inputs of the module are addressed linearly in the P area.

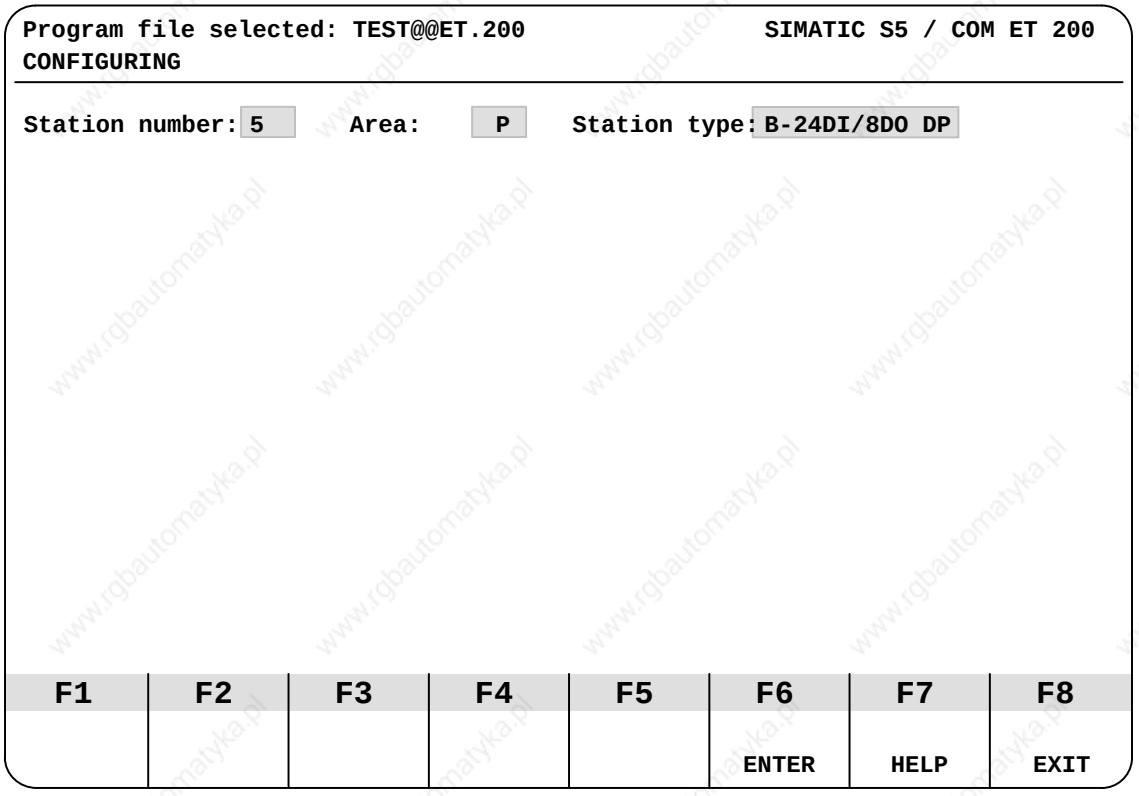


Figure 4-2 “CONFIGURING” Screen Form (2)

4.1.3 Entering the Station Name, Addresses and Address ID

Starting Point

After entering the station type (see Section 4.1.2), further input fields appear for configuring the inputs and outputs in the “CONFIGURING” screen form.

“Station Name”

If desired, you can enter a name for the ET 200B distributed I/O station in the “Station name” input field (all keyboard characters permissible).

“Next Available Address”

COM ET 200 automatically displays the “Next available address” for digital inputs (DIs), digital outputs (DOs), analog inputs (AIs) and analog outputs (AOs).

When the “CONFIGURING” screen form is called for the first time in the selected program file, the next available addresses are set to “0”.

How to Proceed When Entering Addresses and Address IDs

Execute the following steps to define the addresses and the address ID of the ET 200B:

1. If desired, enter another **available** address which you want to use for the inputs or outputs of the ET 200B in the input fields “Next available address”.

   Valid Entries:

   In the case of linear addressing: 0 ... 255

   In the case of dual-port RAM addressing in the Q area: 0 ... 254

   In the case of dual-port RAM addressing in the P area: 192 ... 254

2. Enter the address IDs of the ET 200B in the input fields in the “Configuration area” (Figure 4-3 : 1)

Note

Enter the details for **one** ET 200B station per “CONFIGURING” screen form.

Analog ET 200B modules always have the slot “0.”. In the case of digital ET 200B modules, all output ports have the slot “0.”. All input ports have slot “1.”.

Valid Entries:

You can see from Table 4-2 how to enter the address IDs:

Precondition:

The cursor must be on the input field for the address ID.

3. Confirm the entries with <F6> (ENTER).

Result

COM ET 200 automatically displays the area starting address in the output field “Area address: I: O:”

- In field “I:”, the area starting address for the inputs
- In field “O:”, the area starting address for the outputs

Address IDs

The following address IDs are valid for the ET 200B:

Table 4-2 Address IDs for ET 200B

Module	Order Number	Address ID		Consis-tency	Ad-dress Range (Bytes)		Address Area
		Slot 0	Slot 1		I	O	
ET 200B-16DI	6ES7 131-0BH00-0XB0	000	017	Byte	2	–	Digital
ET 200B-32DI	6ES7 131-0BL00-0XB0	000	019	Byte	4	–	Digital
ET 200B-32DI 0.2ms	6ES7 131-0BL10-0XB0						
ET 200B-16DO	6ES7 132-0BH00-0XB0	033	000	Byte	–	2	Digital
ET 200B-16DO/2A	6ES7 132-0BH10-0XB0	033	000	Byte	–	2	Digital
ET 200B-32DO	6ES7 132-0BL00-0XB0	035	000	Byte	–	4	Digital
ET 200B-8DI/8DO	6ES7 133-0BH00-0XB0	8DA or 032	8DE or 016	Byte	1	1	Digital
ET 200B-24DI/8DO	6ES7 133-0BN00-0XB0	8DA or 032	018	Byte	3	1	Digital
ET 200B-24DI/8DO 0.2ms	6ES7 133-0BN10-0XB0						
ET 200B-8RO	6ES7 132-0GF00-0XB0	032	000	Byte	–	1	Digital
ET 200B-16DI-AC	6ES7 131-0HF00-0XB0	000	017	Byte	2	–	Digital
ET 200B-16DO-AC	6ES7 132-0HF00-0XB0	033	000	Byte	–	2	Digital
ET 200B-16RO-AC	6ES7 132-0HH00-0XB0	033	000	Byte	–	2	Digital
ET 200B-8DI/8RO-AC	6ES7 133-0HH00-0XB0	8DA or 032	8DE or 016	Byte	1	1	Digital
ET 200B-4/8AI	6ES7 134-0KH00-0XB0	087	–	Word	16	–	Analog
ET 200B-4AI	6ES7 134-0HF00-0XB0	4AE or 083	–	Word	8	–	Analog
ET 200B-4AO	6ES7 135-0HF00-0XB0	099	–	Word	–	8	Analog

Entering the Station Name, Addresses and Address IDs, continued

Example

In our example, the ET 200B-24DI/8DO is to be used for a “press control”.

Adresses:

24 digital inputs: I 0.0 to 0.7, I 1.0 to 1.7, I 2.0 to 2.7

8 digital outputs: O 0.0 to 0.7

Address IDs:

24 digital inputs: 018

8 digital outputs: 032

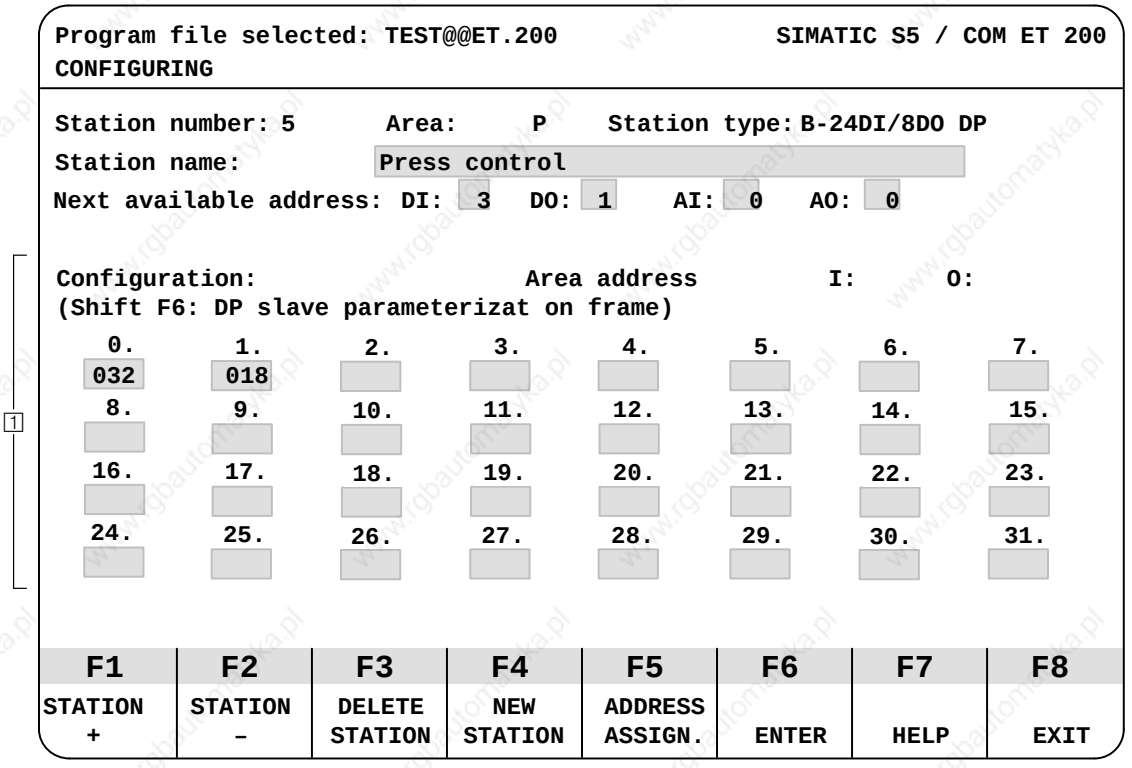


Figure 4-3 “CONFIGURING” Screen Form (3)

Entering the Address IDs Individually

You can find all the address IDs you require for the ET 200B in Table 4-2.

If the address IDs are not available to you, you can have COM ET 200 generate them for you. For this purpose, you must fill out the “DP Identifier” window.

Example

This example shows how to enter the address ID for ET 200B-24DI/8DO:

1. Position the cursor at the input field for slot “0.”.
2. Press <F7> (HELP).

   The “DP Identifier” window appears:

```
DP Identifier
I/O: #  Length: ## Format: # Consistency: #
Help:
I/O:        I: Input,          O: Output,
            X: Input/output,
Length:     1 – 16
Format:     B: Byte,           W: Word,
Consistency:0: Byte/Wort       1: Total
            (depending on format)
```

3. Fill out the 4 input fields with the help of the legend.

   “DP Identifier” window for the 8 outputs of the ET 200B-24DI/8DO (slot “0.”):

```
DP Identifier
I/O: O  Length: 1 Format: B Consistency: 0
Help:
I/O:        I: Input,          O: Output,
            X: Input/output,
Length:     1 – 16
Format:     B: Byte,           W: Word,
Consistency:0: Byte/Word       1: Total
            (depending on format)
```

4. Confirm the entries with <F6> (ENTER).
5. Position the cursor at the input field for slot “1.”.
6. Press <F7> (HELP) again.

   The “DP Identifier” window appears again.

Entering the Station Name, Addresses and Address IDs, continued

7. Fill out the 4 input fields for the 24 inputs too with the help of the legend.

   "DP Identifier" window for the 24 inputs of the ET 200B-24DI/8DO (slot "1."):

```
DP Identifier
I/O: I  Length: 3 Format: B Consistency: 0
Help:
I/O:        I: Input,          O: Output,
            X: Input/output,
Length:     1 – 16
Format:     B: Byte,           W: Word,
Consistency:0: Byte/Wort       1: Total
            (depending on format)
```

8. Confirm the entries with <F6> (ENTER).

Result

The input fields for the address ID contain the correct address IDs for the ET 200B-24DI/8DO (see Figure 4-3):

032: for 8 outputs in slot "0."

018: for 24 inputs in slot "1."

4.2 Entering the Parameterization Frame with COM ET 200 V.4x

Introduction

The diagnostics characteristics for the analog ET 200B modules and the necessary defaults for analog value measurement or analog value output are defined in the parameterization frame.

In the case of the digital ET 200B modules, settings cannot be made via the parameterization frame. When the “DP Slave Parameterization frame” window is selected, 5 bytes are pre-assigned with “00_H”.

Note

You are not allowed to overwrite the 5 bytes of the parameterization frames of the digital ET 200B modules which have been pre-assigned with “00_H”.

How to Proceed When Entering Parameters

Execute the following steps to enter the parameterization frame of the ET 200B:

1. Press (Shift) <F6> (DP Slave Parameterization Frame)

   The “DP Slave Parameterization Frame” window appears with the default parameters for the ET 200B station.

   Example:

   Below is the pre-assigned parameterization frame for the ET 200B-4AI:

```
DP SLAVE PARAMETERIZATION FRAME

Byte (Input in KH format)
 0  | 13  00  00  00  00  00  00  19  19  19
10  | 19  00  00  00  00  00  00  00  00  06
20  | FF  00  00  00  00
```

2. Enter the parameters in “KH”. The figures and tables on the following pages explain the valid entries and their meanings.
3. Terminate entry of the parameterization frame with <F6> (ENTER).
4. Confirm the configuration with <F6> (ENTER).

Result

The configuration is then stored in the default file.

COM ET 200 automatically ensures that areas that must be transferred consistently are also marked as consistent areas. This means that analog values, for example, are transferred in one frame (consistency over an area of 2 bytes).

4.2.1 Parameterizing the ET 200B-4/8AI (6ES7 134-0KH00-0XB0)

Pre-Assignment of the Parameterization Frame

When the "DP SLAVE PARAMETERIZATION FRAME" window is selected for the first time, the parameterization frame for the ET 200B-4/8AI is pre-assigned as follows:

DP SLAVE PARAMETERIZATION FRAME

Byte	(Input in KH format)									
0	13	00	00	00	00	00	AA	14	14	14
10	14	00	00	00	00	00	00	00	00	06
20	FF	00	00	00	00					

Note

Only bytes 3, 4, 6 to 10 and 23 (marked in the figure with "□ ") are relevant for parameterizing the function of the ET 200B-4/8AI.

All other bytes contain "00_H"or COM ET 200-specific codes ("13_H" in byte 0; "06_H" in byte 19; "FF_H" in byte 20), which you must not overwrite!

Structure of the Parameterization Frame, Byte 3

In byte 3, you define the diagnostics characteristics for the input channels of the ET 200B-4/8AI:

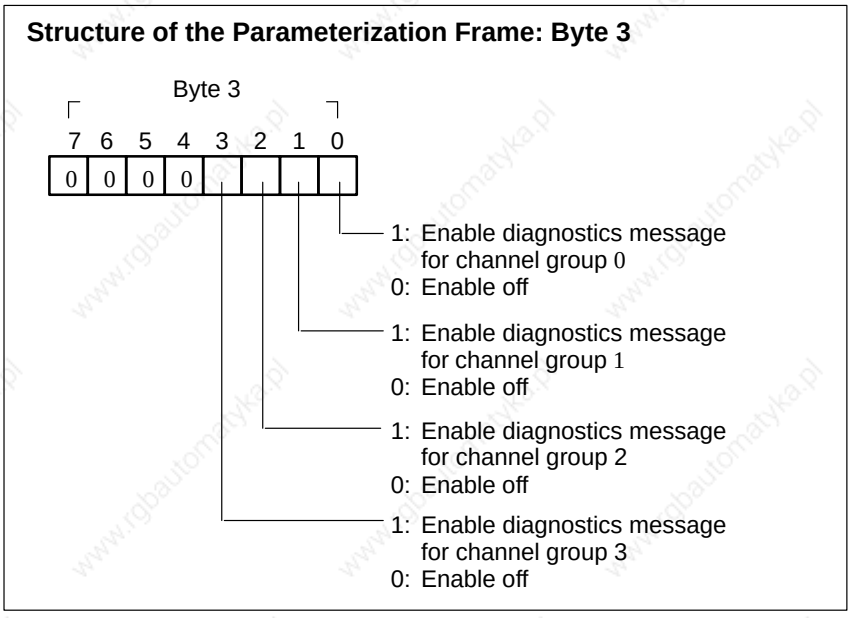


Figure 4-4 Structure of the Parameterization Frame of the ET 200B-4/8AI: Byte 3

Structure of the Parameterization Frame, Byte 4

In byte 4, you define the response of the ET 200B-4/8AI to wire break:

Structure of the Parameterization Frame: Byte 4

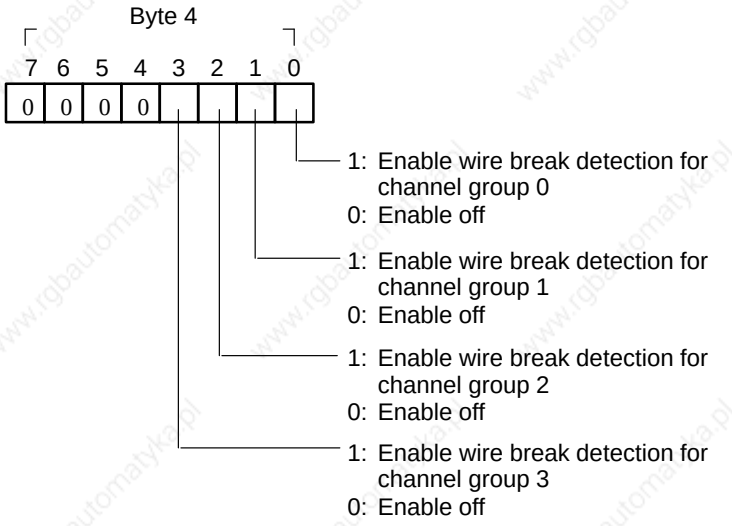


Figure 4-5 Structure of the Parameterization Frame of the ET 200B-4/8AI: Byte 4

Note

You can only parameterize wire break detection if the following sensors are connected:

- Thermocouple: type J, K, L
- Resistance thermometer: Pt 100
- Voltage sensor: ± 80 mV

In all other measured value ranges, you must assign byte 4 the value “00”.

Parameterizing the ET 200B-4/8AI (6ES7 134-0KH00-0XB0), continued

Structure of the Parameterization Frame, Bytes 6 to 10

Table 4-3 contains the permissible entries for bytes 6 to 10 of the parameterization frame of the ET 200B-4/8AI.

Table 4-3 Parameters for the ET 200B-4/8AI (Bytes 6 to 10 of the Parameterization Frame)

Byte	Parameter	Explanation	Value Range	Hex Code
6	Integration time	Specify an optimal integration time of the A/D converter for the purpose of noise suppression.	20 ms 16.7 ms	AA_H 55_H
7	Type and range of the measurement for channel group 0 (channels 0, 1) (terminals 0.1/0.2, 0.3/0.4)	Set the type and the range of the measurement according to the channel group.		
8	Type and range of the measurement for channel group 1 (channels 2, 3) (terminals 1.1/1.2, 1.3/1.4)	in the case of voltage measurement:	± 1 V ± 0.5 V ± 0.25 V ± 80 mV	14_H 13_H 12_H 11_H
9	Type and range of the measurement for channel group 2 (channels 4, 5) (terminals 2.1/2.2, 2.3/2.4)	in the case of resistance thermometer with linearization:	Pt 100 standard range	82_H
10	Type and range of the measurement for channel group 3 (channels 6, 7) (terminals 3.1/3.2, 3.3/3.4)	in the case of a thermocouple with external reference junction:	Type J with linearization Type K with linearization Type L with linearization	$E5_H$ $E8_H$ $E6_H$
23	Measured value representation		Two's complement Amount with sign	00_H 01_H

: Default in the parameterization frame

4.2.2 Parameterization of the ET 200B-4AI (6ES7 134-0HF00-0XB0)

Pre-Assignment of the Parameterization Frame

When the "DP SLAVE PARAMETERIZATION FRAME" window is selected for the first time, the parameterization frame for the ET 200B-4AI is pre-assigned as follows:

DP SLAVE PARAMETERIZATION FRAME

Byte	(Input in KH format)									
0	13	00	00	00	00	00	00	19	19	19
10	19	00	00	00	00	00	00	00	00	06
20	FF	00	00	00	00					

Note

Only bytes 3, 7 to 10 and 23 (marked in the figure with "□") are relevant for parameterizing the function of the ET 200B-4AI.

All other bytes contain "00_H" or COM ET 200-specific codes ("13_H" in byte 0; "06_H" in byte 19; "FF_H" in byte 20), which you must not overwrite!

Structure of the Parameterization Frame, Byte 3

In byte 3, you define the diagnostics characteristics for the input channels of the ET 200B-4AI:

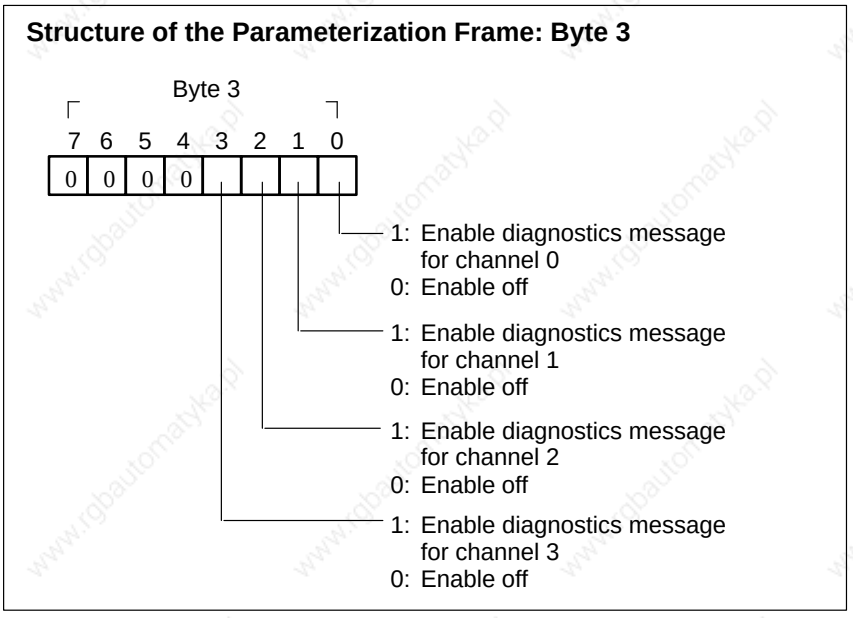


Figure 4-6 Structure of the Parameterization Frame of the ET 200B-4AI: Byte 3

Parameterization of the ET 200B-4AI (6ES7 134-0HF00-0XB0), continued

Structure of the Parameterization Frame, Bytes 7 to 10

Table 4-4 contains the permissible entries for bytes 7 to 10 of the parameterization frame of the ET 200B-4AI.

Table 4-4 Parameters for the ET 200B-4AI (Bytes 7 to 10 of the Parameterization Frame)

Byte	Parameter	Explanation	Value Range	Hex Code
7	Type and range of the measurement for channel 0 (terminals 0.1/0.2)	Set the type and the range of the measurement according to the channel.		
8	Type and range of the measurement for channel 1 (terminals 1.1/1.2)	in the case of voltage measurement:	± 10 V ± 5 V ± 2.5 V ± 1.25 V	19_H 16_H 15_H 14_H
9	Type and range of the measurement for channel 2 (terminals 2.1/2.2)	in the case of current measurement:	± 20 mA 0 to 20 mA 4 to 20 mA	24_H 22_H 23_H
10	Type and range of the measurement for channel 3 (terminals 3.1/3.2)			
23	Measured value representation		Two's complement Amount with sign Binary	00_H 01_H 02_H

: Defaults in the parameterization frame

4.2.3 Parameterization of the ET 200B-4AO (6ES7 135-0HF00-0XB0)

Pre-Assignment of the Parameterization Frame

When the "DP SLAVE PARAMETERIZATION FRAME" window is selected for the first time, the parameterization frame for the ET 200B-4AO is pre-assigned as follows:

DP SLAVE PARAMETERIZATION FRAME

Byte	(Input in KH format)									
0	13	00	00	00	00	00	00	19	19	19
10	19	00	00	00	00	00	00	00	00	06
20	FF	00	00	00	00					

Note

Only bytes 3, 7 to 10 (marked in the figure with "□") are relevant for parameterizing the function of the ET 200B-4AO.

All other bytes contain "00_H"or COM ET 200-specific codes ("13_H" in byte 0; "06_H" in byte 19; "FF_H" in byte 20), which you must not overwrite!

Structure of the Parameterization Frame, Byte 3

In byte 3, you define the diagnostics characteristics for the output channels of the ET 200B-4AO:

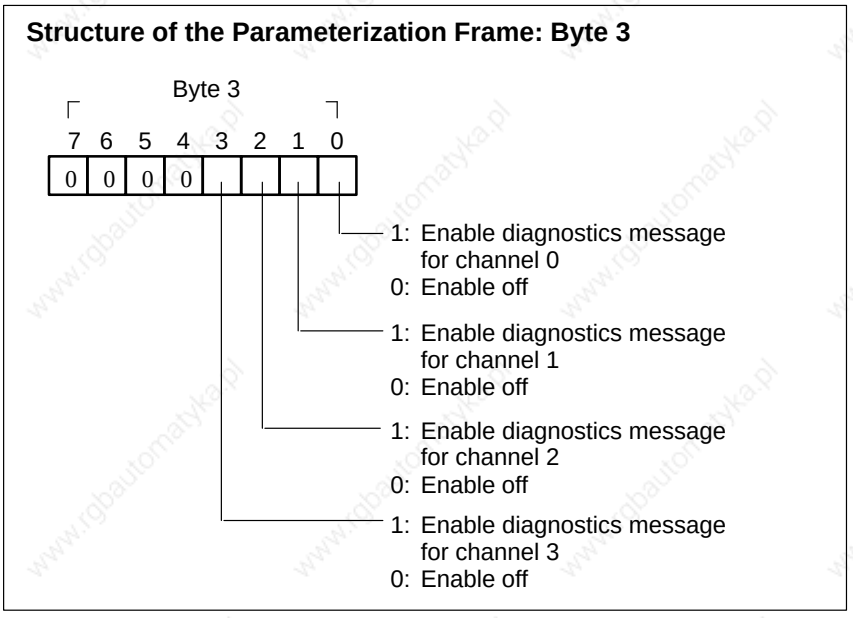


Figure 4-7 Structure of the Parameterization Frame of the ET 200B-4AO: Byte 3

Parameterization of the ET200B-4A0 (6ES7 135-0HF00-0XB0), continued

Structure of the Parameterization Frame, Bytes 7 to 10

Table 4-5 contains the permissible entries for bytes 7 to 10 of the parameterization frame of the ET 200B-4AO.

Table 4-5 Parameters for the ET 200B-4AO (Bytes 7 to 10 of the Parameterization Frame)

Byte	Parameter	Explanation	Value Range	Hex Code
7	Type and range of the measurement for channel 0 (terminals 0.1/0.2)	Set the type and the range of the output according to the channel.		
8	Type and range of the measurement for channel 1 (terminals 1.1/1.2)	in the case of voltage output:	± 10 V 0 to 10 V	19_H 18_H
9	Type and range of the measurement for channel 2 (terminals 2.1/2.2)	in the case of current output:	± 20 mA 0 to 20 mA 4 to 20 mA	24_H 22_H 23_H
10	Type and range of the measurement for channel 3 (terminals 3.1/3.2)			

: Defaults in the parameterization frame

4.2.4 Structure of the Parameterization Frame in KH Format (Summary)

Structure

The 25-byte parameterization frame has the following structure:

Byte No.	0	1	2	3	4	5	6	7	8	9	10	11 ... 18	19	20	21	22	23	24
Contents in Hex	13	00	00	xx	xx	00	xx	xx	xx	xx	xx	00	06	FF	00	00	xx	00

The bytes indicated with “xx” have the following meanings:

Table 4-6 Contents and Meaning of the Bytes

Byte	**Structure**	**Code**		
03	Enables diagnostics message for channel (group).			
	Bit 0 = channel (group) 0 Bit 1 = channel (group) 1 Bit 2 = channel (group) 2 Bit 3 = channel (group) 3	Bit at “1”: diagnostics message enabled Bit at “0”: diagnostics message not enabled (default)		
04	Enables wire break detection, only in the case of the ET 200B-4/8AI with selected value range Pt 100, thermocouple or voltage sensor ± 80 mV			
	Bit 0 = channel group 0 Bit 1 = channel group 1 Bit 2 = channel group 2 Bit 3 = channel group 3	Bit at “1”: diagnostics message enabled Bit at “0”: diagnostics message not enabled (default) (In the event of a wire break, the overflow bit is also set.)		4/8AI
06	Sets the integration time, only for ET 200B–4/8AI			
		AA_H 55_H	Integration time 20 ms for 50 Hz supply (default) Integration time 16.7 ms for 60 Hz supply	4/8AI 4/8AI
07, 08, 09, 10	Sets the analog value range			
	Byte 7 = channel (group) 0 Byte 8 = channel (group) 1 Byte 9 = channel (group) 2 Byte 10 = channel (group) 3	19_H 18_H 16_H 15_H 14_H 14_H 13_H 12_H 11_H	± 10 V 0 to 10 V ± 5 V ± 2.5 V ± 1.25 V, for ET 200B-4AI ± 1 V, for ET 200B-4/8AI ± 0.5 V ± 0.25 V ± 80 mV	4AI, 4AO 4AO 4AI 4AI 4AI 4/8AI 4/8AI 4/8AI 4/8AI
		24_H 22_H 23_H	± 20 mA 0 to 20 mA 4 to 20 mA	4AI, 4AO 4AI, 4AO 4AI, 4AO
		82_H $E5_H$ $E8_H$ $E6_H$	Pt 100 standard Theromocouple type J with linearization Theromocouple type K with linearization Theromocouple type L with linearization	4/8AI 4/8AI 4/8AI 4/8AI

Parameterization of the ET200B-4A0 (6ES7 135-0HF00-0XB0), continued

Table 4-6 Contents and Meaning of the Bytes, continued

Byte	Structure	Code		
23	Selects the measured value representation (ET 200B-4AI and ET 200B-4/8AI only)			
		00_H	Two's complement	4AI, 4/8AI
		01_H	Amount and sign	4AI, 4/8AI
		02_H	Binary	4AI

Startup and Test with COM ET 200

5

Startup Methods

There are two methods of starting up and testing the ET 200B distributed I/O station:

- Using the ET 200 Handheld (only ET 200B digital modules)
- Using COM ET 200 v 4.x and a programmer (with the CP 5410 S5-DOS/ ST interface module)

Handheld

Startup and test of the ET 200B digital modules using the ET 200 Handheld is described in the *ET 200 Handheld* manual.

Starting up the ET 200B analog modules using the ET 200 Handheld is not possible.

In this Chapter

This chapter describes startup and testing of the ET 200B using a programmer and **COM ET 200 V4.x**.

You will learn

- Which constraints are important for operation and testing (see Section 5.1)
- How to select the station and transfer the configuration data to the station (see Section 5.2)
- How you can test the station (see Section 5.3).

COM ET 200 WINDOWS

If you are operating the ET 200B with **COM ET 200 WINDOWS**, you do not need to study this chapter.

The simple procedure for starting up slave stations with COM ET 200 WINDOWS is identical for all the ET 200 slaves and is not described in this manual. Please refer to the *ET 200 Distributed I/O System* manual (Order No. 6ES5 998-3ES12) for further details about whether or not test and startup functions are possible with COM ET 200 WINDOWS, and if so with which version.

COM ET 200 WINDOWS also provides extensive support for starting up the ET 200B modules through its integrated help system.

5.1 Constraints in Operation and Testing

Response Power Off/Power On

In the case of ”power off/power on” occuring repeatedly within a short period of time it is possible in exceptional cases that the ET 200B digital module will not be accepted by the SINEC L2-DP bus.

Remedy:

Switch the STOP/RUN switch to STOP and then back to RUN.

Baud Rate Change

With the ET 200B digital modules, it is not possible to correct a wrong configuration and simultaneously to change the baud rate. If this is attempted, the station will not be accepted by the SINEC L2-DP bus.

Remedy:

Switch the STOP/RUN switch to STOP and then back to RUN.

Minimum Configuration

If there is only one IM 308-B and only one ET 200B analog input module on the bus at a baud rate of $\leq$ 93.75 kbaud, it can happen that the analog input values will not be transferred to the IM 308-B (analog inputs = 0).

Remedy:

- Select “Programmer connected to the bus: Y” in COM ET 200

  or

- Select a higher baud rate

  or

- If you require a further ET 200B station for your application, operate this on the bus also.

5.2 Startup of the ET 200B Distributed I/O Station

Precondition

The correct station number must be set on the terminal block.

Note

A station number (set with a screwdriver, for example) only becomes valid when you have executed a cold restart on the ET 200B slave station (STOP-RUN switch changed from STOP → RUN position).

Procedure When Selecting the Station

Execute the following steps to parameterize the ET 200B:

1. Connect the programmer (with CP5410 S5-DOS/ST interface module) to the SINEC L2-DP bus or directly to the ET 200B module.
2. Call up the “STARTUP/TEST” screen form of the COM ET 200 software package (<F5> in the “FUNCTIONS” screen form).
3. Enter the station number of the plugged-in ET 200B station.
4. Confirm the entry with <F6> (ENTER).

Result

After a safety prompt, COM ET 200 establishes a connection with the plugged-in station, parameterizes it and branches to the “STARTUP/TEST: MODULE SELECTION” screen form if the configuration and the actual station structure agree.

If they do not agree, COM ET 200 reports an error in the message line. If this happens, you must correct the structure of the station in the “CONFIGURING” screen form.

Caution

If you start up an ET 200B station during “bus operation” using the programmer connected to the bus, you must note the following: The station cannot be controlled by the master while it is beeing accessed by the programmer!

Startup of the ET 200B Distributed I/O station, continued

Example

In our example, the ET 200B station with station number “6” is to be started up.

```
Program file selected: TEST@@ET.200                SIMATIC S5 / COM ET 200
STARTUP / TEST: STATION SELECTION

Station number:  6
```

F1	F2	F3	F4	F5	F6	F7	F8
					ENTER	HELP	EXIT

Figure 5-1 “STARTUP/TEST: STATION SELECTION” Screen Form

5.3 Testing the ET 200B Distributed I/O Station

Starting Point

COM ET 200 branches automatically to the “STARTUP/TEST: MODULE SELECTION” screen form after parameterizing the ET 200B station (see Section 5.2).

How to Proceed When Selecting the Slots

Execute the following steps to select the slots of the input or output ports:

1. Position the cursor at the slot of the ET 200B station whose input status you want to evaluate or whose outputs you want to control.
2. Press <F5> (SELECT).

   Result:

   The selected slot is marked with a “*”. Press <F5> (SELECT) again to undo the selection.
3. Confirm the selection with <F6> (ENTER).

Result

The “STARTUP/TEST: STATUS/CONTROL” screen form for the selected station appears with the following contents:

The “Station status” output field contains diagnostics messages in plain text concerning the entire station.

Two tables show the inputs and outputs in “KH” format:

Testing the ET200B Distributed I/O station, continued

Example

In our example, the ET 200B-4AI analog input module (address ID 4AI) is tested.

```
Program file selected: TEST@@ET.200                SIMATIC S5 / COM ET 200
STARTUP / TEST: STATUS/CONTROL
-------------------------------------------------------------------------------
Station number: 6                                  Station type: B-4AI DP
Station name: PRESS
Station status: Station cannot be controlled by PLC


Slot: 0   ID: 4AI
Control   |
----------|--------------------------------------------------------------------
Outputs   |
          |
Status    |
----------|--------------------------------------------------------------------
Inputs    |    KH = 2CA0 0000 0000 0000

+--------+--------+--------+--------+--------+--------+--------+--------+
|   F1   |   F2   |   F3   |   F4   |   F5   |   F6   |   F7   |   F8   |
|        |        |        |        |        |        |        |        |
|        |        |        |        |        | ENTER  |  HELP  |  EXIT  |
+--------+--------+--------+--------+--------+--------+--------+--------+
```

Figure 5-2 “STARTUP/TEST: STATUS/CONTROL” Screen Form

How to Proceed When Testing Inputs

Execute the following steps to test inputs:

1. Specify the input signals (sensor signals) for the module.
2. Press <F6> (ENTER).

   Result:

   The input data of the selected module and the (station) diagnostics data are requested. The diagnosis appears as plain text in the “Station status” field.

   The assignments of the function keys on the screen form change.
3. Press <F6> (STOP) to freeze the screen, that is to stop the output fields in the “Inputs” line from being updated.

Example

Displayed inputs in the case of the ET 200B-4AI (address ID 4AI):

Channel	0	1	2	3
KH =	**0100**	**00FF**	**00AB**	**01AA**

Testing the ET 200B Distributed I/O Station, continued

How to Proceed When Testing Outputs

Execute the following steps to test outputs:

1. Enter output signals in the “Outputs” line.
2. Press <F6> (ENTER).

   Result:

   The output data is transferred cyclically to the selected module.

   The assignments of the function keys on the screen form change.
3. Press <F6> (STOP) to freeze the screen, that is to stop the outputs from being controlled.

Caution

Setting outputs when the load current circuit is switched on can cause hazardous plant conditions.

Outputs are only reset in the following cases:

- If you call the MODULE SELECTION screen form
- If you reset the outputs in the MODULE SELECTION screen form
- If you exit the MODULE SELECTION screen form with <F8> (EXIT) and “YES”.

Example

Set outputs in the case of the ET 200B-32DO (address ID 035):

Byte	0	1	2	3
KH =	**2C**	**A0**	**01**	**34**

Fault Diagnostics

6

In this Chapter

This chapter describes the fault diagnostics of the ET 200B distributed I/O station.

You will find notes on locating faults:

- Via LEDs on the front of the module (see Section 6.1)
- Using **COM ET 200 V4.x** on the programmer (see Section 6.2)
- Via STEP 5 (station diagnostics) in combination with an **IM 308-B** (see Section 6.3)
- Via STEP 5 (station diagnostics) in combination with an **IM 308-C** (see Section 6.4)

COM ET 200 WINDOWS

If you are operating the ET 200B with **COM ET 200 WINDOWS**, you do not need to study Section 6.2.

The simple procedure for diagnosing faults in slave stations with COM ET 200 WINDOWS is identical for all ET 200 slaves and is not described in this manual. Please refer to the *ET 200 Distributed I/O System* manual (Order No. 6ES5 998-3ES12) for further details about whether or not fault diagnostics are possible with COM ET 200 WINDOWS, and if so with which version.

COM ET 200 WINDOWS also provides extensive support for starting up the ET 200B modules through its integrated help system.

6.1 Fault Diagnostics Through LEDs

Introduction

The LEDs on the front of the ET 200B modules give you initial information on the type of fault.

Fault Indications

Table 6-1 explains the meanings of the LED signals on the ET 200B modules.

Table 6-1 LED Indicators

LED	Indication	Meaning
RUN	Lit (green)	ET 200B in operation (power supply switched on; STOP/RUN switch in "RUN" position[1]).
BF	Lit (red)	The monitoring time has elapsed without the ET 200B station being addressed (either because the connection to the IM 308-B or IM 308-C has failed or because the IM 308-B or IM 308-C is set to STOP) **or** The ET 200B station was not parameterized during startup/restart.
DIA	Lit (red)	For digital 24 V DC output modules: • Short-circuit or load voltage failure (L1+, L2+, L3+, L4+) at at least one output For analog modules: • Diagnosis for at least one input or output
L1+	Lit (green)	For ET 200B-16DO 8DI/8DO, 24DI/8DO and 24DI/8DO 0.2 ms: • Voltage is applied for channel group Q0: .0 to .7.[2]
L2+	Lit (green)	For ET 200B-16DO: • Voltage is applied for channel group Q1: .0 to .7.[2]
L1+/L2+	Lit (green)	For ET 200B-32DO: • Voltage is applied for channel groups Q0: .0 to .7 and Q1: .0 to .7.[2] For ET 200B-16DO/2A: • Voltage is applied for channel groups Q0: .0 to .3 and Q0: .4 to .7.[2]
L3+/L4+	Lit (green)	For ET 200B-32DO: • Voltage is applied for channel groups Q2: .0 to .7 and Q3: .0 to .7.[2] For ET 200B-16DO/2A: • Voltage is applied for channel groups Q1: .0 to .3 and Q1: .4 to .7.[2]

1 Not 120/230 V AC digital modules. These have no STOP/RUN switch.
2 LED goes out if fuse blows or voltage drops below a certain limit (typically: 15.5 V).

6.2 Fault Diagnostics with COM ET 200 V4.x

Introduction

The COM ET 200 software package provides the “DIAGNOSTICS” screen form for diagnostics functions.

Precondition

The following preconditions must be met before using the diagnostics functions:

- You must have connected a programmer to the SINEC L2-DP bus using the CP5410 S5-DOS/ST programmer interface module.
- You must have indicated “Programmer connected to the bus: Y” in the “ET 200 SYSTEM PARAMETERS” screen form.
- The selected program file must be identical to the program file on the E(E)PROM.

How to Proceed When Requesting Station Diagnostics

Execute the following steps to request station diagnostics:

1. Call the “DIAGNOSTICS: OVERVIEW” screen form (<F6> in the “FUNCTIONS” screen form).

   Result:

   All numbers of stations on which diagnostics data is available are listed under “Station number” in the screen form.

2. Press <F1> (INDIVIDUAL DIAGNOSTICS).

   Result:

   COM ET 200 prompts you for a “Station number”.

3. Enter the number of the faulty station you wish to diagnose in the “Station number” input field.
4. Press <F6> (ENTER) in order to evaluate diagnostics messages from this station.

Result

After you press <F6> (ENTER), COM ET 200 branches to the “INDIVIDUAL DIAGNOSTICS” screen form with the following contents:

The diagnostics messages for the entire station are displayed in the “Station status” output field in plain text (see Figure 6-1).

The “**Device-Related Diagnostics”** give the channel-group-related diagnostics in “KH” format. See Sections 6.3.5 and 6.3.6 for more detailed information on the structure of the device-related diagnostics of the ET 200B.

Fault Diagnostics with COM ET 200 V4.x, continued

Example

In our example, one or more signal sensor lines of the ET 200B-4AI are interrupted. The ET 200B-4AI has device-related diagnostics of 9 bytes.

See Section 6.3.6 for the precise meaning of the bytes.

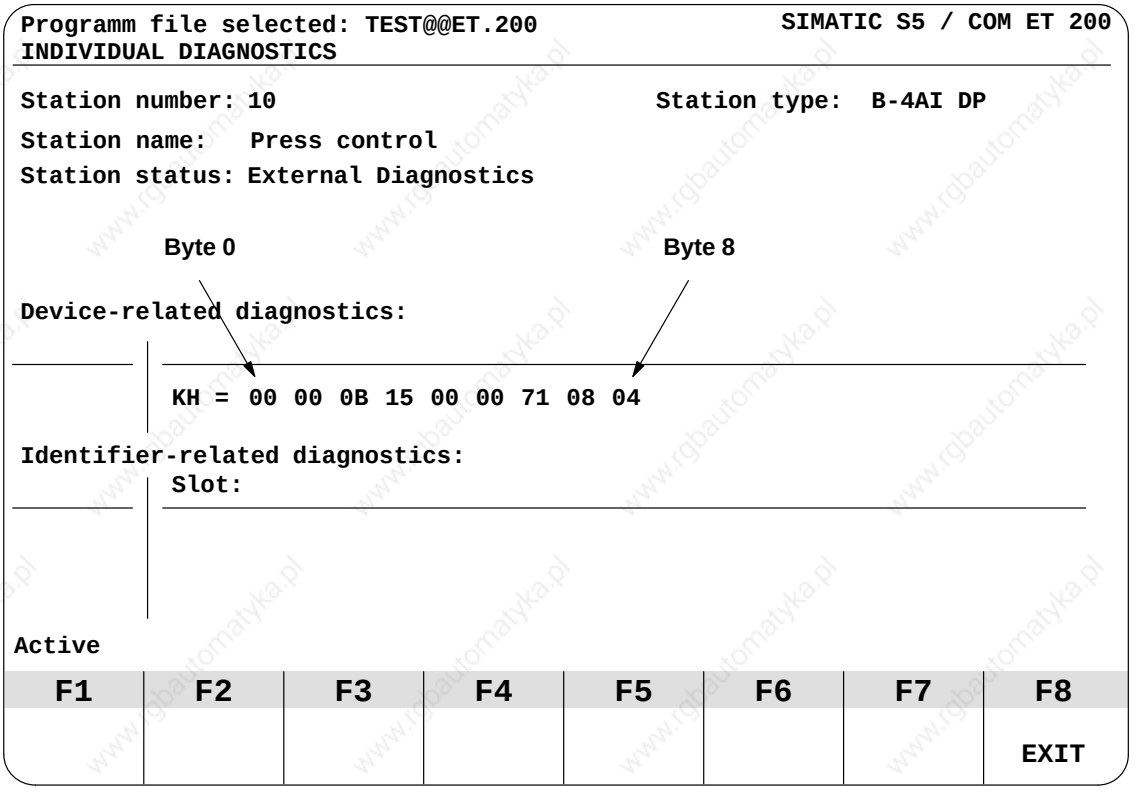


Figure 6-1 “INDIVIDUAL DIAGNOSTICS” Screen Form

6.3 Fault Diagnostics with STEP 5 (Station Diagnostics) in Combination with an IM 308-B

Introduction

You can locate and evaluate a fault systematically with STEP 5.

Diagnostics Functions Using STEP 5

Table 6-2 lists the STEP 5 diagnostics functions in combination with an IM 308-B:

Table 6-2 Diagnostics Functions Using STEP 5 in combination with an IM 308-B

Diagnostics	Information
Diagnostics “Overview”	Determines all stations for which diagnostics data is available.
Diagnostics for “Parameterization and accessibility”	Determines the stations which are parameterized and can be contacted.
Station diagnostics	Provides information on the status of the slave station and displays diagnostics data for individual channel groups (only in the case of modules with diagnostics capability).

Diagnostics “Overview” and “Parameterization and Accessibility”

The “Overview” and “Parameterization and Accessibility” diagnostics functions each comprise two bytes organized in one word.

Fault Diagnostics with STEP 5 (Station Diagnostics) in Combination with an IM 308-B, continued

Structure: Station Diagnostics

16 bytes are reserved per slave station for station diagnostics purposes. The 16 bytes are organized into 8 words.

To avoid misunderstandings, the two diagnostics bytes of the diagnostics word will be referred to in the following as “diagnostics address” and “diagnostics address +1”.

You will find a description of device-related diagnostics as follows:

- In Section 6.3.5 for digital ET 200Bs
- In Section 6.3.6 for analog ET 200Bs

Table 6-3 Structure of the Station Diagnostics for the ET 200B in combination with an IM 308-B

Code	Diagnostics Address	Diagnostics Address + 1
0	Station status 1	Station status 2
1	Station status 3	Master address
2	Manufacturer identification	
3	**Digital:** Header **Analog:** Header	**Digital:** Device-related diagnostics (group diagnostics) **Analog:** Reserved (byte 0)
4	**Digital:** Free **Analog:** Device-related diagnostics (byte 1) (reserved)	**Digital:** Free **Analog:** Device-related diagnostics (byte 2) (system-related diagnostics)
5	**Digital:** Free **Analog:** Device-related diagnostics (byte 3) (system-related diagnostics	**Digital:** Free **Analog:** Device-related diagnostics (byte 4) (system-related diagnostics)
6	**Digital:** Free **Analog:** Device-related diagnostics (byte 5) (system-related diagnostics	**Digital:** Free **Analog:** Device-related diagnostics (byte 6) (input or output channels)
7	**Digital:** Free **Analog:** Device-related diagnostics (byte 7) (reserved)	**Digital:** Free **Analog:** Device-related diagnostics (byte 8) (no. of channels)

Requesting Diagnostics

The diagnostics are loaded word by word and transferred to the diagnostics word. (The load and transfer operations always refer in the following to the default diagnostics address 252.)

In the case of dual-port RAM addressing, the diagnostics word is located on the “basic page”. Before requesting diagnostics in the case of dual-port RAM addressing, you must also “switch” to the basic page number.

Structure of the STEP 5 listing for diagnostics:

STL	Explanation
L KB (basic page number)	Page selection
T PY 255	(basic page number: nx16, n=0,1,..)
L KY (station number),(code)	Load diagnostics (station number:
T PW 252	3 to 99, code: -> Table 6-3) and transfer to the diagnostics word (diagnostics word: in this case, PW 252).
L PW 252	Evaluate diagnostics word (hex code:
L KH (hex-code: no error)	-> Sections 6.3.1 to 6.3.6)
!=F	Error?
BEC	
JC FBx	Evaluate error in FBx

6.3.1 Diagnostics “Overview” with IM 308-B

Introduction

The diagnostics “Overiew” encompasses all stations for which diagnostics data is available.

Requesting the Diagnostics “Overview”

Program the following in STEP 5:

STL	Explanation
L KY 127,n	Store the value 127 (code for requesting the diagnostics “Overview”) in the “Diagnostics address” byte; store in the “Diagnostics address +1” byte the code for the station numbers of the stations from which the diagnostics “Overview” are to be requested (the diagnostics “Overview” cover station (n x 16) to station (n x 16 + 15) in each case!)
T PW 252	
L PW 252	Load diagnostics word
L KH 0000	
!=F	No station with errors?
BEC	
JC FBx	Evaluate error in FBx

Structure: Diagnostics Word "Overview"

The diagnostics word has the following structure after requesting the diagnostics "Overview":

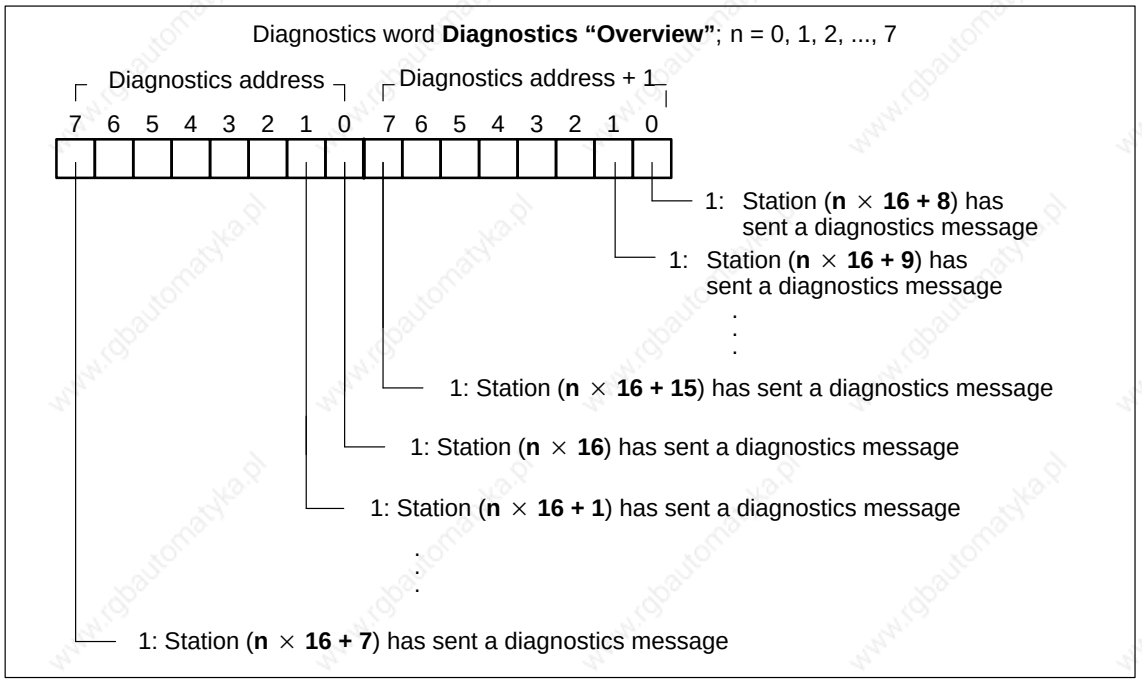


Figure 6-2 Structure of the Diagnostics Word After Requesting the Diagnostics "Overview"

6.3.2 Diagnostics “Parameterization and Accessibility” with IM 308-B

Introduction

The diagnostics “Parameterization and Accessibility” encompass all stations which have been parameterized and are accessible.

Requesting the Diagnostics “Parameterization and Accessibility”

Program the following in STEP 5:

STL	Explanation
L KY 126,n T PW 252	Store the value 126 (code for requesting the diagnostics “Parameterization and Accessibility”) in the “Diagnostics address” byte; store in the “Diagnostics address +1” byte the code for the station numbers of the stations from which the diagnostics “Parameterization and Accessibility” are to be requested (the diagnostics cover station (n x 16) to station (n x 16 + 15) in each case!)
L PW 252 L KH FFFF	Load diagnostics word
!=F	No station with errors?
BEC	
JC FBx	Evaluate error in FBx.

Structure: Diagnostics Word "Parameterization and Accessibility"

The diagnostics word has the following structure after requesting the diagnostics "Parameterization and Accessibility":

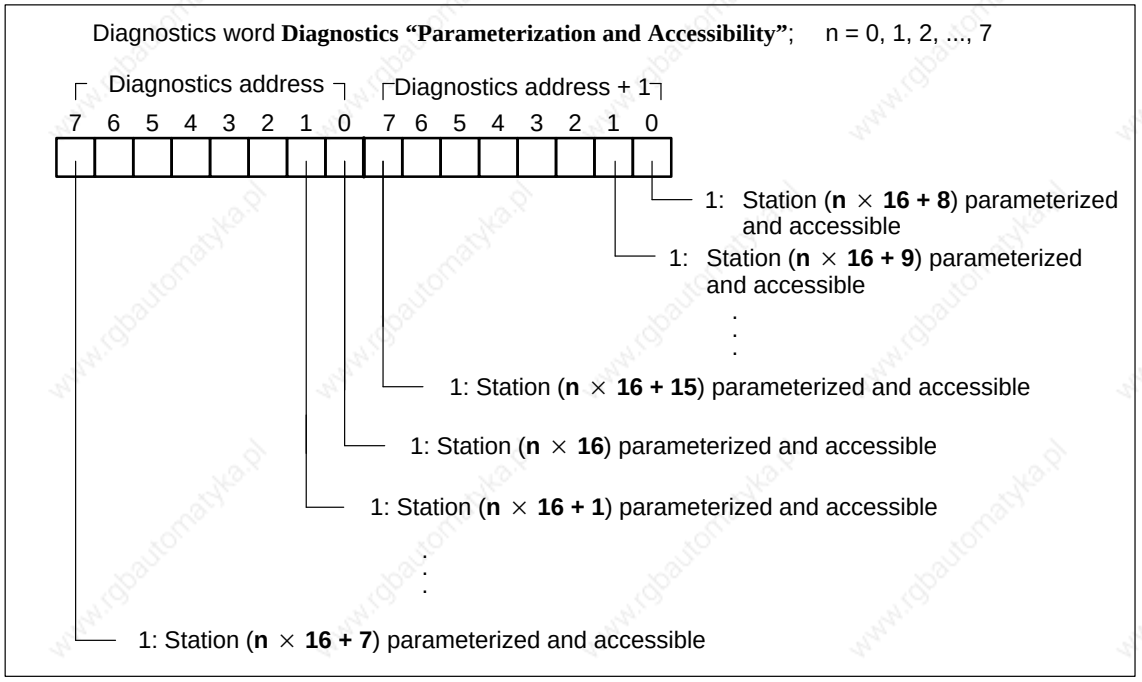


Figure 6-3 Structure of the Diagnostics Word After Requesting the Diagnostics "Parameterization and Accessibility"

Diagnostics "Overview" and "Parameterization and Accessibility"

The following diagnostics messages can be generated by combining diagnostics "Overview" and diagnostics "Parameterization and Accessibility":

Table 6-4 Combination of Diagnostics "Overview" and Diagnostics "Parameterization and Accessibility"

Overview	Parameterization and Accessibility	Meaning: Station is ...
0	0	... not parameterized and not accessible
0	1	... error-free and accessible
1	0	... parameterized and not accessible
1	1	... contains errors but is accessible

6.3.3 Station Status Diagnostics with IM 308-B

Introduction

The diagnostics bytes “Station status 1 to 3” give information on the station. The station number of the master station which has parameterized the slave station is stored in the “Master address” diagnostics byte.

Requesting Station Status 1 and 2

Program the following in STEP 5:

STL	Explanation
L KY n,0	Store in the “Diagnostics address”
T PW 252	byte the number of the slave station (n = station number) from which the station status is to be requested; store the code for “Station status 1 and station status 2” (code = 0) in the ”Diagnostics address +1” byte.
L PW 252	Load the diagnostics word
L KH 000C	Threshold monitoring activated
!=F	No error?
BEC	
JC FBx	Evaluate error in FBx

Structure: Diagnostics Word Station Status 1 and 2

The diagnostics word has the following structure when station status 1 and 2 (code = 0) has been requested:

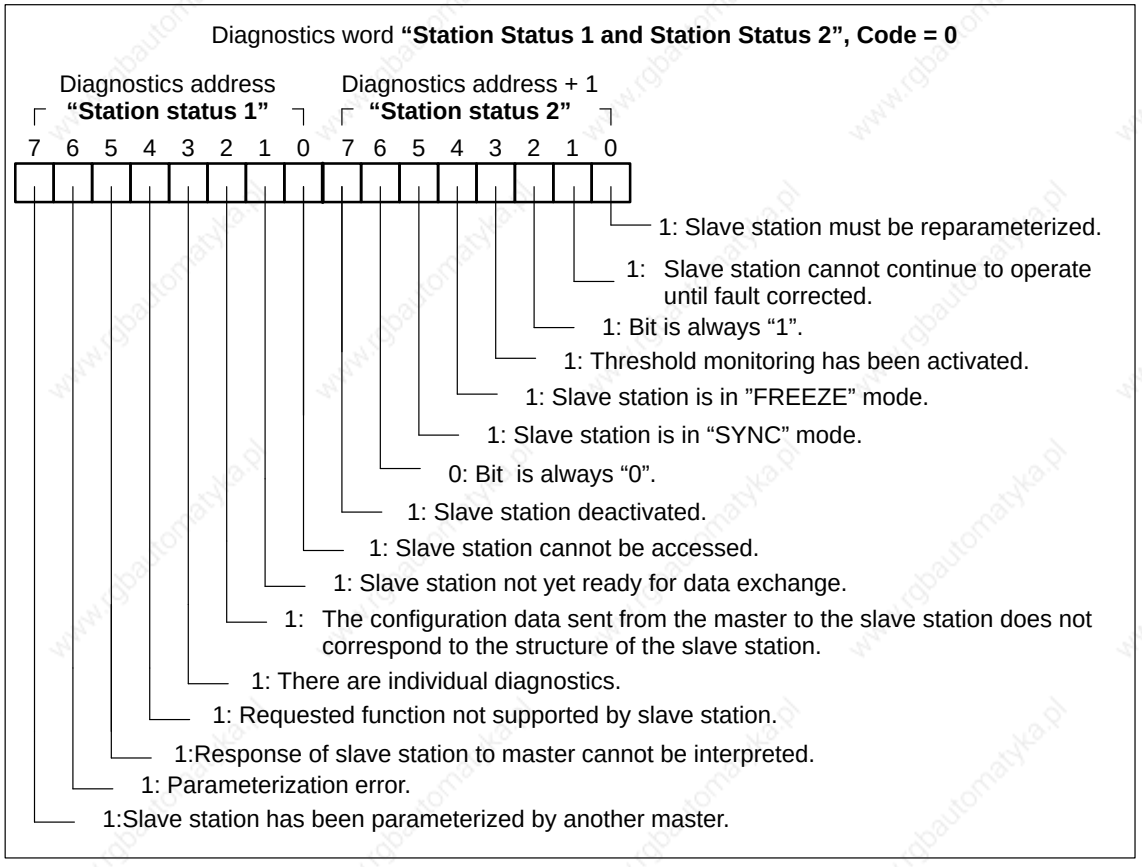


Figure 6-4 Structure of the Diagnostics Word (Station Status 1 and Station Status 2)

Note

If you are operating with the IM 308-B and the slave station has not been configured with COM ET 200 (V4.0), the diagnostics word "Station status 1 and station status 2" has the following structure (in KH format):

Station status 1: 01_H

Station status 2: 44_H

Station Status Diagnostics with IM 308-B, continued

Requesting Station Status 3 and Master Address

Program the following in STEP 5:

STL	Explanation
L KY n,1 T PW 252	Store the number of the slave station (n = station number) from which the master address is to be requested in the “Diagnostics address” byte; store the code for “Station status 3 and master address” (code = 1) in the “Diagnostics address + 1” byte.

Structure: Diagnostics Word Station Status 3 and Master Address

The diagnostics word has the following structure after station status 3 and the master address (code = 1) has been requested.

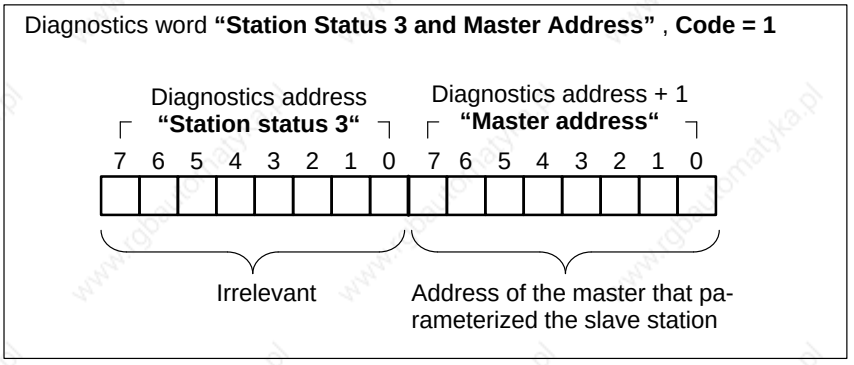


Figure 6-5 Structure of the “Station Status 3 and Master Address” Diagnostics Word

6.3.4 Diagnostics of the Manufacturer Identification with IM 308-B

Introduction

The “Manufacturer identification” diagnostics word describes the type of the slave station.

Requesting the Manufacturer Identification

Program the following in STEP 5:

STL	Explanation
L KY n,2	Store the number of the slave station (n = station number) from which the manufacturer identification is to be requested in the “Diagnostics address“ byte; store the code for “Manufacturer identification” (code = 2) in the “Diagnostics address +1” byte.
T PW 252	
L PW 252	Load the manufacturer identification (e.g. ”0001_H” for ET 200B-16DI)
L KH 0001	
!=F	No error?
BEC	
JC FBx	Evaluate error in FBx.

Diagnostics of the Manufacturer Identification with IM 308-B, continued

Structure: Diagnostics Word Manufacturer Identification

The diagnostics word has the following structure when the manufacturer identification (code = 2) has been requested:

Diagnostics word **"Manufacturer Identification", Code = 2**

Diagnostics address								Diagnostics address + 1							
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

0001_H:	ET 200B-16DI	(6ES7 131-0BH00-0XB0)
0002_H:	ET 200B-16DO	(6ES7 132-0BH00-0XB0)
0003_H:	ET 200B-8RO	(6ES7 132-0GF00-0XB0)
0004_H:	ET 200B-32DI	(6ES7 131-0BL00-0XB0)
0005_H:	ET 200B-16DO/2A	(6ES7 131-0BH10-0XB0)
$000B_H$:	ET 200B-8DI/8DO	(6ES7 133-0BH00-0XB0)
$000C_H$:	ET 200B-32DI 0.2ms	(6ES7 131-0BL10-0XB0)
$000D_H$:	ET 200B-32DO	(6ES7 132-0BL00-0XB0)
$000E_H$:	ET 200B-24DI/8DO 0.2ms	(6ES7 133-0BN10-0XB0)
$000F_H$:	ET 200B-24DI/8DO	(6ES7 133-0BN00-0XB0)
0019_H:	ET 200B-16DI-AC	(6ES7 131-0HF00-0XB0)
$001A_H$:	ET 200B-16DO-AC	(6ES7 132-0HF00-0XB0)
$001C_H$:	ET 200B-16RO-AC	(6ES7 132-0HH00-0XB0)
$001D_H$:	ET 200B-8DI/8RO-AC	(6ES7 133-0HH00-0XB0)
8018_H:	ET 200B-4AO	(6ES7 135-0HF00-0XB0)
8019_H:	ET 200B-4AI	(6ES7 134-0HF00-0XB0)
$801A_H$:	ET 200B-4/8AI	(6ES7 134-0KH00-0XB0)

Figure 6-6 Structure of the "Manufacturer Identification" Diagnostics Word

6.3.5 Device-Related Diagnostics (Digital ET 200B) in the Case of Operation with IM308-B

Introduction

You can detect faults in inputs and outputs using device-related diagnostics. The header gives information on the length of the device-related diagnostics.

Note

Device-related diagnostics are only possible in the case of ET 200B stations with diagnostics capability.

ET 200B stations **without** diagnostics capability contain the value "07_H" in the header and the remaining bytes are reserved.

Requesting Device-Related Diagnostics

Program the following in STEP 5:

STL	Explanation
L KY n,3 T PW 252	Store the number of the slave station (n = station number) from which the device-related diagnostics are to be requested in the "Diagnostics address" byte; store the code for "Header and device-related diagnostics" (code = 3) in the "Diagnostics address +1" byte.
L KH 0700	Load the diagnostics word.
L PW 252	
!=F	No error?
BEC	
JC FBx	Evaluate error in FBx.

Device-Related Diagnostics (Digital ET 200B) in the Case of Operation with IM 308-B, continued

Structure: Diagnostics Word Header and Device-Related Diagnostics

The diagnostics word has the following structure after device-related diagnostics (code = 3) has been requested in the case of digital ET 200B modules:

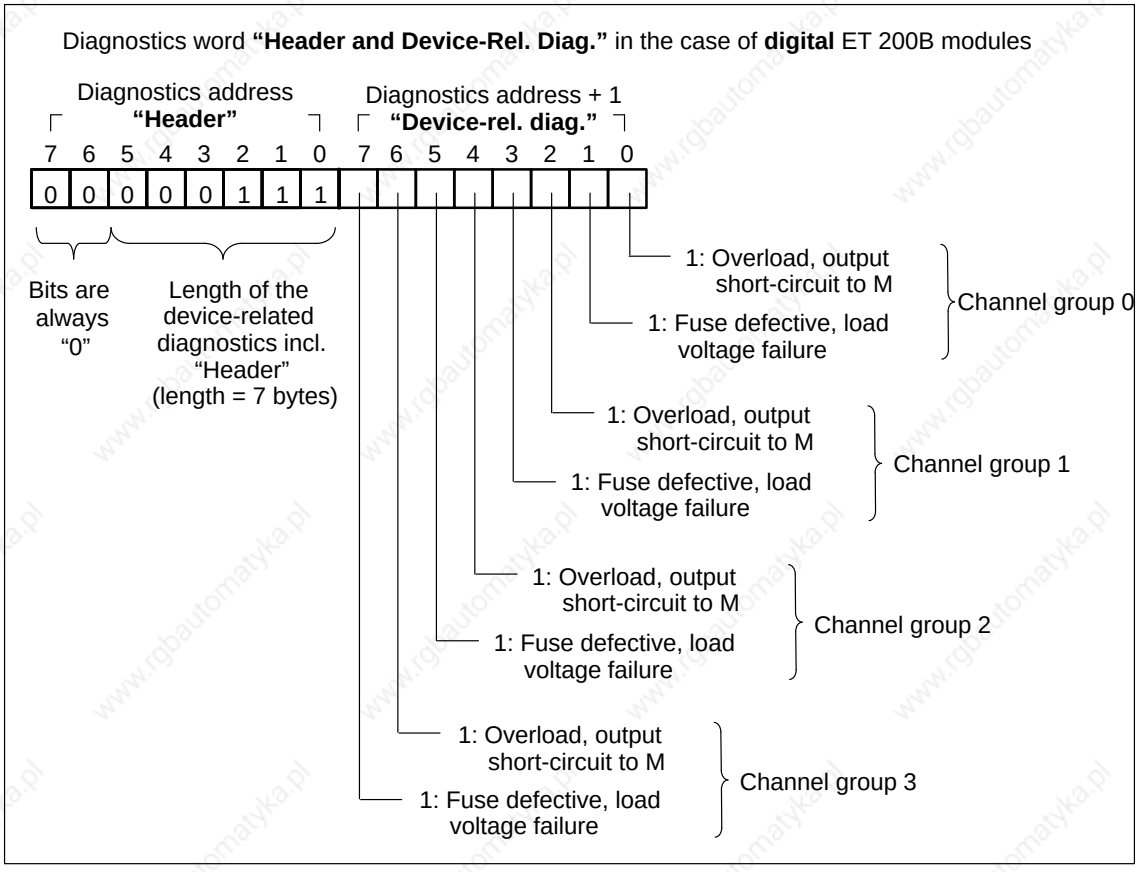


Figure 6-7 Structure of the "Header and Device-Related Diagnostics" Diagnostics Word in the Case of Digital ET 200B Modules

Note

The channel group of a digital ET 200B module always comprises one byte in the S5 address range of the CPU (corresponding to 8 inputs or 8 outputs), irrespective of the galvanic isolation of the module (grouping).

Example: ET 200B-16DO/2A (galvanic isolation in groups of 4)

Channel group 0 corresponds to Q0: outputs .0 ... .7.

Potential group 0 corresponds to Q0: outputs .0 ... .3.

6.3.6 Device-Related Diagnostics (Analog ET 200B) in the Case of Operation with IM 308-B

Introduction

Using the device-related diagnostics for an analog ET 200B, you can detect which faults the ET 200B reports. The header gives information on the length of the device-related diagnostics.

Note

Under analog value representation in Chapter 9, you will find "Supplementary Bits" which will provide you with additional diagnostics information.

Requesting Device-Related Diagnostics

To request device-related diagnostics for an analog ET 200B, program the following in STEP 5:

STL	Explanation
L KY n,4 T PW 252	Store the number of the slave station (n = station number) from which device-related diagnostics are to be requested in the "Diagnostics address" byte; store the code for "Device-related diagnostics (byte 1, 2)" in the "Diagnostics address +1" byte.
L KH 0000 L PW 252	Load the diagnostics word
!=F	No error?
BEC	
JC FBx	Evaluate error in FBx.

Select code = 5 (bytes 3, 4), 6 (bytes 5, 6) or 7 (bytes 7, 8) for further device-related diagnostics.

Device-Related Diagnostics (Analog ET 200B) in the Case of Operation with IM 308-B, continued

Structure: Diagnostics Word Header

The diagnostics word “Header” has the following structure after device-related diagnostics (code = 3) has been requested in the case of analog ET 200B modules:

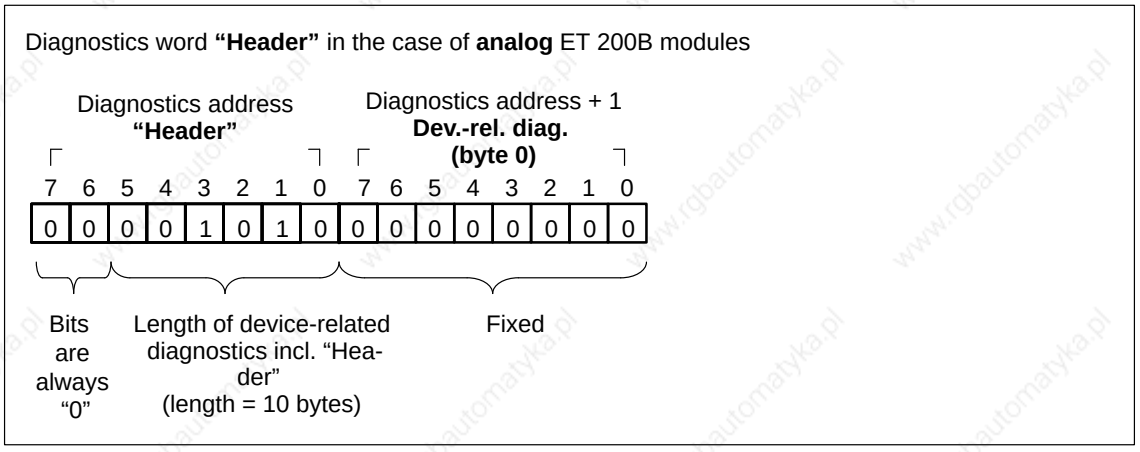


Figure 6-8 Structure of the “Header” Diagnostics Word in the Case of Analog ET 200B Modules

Structure: Diagnostics Word Device-Related Diagn. (Byte 2)

The diagnostics word has the following structure after device-related diagnostics (code = 4) has been requested in the case of analog ET 200B modules:

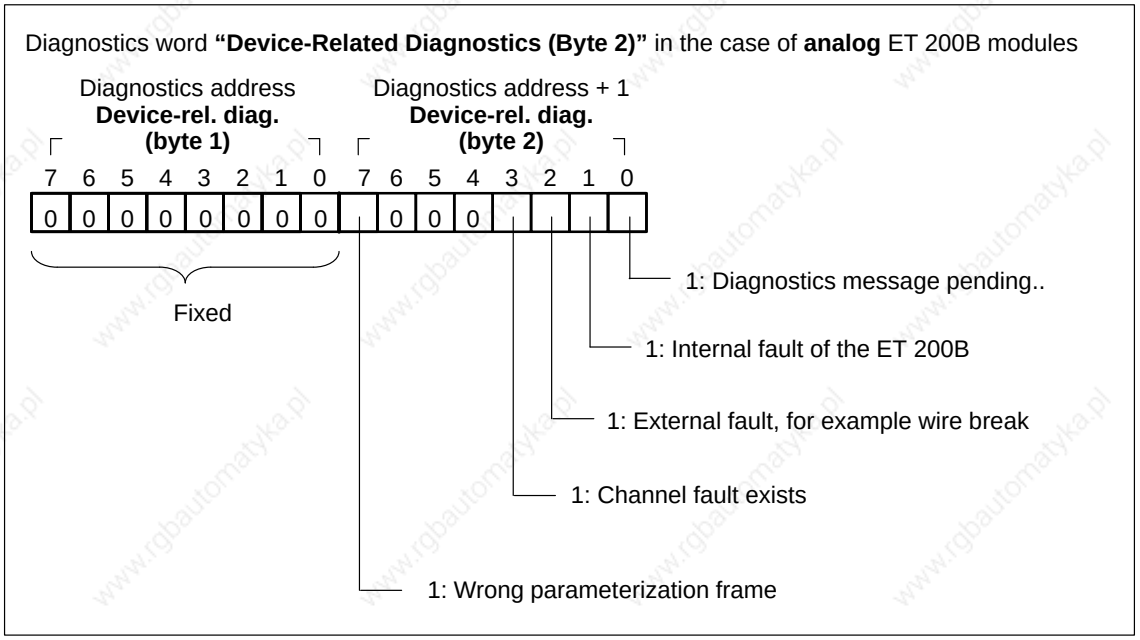


Figure 6-9 Structure of the “Device-Related Diagnostics (Byte 2)” Diagnostics Word in the Case of Analog ET 200B Modules

Structure: Diagnostics Word Device-Related Diag. (Bytes 3, 4)

The diagnostics word has the following structure after device-related diagnostics (code = 5) has been requested in the case of analog ET 200B modules:

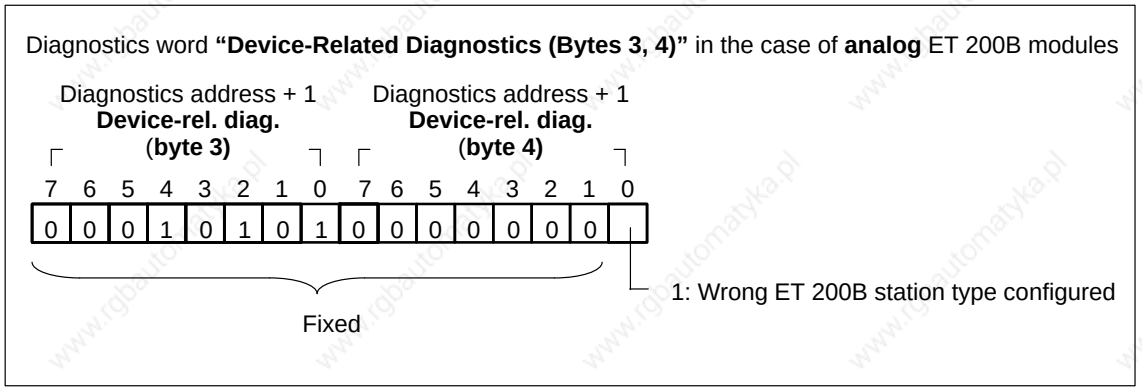


Figure 6-10 Structure of the "Device-Related Diagnostics (Bytes 3, 4)" Diagnostics Word in the Case of Analog ET 200B Modules

Structure: Diagnostics Word Device-Related Diagn. (Bytes 5, 6)

The diagnostics word has the following structure after device-related diagnostics (code = 6) has been requested in the case of analog ET 200B modules:

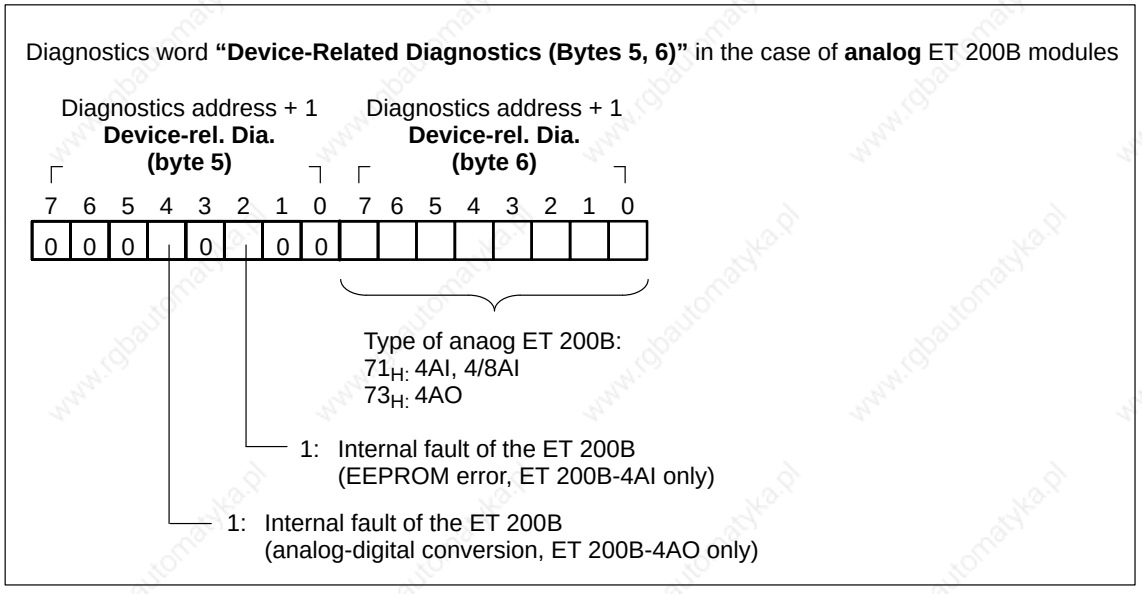


Figure 6-11 Structure of the "Device-Related Diagnostics (Byte 5, 6)" Diagnostics Word in the Case of Analog ET 200B Modules

Device-Related Diagnostics (Analog ET 200B) in the Case of Operation with IM 308-B, continued

Structure: Diagnostics Word Device-Related Diagnostics (Bytes 7, 8)

The diagnostics word has the following structure after device-related diagnostics (code = 7) has been requested in the case of analog ET 200B modules:

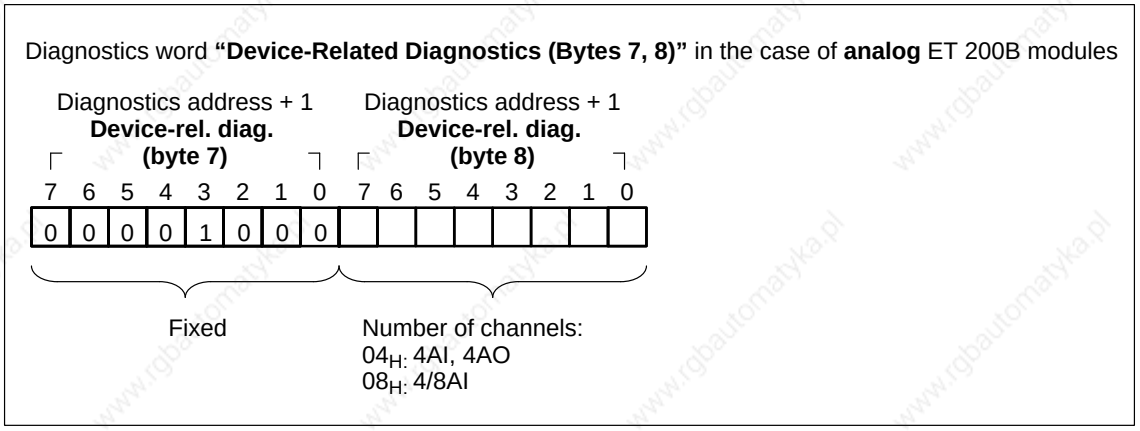


Figure 6-12 Structure of the "Device-Related Diagnostics (Byte 7, 8)" Diagnostics Word in the Case of Analog ET 200B Modules

6.4 Fault Diagnostics with STEP 5 (Station Diagnostics) in Combination with an IM 308-C

Introduction

You can locate and evaluate a fault systematically with STEP 5.

Diagnostics Functions Using STEP 5

Table 6-5 lists the STEP 5 diagnostics functions in combination with an IM 308-C:

Table 6-5 Diagnostics Functions Using STEP 5 in Combination with an IM 308-C

Diagnostics	Contents
Master diagnostics	• Determines all slaves for which diagnostics data is available. • Determines all slaves with which data transfers have taken place during a specified period. • Provides information on the operating mode of the DP master.
Station diagnostics	Provides information on the status of the slave and displays diagnostics data separately for each channel group (only in the case of modules with diagnostics capability).

In this Section

Master diagnostics with the IM 308-C are independent of the station type of the slaves. They are described in detail in the *ET 200 Distributed I/O System* manual (Order No. 6ES5 998-3ES12).

Station diagnostics for the **ET 200B** are described below.

Fault Diagnostics with STEP 5 (Station Diagnostics) in Combination with an IM 308-C, continued

Structure: Station Diagnostics

25 bytes are reserved per slave station for station diagnostics purposes.

Table 6-6 shows the structure of the station diagnostics for the ET 200B:

Table 6-6 Structure of the Station Diagnostics for the ET 200B in Combination with an IM 308-C

Byte	Contents
Diagnostics byte 0	Station status 1
Diagnostics byte 1	Station status 2
Diagnostics byte 2	Station status 3
Diagnostics byte 3	Master station number
Diagnostics byte 4	Manufacturer identification (high)
Diagnostics byte 5	Manufacturer identification (low)
Diagnostics byte 6	Header (device-related diagnostics)
Diagnostics byte 7	**Digital:** Device-related diagnostics (group diagnostics) **Analog:** Device-related diagnostics (byte 0)
Diagnostics bytes 8 to 24	**Digital:** Free **Analog:** Device-related diagnostics (bytes 1 to 17)

Requesting Station Diagnostics

In order to request the station diagnostics for an ET 200B station, you must invoke the FB IM308C function block (FB 192) with the FCT = SD function.

FB IM308C saves the station diagnostics in the S5 data area of the CPU which was opened by the function block call (data block or flag area).

Description

FB IM308C handling comprises general access to the diagnostics data of the IM 308-C and is described in detail in the *ET 200 Distributed I/O System* manual (Order No. 6ES5 998-3ES12).

The example given below shows how you can request the station diagnostics with the aid of FB IM308C and save them in a data block.

The procedure for analyzing the station diagnostics is described next. We have assumed that the diagnostics data have already been saved in a data block.

Example: Requesting Diagnostics with FB IM308C

This example shows how the station diagnostics of a slave with station number 3 can be requested with FB IM308C (FB 192). The diagnostics data should be saved in data block DB 10, starting at data word DW 0.

Basic structure of the STEP 5 listing (e.g. in OB 1):

```
STL                                        Explanation
    :
    :JU  FB 192                            Invoke FB IM308C
Name:IM308C                                DP frame: F800
DPAD:    KH F800                           Number of IM 308-C: 0, station num-
IMST:    KY 0,3                            ber of slave: 3
FCT :    KS SD                             SD = Read slave diagnostics
GCGR:    KM 00000000 00000000              Irrelevant
TYP :    KY 0,10                           Page: 0, block: DB 10
STAD:    KF +0                             Number of first data word: DW 0
LENG:    KF -1                             Bytes to be transferred: -1
ERR :    FW 134                            (joker length)
    :                                      Error word: MW 134
    :***
```

Note

The block parameters of FB IM308C and the error numbers in the ERR parameter of FB IM308C are described in detail in the *ET 200 Distributed I/O System* manual (Order No. 6ES5 998-3ES12).

6.4.1 Station Status Diagnostics with IM 308-C

Introduction

The diagnostics bytes ”Station status 1 to 3” give information on the station. The number of the station which has parameterized the slave station is stored in the ”Master station number” diagnostics byte.

Assumption

The station diagnostics of a digital ET 200B module have been requested by the CPU; they are saved in a data block (DB) starting at data word DW n (n = 0).

Table 6-7 shows the position of the diagnostics data in a data block:

Table 6-7 Position of the Diagnostics Data in a Data Block

Data Word	DL	DR
DW n	Station status 1	Station status 2
DW n + 1	Station status 3	Master station number
DW n + 2	Manufacturer identification	
DW n + 3	Header	Device-related diagnostics (byte 0)
...	...	...
DW n + 12	Device-related diagnostics (byte 17)	Free

n = Word address starting at which the diagnostics data is saved in the DB.

Reading Station Status 1 and 2

Program the following in STEP 5:

STL	Explanation
C DB 10	Invoke the data block (in this example:
L DW 0	DB 10) Load the diagnostics word ”Station
L KH 0004	status 1 and station status 2
!=F	”No error?
BEC	
JC FBx	Evaluate error in FBx.

Structure: Diagnostics Word Station Status 1 and 2

The diagnostics word has the following structure for station status 1 and 2 (in this example: DW 0):

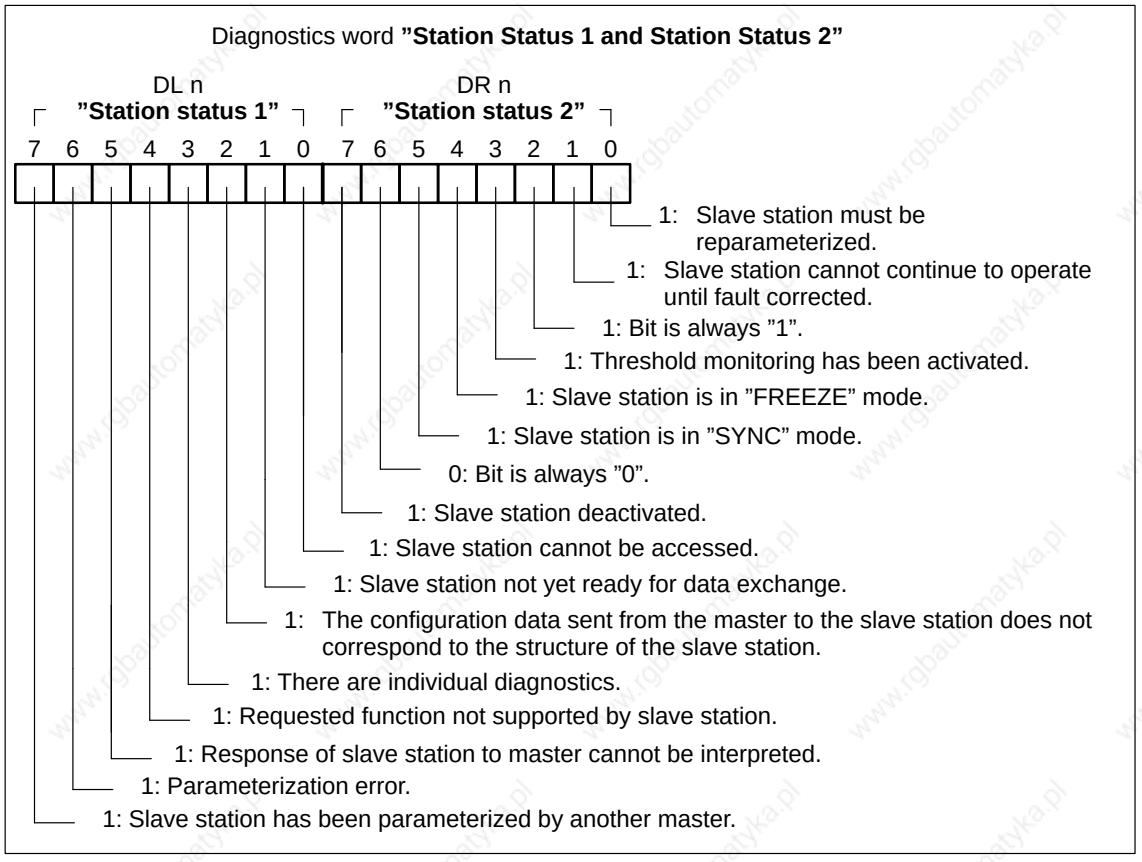


Figure 6-13 Structure of the Diagnostics Word (Station Status 1 and Station Status 2)

Station Status Diagnostics with IM 308-C, continued

Reading Station Status 3 and Master Station Number

Program the following in STEP 5:

STL	Explanation
C DB 10 L DW 1 L KH 0001	Invoke the data block (in this example: DB 10) Load the diagnostics word "Station status 3 and master station number" (in this example: 1)

Structure: Diagnostics Word Station Status 3 and Master Station Number

The diagnostics word has the following structure for station status 3 and the master station number (in this example: DW 1):

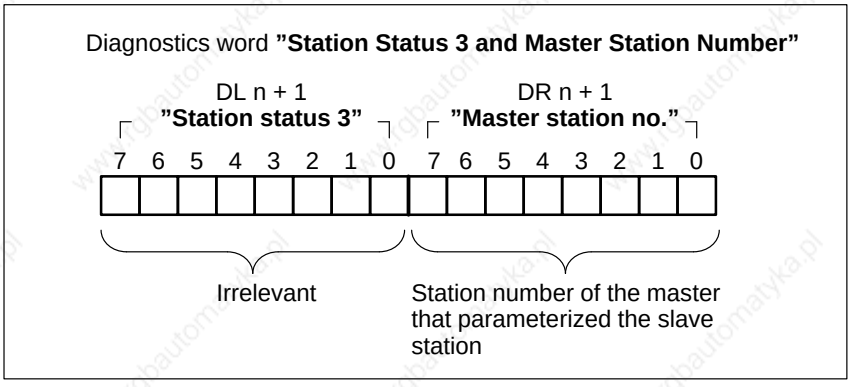


Figure 6-14 Structure of the "Station Status 3 and Master Station Number" Diagnostics Word

6.4.2 Diagnostics of the Manufacturer Identification with IM 308-C

Introduction

The ”Manufacturer identification” diagnostics word describes the type of the slave station.

Assumption

The station diagnostics have been requested by the CPU; they are saved in data block DB 10 starting at data word DW n (n = 0) (see Table 6-7).

Reading the Manufacturer Identification

Program the following in STEP 5:

STL	Explanation
C DB 10	Invoke the data block (in this exam-
L DW 2	ple: DB 10) Load the diagnostics
L KH 0001	word ”Manufacturer identification”
!=F	(e.g. ”0001H” for ET 200B-16DI)
	No error?
BEC	Evaluate error in FBx.
JC FBx	

Diagnostics of the Manufacturer Identification with IM 308-C, continued

Structure: Diagnostics Word Manufacturer Identification

The diagnostics word has the following structure for the manufacturer identification (in this example: DW 2):

Diagnostics word **"Manufacturer Identification", Code = 2**

	DL n + 2								DR n + 2							
	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

0001_H:	ET 200B-16DI	(6ES7 131-0BH00-0XB0)
0002_H:	ET 200B-16DO	(6ES7 132-0BH00-0XB0)
0003_H:	ET 200B-8RO	(6ES7 132-0GF00-0XB0)
0004_H:	ET 200B-32DI	(6ES7 131-0BL00-0XB0)
0005_H:	ET 200B-16DO/2A	(6ES7 131-0BH10-0XB0)
$000B_H$:	ET 200B-8DI/8DO	(6ES7 133-0BH00-0XB0)
$000C_H$:	ET 200B-32DI 0.2ms	(6ES7 131-0BL10-0XB0)
$000D_H$:	ET 200B-32DO	(6ES7 132-0BL00-0XB0)
$000E_H$:	ET 200B-24DI/8DO 0.2ms	(6ES7 133-0BN10-0XB0)
$000F_H$:	ET 200B-24DI/8DO	(6ES7 133-0BN00-0XB0)
0019_H:	ET 200B-16DI-AC	(6ES7 131-0HF00-0XB0)
$001A_H$:	ET 200B-16DO-AC	(6ES7 132-0HF00-0XB0)
$001C_H$:	ET 200B-16RO-AC	(6ES7 132-0HH00-0XB0)
$001D_H$:	ET 200B-8DI/8RO-AC	(6ES7 133-0HH00-0XB0)
8018_H:	ET 200B-4AO	(6ES7 135-0HF00-0XB0)
8019_H:	ET 200B-4AI	(6ES7 134-0HF00-0XB0)
$801A_H$:	ET 200B-4/8AI	(6ES7 134-0KH00-0XB0)

Figure 6-15 Structure of the "Manufacturer Identification" Diagnostics Word

6.4.3 Device-Related Diagnostics (Digital ET 200B) in the Case of Operation with IM 308-C

Introduction

You can detect faults in inputs and outputs using device-related diagnostics. The header gives information on the length of the device-related diagnostics.

Note

Device-related diagnostics are only possible in the case of ET 200B stations with diagnostics capability.

ET 200B stations **without** diagnostics capability contain the value ”07H” in the header and the remaining bytes are reserved.

Assumption

The station diagnostics of a digital ET 200B module have been requested by the CPU; they are saved in data block DB 10 starting at data word DW n (n = 0). Device-related diagnostics with a length of 7 bytes exist.

Table 6-8 shows the position of the diagnostics data in a data block:

Table 6-8 Position of the Diagnostics Data in a Data Block (Digital ET 200B)

Data Word	DL	DR
DW n	Station status 1	Station status 2
DW n + 1	Station status 3	Master station number
DW n + 2	Manufacturer identification	
DW n + 3	Header	Device-related diagnostics (group diagnostics)
DW n + 4 ... DW n + 6	Reserved	Reserved

n = Word address starting at which the diagnostics data is saved in the DB.

Reading Device-Related Diagnostics

Program the following in STEP 5:

```
STL          Explanation
C DB 10      Invoke the data block (in this example: DB
L DW 3       10) Load the diagnostics word ”Header and
L KH 0700    device-related diagnostics”
!=F          No error?
BEC
JC FBx       Evaluate error in FBx.
```

Device-Related Diagnostics (Digital ET 200B) in the Case of Operation with IM 308-C, continued

Structure: Diagnostics Word Header and Device-Related Diagnostics

The diagnostics word has the following structure for the header and device-related diagnostics (in this example: DW 3) in the case of digital ET 200B modules:

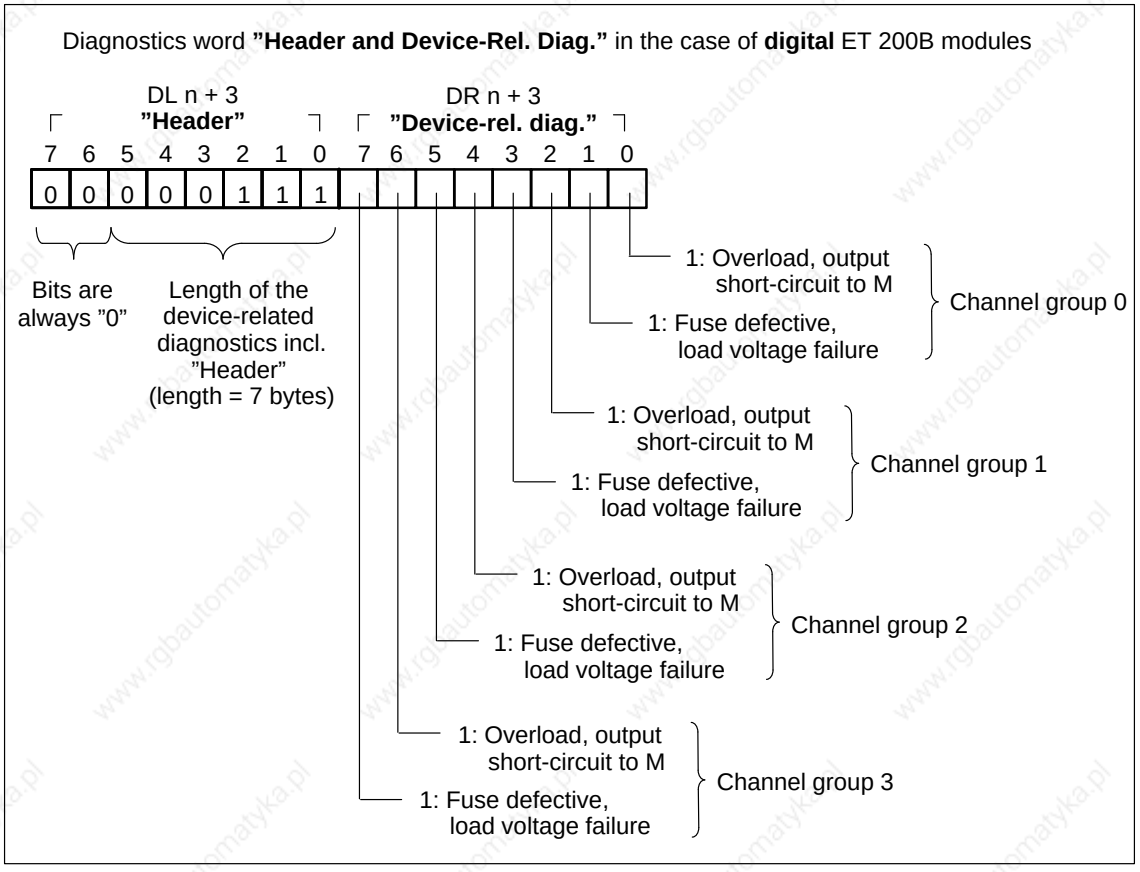


Figure 6-16 Structure of the "Header and Device-Related Diagnostics" Diagnostics Word in the Case of Digital ET 200B Modules"

Note

The channel group of a digital ET 200B module always comprises one byte in the S5 address range of the CPU (corresponding to 8 inputs or 8 outputs), irrespective of the galvanic isolation of the module (grouping).

Example: ET 200B-16DO/2A (galvanic isolation in groups of 4)

Channel group 0 corresponds to Q0: outputs .0 ... .7.

Potential group 0 corresponds to Q0: outputs .0 ... .3.

6.4.4 Device-Related Diagnostics (Analog ET 200B) in the Case of Operation with IM 308-C

Introduction

Using the device-related diagnostics for an analog ET 200B, you can detect which faults the ET 200B reports. The header gives information on the length of the device-related diagnostics.

Note

Under analog value representation in Chapter 9 you will find ”Supplementary Bits” which will provide you with additional diagnostics information.

Assumption

The station diagnostics of analog ET 200B modules have been requested by the CPU; they are saved in data block DB 10 starting at data word DW n (n = 0).

Table 6-9 Position of the Diagnostics Data in the Data Block (Analog ET 200B)

Data Word	DL	DR
DW n	Station status 1	Station status 2
DW n + 1	Station status 3	Master station number
DW n + 2	Manufacturer identification	
DW n + 3	Header	Reserved (byte 0)
DW n + 4	Reserved (byte 1)	System-specific diagnostics (byte 2)
DW n + 5	System-specific diagnostics (byte 3)	System-specific diagnostics (byte 4)
DW n + 6	System-specific diagnostics (byte 5)	Input or output channels (byte 6)
DW n + 7	Reserved (byte 7)	Number of channels (byte 8)
DW n + 8	Channel fault (byte 9)	Channel-specific diagnostics (byte 10) **Channel 0:** 4/8AI, 4AI, 4AO
DW n + 9	Channel-specific diagnostics (byte 11) **Channel 1:** 4/8AI, 4AI, 4AO	Channel-specific diagnostics (byte 12) **Channel 2:** 4/8AI, 4AI, 4AO
DW n + 10	Channel-specific diagnostics (byte 13) **Channel 3:** 4/8AI, 4AI, 4AO	Channel-specific diagnostics (byte 14) **Channel 4:** 4/8AI
DW n + 11	Channel-specific diagnostics (byte 15) **Channel 5:** 4/8AI	Channel-specific diagnostics (byte 16) **Channel 6:** 4/8AI
DW n + 12	Channel-specific diagnostics (byte 17) **Channel 7:** 4/8AI	Free

n = Word address starting at which the diagnostics data is saved in the DB.

Device-Related Diagnostics (Analog ET 200B) in the Case of Operation with IM 308-C, continued

Reading Device-Related Diagnostics

Program the following in STEP 5:

```
STL             Explanation
C DB 10         Invoke the data block (in this example: DB
L DW 4          10) Load the diagnostics word ”Device-re-
L KH 0700       lated diagnostics (bytes 1, 2)
!=F             ”No error?
BEC             Evaluate error in FBx.
JC FBx
```

Load the appropriate data words of the DB instead of DW 4 for further device-related diagnostics (see Table 6-9).

Structure: Diagnostics Word Header

The diagnostics word ”Header and device-related diagnostics” (in this example: DW 3) has the following structure in the case of analog ET 200B modules:

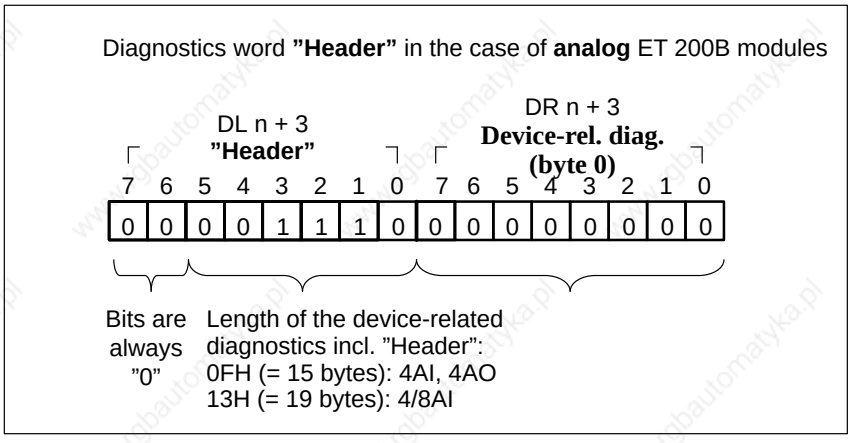


Figure 6-17 Structure of the ”Header” Diagnostics Word in the Case of Analog ET 200B Modules

Structure: Diagnostics Word Device-Related Diagnostics (Byte 2)

The diagnostics word (in this example: DW 4) has the following structure in the case of analog ET 200B modules:

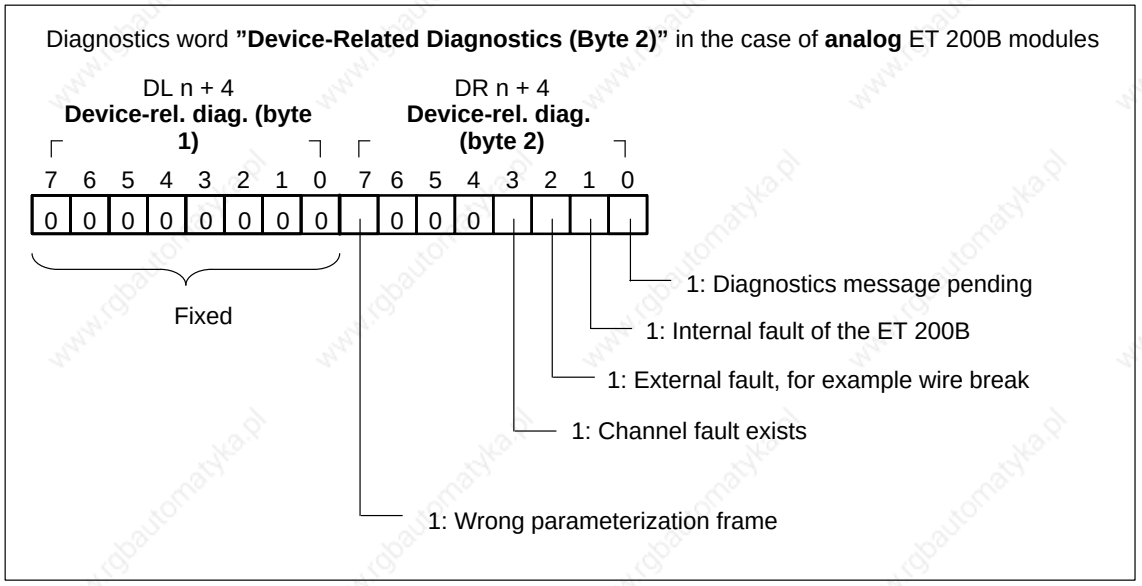


Figure 6-18 Structure of the "Device-Related Diagnostics (Byte 2)" Diagnostics Word in the Case of Analog ET 200B Modules

Structure: Diagnostics Word Device-Related Diagnostics (Bytes 3, 4)

The diagnostics word (in this example: DW 5) has the following structure in the case of analog ET 200B modules:

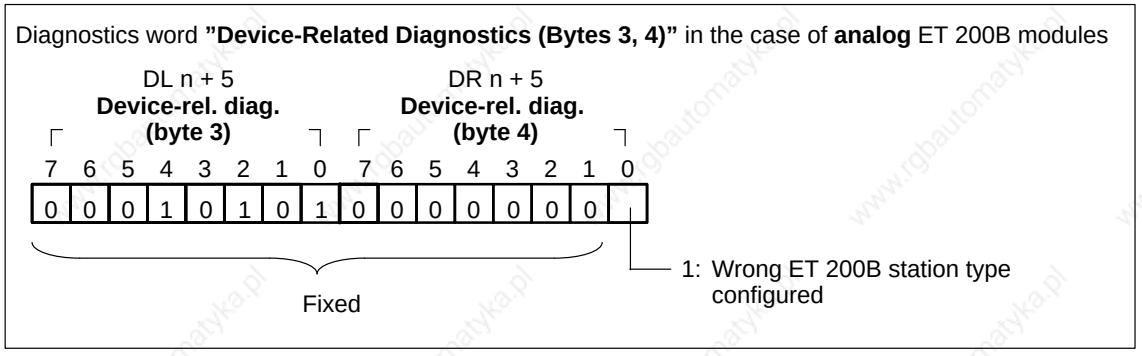


Figure 6-19 Structure of the "Device-Related Diagnostics (Bytes 3, 4)" Diagnostics Word in the Case of Analog ET 200B Modules

Device-Related Diagnostics (Analog ET 200B) in the Case of Operation with IM 308-C, continued

Structure: Diagnostics Word Device-Related Diagn. (Bytes 5, 6)

The diagnostics word (in this example: DW 6) has the following structure in the case of analog ET 200B modules:

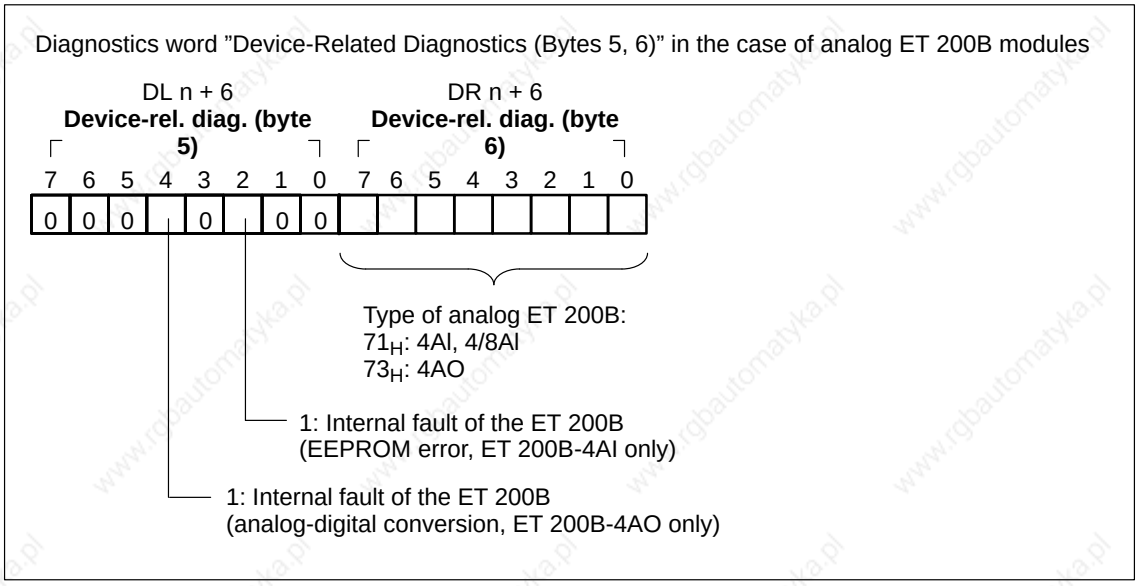


Figure 6-20 Structure of the "Device-Related Diagnostics (Bytes 5, 6)" Diagnostics Word in the Case of Analog ET 200B Modules

Structure: Diagnostics Word Device-Related Diagn. (Bytes 7, 8)

The diagnostics word (in this example: DW 7) has the following structure in the case of analog ET 200B modules:

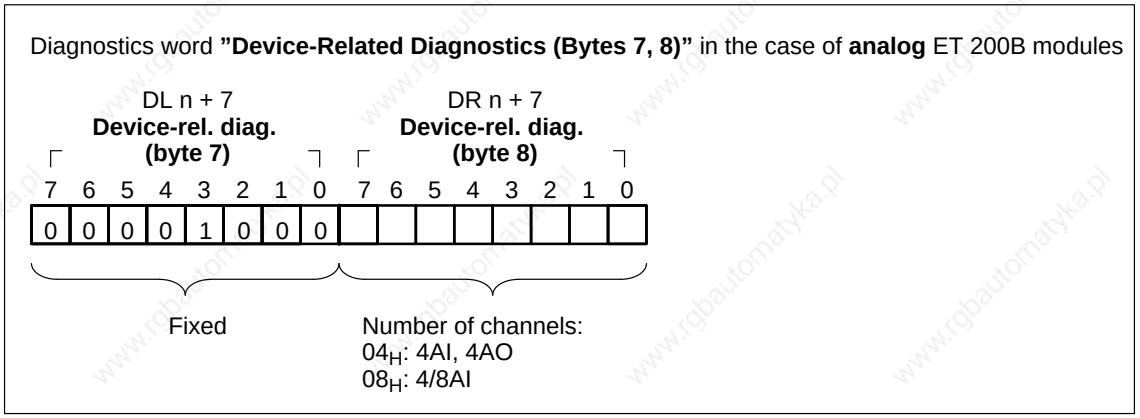


Figure 6-21 Structure of the "Device-Related Diagnostics (Bytes 7, 8)" Diagnostics Word in the Case of Analog ET 200B Modules

Structure: Diagnostics Word Device-Related Diagnostics (Bytes 9, 10)

The diagnostics word (in this example: DW 8) has the following structure in the case of analog ET 200B modules:

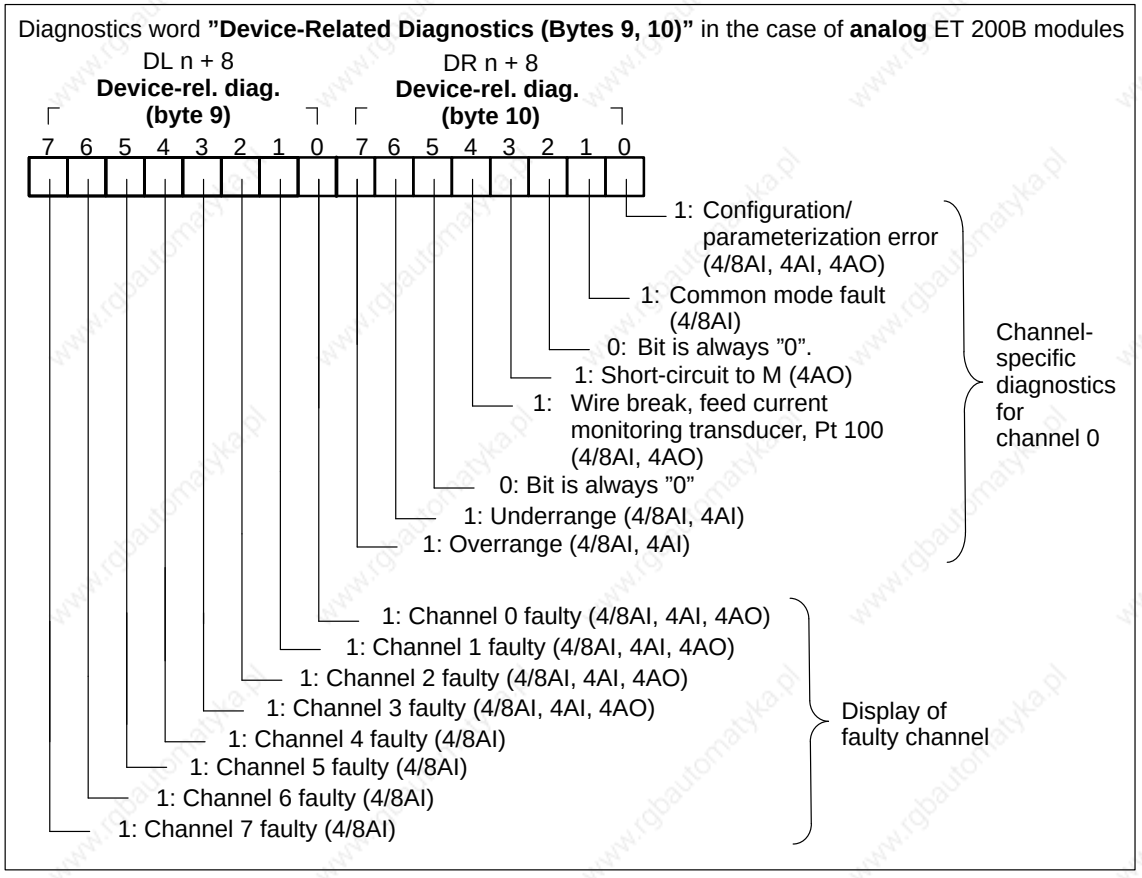


Figure 6-22 Structure of the "Header and Device-Related Diagnostics (Bytes 9, 10)" Diagnostics Word in the Case of Analog ET 200B Modules

Structure: Diagnostic Word Device-Related Diagnostics (Bytes 11, 12)

Diagnostics bytes 11 and 12 (in this example: DW 9) have the same structure as byte 10; they describe the channel-specific diagnostics for channels 1 and 2.

Device-Related Diagnostics (Analog ET 200B) in the Case of Operation with IM 308-C, continued

Structure: Diagnostics Word Device-Related Diagnostics (Bytes 13, 14)

The diagnostics word (in this example: DW 8) has the following structure in the case of analog ET 200B modules:

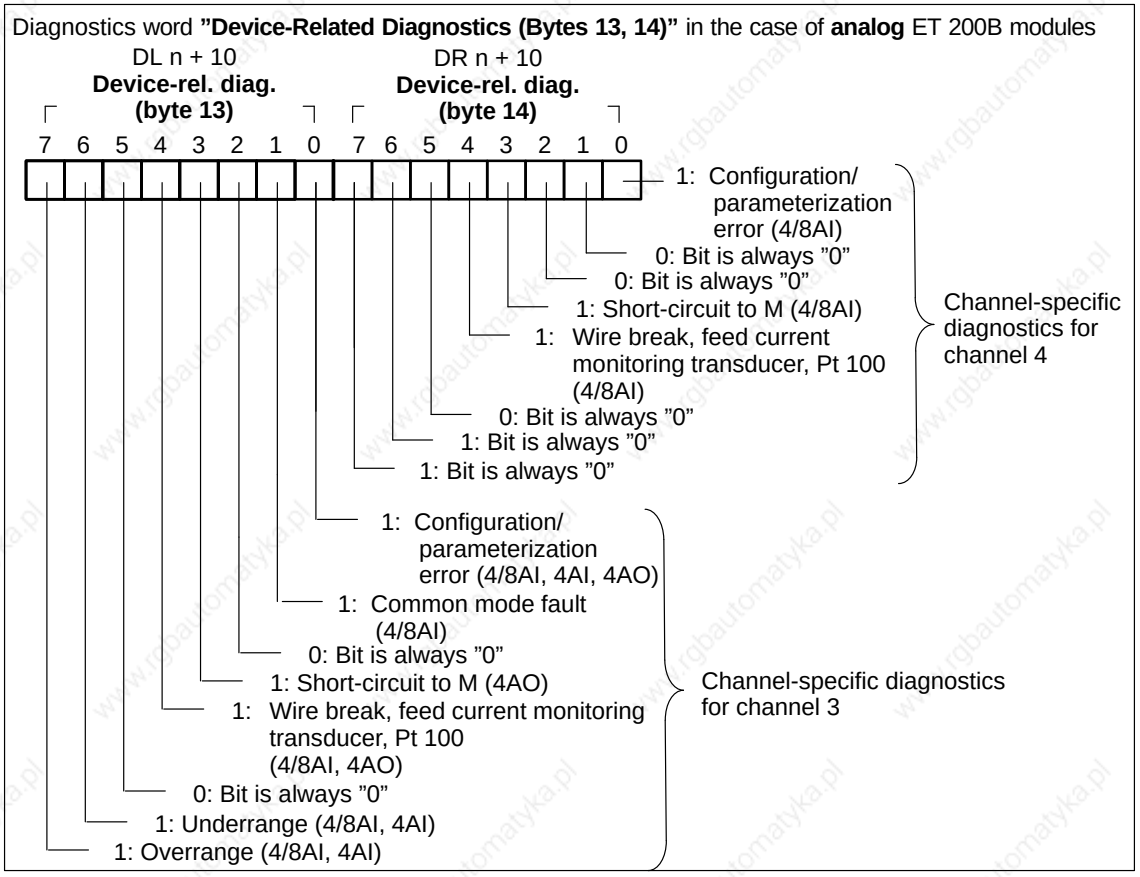


Figure 6-23 Structure of the "Header and Device-Related Diagnostics (Bytes 13, 14)" Diagnostics Word in the Case of Analog ET 200B Modules

Structure: Diagnostic Word Device-Related Diagnostics (Bytes 15, 16, 17)

Diagnostics bytes 15 to 17 have the same structure as byte 14; they describe the channel-specific diagnostics for channels 5 to 7 of the ET 200B-4/8AI.

General Technical Specifications 7

In this Chapter

This chapter contains the technical specifications.

The general technical specifications contain the standards and test values all ET 200B modules comply with and the test criteria for which all modules were checked.

7.1 General Technical Specifications

Climatic environ. conditions acc. to IEC 1131-2	
Operating temperature	
• Preferred installation (= horizontal installation on a vertical wall: see Figure 3-5)	0 to + 60 °C (32 to 140 °F)
• Other installation positions	0 to + 40 °C (32 to 104 °F) (Air intake temperature, measured at the bottom of the module)
Storage/transport temperature	− 40 to + 70 °C (–40 to 158 °F)
Relative humidity to DIN 40040	15 to 95 % (indoor), no condensation
Atmospheric pressure	
• Operating	795 to 1080 hPa
• Storage/transport	660 to 1080 hPa
Pollutants	
• SO_2	≤ 0.5 ppm (rel. humidity ≤ 60 %, no condensation)
• H_2S	≤ 0.1 ppm (rel. humidity ≤ 60 %, no condensation)

Mechanical environmental conditions	
Vibration[1] tested to IEC 68-2-6	
• 10 Hz ≤ f < 57 Hz	Const. amplitude 0.075 mm
• 57 Hz ≤ f < 150 Hz	Const. acceleration 1g
• Mode of vibration	Frequency sweeps with a rate of change of 1 octave/min.
• Period of oscillation	10 frequency sweeps per axis in each of the 3 perpendicular axes
• Operating conditions	In accordance with IEC 1131-2
Shock[1] tested to IEC 68-2-27	
• Type of shock	Semi-sinusoidal
• Strength of shock	15 g peak value, 11 ms duration
• Direction of shock	2 shocks in each of the 3 perpendicular axes
Drop and topple to IEC 68-2-31	
• Tested with	Height of fall 100 mm (3.90 in.)

Electromagnetic compatibility (EMC)/noise immunity	
Static electricity to IEC 801-2	Discharge to all parts that are accessible to the operator during normal operation
• Test voltage	8 kV air discharge 4 kV contact discharge (relative humidity 30 to 95%)
Electromagnetic fields to IEC 801-3	Field strength 10 V/m
Fast transient burst to IEC 801-4, Class III	
• Digital input/output module	
for V = 24 V	2 kV
for V > 24 V	2 kV
• Analog input/output module	2 kV
• Communications interface	2 kV

IEC/VDE safety information	
Degree of protection to IEC 529	
• Type	IP 20
• Class	I to IEC 536
Insulation rating	
• Between electrically independent circuits and circuits connected to a central grounding point	to DIN VDE 0160 (05.1988) and IEC 1131-2
• Between all circuits and central grounding point (standard sectional rail)	to DIN VDE 0160 (05.1988) and IEC 1131-2
Test voltage for a nominal voltage V_{input} of the circuits (AC/DC)	to DIN VDE 0160 and IEC 1131-2
V_{input} = 0 to 50 V	500 V DC
V_{input} = 50 to 125 V	1250 V AC
V_{input} = 125 to 250 V	1500 V AC
Radio interference suppression	to VDE 0871
• Limit class	A

[1] Vibrations and shocks permanently reaching the specified values as well as bumps must be prevented by adequate measures.

Digital Modules

8

In this Chapter

This chapter contains the technical specifications of the ET 200B digital modules. The chapter is broken down into sections for

- 24 V DC digital modules
- 120/230 V AC V digital modules

8.1 Digital Modules

Introduction

The tables below provide an overview of the digital modules of the ET 200B.

List of Electronics Blocks

The following types of digital electronics blocks are available:

Table 8-1 ET 200B Digital Electronics Blocks (24 V DC)

Electronics Block	Order No.	Description
ET 200B-16DI	6ES7 131-0BH00-0XB0	Inputs: 16 × DC 24 V (3 ms)
ET 200B-32DI	6ES7 131-0BL00-0XB0	Inputs: 32 × DC 24 V (3 ms)
ET 200B-32DI 0.2ms	6ES7 131-0BL10-0XB0	Inputs: 32 × DC 24 V (0,2 ms)
ET 200B-16DO	6ES7 132-0BH00-0XB0	Outputs: 16 × DC 24 V (0,5 A/2 A)
ET 200B-16DO/2A	6ES7 132-0BH10-0XB0	Outputs: 16 × DC 24 V (2 A)
ET 200B-32DO	6ES7 132-0BL00-0XB0	Outputs: 32 × DC 24 V (0,5 A)
ET 200B-8DI/8DO	6ES7 133-0BH00-0XB0	Inputs: 8 × DC 24 V (3 ms) Outputs: 8 × DC 24 V (0,5 A)
ET 200B-24DI/8DO	6ES7 133-0BN00-0XB0	Inputs: 24 × DC 24 V (3 ms) Outputs: 8 × DC 24 V (0,5 A)
ET 200B-24DI/8DO 0.2ms	6ES7 133-0BN10-0XB0	Inputs: 24 × DC 24 V (0,2 ms) Outputs: 8 × DC 24 V (0,5 A)
ET 200B-8RO	6ES7 132-0GF00-0XB0	Outputs: 8 × REL. DC 24 ... 60 V
ET 200B-16DI-AC	6ES7 131-0HF00-0XB0	Inputs: 16 x AC 120/230 V
ET 200B-16DO-AC	6ES7 132-0HF00-0XB0	Outputs: 16 x AC 120/230 V (0,5 A)
ET 200B-16RO-AC	6ES7 132-0HH00-0XB0	Outputs: 16 x REL. AC 120/230 V/DC 24 ... 150 V
ET 200B-8DI/8RO-AC	6ES7 133-0HH00-0XB0	Inputs: 8 x AC 120/230 V Outputs: 8 x REL. AC 120/230 V/DC 24 ... 150 V

List of Terminal Blocks

The following types of digital terminal blocks are available:

Table 8-2 ET 200B Digital Terminal Blocks

Terminal Block	Order No.	Description
TB1/DC	6ES7 193-0CA10-0XA0	16-channel, screw-type terminal, 3-tier
TB1-4/DC	6ES7 193-0CA20-0XA0	16-channel, screw-type terminal, 4-tier
TB2/DC	6ES7 193-OCB10-0XA0	32-channel, screw-type terminal, 3-tier
TB2-4/DC	6ES7 193-0CB20-0XA0	32-channel, screw-type terminal, 4-tier
TB3/DC	6ES7 193-0CA30-0XA0	16-channel, spring-loaded terminal
TB4/DC	6ES7 193-0CB30-0XA0	32-channel, spring-loaded terminal
TB6/AC	6ES7 193-0CC10-0XA0	16-channel, screw-type terminal, 3-tier

8.1.1 Terminal Blocks TB1/DC (6ES7 193-0CA10-0XA0), TB1-4/DC (6ES7 193-0CA20-0XA0) and TB3/DC (6ES7 193-0CA30-0XA0)

Dimension Drawing TB1/DC

Dimension drawing: Terminal block TB1/DC (screw-type terminal, 3-tier)

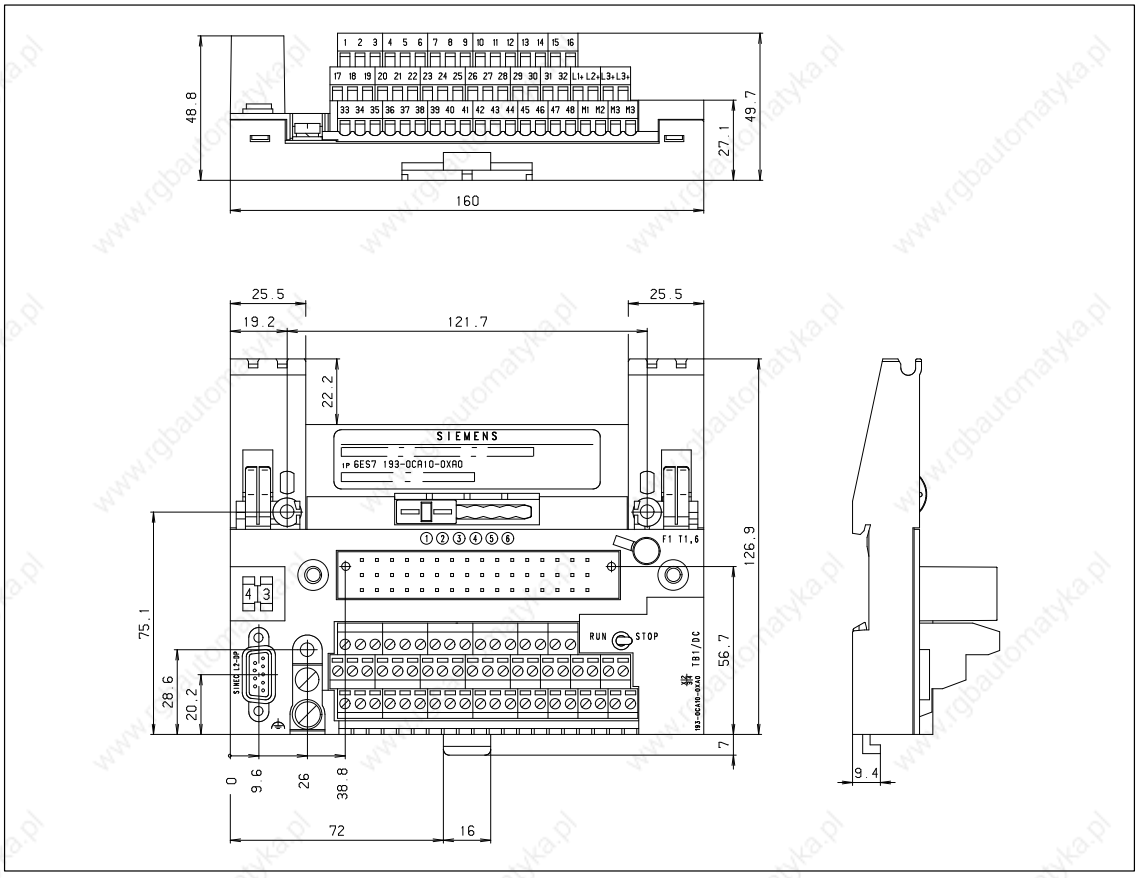


Figure 8-1 Dimension Drawing: Terminal Block TB1/DC (Screw-Type Terminal, 3-Tier)

Dimension Drawing TB1-4/DC

Dimension drawing: Terminal block TB1-4/DC (screw-type terminal, 4-tier)

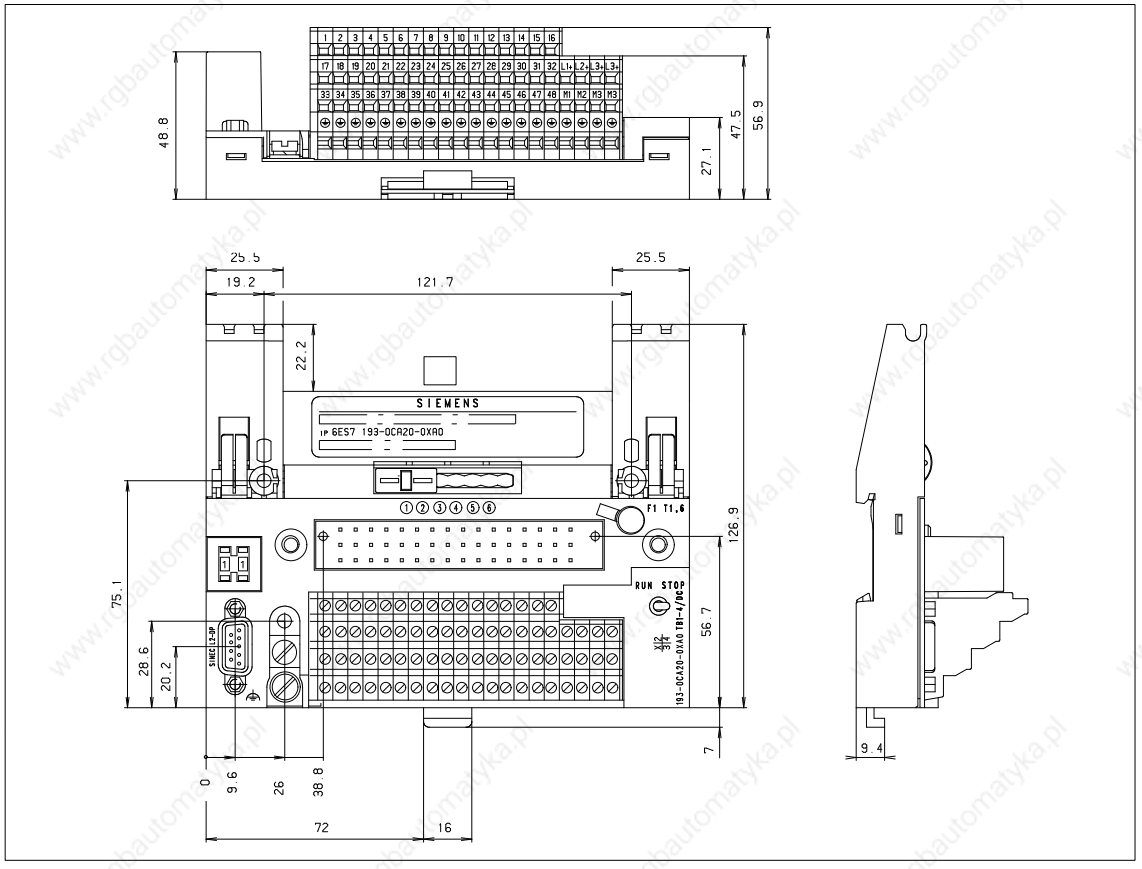


Figure 8-2 Dimension Drawing: Terminal Block TB1-4/DC (Screw-Type Terminal, 4-Tier)

Terminal Blocks TB1/DC (6ES7 193-0CA10-0XA0), TB1-4/DC (6ES7 193-0CA20-0XA0) and TB3/DC (6ES7 193-0CA30-0XA0), continued

Dimension Drawing TB3/DC

Dimension Drawing: Terminal block TB3/DC (spring-loaded terminal)

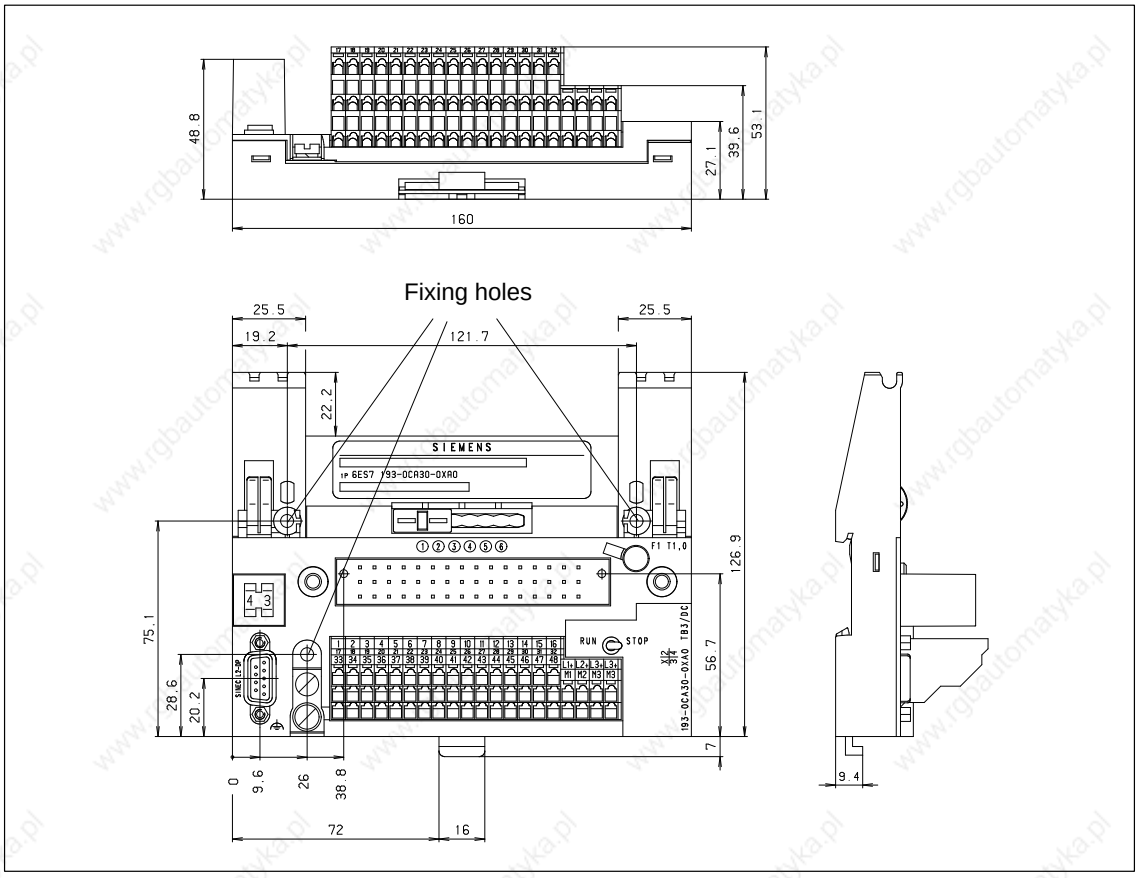


Figure 8-3 Dimension Drawing: Terminal Block TB3/DC (Spring-Loaded Terminal)

Dimension Drawing TB with Bus Connector (6ES7 ...)

Dimension drawing: Side elevation TB1/DC, TB1-4/DC or TB3/DC with SINEC L2 bus connector (6ES7 ...)

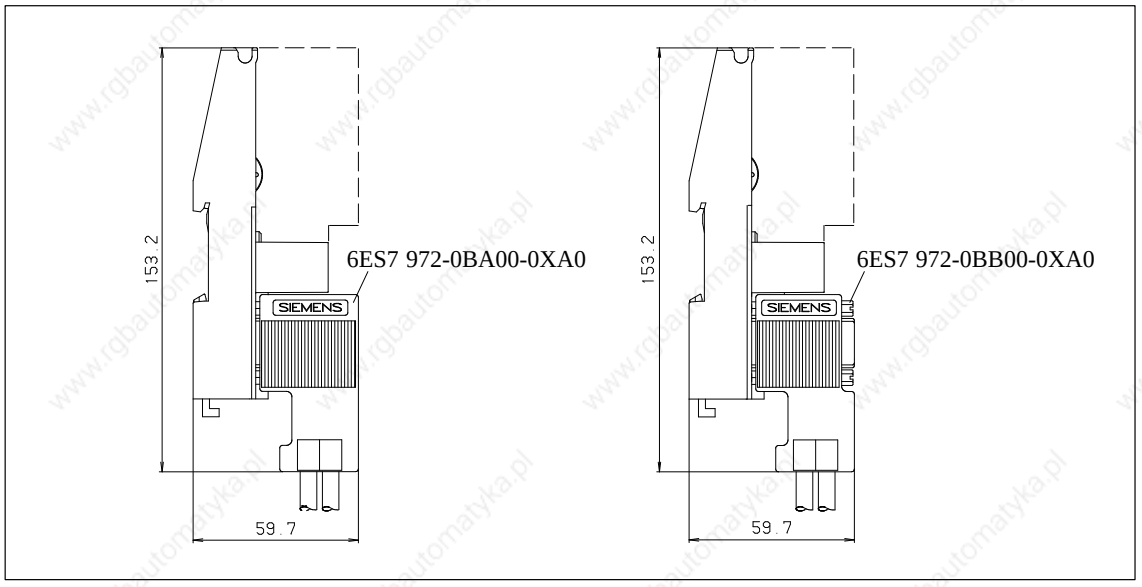


Figure 8-4 Dimension Drawing: Side Elevation of Terminal Blocks, TB1/DC, TB1-4/DC and TB3/DC with SINEC L2 Bus Connector (6ES7 972-0BA00-0XA0 and 6ES7 972-0BB00-0XA0)

Dimension Drawing TB with Bus Connector (6ES5 ...)

Dimension drawing: Side elevation TB1/DC, TB1-4/DC or TB3/DC with SINEC L2 bus connector (6ES5 ...)

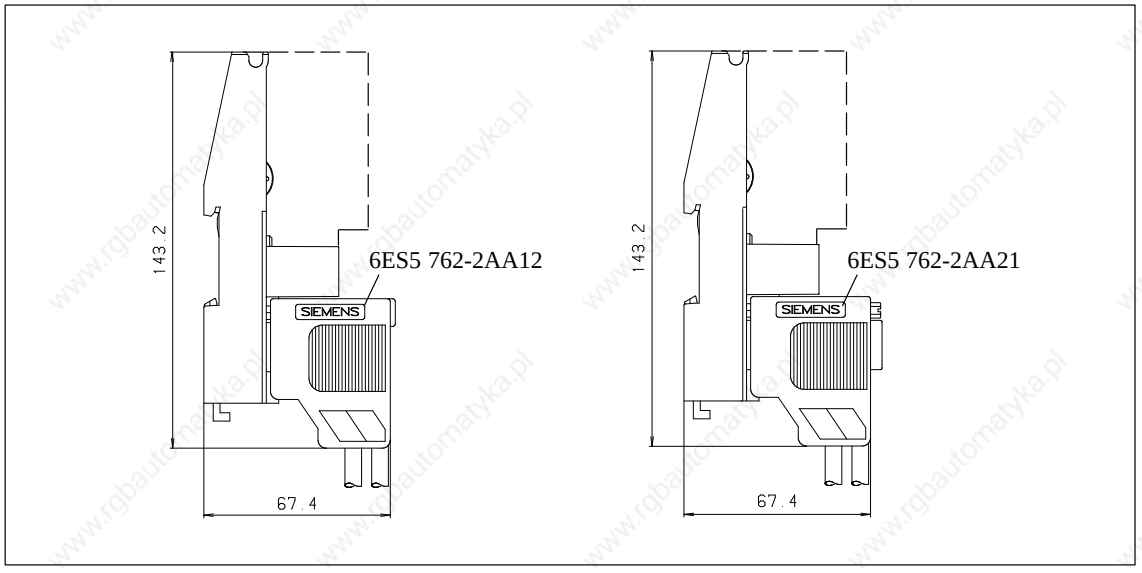


Figure 8-5 Dimension Drawing: Side Elevation of Terminal Blocks TB1/DC, TB1-4/DC and TB3/DC with SINEC L2 Bus Connector (6ES5 762-2AA12 and 6ES5 762-2AA21)

8.1.2 Terminal Blocks TB2/DC (6ES7 193-0CB10-0XA0), TB2-4/DC (6ES7 193-0CB20-0XA0) and TB4/DC (6ES7 193-0CB30-0XA0)

Dimension Drawing TB2/DC

Dimension Drawing: Terminal Block TB2/DC (screw-type terminal, 3-tier)

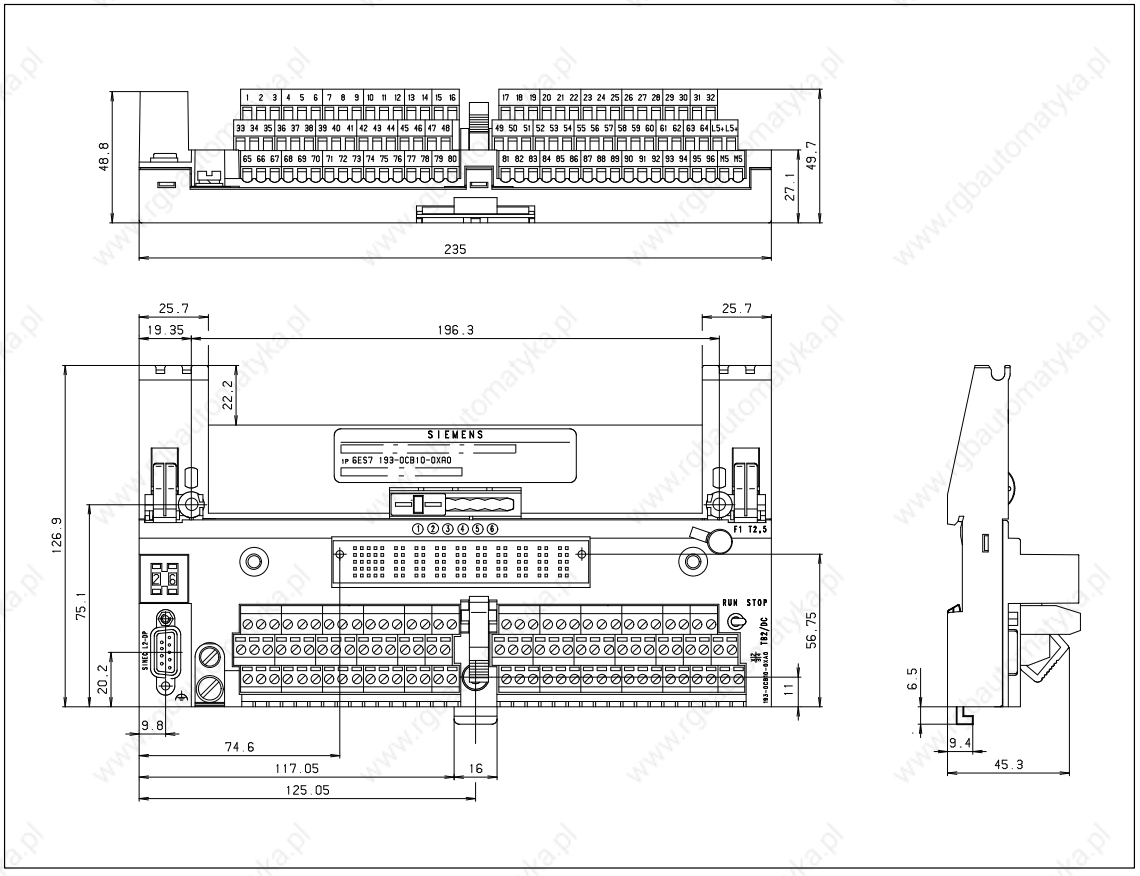


Figure 8-6 Dimension Drawing: Terminal Block TB2/DC (screw-type terminal, 3-tier)

Dimension Drawing TB2–4/DC

Dimension Drawing: Terminal Block TB2-4/DC (screw-type terminal, 4-tier)

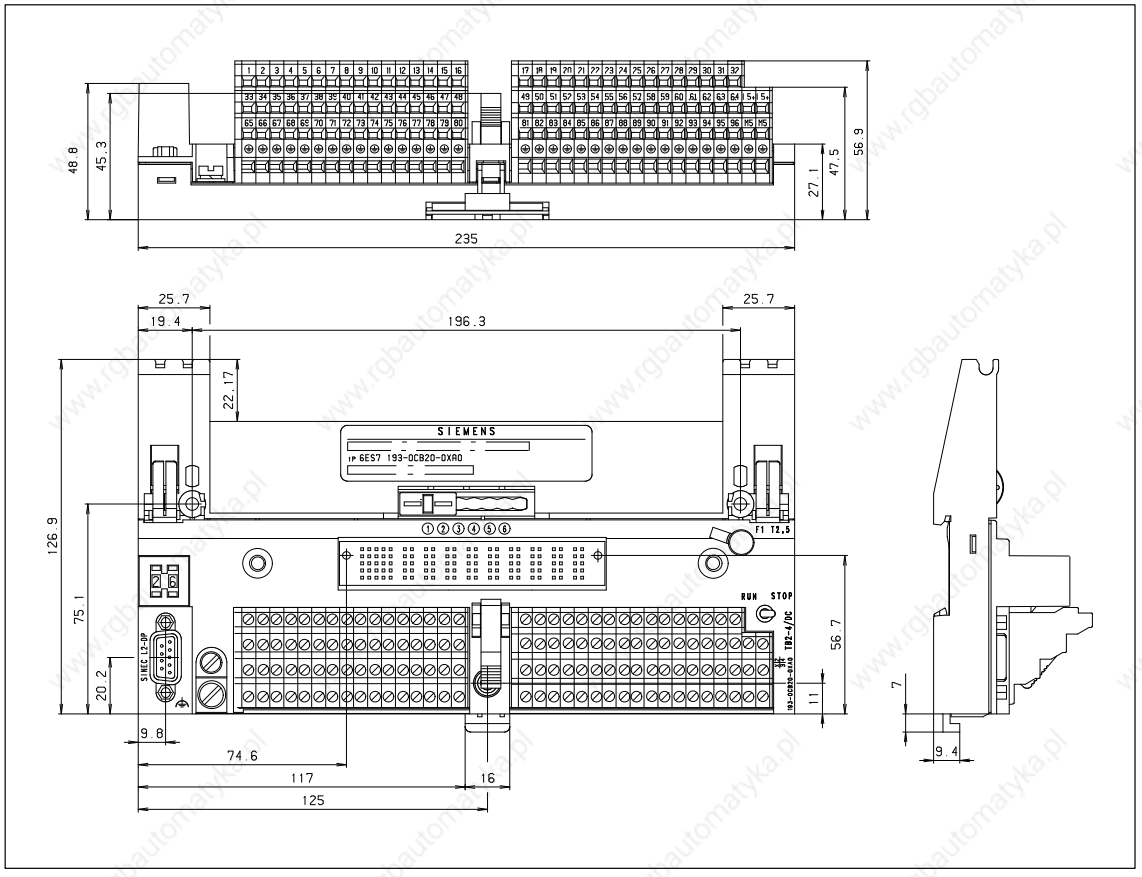


Figure 8-7 Dimension Drawing: Terminal Block TB2-4/DC (screw-type terminal, 4-tier)

Terminal Blocks TB2/DC (6ES7 193-0CB10-0XA0), TB2-4/DC (6ES7 193-0CB20-0XA0) and TB4/DC (6ES7 193-0CB30-0XA0), continued

Dimension Drawing TB4/DC

Dimension Drawing: TB4/DC (Spring-loaded terminal)

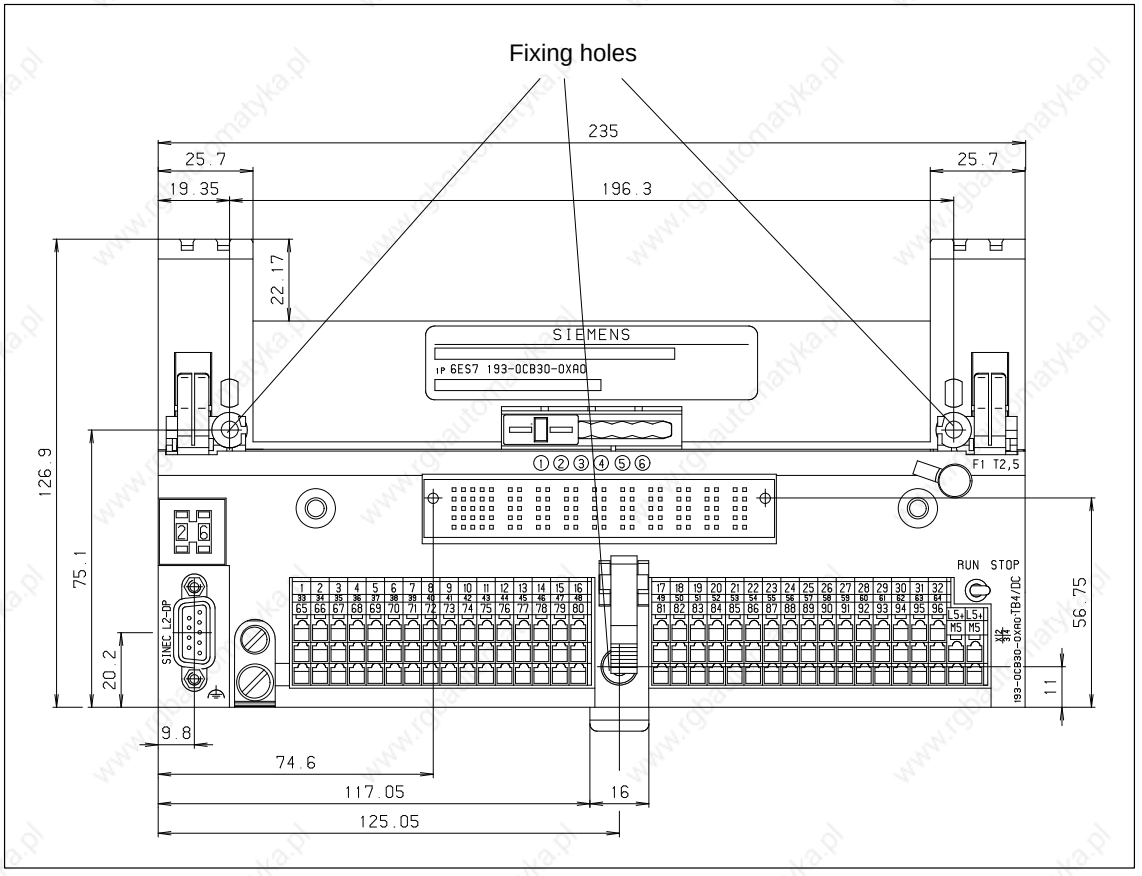


Figure 8-8 Dimension Drawing: TB4/DC (Spring-loaded terminal)

Dimension Drawing TB with Bus Connector (6ES7 ...)

Dimension drawing: Side elevation TB2/DC, TB2-4/DC or TB4/DC with SINEC L2 bus connector (6ES7 ...)

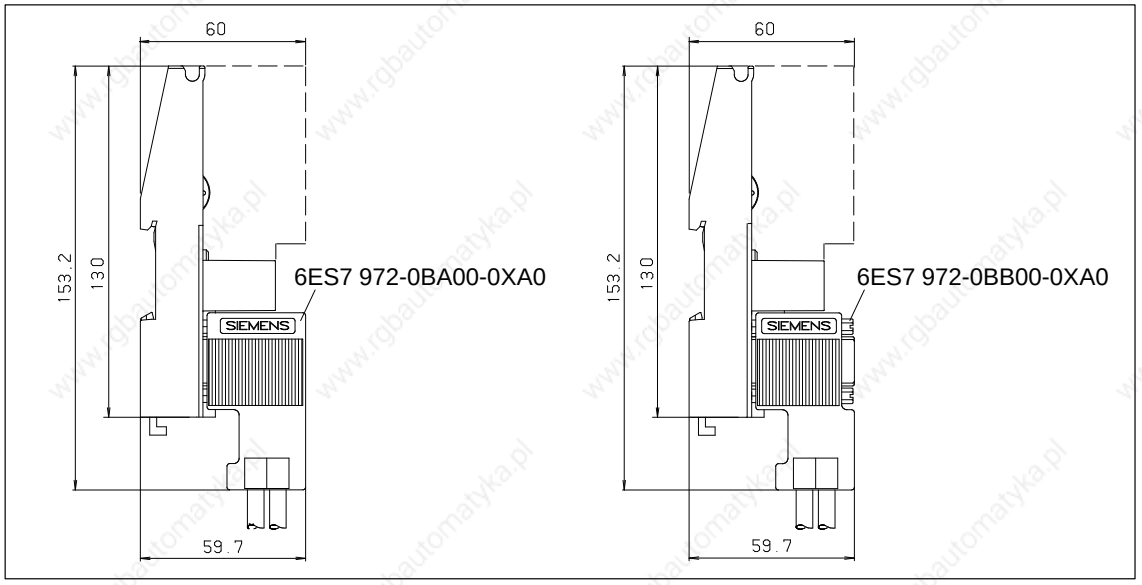


Figure 8-9 Dimension Drawing: Side Elevation of Terminal Blocks TB2/DC, TB2-4/DC and TB4/DC with SINEC L2 Bus Connector (6ES7 972-0BA00-0XA0 and 6ES7 972-0BB00-0XA0)

Dimension Drawing TB with Bus Connector (6ES5 ...)

Dimension drawing: Side elevation TB2/DC, TB2-4/DC or TB4/DC with SINEC L2 bus connector (6ES5 ...)

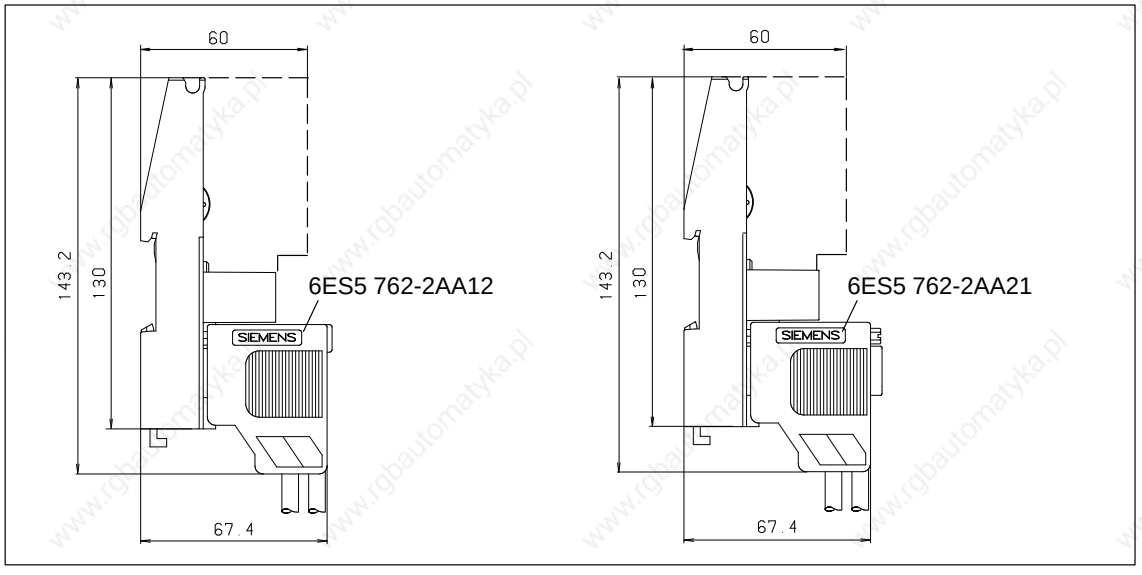


Figure 8-10 Dimension Drawing: Side Elevation of Terminal Blocks TB2/DC, TB2-4/DC and TB4/DC with SINEC L2 Bus Connector (6ES5 762-2AA12 and 6ES5 762-2AA21)

8.1.3 Terminal Block TB6/AC (6ES7 193-0CC10-0XA0)

Dimension Drawing TB6/AC Dimension Drawing: Terminal Block TB6/AC (screw-type terminal, 3-tier)

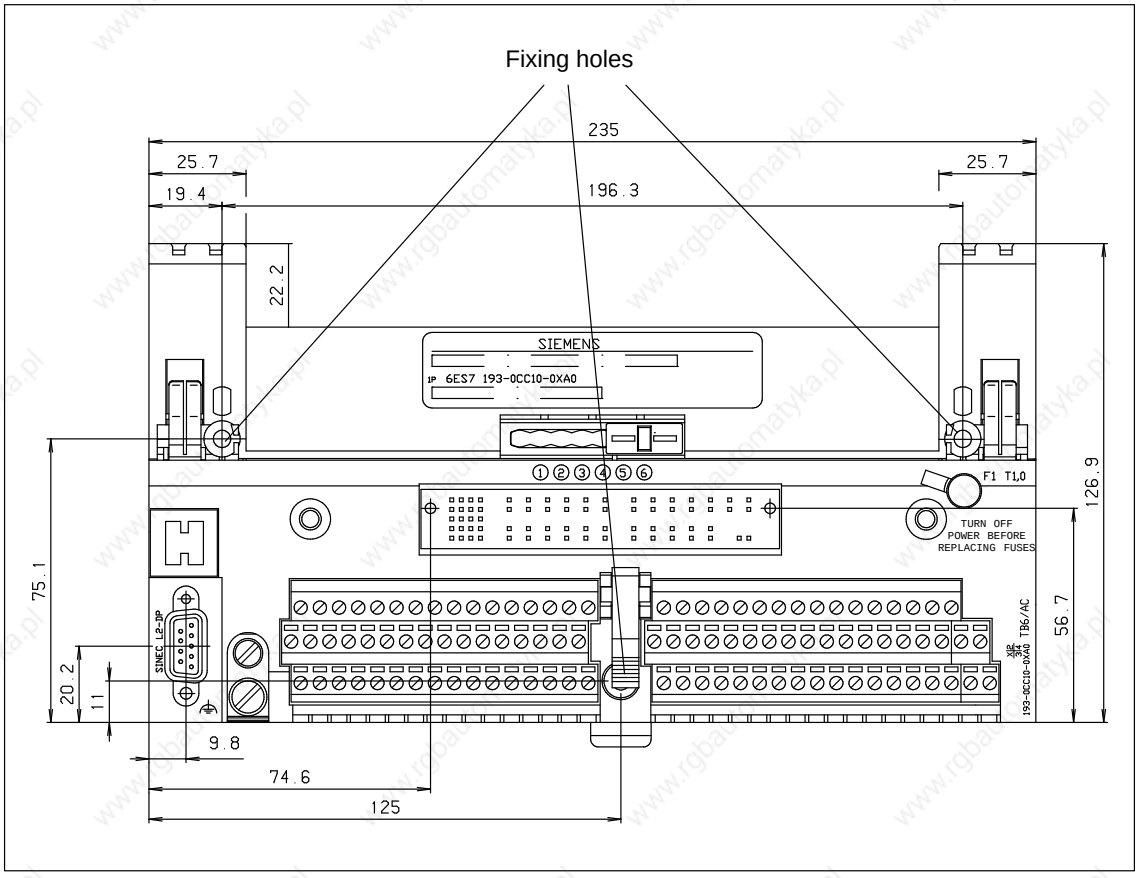


Figure 8-11 Dimension Drawing: Terminal Block TB6/AC (screw-type terminal, 3-tier)

Dimension Drawing TB6/AC with Bus Connector (6ES7 ...)

Dimension drawing: Side elevation TB6/AC with SINEC L2 bus connector

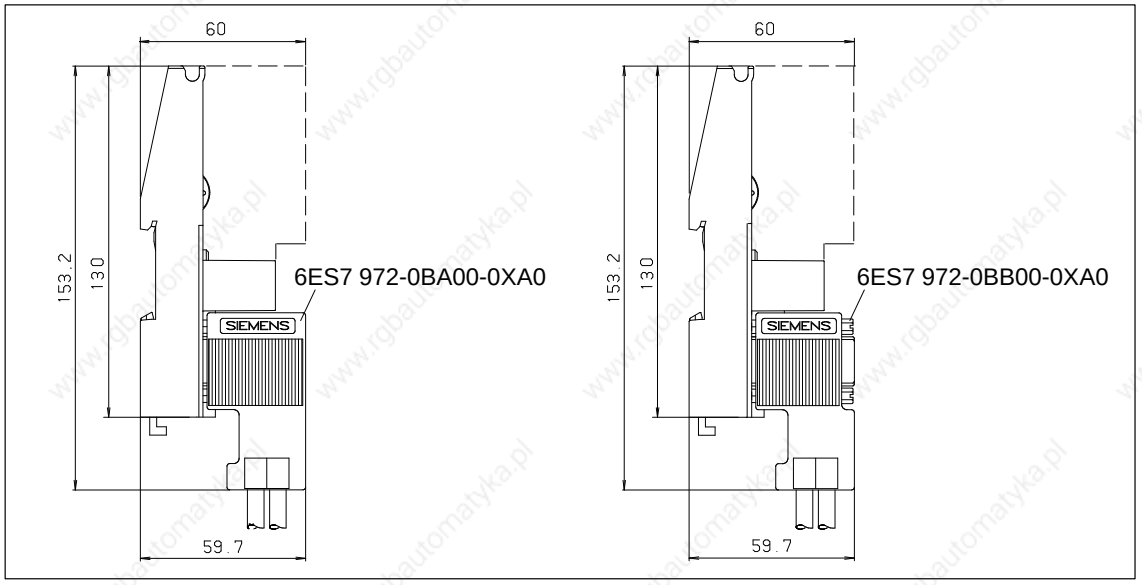


Figure 8-12 Dimension Drawing: Side Elevation of Terminal Block TB6/AC with SINEC L2 Bus Connector (6ES7 972-0BA00-0XA0 and 6ES7 972-0BB00-0XA0)

Dimension Drawing TB6/AC with Bus Connector (6ES5 ...)

Dimension drawing: Side elevation TB6/AC with SINEC L2 bus connector

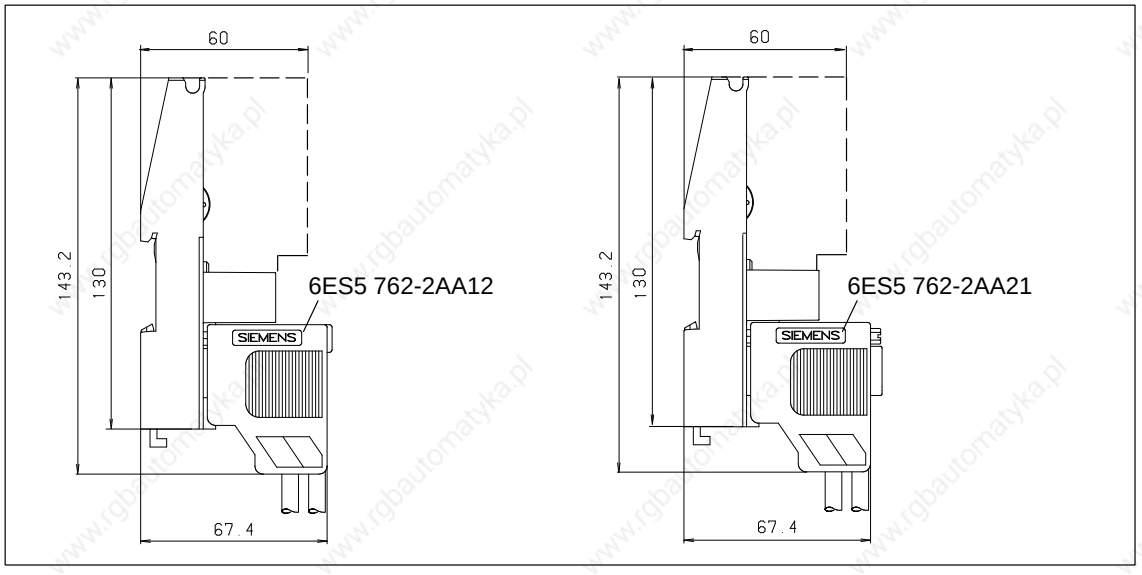


Figure 8-13 Dimension Drawing: Side Elevation of Terminal Block TB6/AC with SINEC L2 Bus Connector (6ES5 762-2AA12 and 6ES5 762-2AA21)

8.1.4 Electronics Block ET 200B-16DI (6ES7 131-0BH00-0XB0)

Characteristics

The ET 200B 16DI electronics block has the following features

- 16 inputs, non-floating
- Input voltage: 24 V DC
- Suitable for switches and 2/3-wire proximity switches (BEROs).

Dimension Drawing

Dimension drawing for ET 200B-16DI:

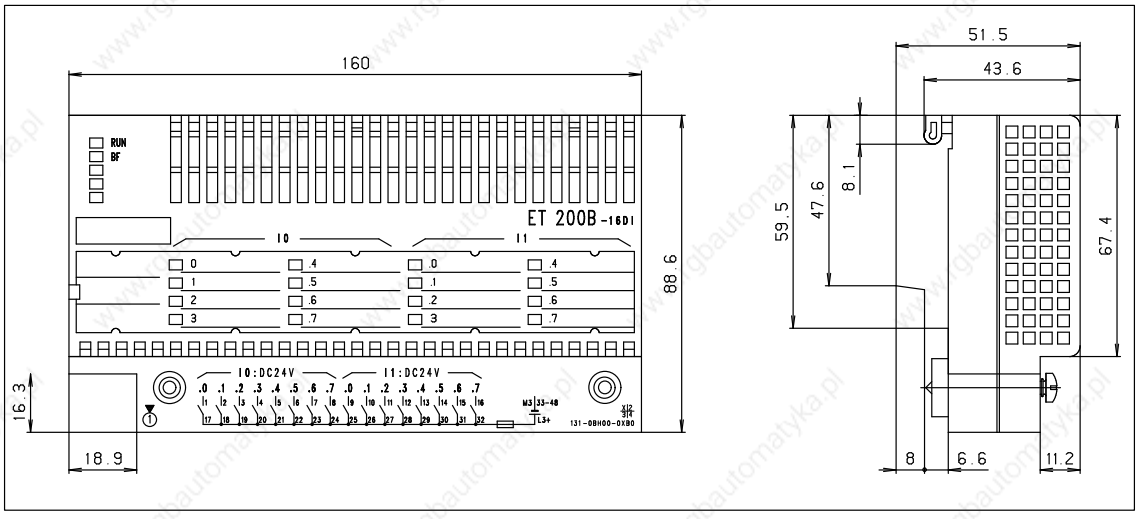


Figure 8-14 Dimension Drawing: ET 200B-16DI (6ES7 131-0BH00-0XB0)

Schematic Circuit Diagram Simplified diagram of potential for the ET 200B-16DI and TB1/DC or TB3/DC:

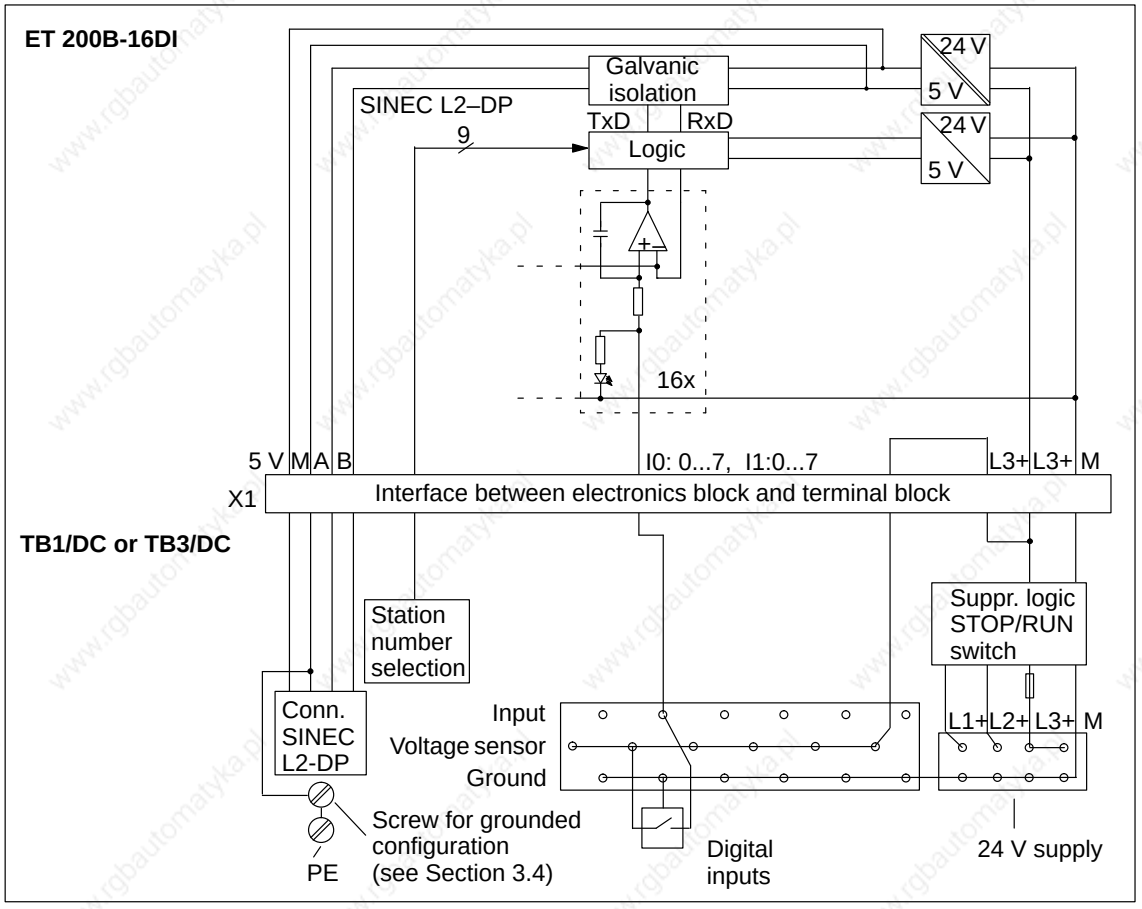


Figure 8-15 Schematic Circuit Diagram: ET 200B-16DI (6ES7 131-0BH00-0XB0) and TB1/DC or TB3/DC

Electronics Block ET 200B-16DI (6ES7 131-0BH00-0XB0), continued

Schematic Circuit Diagram

Simplified diagram of the potential for the ET 200B-16DI and TB1-4/DC:

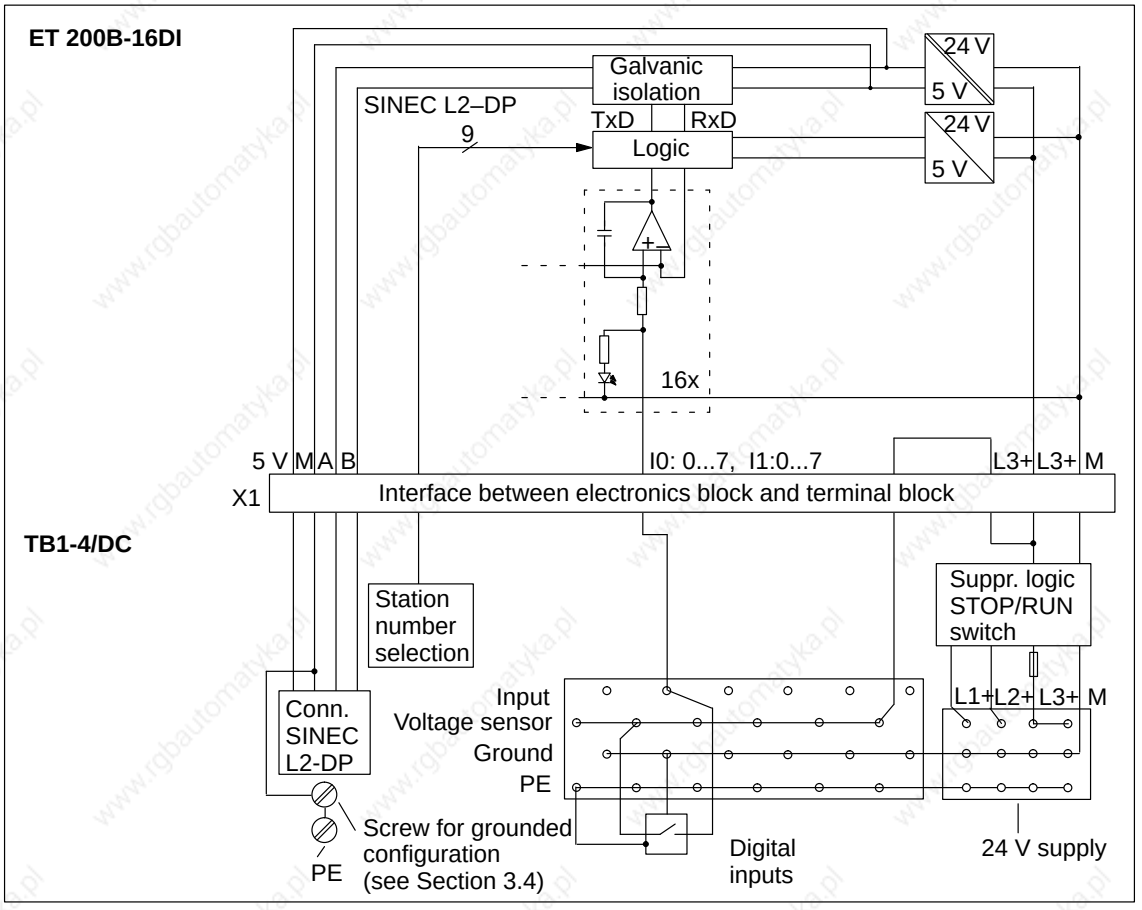


Figure 8-16 Schematic Circuit Diagram: ET 200B-16DI (6ES7 131-0BH00-0XB0) and TB1-4/DC

Note

The connection terminals for PE on the 4-tier terminal block are not connected to the PE terminal of the TB1-4/DC terminal block.

Terminal Assignments

The ET 200B-16DI can be plugged into the TB1/DC, TB1-4/DC or TB3/DC.

Table 8-3 contains the terminal assignments of the terminal blocks for the ET 200B-16DI:

Table 8-3 Terminal Assignments of Terminal Blocks TB1/DC, TB2-4/DC and TB3/DC for the ET 200B-16DI (6ES7 131-0BH00-0XB0)

Terminal	Assignment
1 to 8	I0: Inputs .0 to .7
9 to 16	I1: Inputs .0 to .7
17 to 32	24 V (sensor supply, internally jumpered)
33 to 48	Ground (sensor supply, internally jumpered)
20 terminals ⏚ (TB1-4/DC only)	PE (internally jumpered, but not connected to PE screw) (TB1-4/DC only)
L1+	Unassigned
L2+	Unassigned
L3+	Power supply of the internal logic **and** 24 V sensor supply
L3+	Power supply of the internal logic **and** 24 V sensor supply
M1	Unassigned
M2	Unassigned
M3	Ground connection of the internal logic **and** sensor supply
M3	Ground connection of the internal logic **and** sensor supply

Note

L3+ and terminals 17 to 32 are connected to each other, as are M1, M2, M3 and terminals 33 to 48.

Electronics Block ET 200B-16DI (6ES7 131-0BH00-0XB0), Continued

Technical specifications	
Baud rates	9.6/19.2/93.75/187.5/500/ 1500/3000*/6000*/ 12000* kbps
Bus protocol	DP standard
FREEZE cabability	Yes+
Galvanic isolation to SINEC L2-DP	Yes
Power losses	Typ. 2.5 W
Weight (EB and TB)	Approx. 600 g (21 oz.)
Dimensions (EB and TB: W × H × D)	160 × 130 × 60 mm (6.24 x 5.07 x 2.34 in.)
Diagnostics functions	
Voltage monitoring	Green “RUN” LED
Bus monitoring SINEC L2-DP	Red “BF” LED
Status of inputs	Green LEDs
Supply voltage for inputs, sensor supply and internal logic	
Supply voltage (L3+)	
• Rated value	24 V DC
• Permissible range	18.5 to 30.2 V
• Value for t < 0.5 s	35 V
Current consumption from L3+	
• Logic	Typ. 70 mA
• Sensors	Max. 500 mA
I^2t (for inrush current)	≤ 0.05 A^2s

Inputs	
Number of inputs	16
Galvanic isolation to internal electronic circuits	No
Input voltage	
• Rated value	24 V DC
• For “0” signal	– 30 V to 5 V
• For “1” signal	13 V to 30 V
Input current for “1” signal	Typ. 4 mA at 24 V Min. 2 mA
Delay of inputs	2.0 to 3.5 ms
Connection of 2–wire BERO	Possible
• Quiescent current	≤ 1.5 mA
Connection of mechanical switches	Possible
Wire lengths of the sensors	
• Unshielded	Max. 100 m (328 ft.)

* Only relevant when operating with the IM 308-C.

8.1.5 Electronics Blocks ET 200B-32DI (6ES7 131-0BL00-0XB0) and ET 200B-32DI 0.2ms (6ES7 131-0BL10-0XB0)

Characteristics

The ET 200B-32DI and ET 200B-32DI 0.2ms electronics blocks have the following features:

- 32 inputs, non-floating
- Input voltage: 24 V DC
- Input delay:

  6ES7 131-0BL00-0XB0 → 3 ms

  6ES7 131-0BL10-0XB0 → 0.2 ms
- Suitable for switches and 2/3-wire proximity switches (BEROs).

Dimension Drawing

Dimension drawing for ET 200B-32DI (6ES7 131-0BL00-0XB0) and ET 200B-32DI 0.2ms (6ES7 131-0BL10-0XB0):

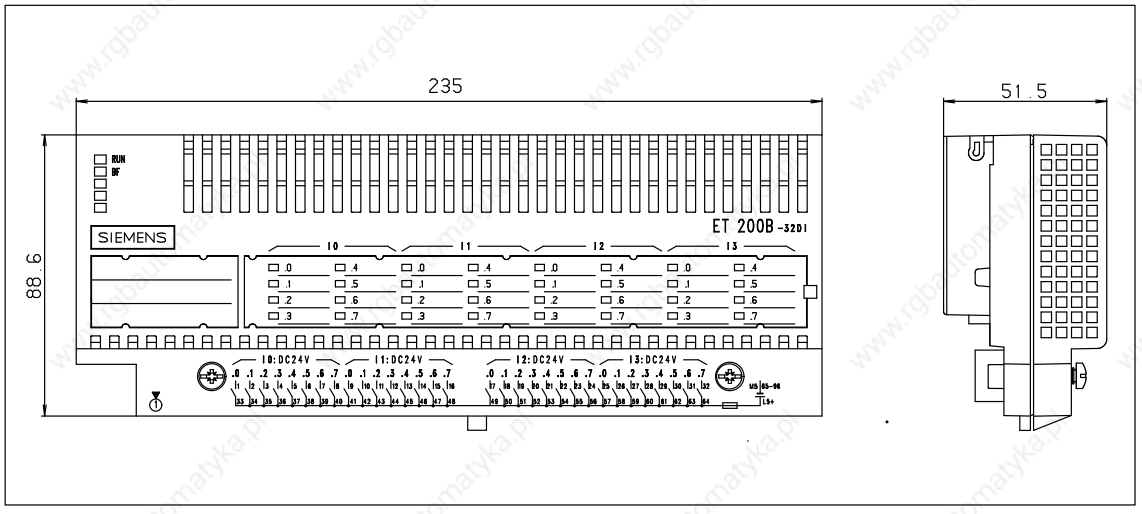


Figure 8-17 Dimension Drawing: ET 200B-32DI (6ES7 131-0BL00-0XB0) and ET 200B-32DI 0.2ms (6ES7 131-0BL10-0XB0)

Electronics Blocks ET 200B-32DI (6ES7 131-0BL00-0XB0) and ET 200B-32DI 0.2ms (6ES7 131-0BL10-0XB0)

Schematic Circuit Diagram

Simplified diagram of potential for the ET 200B-32DI or ET 200B-32DI 0.2 ms and TB2/DC or TB4/DC:

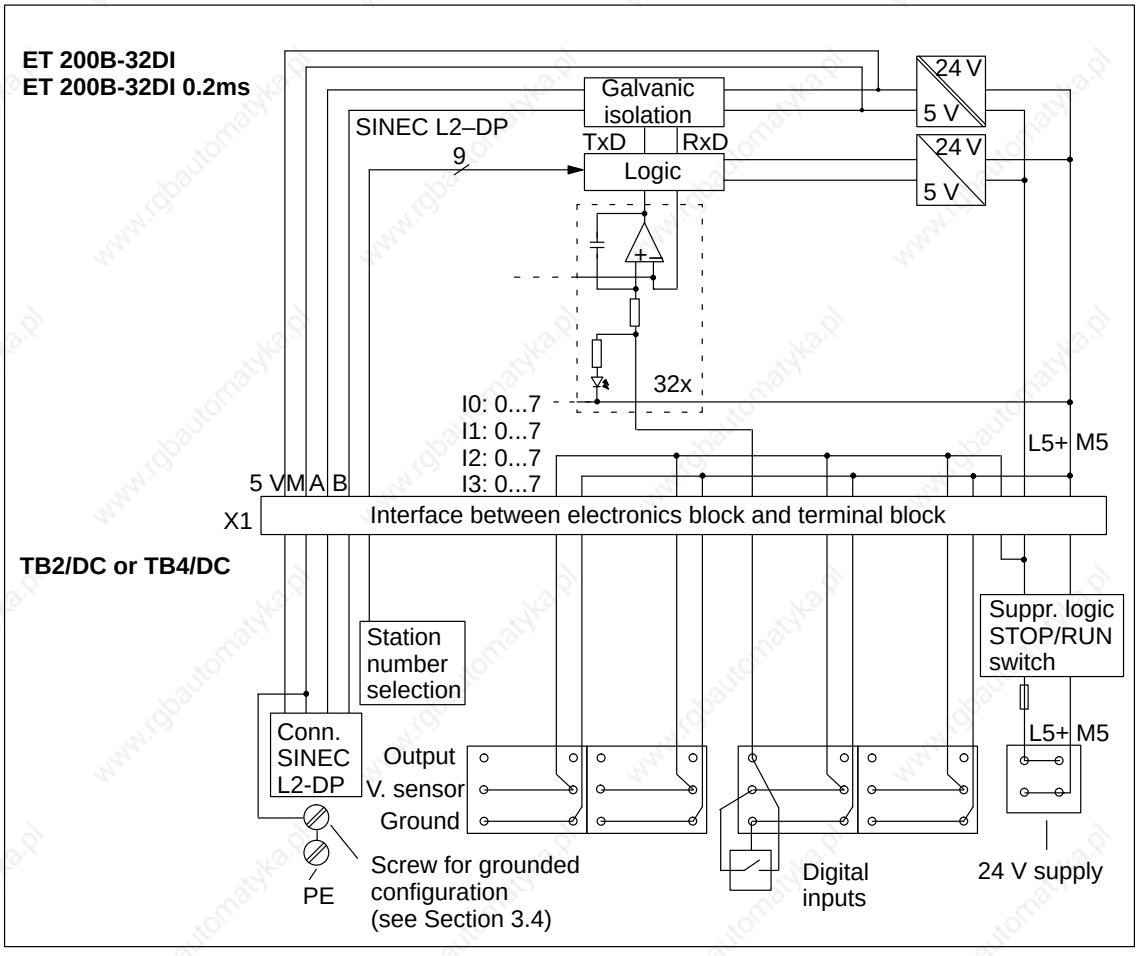


Figure 8-18 Schematic Circuit Diagram: ET 200B-32DI (6ES7 131-0BL00-0XB0) or ET 200B-32DI 0.2ms (6ES7 131-0BL10-0XB0) and TB2/DC or TB4/DC

Schematic Circuit Diagram

Simplified diagram of the potential for the ET 200B-32DI or ET 200B-32DI 0.2 ms and TB2-4/DC:

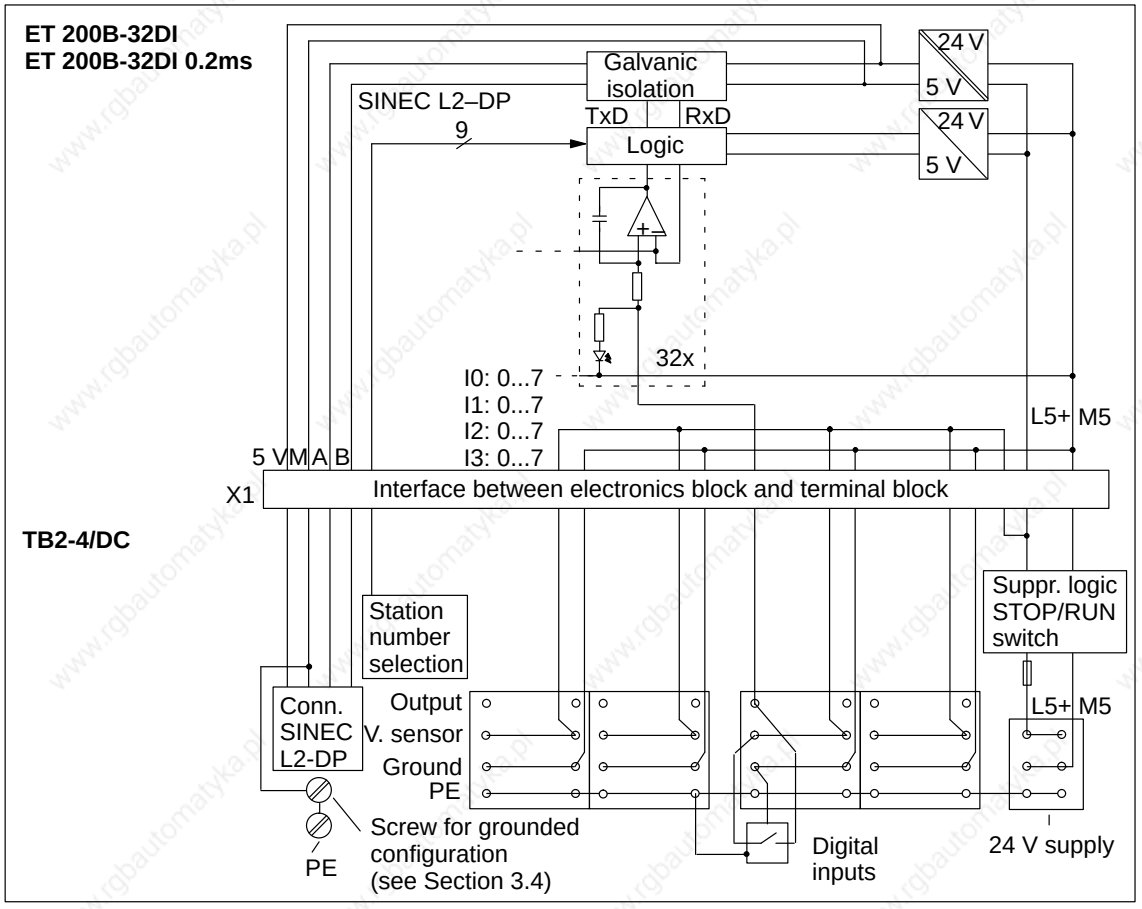


Figure 8-19 Schematic Circuit Diagram: ET 200B-32DI (6ES7 131-0BL00-0XB0) or ET 200B-32DI 0.2 ms (6ES7 131-0BL10-0XB0) and TB2-4/DC

Note

The connection terminals for PE on the 4-tier terminal block are not connected to the PE terminal of the TB2-4/DC terminal block.

Electronics Blocks ET 200B-32DI (6ES7 131-0BL00-0XB0) and ET 200B-32DI 0.2ms (6ES7 131-0BL10-0XB0), continued

Terminal Assignments

The ET 200B-32DI and ET 200B-32DI 0.2 ms can be plugged into the TB2/DC, TB2-4/DC or TB4/DC.

Table 8-4 contains the terminal assignments of the terminal blocks for the ET 200B-32DI and ET 200B-32DI 0.2 ms:

Table 8-4 Terminal Assignments of Terminal Blocks TB2/DC, TB2-4/DC and TB4/DC8-22 for ET 200B-32DI (6ES7 131-0BL00-0XB0) and ET 200B-32DI 0.2ms (6ES7 131-0BL10-0XB0)

Terminal	Assignment
1 to 8	I0: Inputs .0 to .7
9 to 16	I1: Inputs .0 to .7
17 to 24	I2: Inputs .0 to .7
25 to 32	I3: Inputs .0 to .7
33 to 64	24 V (sensor supply, internally jumpered)
65 to 96	Ground (sensor supply, internally jumpered)
34 terminals: ⏚ (TB2-4/DC only)	PE (internally jumpered, but not connected to PE screw) (TB2-4/DC only)
L5+	Power supply of the internal logic **and** 24 V sensor supply
L5+	Power supply of the internal logic **and** 24 V sensor supply
M5	Ground connection of the internal logic **and** sensor supply
M5	Ground connection of the internal logic **and** sensor supply

Note

L5+ and terminals 33 to 64 are connected to each other, as are M5 and terminals 65 to 96.

Technical specifications	
Baud rates for 6ES7 131-0BL10-0XB0 and 6ES7 131-0BL00-0BL0	9.6/19.2/93.75/187.5/500/ 1500/3000*/6000*/ 12000* kbps
Bus protocol for 6ES7 131-0BL10-0XB0 and 6ES7 131-0BL00-0XB0	DP Standard
FREEZE capability for 6ES7 131-0BL10-0XB0 and 6ES7 131-0BL00-0XB0	Yes*
Galvanic isolation to SINEC L2-DP	Yes
Power losses	Typ. 4.8 W
Weight (EB and TB)	Approx. 800 g (28 oz.)
Dimensions (EB and TB: W x H x D)	235 x 130 x 60 mm (9.17 x 5.07 x 2.34 in.)
Diagnostics functions	
Voltage monitoring	Green “RUN” LED
Bus monitoring SINEC L2-DP	Red “BF” LED
Status of inputs	Green LEDs
Supply voltage for inputs, sensor supply and internal logic	
Supply logic (L5+)	
• Rated value	24 V DC
• Permissible range	18.5 to 30.2 V
• Value for t < 0.5 s	35 V
Current consumption from L5+	
• Logic	Typ. 70 mA
• Sensors	Max. 1 A
I^2t (for inrush current)	$\leq$ 0.05 A^2s

Inputs	
Number of inputs	32
Galvanic isolation to internal electronic circuits	No
Input voltage	
• Rated value	24 V DC
• For “0” signal	– 30 V to 5 V
• For “1” signal	13 V to 30 V
Input current for “1” signal	Typ. 4 mA for 24 V Min. 2 mA
Delay of inputs for 6ES7 131-0BL00-0XB0	3 ms
Delay of inputs for 6ES7 131-0BL10-0XB0	0.2 ms
Connection of 2-wire BERO	Possible
• Quiescent current	$\leq$ 1.5 mA
Connection of mechanical switches	Possible
Cable length of sensors	
• Unshielded	Max. 100 m (328 ft.)

* Only relevant when operating with the IM 308-C.

8.1.6 Electronics Block ET 200B-16DO (6ES7 132-0BH00-0XB0)

Characteristics

The ET 200B-16DO electronics block has the following features:

- 16 outputs, non-floating
- Load voltage: 24 V DC
- Output current: 0.5 A/2 A
- Suitable for solenoid valves and DC contactors.

Dimension Drawing

See Figure 8-14 for the precise dimensions.

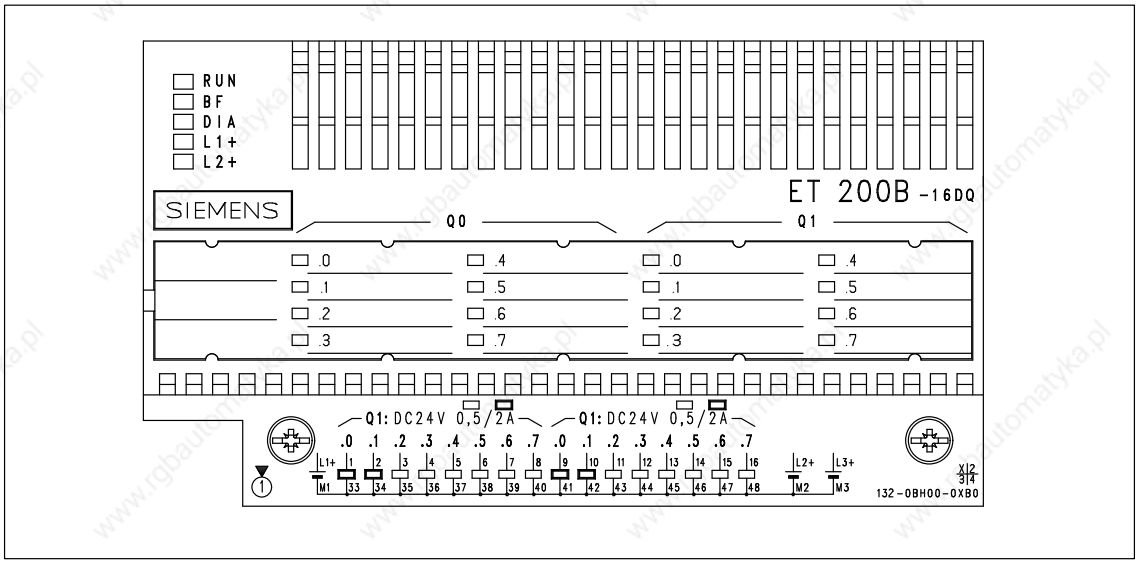


Figure 8-20 Front Elevation: ET 200B-16DO (6ES7 132-0BH00-0XB0)

Schematic Circuit Diagram Simplified diagram of potential for the ET 200B-16DO and TB1/DC or TB3/DC:

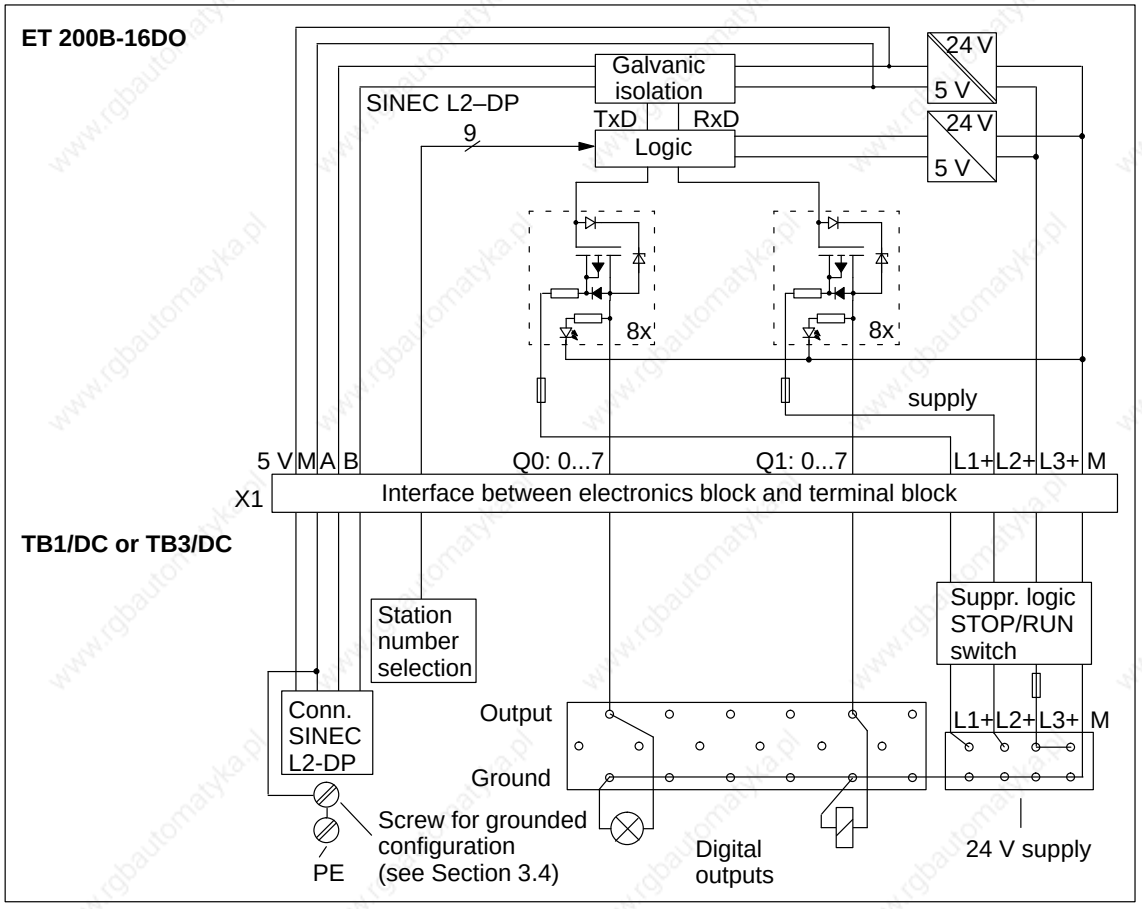


Figure 8-21 Schematic Circuit Diagram: ET 200B-16DO (6ES7 132-0BH00-0XB0) and TB1/DC or TB3/DC

Electronics Block ET 200B-16DO (6ES7 132-0BH00-0XB0), continued

Schematic Circuit Diagram

Simplified diagram of the potential for the ET 200B-16DO and TB1-4/DC:

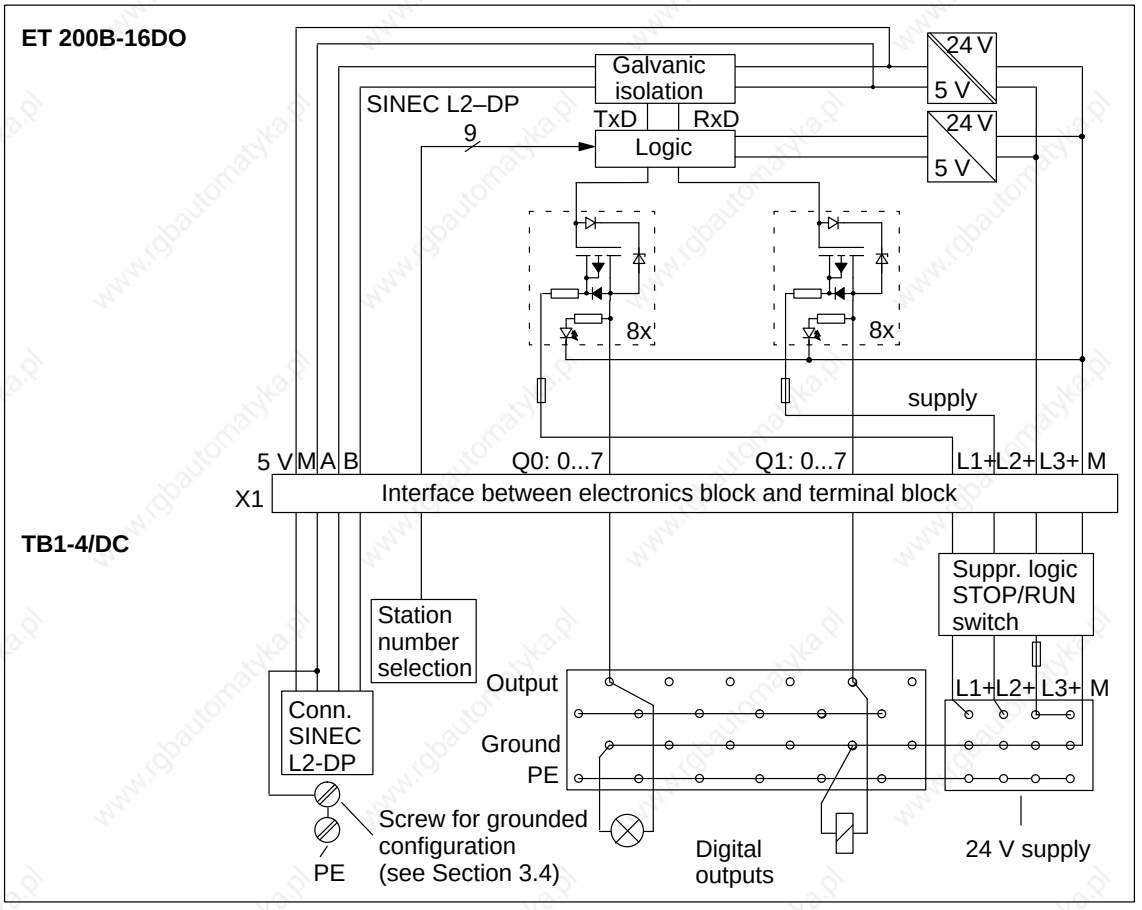


Figure 8-22 Schematic Circuit Diagram: ET 200B-16DO (6ES7 132-0BH00-0XB0) and TB1-4/DC

Note

The connection terminals for PE on the 4-tier terminal block are not connected to the PE terminal of the TB1-4/DC terminal block.

Terminal Assignments

The ET 200B-16DO can be plugged into the TB1/DC, TB1-4/DC or TB3/DC.

Table 8-5 contains the terminal assignments of the terminal blocks for the ET 200B-16DO:

Table 8-5 Terminal Assignments of Terminal Blocks TB1/DC, TB1-4/DC and TB3/DC for ET 200B-16DO (6ES7 132-0BH00-0XB0)

Terminal	Assignment
1 to 8	Q0: Outputs .0 to .7
9 to 16	Q1: Outputs .0 to .7
17 to 32	Unassigned
33 to 48	Ground (internally jumpered)
20 terminals: ⏚ (TB1-4/DC only)	PE (internally jumpered, but not connectd to PE screw) (TB1-4/DC only)
L1+	Power supply L1+ for channel group Q0: .0 to .7
L2+	Power supply L2+ for channel group Q1: .0 to .7
L3+	Power supply for the internal logic
L3+	Power supply for the internal logic
M1	Ground connection M1 for channel group Q0: .0 to .7
M2	Ground connection M2 for channel group Q1: .0 to .7
M3	Ground connection of internal logic
M3	Ground connection of internal logic

Note

L1+, L2+ and L3+ are **not** connected to each other.

M1, M2, M3 and terminals 33 to 48 are connected to each other internally.

Electronics Block ET200B-16DO (6ES7 132-0BH00-0XB0), continued

Technical specifications	
Baud rates	9.6/19.2/93.75/187.5/500/ 1500/3000*/6000*/ 12000* kbps
Bus protocol	DP standard
SYNC capability	Yes*
Galvanic isolation to SINEC L2-DP bus	Yes
Power losses	Max. 5 W
Weight (EB and TB)	Approx. 600 g (21 oz.)
Dimensions (EB and TB: W x H x D)	160 x 130 x 60 mm (6.24 x 5.07 x 2.34 in.)
Diagnostics functions	
Voltage monitoring	Green “RUN” LED
Bus monitoring SINEC L2-DP	Red “BF” LED
Group diagnostics for short-circuit, load voltage failure	Red “DIA ”LED
Load voltage monitoring, by group	Green “L1+”, “L2+” LEDs
Status of outputs	Green LEDs
Supply voltage for outputs, load voltage supply and internal logic	
Supply voltages (L1+,L2+,L3+)	
• Rated value	24 V DC
• Permissible range	18.5 to 30.2 V
• Value for t < 0.5 s	35 V
Current consumption from L3+	
• Logic	80 mA
I^2t (for inrush current)	$\leq 0.05\ A^2s$
Short-circuit protection in case of polarity reversal (L1+ and L2+) of load voltage	No

Outputs	
Number of outputs	16
Galvanic isolation	No
• In groups of	8
Output voltage	
• For “0” signal	Max. 2 V (idle)
• For “1” signal	Min. (supply voltage – 3 V)
Output voltage	
• For “0” signal	Max. 1 mA
• For “1” signal	Max. 2 A (2 outputs per group; .0 and .1) Max. 0.5 A (6 outputs per group; .2 to .7)
Delay of outputs	Max. 1 ms
• At max. lamp load	Max. 80 ms
Switching frequency	
• Resistive load	Max. 100 Hz
• Inductive load	Max. 0.5 Hz
• Lamp load	Max. 8 Hz
Load current per group	
• Total current	Max. 4 A
• In case of short-circuit	Max. 6.5 A
Lamp load	
• At I = 0.5 A	Max. 5 W
• At I = 2 A	Max. 10 W
Setting a digital input	Possible
Limitation of voltage induced on current interruption	Typ. (L5+) –55 V

* Only relevant when operating with the IM 308-C.

8.1.7 Electronics Block ET 200B-16DO/2A (6ES7 132-0BH10-0XB0)

Characteristics

The ET 200B-16DO/2A electronics block has the following features:

- 16 outputs, floating in groups of 4
- Load voltage: 24 V DC
- Output current: 2 A

Dimension Drawing

See Figure 8-17 for the precise dimensions.

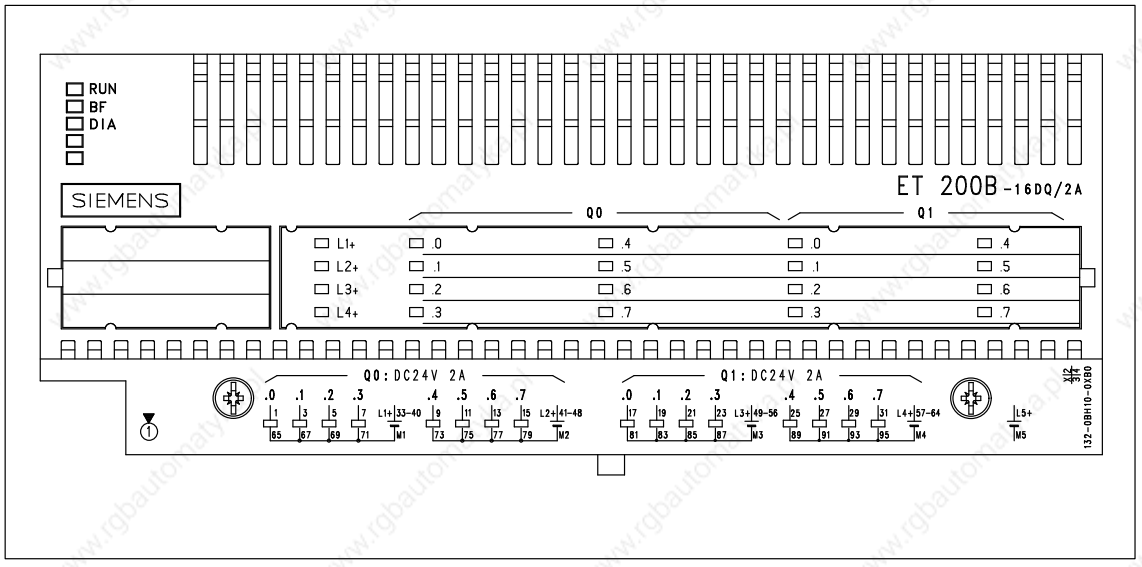


Figure 8-23 Front Elevation: ET 200B-16DO/2A (6ES7 132-0BH10-0XB0)

Electronics Block ET 200B-16DO/2A (6ES7 132-0BH10-0XB0), continued

Schematic Circuit Diagram

Simplified diagram of the potential for the ET 200B-16DO/2A and TB2/DC or TB4/DC:

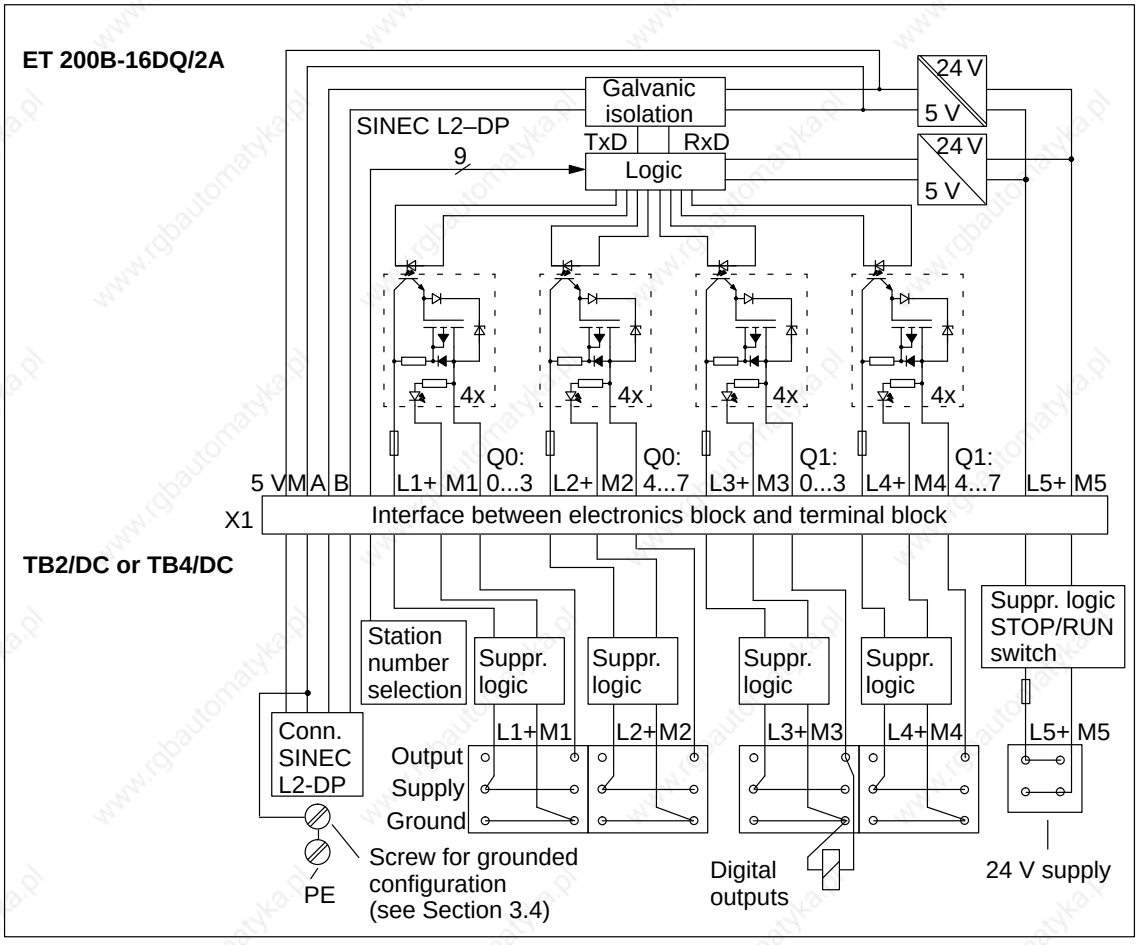


Figure 8-24 Schematic Circuit Diagram: ET 200B-16DO/2A (6ES7 132-0BH10-0XB0) and TB2/DC or TB4/DC

Schematic Circuit Diagram

Simplified diagram of the potential for the ET 200B-16DO/2A and TB2-4/DC:

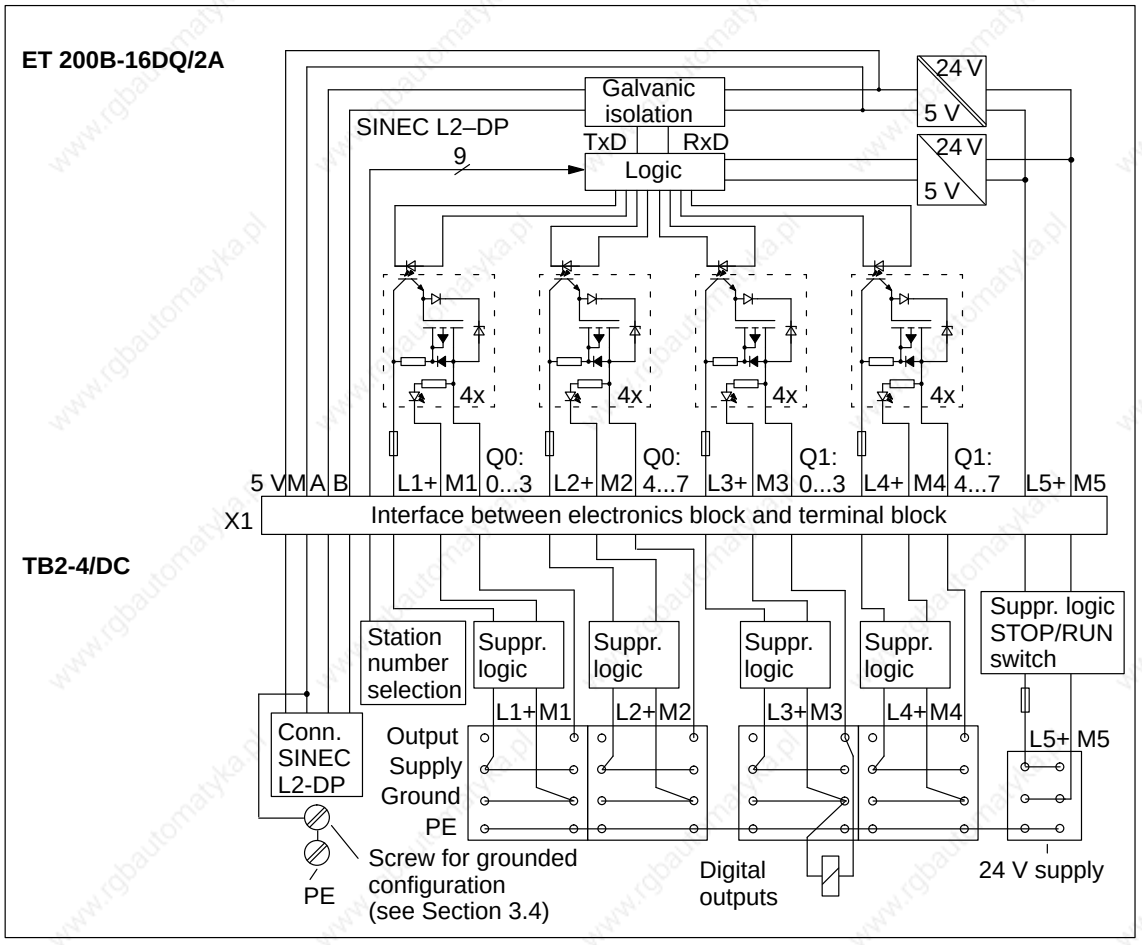


Figure 8-25 Schematic Circuit Diagram: ET 200B-16DO/2A (6ES7 132-0BH10-0XB0) and TB2-4/DC

Note

The connection terminals for PE on the 4-tier terminal block are not connected to the PE terminal of the TB2-4/DC terminal block.

Electronics Block ET 200B-16DO/2A (6ES7 132-0BH10-0XB0), continued

Terminal Assignments

The ET 200B-16DO/2A can be plugged into the TB2/DC, TB2-4/DC or TB4/DC.

Table 8-6 contains the terminal assignments of the terminal blocks for the ET 200B-16DO/2A:

Table 8-6 Terminal Assignments of Terminal Blocks TB2/DC, TB2-4/DC and TB4/DC for ET 200B-16DO/2A (6ES7 132-0BH10-0XB0)

Terminal [1]	Assignment
1, 3, 5 to 15	Q0: Outputs .0 to .7
17, 19, 21 to 31	Q1: Outputs .0 to .7
33 to 40	Power supply L1+ for channel group Q0: .0 to .3 (internally jumpered)
41 to 48	Power supply L2+ for channel group Q0: .4 to .7 (internally jumpered)
49 to 56	Power supply L3+ for channel group Q1: .0 to .3 (internally jumpered)
57 to 64	Power supply L4+ for channel group Q1: .4 to .7 (internally jumpered)
65 to 72	Ground M1 for channel group Q0: .0 to .3 (internally jumpered)
73 to 80	Ground M2 for channel group Q0: .4 to .7 (internally jumpered)
81 to 88	Ground M3 for channel group Q1: .0 to .3 (internally jumpered)
89 to 96	Ground M4 for channel group Q1: .4 to .7 (internally jumpered)
34 terminals: ⏚ (TB2-4/DC only)	PE (internally jumpered, but not connected to PE screw) (TB2-4/DC only)
L5+	Power supply of the internal logic
L5+	Power supply of the internal logic
M5	Ground connection of the internal logic
M5	Ground connection of the internal logic

[1] Terminals 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32 are unassigned.

Note

If all actuators have 2-wire connections to TB2/DC or TB4/DC, terminate for each group the ground connection of one actuator and the incoming reference potential line via a terminal pin in accordance with DIN 46231.

L1+ to L5+ and M1 to M5 are not connected to each other internally.

Technical specifications	
Baud rates	9.6/19.2/93.75/187.5/500/ 1500/3000*/6000*/ 12000* kbps
Bus protocol	DP standard
SYNC capability	Yes*
Galvanic isolation to SINEC L2-DP bus	Yes
Power losses	Max. 7 W
Weight (EB and TB)	Approx. 900 g (31.5 oz.)
Dimensions (EB and TB: W x H x D)	235 x 130 x 60 mm (9.17 x 5.07 x 2.34 in.)
Diagnostics functions	
Voltage monitoring	Green "RUN" LED
Bus monitoring SINEC L2-DP	Red "BF" LED
Group diagnostics for short-circuit, load voltage failure	Red "DIA" LED
Load voltage monitoring, by channel group (QO, Q1)	Green LEDs "L1+"/"L2+" (QO: .0 to 7) "L3+"/"L4+" (Q1: .0 to 7)
Status of outputs	Green LEDs
Supply voltage for outputs, load voltage supply and internal logic	
Supply voltage (L1+,L2+,L3+,L4+,L5+)	
• Rated value	24 V DC
• Permissible range	18.5 to 30.2 V
• Value at t < 0.5 s	35 V
Current consumption from L5+	
• Logic	100 mA
I^2t (for inrush current)	$\leq$ 0.05 A^2s
Short-circuit protection in case of polarity reversal (L1+,L2+,L3+,L4+) of load vloltage	No

Outputs	
Number of outputs	16
Galvanic isolation	Yes
• In groups of	4
Output voltage	
• For "0" signal	Max. 2 V (idle)
• For "1" signal	Min. (supply voltage – 3 V)
Output	
• For "0" signal	Max. 1 mA
• For "1" signal	Max. 2 A
Delay of outputs	Max. 1 ms
• At max. lamp load	Max. 80 ms
Switching frequency	
• Resistive load	Max. 100 Hz
• Inductive load	Max. 0.5 Hz
• Lamp load	Max. 8 Hz
Load current per group	
• Total current	Max. 4 A
• In case of short-circuit	Max. 6.5 A
Lamp load	Max. 10 W
Setting a digital input	Possible
Cable length	Max. 100 m (328 ft.)

* Only relevant when operating with the IM 308-C.

8.1.8 Electronics Block ET 200B-32DO (6ES7 132-0BL00-0XB0)

Characteristics

The ET 200B–32DO electronics block has the following features:

- 32 outputs, floating in groups of 8
- Load voltage: 24 V DC
- Output voltage: 0.5 A
- Suitable for solenoid valves and DC contactors

Dimension Drawing

See Figure 8-17 for the precise dimensions.

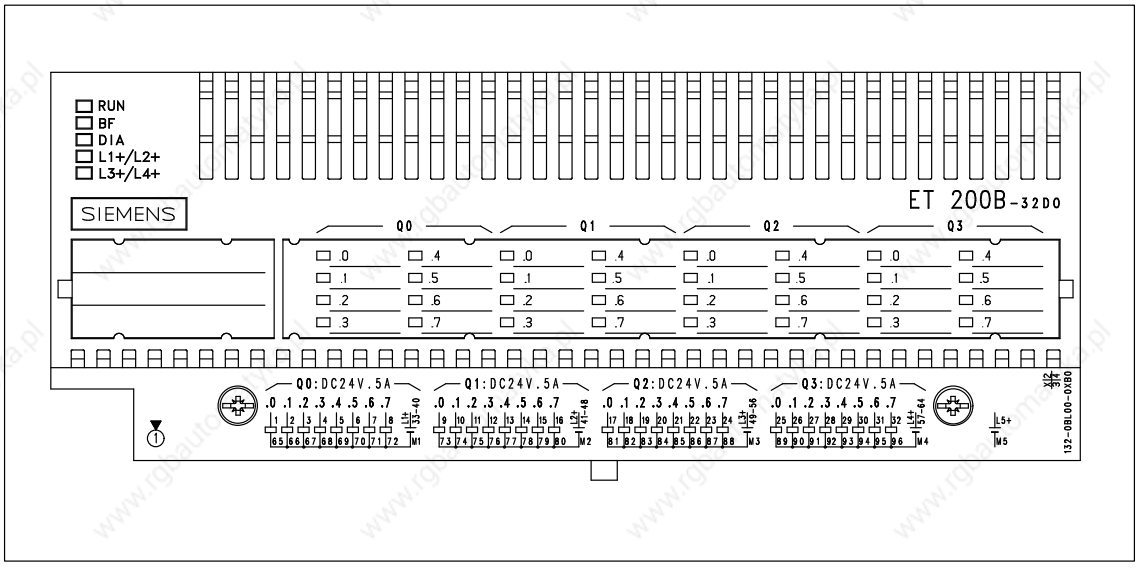


Figure 8-26 Front Elevation: ET 200B-32DO (6ES7 132-0BL00-0XB0)

Schematic Circuit Diagram Simplified diagram of potential for the ET 200B-32DO and TB2/DC or TB4/DC:

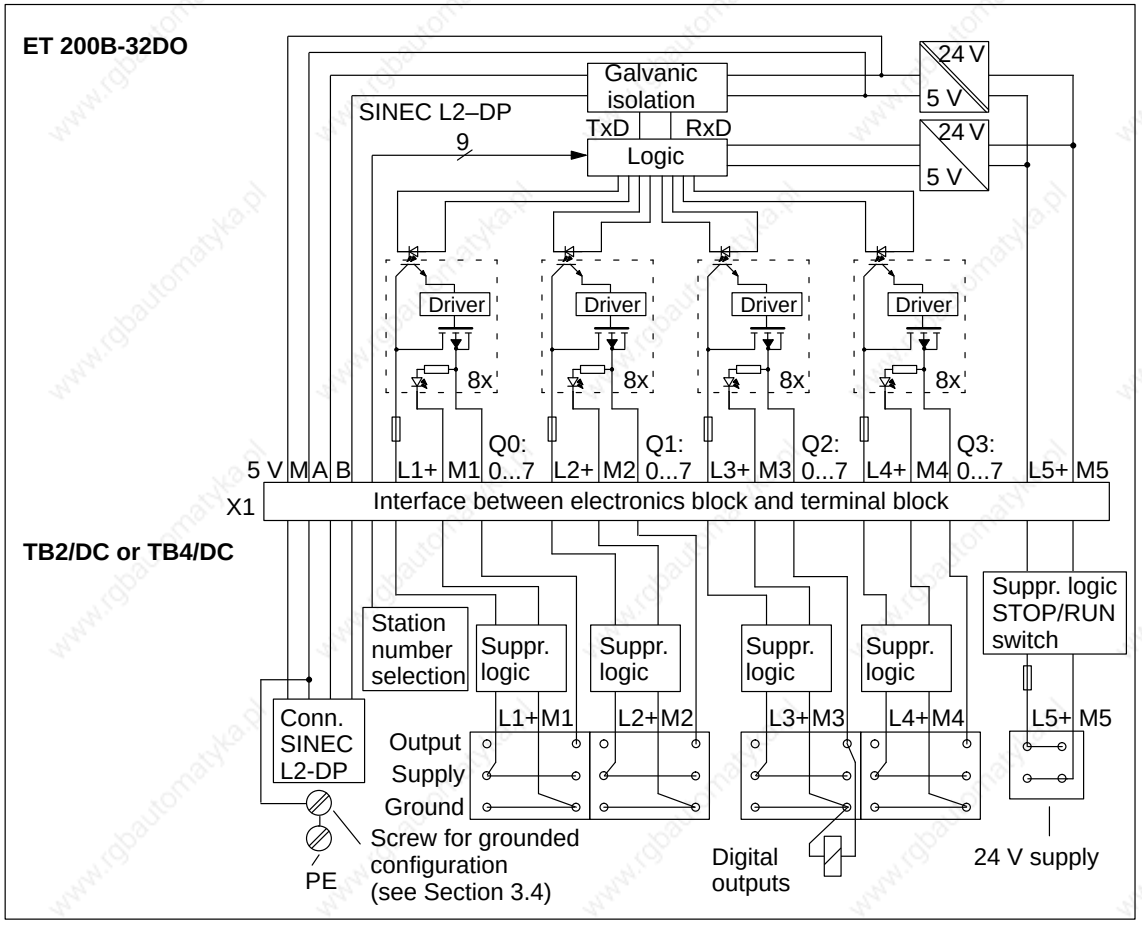


Figure 8-27 Schematic Circuit Diagram: ET 200-B-32DO (6ES7 132-0BL00-0BX0) and TB2/DC or TBA/DC

Electronics Block ET 200B-32DO (6ES7 132-0BL00-0XB0), continued

Schematic Circuit Diagram

Simplified diagram of the potential for the ET 200B-32DO and TB2-4/DC:

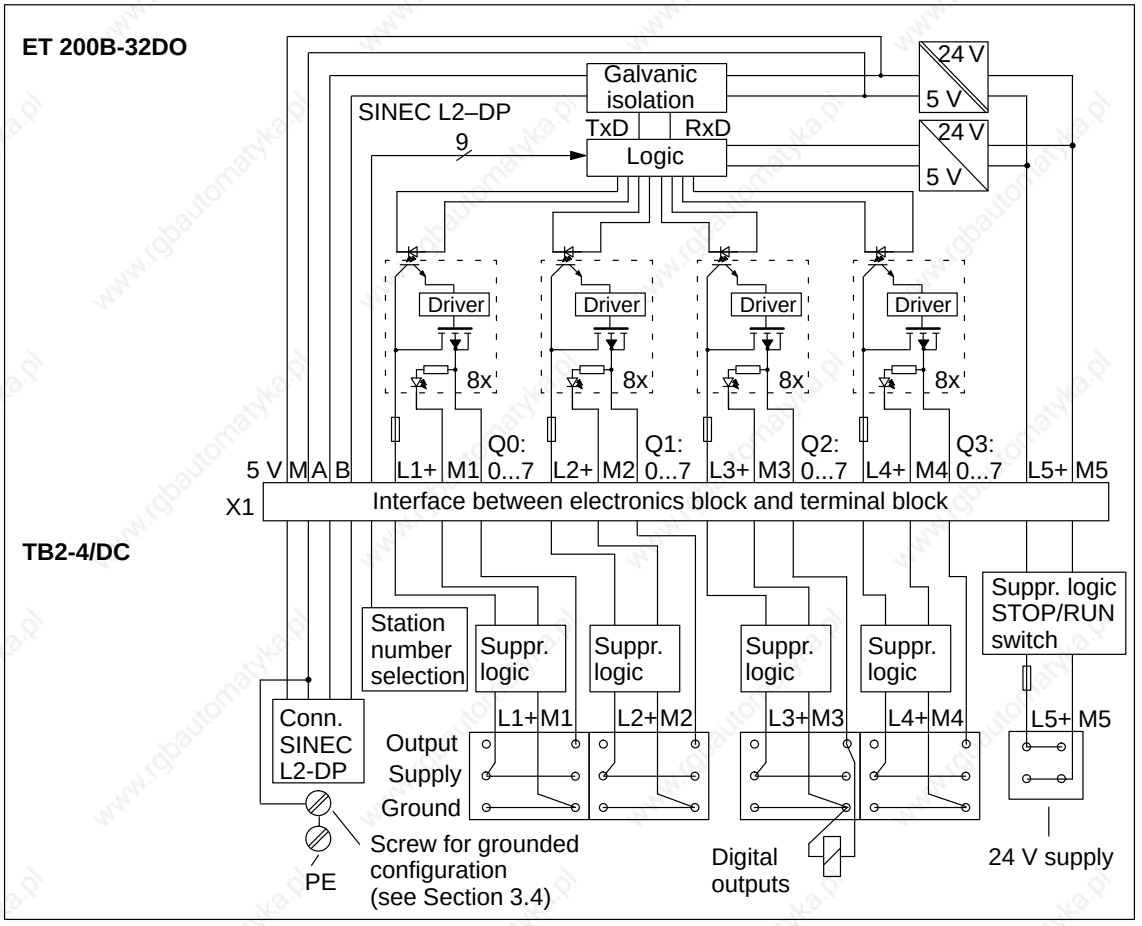


Figure 8-28 Schematic Circuit Diagram: ET 200B-32DO (6ES7 132-0BL00-0XB0) and TB2-4/DC

Note

The connection terminals for PE on the 4-tier terminal block are not connected to the PE terminal of the TB2-4/DC terminal block.

Terminal Assignments

The ET 200B-32DO can be plugged into the TB2/DC, TB2-4/DC or TB4/DC.

Table 8-7 contains the terminal assignments of the terminal blocks for the ET 200B-32DO:

Table 8-7 Terminal Assignments of Terminal Blocks TB2/DC, TB2-4/DC and TB4/DC for ET 200B-32DO (6ES7 132-0BL00-0XB0)

Terminal	Assignment
1 to 8	Q0: Outputs .0 to .7
9 to 16	Q1: Outputs .0 to .7
17 to 24	Q2: Outputs .0 to .7
25 to 32	Q3: Outputs .0 to .7
33 to 40	Power supply L1+ for channel group Q0: .0 to .7 (internally jumpered)
41 to 48	Power supply L2+ for channel group Q1: .0 to .7 (internally jumpered)
49 to 56	Power supply L3+ for channel group Q2: .0 to .7 (internally jumpered)
57 to 64	Power supply L4+ for channel group Q3: .0 to .7 (internally jumpered)
65 to 72	Ground M1 for channel group Q0: .0 to .7 (internally jumpered)
73 to 80	Ground M2 for channel group Q1: .0 to .7 (internally jumpered)
81 to 88	Ground M3 for channel group Q2: .0 to .7 (internally jumpered)
89 to 96	Ground M4 for channel group Q3: .0 to .7 (internally jumpered)
34 terminals: ⏚ (TB2-4/DC only)	PE (internally jumpered, but not connected to PE screw) (TB2-4/DC only)
L5+	Power supply of the internal logic
L5+	Power supply of the internal logic
M5	Ground connection of the internal logic
M5	Ground connection of the internal logic

Note

If all actuators have 2-wire connections to TB2/DC or TB4/DC, terminate for each group the ground connection of one actuator and the incoming reference potential line via a terminal pin in accordance with DIN 46231.

L1+ to L5+ and M1 to M5 are not connected to each other internally.

Electronics Block ET 200B-32DO (6ES7 132-0BL00-0XB0), continued

Technical specifications	
Baud rates	9.6/19.2/93.75/187.5/500/ 1500/3000*/6000*/ 12000* kbps
Bus protocol	DP Standard
SYNC capability	Yes*
Galvanic isolation to SINEC L2-DP bus	Yes
Power losses	Max. 7.9 W
Weight (EB and TB)	Approx. 800 g (28 oz.)
Dimensions (EB and TB: W x H x D)	235 x 130 x 60 mm (9.17 x 5.07 x 2.34 in.)
Diagnostics functions	
Voltage monitoring	Green "RUN "LED
Bus monitoring SINEC L2-DP	Red "BF" LED
Group diagnostics for short-circuit, load voltage failure	Red "DIA" LED
Load voltage monitoring	Green "L1+/L2+", "L3+/L4+" LEDs
Status of outputs	Green LEDs
Supply voltage for outputs, load voltage supply and internal logic	
Supply voltage (L1+,L2+,L3+,L4+,L5+)	
• Rated value	24 V DC
• Permissible range	18.5 to 30.2 V
• Value for t < 0.5 s	35 V
I^2t (for inrush current)	$\leq 0.05\ A^2s$
Current consumption from L5+	
• Logic	Typ. 75 mA

Outputs	
Number of outputs	32
Galvanic isolation	Yes
• In groups of	8
Output voltage	
• For "0" signal	Max. 2 V (idle)
• For "1" signal	Min. (supply voltage – 3 V)
Output current	
• For "0" signal	Max. 1 mA
• For "1" signal	Max. 0.5 A
Delay of outputs	
• From "0" to "1"	Approx. 20 µs
• From "1" to "0"	Max. 0.5 ms
Switching frequency	
• Resistive load	Max. 1000 Hz
• Inductive load	Max. 0.5 Hz
• Lamp load	Max. 8 Hz
Short-circuit protection	Yes
Load current per group	
• Total current	Max. 2 A
Lamp load	Max. 5 W
Setting a digital input	Possible
Limitation of voltage induced on current interruption	Typ. (L5+) – 55 V
Cable length	Max. 100 m (328 ft.)

* Only relevant when operating with the IM 308-C.

8.1.9 Electronics Block ET 200B-8RO (6ES7 132-0GF00-0XB0)

Characteristics

The ET 200B-8RO electronics block has the following features:

- 8 relay outputs, floating in groups of 1
- Switching voltage: 24 to 60 V DC

Dimension Drawing

See Figure 8-14 for the precise dimensions.

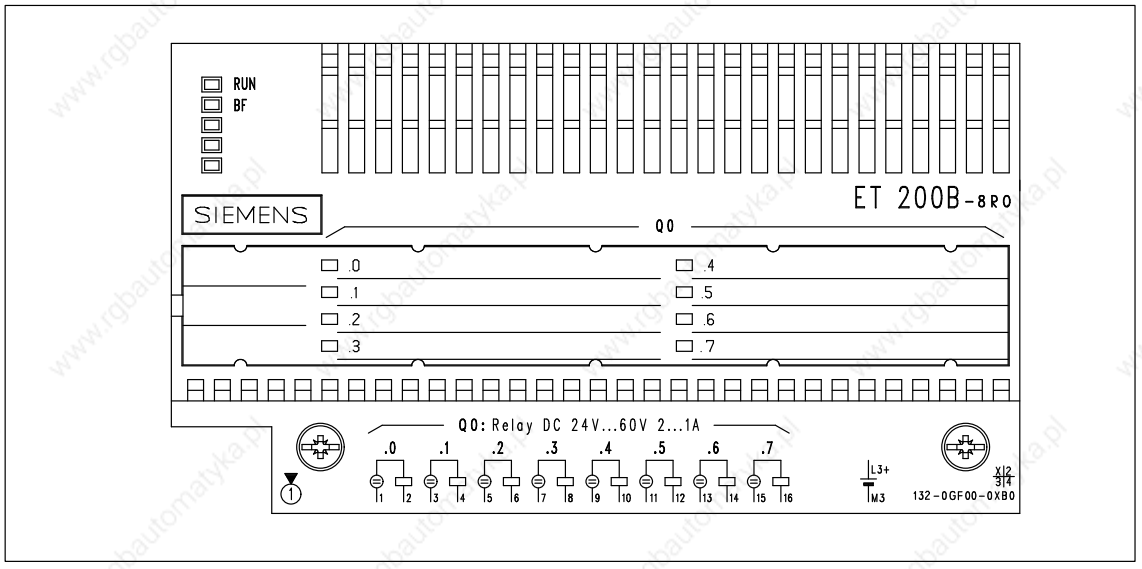


Figure 8-29 Front Elevation: ET 200B-8RO (6ES7 132-0GF00-0XB0)

Electronics Block ET 200B-8RO (6ES7 132-0GF00-0XB0), continued

Schematic Circuit Diagram

Simplified diagram of the potential for the ET 200B-8RO and TB1/DC or TB3/DC:

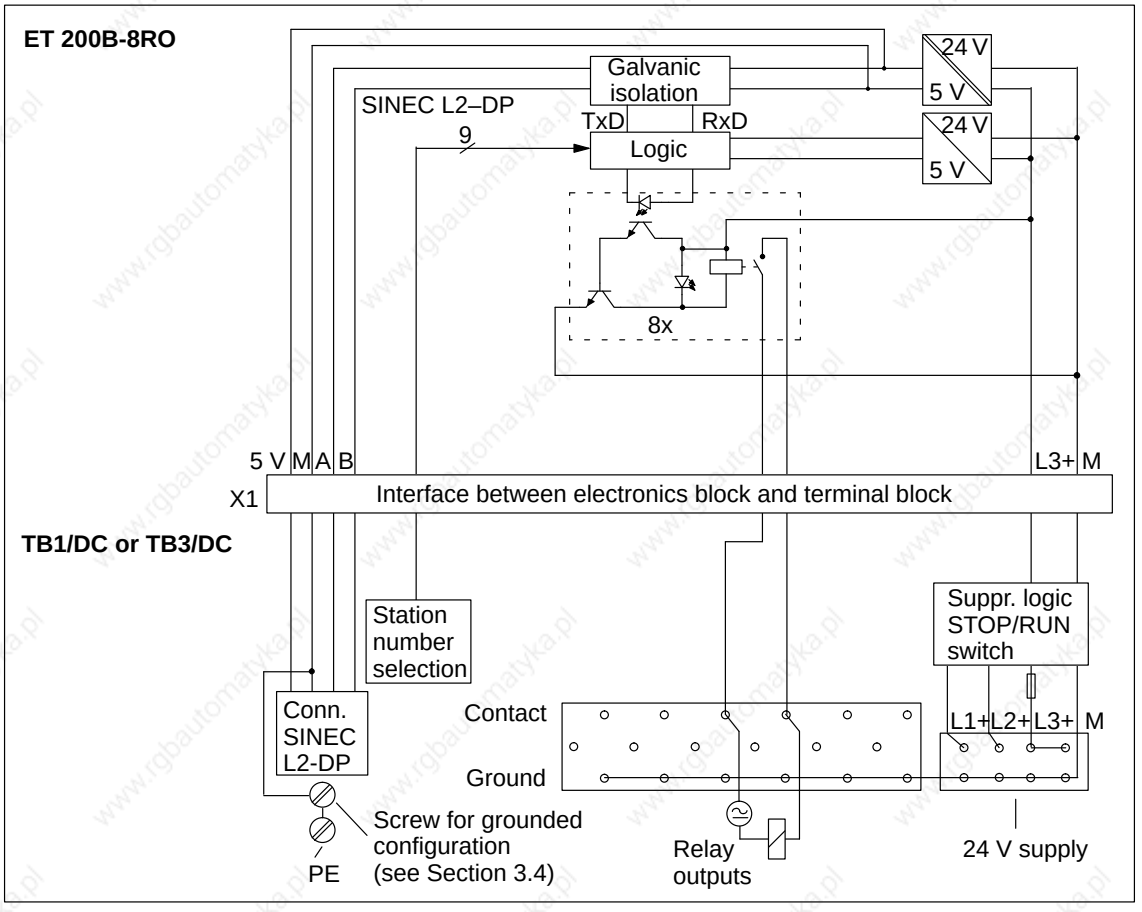


Figure 8-30 Schematic Circuit Diagram: ET 200B-8RO (6ES7 132-0GF00-0XB0) and TB1/DC or TB3/DC

Schematic Circuit Diagram

Simplified diagram of the potential for the ET 200B-8RO and TB1-4/DC:

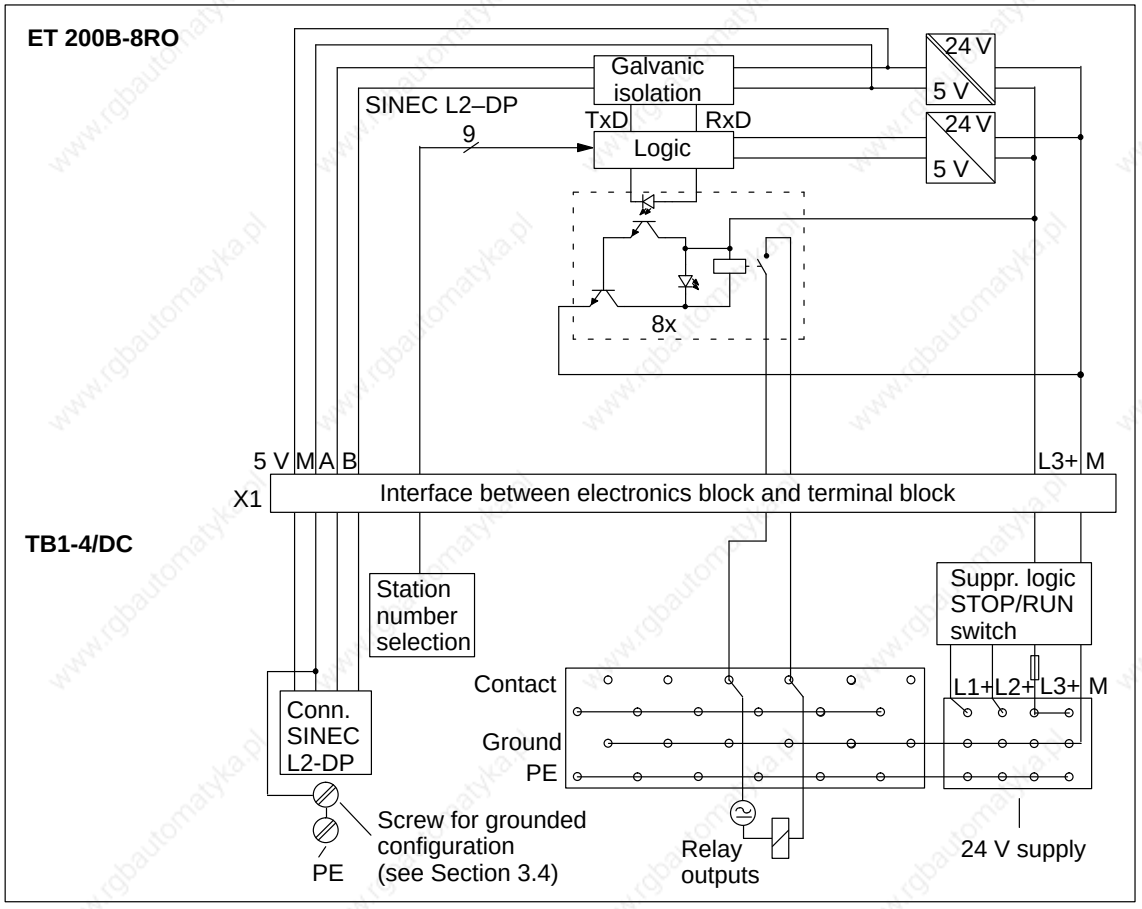


Figure 8-31 Schematic Circuit Diagram: ET 200B-8RO (6ES7 132-0GF00-0XB0) and TB1-4/DC

Note

The connection terminals for PE on the 4-tier terminal block are not connected to the PE terminal of the TB1-4/DC terminal block.

Electronics Block ET 200B-8RO (6ES7 132-0GF00-0XB0), continued

Terminal Assignments

The ET 200B-8RO can be plugged into the TB1/DC, TB1-4/DC or TB3/DC.

Table 8-8 contains the terminal assignments of the terminal blocks for the ET 200B-8RO:

Table 8-8 Terminal Assignments of Terminal Blocks TB1/DC, TB1-4/DC and TB3/DC for ET 200B-8RO (6ES7 132-0GF00-0XB0)

Terminal	Assignment
1	Q0: Output 0/0
2	Q0: Output 0/1
3	Q0: Output 1/0
4	Q0: Output 1/1
5	Q0: Output 2/0
6	Q0: Output 2/1
7	Q0: Output 3/0
8	Q0: Output 3/1
9	Q0: Output 4/0
10	Q0: Output 4/1
11	Q0: Output 5/0
12	Q0: Output 5/1
13	Q0: Output 6/0
14	Q0: Output 6/1
15	Q0: Output 7/0
16	Q0: Output 7/1
17 to 32	Unassigned
33 to 48	Ground (internally jumpered)
20 terminals: ⏚ (TB1-4/DC only)	PE (internally jumpered, but not connected to PE screw) (TB1-4/DC only)
L1+	Unassigned
L2+	Unassigned
L3+	Power supply of the internal logic
L3+	Power supply of the internal logic
M1	Unassigned
M2	Unassigned
M3	Ground connection of the internal logic
M3	Ground connection of the internal logic

Note

M1, M2, M3 and terminals 33 to 48 are connected to each other.

Technical specifications	
Baud rates	9.6/19.2/93.75/187.5/500/ 1500/3000*/6000*/ 12000* kbps
Bus protocol	DP standard
SYNC capability	Yes*
Galvanic isolation to the SINEC L2-DP bus	Yes
Power losses	Typ. 2 W
Weight (EB and TB)	Approx. 650 g (22.75 oz.)
Dimensions (EB and TB: W x H x D)	160 x 130 x 60 mm (6.24 x 5.07 x 2.34 in.)
Diagnostics functions	
Voltage monitoring	Green "RUN" LED
Bus monitoring SINEC L2-DP	Red "BF" LED
Status of outputs	Green LEDs
Supply voltage for relay outputs and internal logic	
Supply voltage (L3+)	
• Rated value	24 V DC
• Permissible range	18.5 to 30.2 V
• Value for t < 0.5 s	35 V
Current consumption from L3+	
• Logic	Typ. 130 mA
I^2t (for inrush current)	$\leq$ 0.05 A^2s

Relay outputs	
Number of outputs	8
Galvanic isolation	Yes
• In groups of	1
Short-circuit protection	No
Continuous current I_{th}	Max. 5 A
Relay type	Dold OW 5699
Cycling capacity of contacts	
• Resistive load	Max. 2 A at 24 V DC Max. 1.5 A at 48 V DC Max. 1 A at 60 V DC
• Inductive load	Max. 0.5 A at 30 V DC
Mechanical service life	> 10^8 switching operations
Switching rate	Max. 20/s
Cable length	
• Unshielded	Max. 100 m (328 ft.)
Setting of a digital input	Possible

* Only relevant when operating with the IM 308-C.

8.1.10 Electronics Block ET 200B-8DI/8DO (6ES7 133-0BH00-0XB0)

Characteristics

The ET 200B-8DI/8DO electronics block has the following features:

- 8 inputs, non-floating
- 8 outputs, non-floating
- Input voltage: 24 V DC
- Input delay: 3 ms
- Load voltage: 24 V DC

Dimension Drawing

See Figure 8-14 for the precise dimensions.

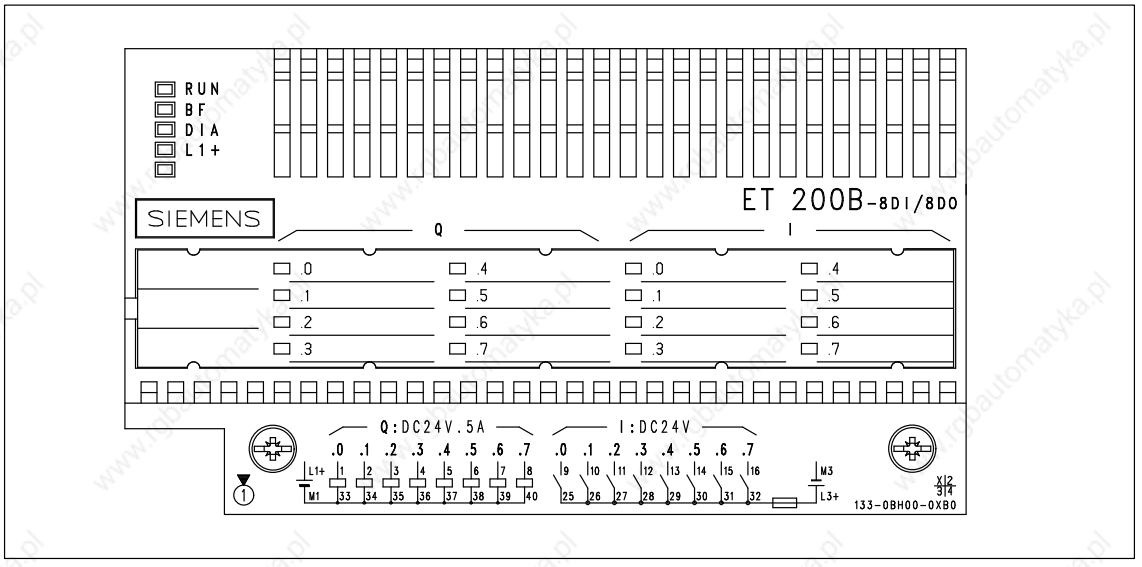


Figure 8-32 Front Elevation: ET 200B-8DI/8DO (6ES7 133-0BH00-0XB0)

Schematic Circuit Diagram

Simplified diagram of potential for the ET 200B-8DI/8DO and TB1/DC or TB3/DC:

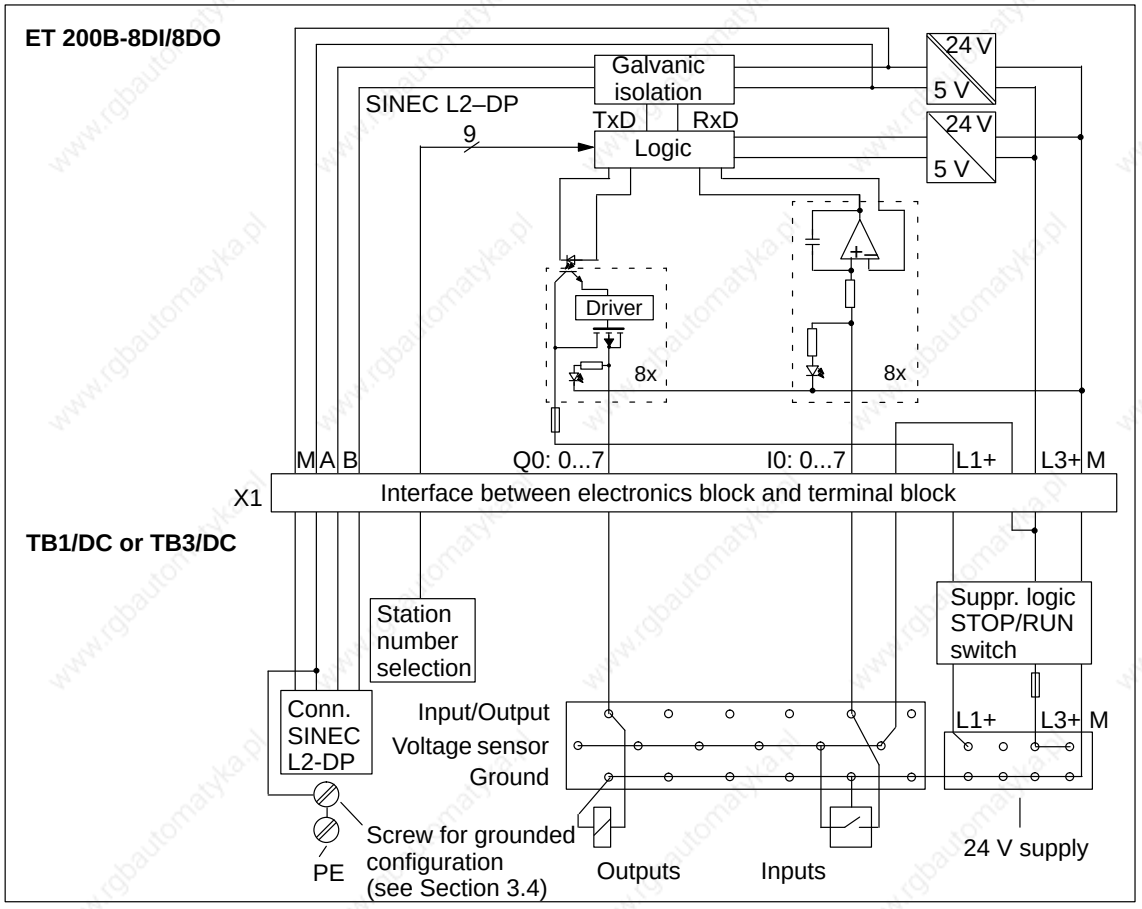


Figure 8-33 Schematic Circuit Diagram: ET 200B-8DI/8DO (6ES7 133-0BH00-0XB0) and TB1/DC or TB3/DC

Electronics Blocks ET 200B-8DI/8DO (6ES7 133-0BH00-0XB0), continued

Schematic Circuit Diagram

Simplified diagram of the potential for the ET 200B-8DI/8DO and TB1-4/DC:

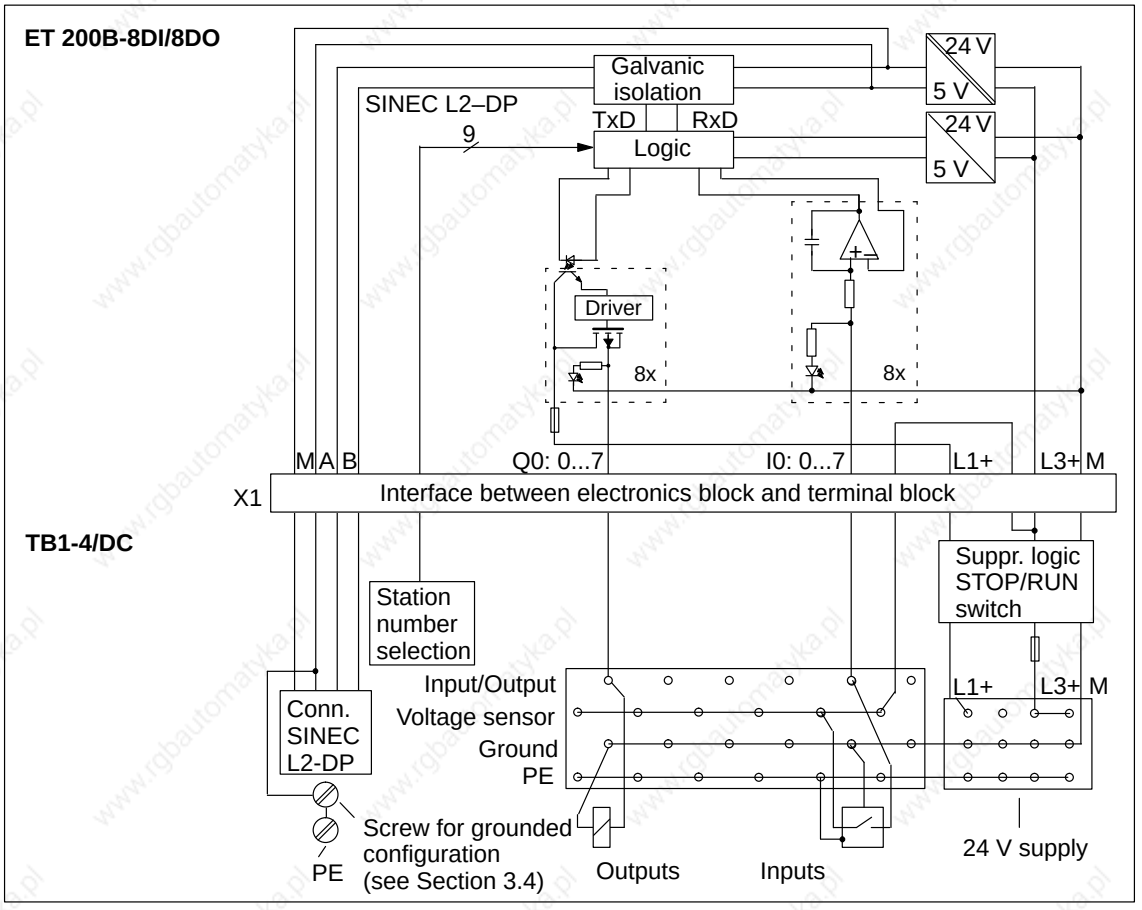


Figure 8-34 Schematic Circuit Diagram: ET 200B-8DI/8DO (6ES7 133-0BH00-0XB0) and TB1-4/DC

Note

The connection terminals for PE on the 4-tier terminal block are not connected to the PE terminal of the TB1-4/DC terminal block.

Terminal Assignments

The ET 200B-8DI/8DO can be plugged into the TB1/DC, TB1-4/DC or TB3/DC.

Table 8-9 contains the terminal assignments of the terminal blocks for the ET 200B-8DI/8DO:

Table 8-9 Terminal Assignments of Terminal Blocks TB1/DC, TB1-4/DC and TB3/DC for ET 200B-8DI/8DO (6ES7 133-0BH00-0XB0)

Terminal	Assignment
1 to 8	Q0: Output .0 to .7
9 to 16	I0: Input .0 to .7
17 to 24	24 V (sensor supply) (internally jumpered)
25 to 32	24 V (sensor supply) (internally jumpered)
33 to 40	Ground (outputs) (internally jumpered)
41 to 48	Ground (sensor supply) (internally jumpered)
20 terminals: ⏚ (TB1-4/DC only)	PE (internally jumpered, but not connected to PE screw) (TB1-4/DC only)
L1+	Power supply L1+ for channel group Q0: .0 to .7
L2+	Unassigned
L3+	Power supply of the internal logic **and** 24 V sensor supply
L3+	Power supply of the internal logic **and** 24 V sensor supply
M1	Ground connection M1 for channel group Q0: .0 to .7
M2	Unassigned
M3	Ground connection of the internal logic **and** sensor supply
M3	Ground connection of the internal logic **and** sensor supply

Note

L1+ and L3+ are **not** connected to each other internally.

L3+ and terminals 25 to 32 are connected to each other, as are M1, M2, M3 and terminals 33 to 48.

Electronics Block ET 200B-8DI/8DO (6ES7 133-0BH00-0XB0), continued

Technical specifications	
Baud rates	9.6/19.2/93.75/187.5/500/ 1500/3000*/6000*/ 12000* kbps
Bus protocol	DP Standard
FREEZE and SYNC capability	Yes*
Galvanic isolation to SINEC L2-DP bus	Yes
Power losses	Max. 3.8 W
Weight (EB and TB)	Approx. 650 g (22.75 oz.)
Dimensions (EB and TB: W x H x D)	160 x 130 x 60 mm (6.24 x 5.07 x 2.34 in.)
Diagnostics functions	
Voltage monitoring	Green “RUN” LED
Bus monitoring SINEC L2-DP	Red “BF” LED
Group diagnostics for short-circuit, load voltage failure	Red “DIA” LED
Load voltage monitoring	Green “L1+” LED
Status of inputs and outputs	Green LEDs
Supply voltage for sensor supply, load voltage supply and internal logic	
Supply voltage (L1+,L3+)	
• Rated value	24 V DC
• Permissible range	18.5 to 30.2 V
• Value for t < 0.5 s	35 V
Current consumption from L3+	
• Logic	Typ. 70 mA
• Sensors	Max. 500 mA
I^2t (for inrush current)	$\leq$ 0.05 A^2s
Inputs	
Number of inputs	8
Galvanic isolation to internal electronic circuits	No
Input voltage	
• Rated value	24 V DC
• For “0” signal	– 30 V to 5 V
• For “1” signal	13 V to 30 V

Inputs, continued	
Input current for “1” signal	Typ. 4 mA at 24 V Min. 2 mA
Delay of inputs for 6ES7 133-0BN00-0XB0	3 ms
Delay of inputs for 6ES7 133-0BN10-0XB0	0.2 ms
Connection of 2-wire BERO	Possible
• Quiescent current	$\leq$ 1.5 mA
Connection of mechanical switches	Possible
Cable length of sensors	
• Unshielded	Max. 100 m (328 ft.)
Outputs	
Number of outputs	8
Galvanic isolation	No
• In groups of	8
Output voltage	
• For “0” signal	Max. 2 V (idle)
• For “1” signal	Min. (supply voltage – 3 V)
Output current	
• For “0” signal	Max. 1 mA
• For “1” signal	Max. 0.5 A
Delay of outputs	
• From “0” to “1”	Approx. 20 µs
• From “1” to “0”	Max. 0.5 ms
Switching frequency	
• Resistive load	Max. 100 Hz
• Inductive load	Max. 0.5 Hz
• Lamp load	Max. 8 Hz
Short-circuit protection	Yes
Load current	
• Total current	Max. 2 A
Lamp load	Max. 5 W
Setting a digital input	Possible
Limitation of voltage induced on current interruption	Typ. (L3+) – 55 V
Cable length	Max. 100 m (328 ft.)

* Only relevant when operating with the IM 308-C.

8.1.11 Electronics Blocks ET 200B-24DI/8DO (6ES7 133-0BN00-0XB0) and ET 200B-24DI/8DO 0.2ms (6ES7 133-0BN10-0XB0)

Characteristics

The ET 200B-24DI/8DO and ET 200B-24DI/8DO 0.2ms electronics blocks have the following features:

- 24 inputs, non-floating
- 8 outputs, floating in groups of 8
- Input voltage: 24 V DC
- Input delay:

  6ES7 133-0BN00-0XB0 → 3 ms

  6ES7 133-0BN10-0XB0 → 0.2 ms
- Load voltage: 24 V DC

Dimension Drawing

See Figure 8-17 for the precise dimensions.

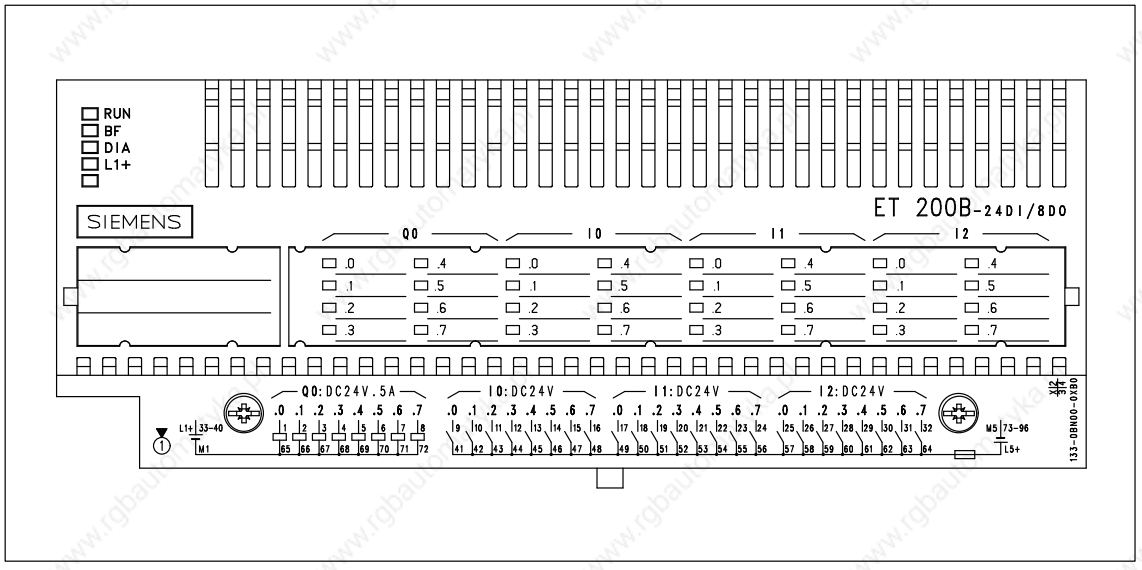


Figure 8-35 Front Elevation: ET 200B-24DI/8DO (6ES7 133-0BN00-0XB0) and ET 200B-24DI/8DO 0.2ms (6ES7 133-0BN10-0XB0)

Electronics Blocks ET 200B-24DI/8DO (6ES7 133-0BN00-0XB0) and ET 200B-24DI/8DO 0.2 ms (6ES7 133-0BN10-0XB0), continued

Schematic Circuit Diagram

Simplified diagram of the potential for the ET 200B-24DI/8DO or ET 200B-24DI/8DO 0.2 ms and TB2/DC or TB4/DC:

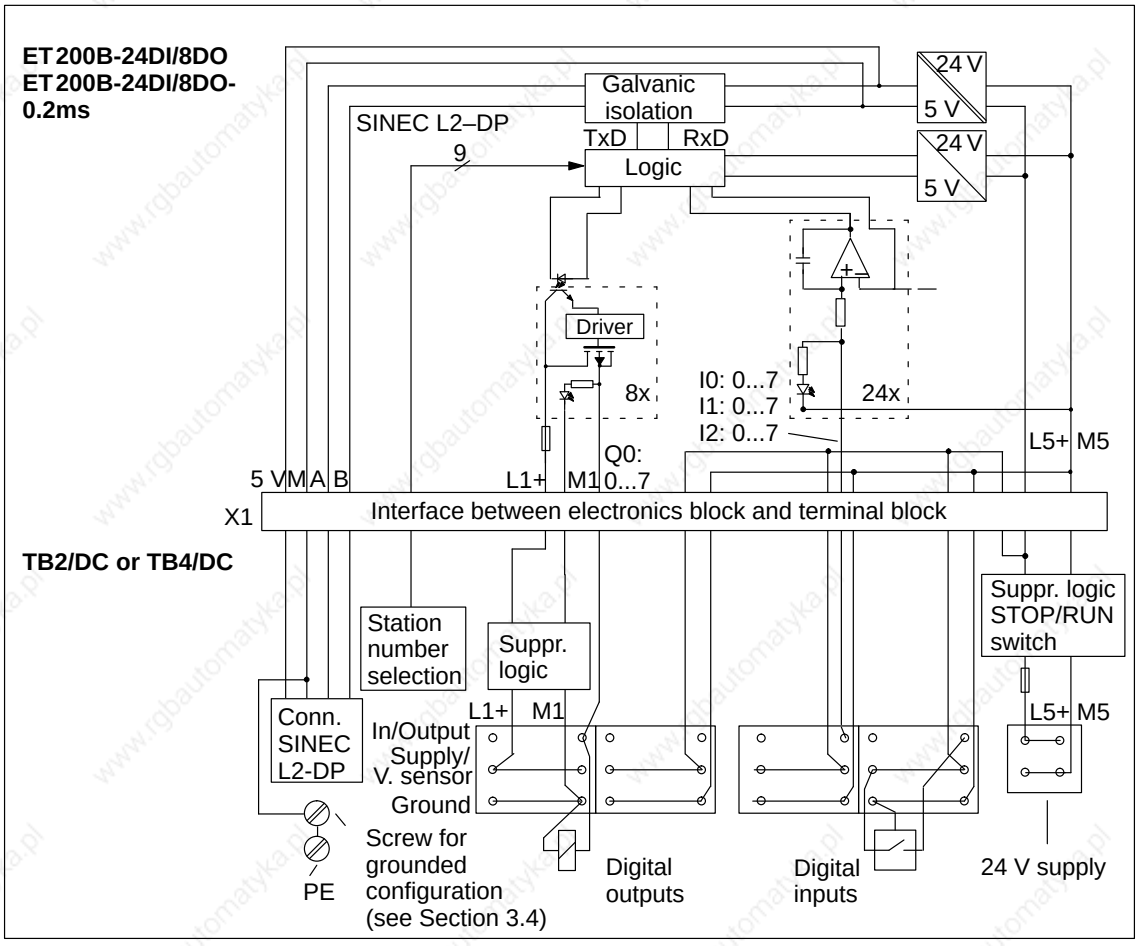


Figure 8-36 Schematic Circuit Diagram: ET 200B-24DI/8DO (6ES7 133-0BN00-0XB0) or ET 200B-24DI/8DO 0.2 ms (6ES7 133-0BN10-0XB0) and TB2/DC or TB4/DC

Schematic Circuit Diagram

Simplified diagram of the potential for the ET 200B-24DI/8DO or ET 200B-24DI/8DO 0.2 ms and TB2-4/DC:

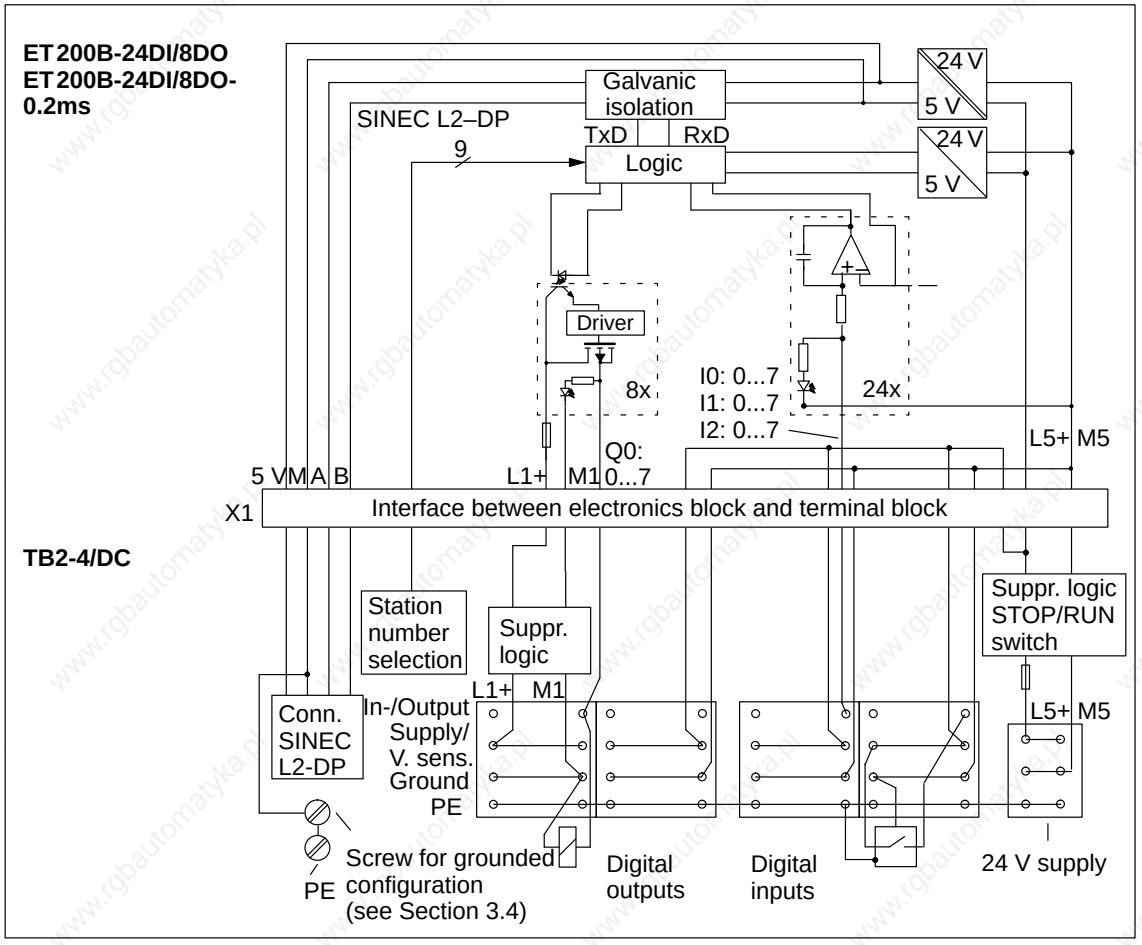


Figure 8-37 Schematic Circuit Diagram: ET 200B-24DI/8DO (6ES7 133-0BN00-0XB0) or ET 200B-24DI/8DO 0.2 ms (6ES7 133-0BN10-0XB0) and TB2-4/DC

Note

The connection terminals for PE on the 4-tier terminal block are not connected to the PE terminal of the TB2-4/DC terminal block.

Electronics Blocks ET 200B-24DI/8DO (6ES7 133-0BN00-0XB0) and ET 200B-24DI/8DO 0.2ms (6ES7 133-0BN10-0XB0), continued

Terminal Assignments

The ET 200B-24DI/8DO and ET 200B-24DI/8DO 0.2ms can be plugged into the TB2/DC, TB2-4/DC or TB4/DC.

Table 8-10 contains the terminal assignments of the terminal blocks for the ET 200B-24DI/8DO and ET 200B-24DI/8DO 0.2ms:

Table 8-10 Terminal Assignments of Terminal Blocks TB2/DC, TB2-4/DC and TB4/DC for ET 200B-24DI/8DO (6ES7 133-0BN00-0XB0) and ET 200B-24DI/8DO 0.2ms (6ES7 133-0BN10-0XB0)

Terminal	Assignment
1 to 8	Q0: Outputs .0 to .7
9 to 16	I0: Inputs .0 to .7
17 to 24	I1: Inputs .0 to .7
25 to 32	I2: Inputs .0 to .7
33 to 40	Power supply L1+ for channel group Q0: .0 to .7
41 to 64	24 V (sensor supply)
65 to 72	Ground M1 for channel group Q0: .0 to .7
73 to 96	Ground (sensor supply)
34 terminals: ⏚ (TB2-4/DC only)	PE (internally jumpered, but not connected to PE screw) (TB2-4/DC only)
L5+	Power supply of the internal logic **and** 24 V sensor supply
L5+	Power supply of the internal logic **and** 24 V sensor supply
M5	Ground connection of the internal logic **and** 24 V sensor supply
M5	Ground connection of the internal logic **and** 24 V sensor supply

Note

If all actuators have 2-wire connections to TB2/DC or TB4/DC, terminate for each group the ground connection of one actuator and the incoming reference potential line via a terminal pin in accordance with DIN 46231.

L1+/L5+ and M1/M5 are **not** connected to each other.

L5+ and terminals 41 to 64 are connected to each other, as are M5 and terminals 73 to 96.

Technical specifications	
Baud rates	9.6/19.2/93.75/187.5/500/ 1500/3000*/6000*/ 12000* kbps
Bus protocol	DP Standard
FREEZE and SYNC capability	Yes*
Galvanic isolation SINEC L2-DP bus	Yes
Power losses	Max. 5.5 W
Weight (EB and TB)	Approx. 800 g (28 oz.)
Dimensions (EB and TB: W x H x D)	235 x 130 x 60 mm (9.17 x 5.07 x 2.34 in.)
Diagnostics functions	
Voltage monitoring	Green “RUN” LED
Bus monitoring SINEC L2-DP	Red “BF” LED
Group diagnostics for short-circuit, load voltage failure	Red “DIA” LED
Load voltage monitoring	Green “L1+” LED
Status of inputs and outputs	Green LEDs
Supply voltage for sensor supply, load voltage supply and internal logic	
Supply voltage (L1+,L5+)	
• Rated value	24 V DC
• Permissible range	18.5 to 30.2 V
• Value for t < 0.5 s	35 V
Current consumption from L5+	
• Logic	Typ. 85 mA
• Sensors	Max. 1 A
I^2t (for the inrush current)	$\leq$ 0.05 A^2s
Inputs	
Number of inputs	24
Galvanic isolation to internal electronic circuits	No
Input voltage	
• Rated value	24 V DC
• Fot “0” signal	– 30 V to 5 V
• For “1” signal	13 V to 30 V
Input current for “1” signal	Typ. 4 mA at 24 V Min 2 mA

Inputs, continued	
Delay of inputs for 6ES7 133-0BN00-0XB0	3 ms
Delay of inputs for 6ES7 133-0BN10-0XB0	0.2 ms
Connection of 2-wire BERO	Possible
• Quiescent current	≤ 1.5 mA
Connection of mechanical switches	Possible
Cable length of sensors	
• Unshielded	Max. 100 m (328 ft.)
Outputs	
Number of outputs	8
Galvanic isolation	Yes
• In groups of	8
Output voltage	
• For “0” signal	Max. 2 V (idle)
• For “1” signal	Min. (supply voltage – 3 V)
Output current	
• For “0” signal	Max. 1 mA
• For “1” signal	Max. 0.5 A
Delay of outputs	
• From “0” to “1”	Approx. 20 µs
• From “1” to “0”	Max. 0.5 ms
Switching frequency	
• Resistive load	Max. 1000 Hz
• Inductive load	Max. 0.5 Hz
• Lamp load	Max. 8 Hz
Short-circuit protection	Yes
Load current	
• Total current	Max. 2 A
Lamp load	Max. 5 W
Setting a digital input	Possible
Limitation of voltage induced on current interruption	Typ. (L5+) – 55 V
Cable length	Max. 100 m (328 ft.)

* Only relevant when operating with the IM 308-C.

8.1.12 Electronics Block ET 200B-16DI-AC (6ES7 131-0HF00-0XB0)

Characteristics

The ET 200B-16DI-AC electronics block has the following features:

- 16 inputs, floating in groups of 4
- Input voltage: 120/230 V AC
- Suitable for switches and 2-wire proximity switches acc. to IEC 1131, type 1

Dimension Drawing

See Figure 8-17 for the precise dimensions.

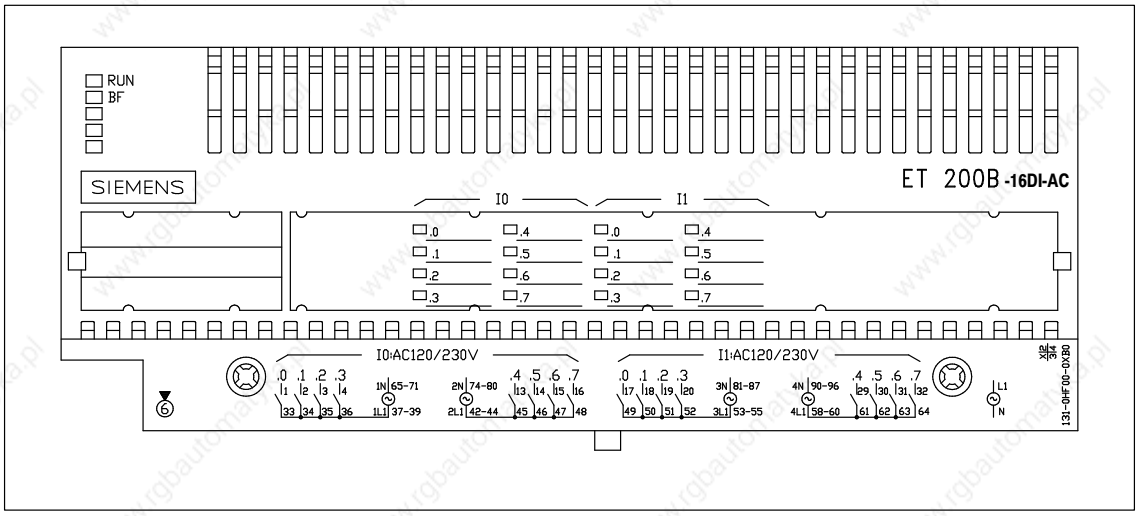


Figure 8-38 Front Elevation: ET 200B-16DI-AC (6ES7 131-0HF00-0XB0)

Schematic Circuit Diagram

Simplified diagram of the potential for the ET 200B-16DI-AC and TB6/AC:

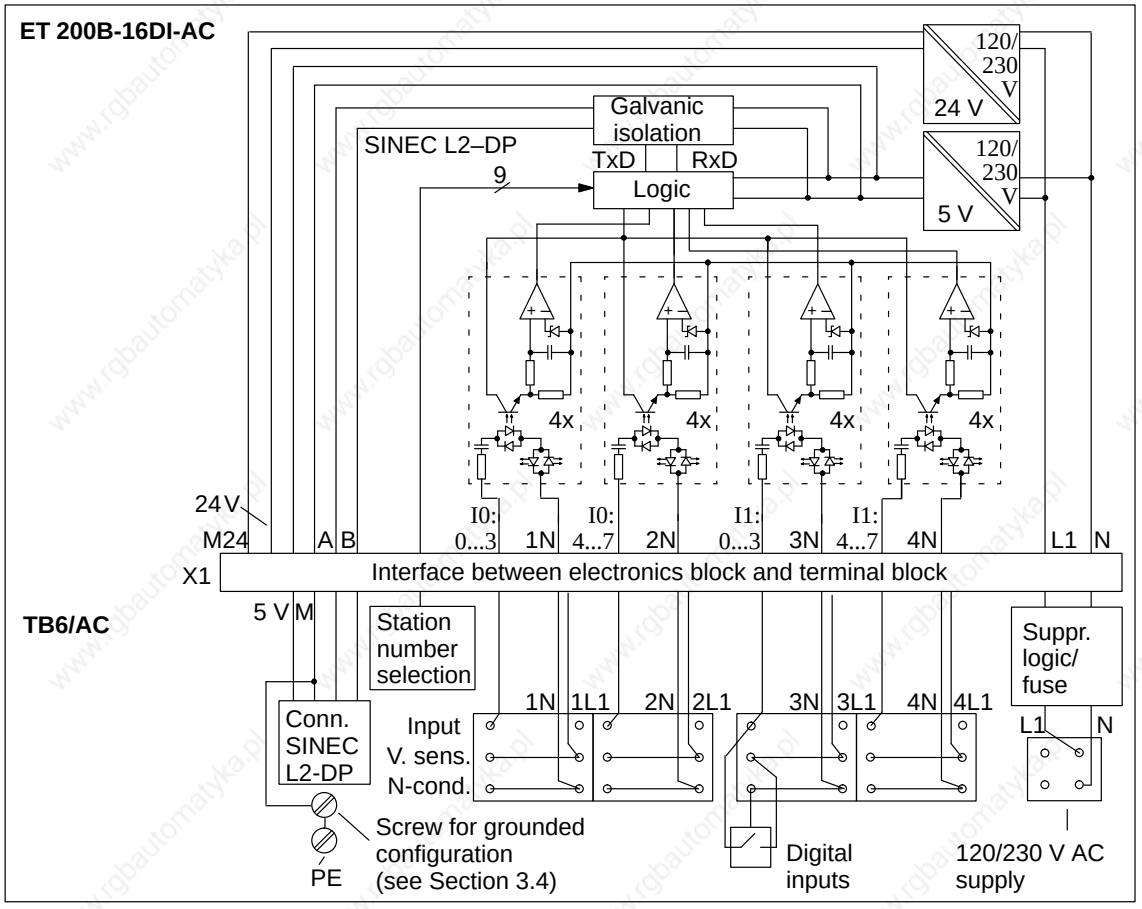


Figure 8-39 Schematic Circuit Diagram: ET 200B-16DI-AC (6ES7 131-0HF00-0XB0) and TB6/AC

Electronics Block ET 200B-16DI-AC (6ES7 131-0HF00-0XB0), continued

Terminal Assignments

The ET 200B-16DI-AC can be plugged into the TB6/AC.

Table 8-11 contains the terminal assignments of the TB6/AC terminal block for the ET 200B-16DI-AC:

Table 8-11 Terminal Assignments of Terminal Block TB6/AC for ET 200B-16DI-AC (6ES7 131-0HF00-0XB0)

Terminal	Assignment
1 ... 4	I0: Inputs .0 3
13 ... 16	I0: Inputs .4 7
17 ... 20	I1: Inputs .0 3
29 ... 32	I1: Inputs .4 7
33 ... 39	Sensor supply 1L1 for channel I0: .0 3
42 ... 48	Sensor supply 2L1 for channel I0: .4 7
49 ... 55	Sensor supply 3L1 for channel I1: .0 3
58 ... 64	Sensor supply 4L1 for channel I1: .4 7
65 ... 71	Sensor supply 1N for channel I0: .0 3
74 ... 80	Sensor supply 2N for channel I0: .4 7
81 ... 87	Sensor supply 3N for channel I1: .0 3
90 ... 96	Sensor supply 4N for channel I1: .4 7
L1	Power supply for the internal logic
N	Power supply for the internal logic

Technical specifications	
Baud rates	9,6/19,2/93,75/187,5/500/ 1500/3000*/6000*/ 12000* kbps
Bus protocol	DP-Standard
Galvanic isolation to SINEC L2-DP	Yes, 500 V DC to logic, 1500 V AC to connection terminals
Power losses	
• at 230 V	Typ. 6 W
• at 120 V	Typ. 4.5 W
Weight (EB and TB)	811 g (29 oz.)
Dimensions (EB and TB: W x H x D)	235 x 130 x 60 mm (9.17 x 5.07 x 2.34 in.)
Diagnostics functions	
Voltage monitoring	Green ‘‘RUN” LED
Bus monitoringSINEC L2-DP	Red ‘‘BF” LED
Status of inputs	Green LEDs
Supply voltage for internal logic	
Supply voltage L1	
• Rated value	120/230 V AC
• Permissible range	85 to 264 V AC
• Frequency	47 to 63 Hz
• Current consumption from L1	Typ. 60 mA

Note:
If the module is installed in a 230 V AC system, the following must each be connected to the same phase:

- 1L1/1N and 2L1/2N (same phase)
- 3L1/3N and 4L1/4N (same phase)

Restriction:
If the module is installed in a 230 V AC system with ambient temperatures higher than 40 °C (104 °F), only 12 inputs are allowed to be used and the rated input voltage must not exceed 240 V AC.* Only relevant when operating with the IM 308-C.

* Only relevant when operating with the IM 308-C.

Inputs	
Number of inputs	16
Galvanic isolation	Yes (Optokoppler)
• In groups of	4
Input voltage	
• Rated value	120/230 V AC
• For ‘‘0” signal	0 to 40 V AC
• For ‘‘1” signal	79 to 264 V AC
Input current for ‘‘1” signal	3 to 16 mA
• At 120 V, 60 Hz	Typ. 6,5 mA
• At 230 V, 50 Hz	Typ. 10,5 mA
Type of input acc. to IEC 1131	Type 1
Delay of inputs	0 to 25 ms
Connection of 2-wire BERO	No
• Permissible quiescent current	2 mA
Connection of mechanical switches	Yes
Cable length	Max. 600 m (1968 ft)

8.1.13 Electronics Block ET 200B-16DO-AC (6ES7 132-0HF00-0XB0)

Characteristics

The ET 200B-16DO-AC electronics block has the following features:

- 16 outputs, floating in groups of 4
- Output current: 0.5 A
- Load voltage: 120/230 V AC

Dimension Drawing

See Figure 8-17 for the precise dimensions.

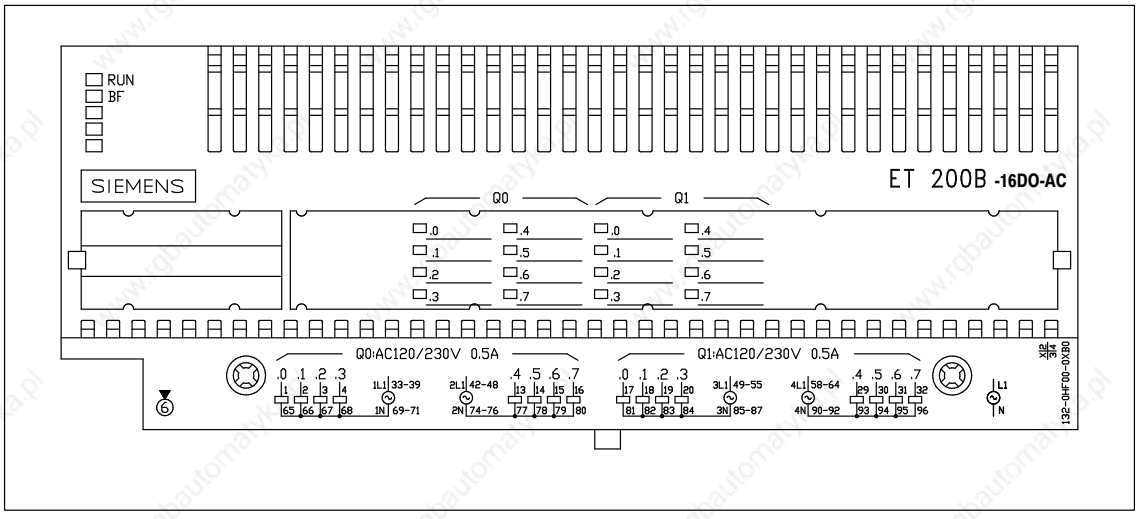


Figure 8-40 Front Elevation: ET 200B-16DO-AC (6ES7 132-0HF00-0XB0)

Schematic Circuit Diagram

Simplified diagram of the potential for the ET 200B-16DO-AC and TB6/AC:

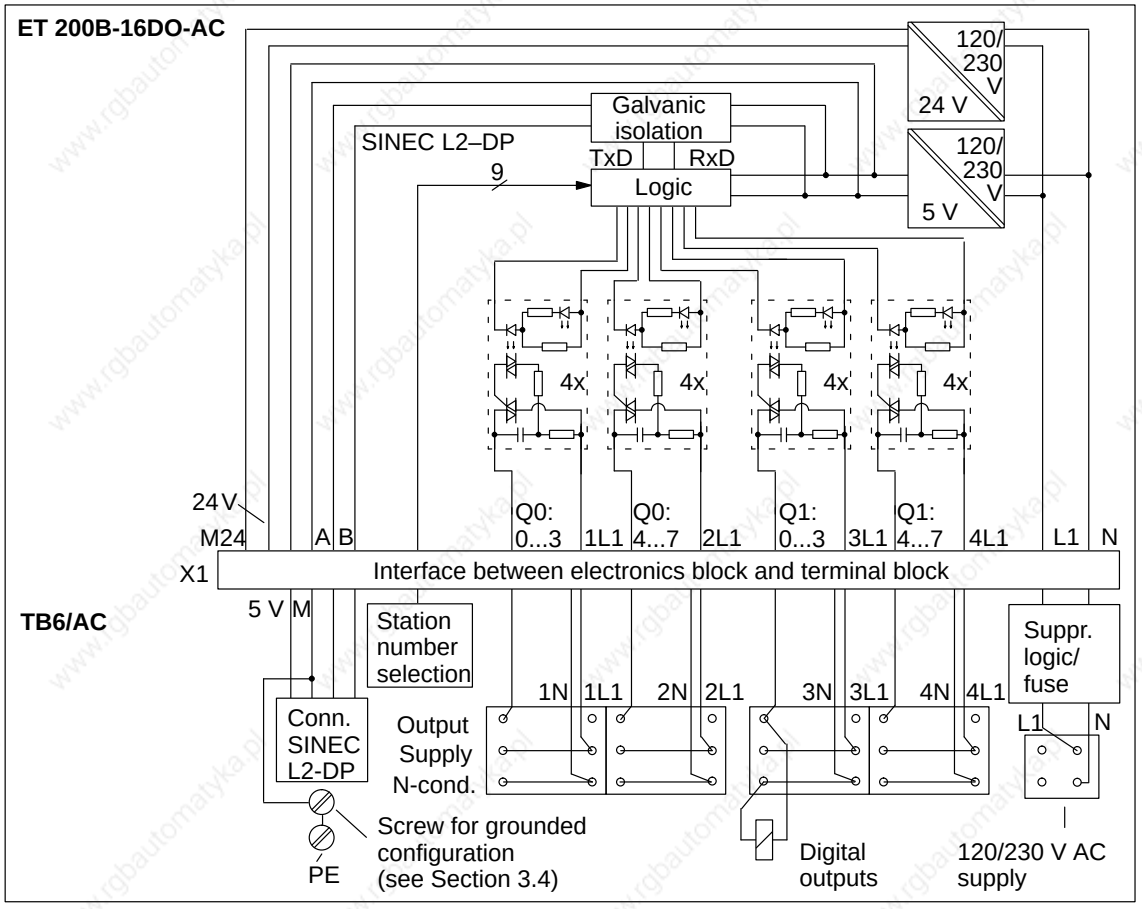


Figure 8-41 Schematic Circuit Diagram: ET 200B-16DO-AC (6ES7 132-0HF00-0XB0) and TB6/AC

Electronics Block ET 200B-16DO-AC (6ES7 132-0HF00-0XB0), continued

Terminal Assignments

ET 200B-16DO-AC can be plugged into the TB6/AC.

Table 8-12 contains the terminal assignments of the TB6/AC terminal block for the ET 200B-16DO-AC:

Table 8-12 Terminal Assignments of Terminal Block TB6/AC for ET 200B-16DO-AC (6ES7 132-0HF00-0XB0)

Terminal	Assignment
1 ... 4	Q0: Outputs .0 3
13 ... 16	Q0: Outputs .4 7
17 ... 20	Q1: Outputs .0 3
29 ... 32	Q1: Outputs .4 7
33 ... 39	Sensor supply 1L1 for channel Q0: .0 3
42 ... 48	Sensor supply 2L1 for channel Q0: .4 7
49 ... 55	Sensor supply 3L1 for channel Q0: .0 3
58 ... 64	Sensor supply 4L1 for channel Q0: .4 7
65 ... 71	Sensor supply 1N for channel Q1: .0 3
74 ... 80	Sensor supply 2N for channel Q1: .4 7
81 ... 87	Sensor supply 3N for channel Q1: .0 3
90 ... 96	Sensor supply 4N for channel Q1: .4 7
L1	Power supply for the internal logic
N1	Power supply for the internal logic

Technical specifications	
Baud rates	9,6/19,2/93,75/187,5/500/ 1500/3000*/6000*/ 12000* kbps
Bus protocol	DP-Norm
Galvanic isolation to SI-NEC L2-DP bus	Yes, 500 V DC to logic, 1500 V AC to connection terminals
Power losses	Max. 11 W
Weight (EB and TB)	Approx. 805 g (29 oz)
Dimensions (EB and TB: W x H x D)	235 x 130 x 60 mm (9.17 x 5.07 x 2.34 in.)
Diagnostics functions	
Voltage monitoring	Green ‘‘RUN‘‘ LED
Bus monitoring SINEC L2-DP	Red ‘‘BF” LED
Group diagnostics for short-circuit, load voltage failure	No
Load voltage monitoring	No
Status of outputs	Green LEDs
Supply voltage for internal logic	
Supply voltage L1	
• Rated value	120/230 V AC
• Permissible range	85 to 264 V AC
• Frequency	47 to 63 Hz
• Current consumption from L1	Typ. 150 mA

Note:
If the module is installed in a 230 V AC system, the following must each be connected to the same phase:

- 1L1/1N and 2L1/2N (same phase)
- 3L1/3N and 4L1/4N (same phase)

* Only relevant when operating with the IM 308-C.

Outputs	
Number of outputs	16
Galvanic isolation	Yes (optocouplers)
• In groups of	4
• Signal voltage	79 to 264 V AC
Output voltage	
• For ‘‘1” Signal ($\geq$ 50 mA)	Max. L1 – 1,5 V
• For ‘‘1” Signal ($\leq$ 50 mA)	Max. L1 – 8,5 V
Output current	
• For ‘‘0” signal	Max. 1,3 mA
Delay of outputs	Max. 20 ms
Short-circuit protection	No
Switching frequency	
• Resistive load	10 Hz
• Inductive load	0,5 Hz
• Lamp load	1 Hz
Load current per output in preferred mounting position	
• 0 °C to 40 °C (32 ° F to 104 ° F)	0,5 A
• 40 °C to 60 °C (32 ° F to 140 ° F)	0,35 A
Load current per output in other mounting positions	
• 0 °C to 40 °C (32 ° F to 104 ° F)	0,35 A
Lamp load	Max. 25 W
Size of motor starter	Max. size 3 acc. to NEMA
Parallel connection of 2 outputs	Possible (though not in order to increase power)
Setting a digital input	Possible
Cable length	Max. 600 m (1968 ft)

8.1.14 Electronics Block ET 200B-16RO-AC (6ES7 132-0HH00-0XB0)

Characteristics

The ET 200B-16RO-AC electronics block has the following features:

- 16 relay outputs, floating in groups of 1
- Load voltage: 120/230 V AC
  24 ... 150 V DC
- Output current: 4A for outputs 0.0, 0.7, 1.0 and 1.7
  12 A for outputs 0.1 to 0.6 and 1.1 to 1.6
- Suitable for AC/DC solenoid valves, switches, motor starters, small-power motors, motors and lamps.

Dimension Drawing

See Figure 8-17 for the precise dimensions.

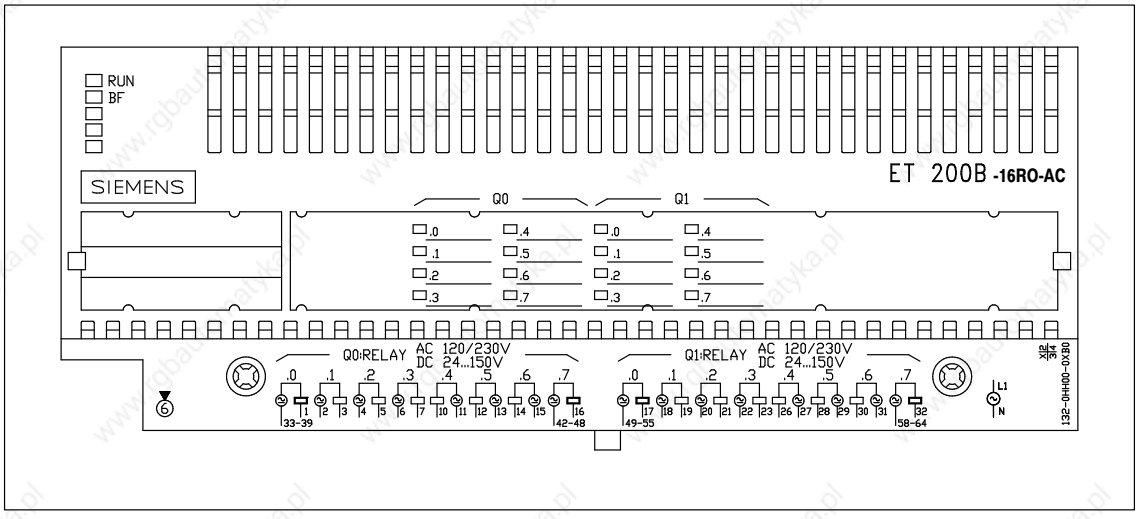


Figure 8-42 Front Elevation: ET 200B-16RO-AC (6ES7 132-0HH00-0XB0)

Schematic Circuit Diagram

Simplified diagram of the potential for the ET 200B-16RO-AC and TB6/DC:

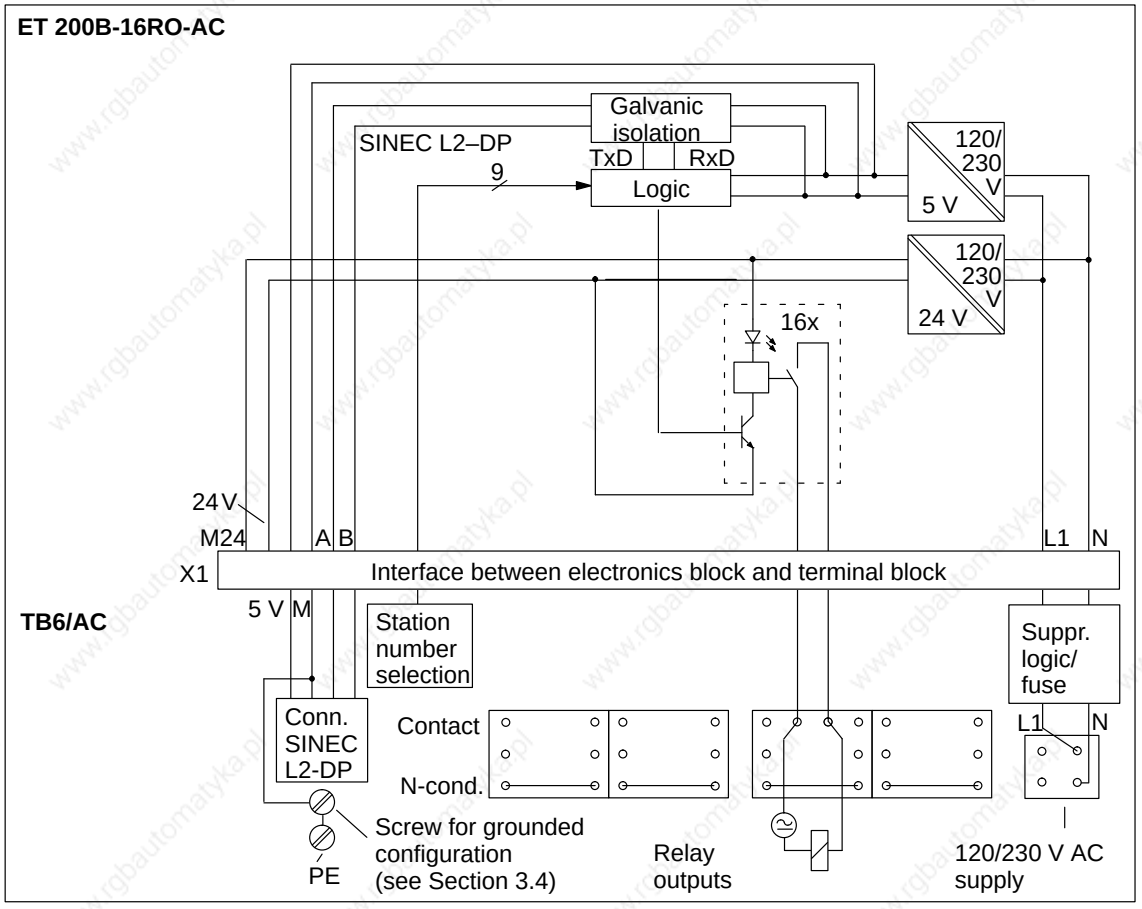


Figure 8-43 Schematic Circuit Diagram: ET 200B-16RO-AC (6ES7 132-0HH00-0XB0) and TB6/AC

Electronics Block ET 200B-16RO-AC (6ES7 132-0HH00-0XB0), continued

Terminal Assignments

The ET 200B-16RO-AC can be plugged into the TB6/AC.

Table 8-13 contains the terminal assignments of the TB6/AC terminal block for the ET 200B-16RO-AC:

Table 8-13 Terminal Assignments of Terminal Block TB6/AC for ET 200B-16RO-AC (6ES7 132-0HH00-0XB0)

Terminal	Assignment
33 ... 39	Q0: Output 0/0
1	Q0: Output 0/1
2	Q0: Output 1/0
3	Q0: Output 1/1
4	Q0: Output 2/0
5	Q0: Output 2/1
6	Q0: Output 3/0
7	Q0: Output 3/1
10	Q0: Output 4/1
11	Q0: Output 4/0
12	Q0: Output 5/1
13	Q0: Output 5/0
14	Q0: Output 6/1
15	Q0: Output 6/0
16	Q0: Output 7/1
42 ... 48	Q0: Output 7/0
49 ... 55	Q1: Output 0/0
17	Q1: Output 0/1
18	Q1: Output 1/0
19	Q1: Output 1/1
20	Q1: Output 2/0
21	Q1: Output 2/1
22	Q1: Output 3/0
23	Q1: Output 3/1
26	Q1: Output 4/1
27	Q1: Output 4/0
28	Q1: Output 5/1
29	Q1: Output 5/0
30	Q1: Output 6/1

Table 8-13 Terminal Assignments of Terminal Block TB6/AC for ET 200B-16RO-AC (6ES7 132-0HH00-0XB0)

Terminal	Assignment
31	Q1: Output 6/0
32	Q1: Output 7/1
58 ... 64	Q1: Output 7/0
L1	Power supply of the internal logic
N	Power supply of the internal logic

Electronics Block ET 200B-16RO-AC (6ES7 132-0HH00-0XB0), continued

Technical specifications	
Baud rates	9,6/19,2/93,75/187,5/500/ 1500/3000*/6000*/ 12000* kbps
Bus protocol	DP Standard
Galvanic isolation to SINEC L2-DP bus	Yes, 500 V DC to logic, 1500 V AC to connection terminals
Power losses	20 W
Weight (EB and TB)	814 g (29 oz)
Dimensions (EB and TB: W x H x D)	235 x 130 x 60 mm (9.17 x 5.09 x 2.34 in.)
Diagnostics functions	
Voltage monitoring	Green "RUN" LED
Bus monitoring SINEC L2-DP	Red "BF" LED
Group diagnostics for short-circuit, load voltage failure	No
Load voltage monitoring	No
Status of outputs	Green LEDs
Supply voltage for internal logic	
Supply voltage L1	
• Rated value	120/230 V AC
• Permissible range	85 to 264 V AC
• Frequency	47 to 63 Hz
• Current consumption from L1	Typ. 210 mA

Note:
Protect the module against inductive overvoltages at the relay contacts. Use an RC element or a varistor, switched either via the relay contact or via the load, as the overvoltage protection device. The size and values of the components must be chosen according to the magnitude and type of the load.
Overvoltage protection devices increase the service life of the relay contacts.

Note:
If the module is installed in a 230 V AC system, all the outputs belonging to a particular channel group (Q0, Q1) must be connected to the same phase.

* Only relevant when operating with the IM 308-C.

Relay outputs		
Number of outputs		
• High current	4 (0.0, 0.7, 1.0 and 1.7)	
• Low current	12 (0.1 to 0.6, 1.1 to 1.6)	
Galvanic isolation	Yes (relays)	
• In groups of	1	
Short-circuit protection	No	
Relay type	Takamisawa NY 24 W-K	
Output voltage		
• Rated value	24 to 150 V DC 120/230 V AC	
• Permissible range	0,1 to 150 V DC 79 to 264 V AC	
Continuous current I_{th}	Max. 4 A (for high current points) Max. 2 A (for low current points)	
Switching capacity of contacts		
• High current points		
Resistive load	0 to 40 °C (32 to 104 ° F)	60 °C (140° F)
24 V DC/ 120/230 V AC	4 A	2 A
120 V DC	0,2 A	0,2 A
Inductive load		
24 V DC/ 120/230 V AC	2 A	2 A
120 V DC	0,2 A	0,2 A
• Low current points		
Resistive and inductive loads	0 to 40 °C (32 to 104 ° F)	60 °C (140° F)
24 V DC/ 120/230 V AC	2 A	1 A
120 V DC	0,2 A	0,2 A
Switching cycles of contacts acc. to VDE 0660, Part 200		
• DC-11	$> 100 \times 10^6$	
• AC-15	$> 300 \times 10^5$	
Switching frequency		
• Resistive load	Max. 10 Hz	
• Inductive load	Max. 2 Hz	
Cable length	Max. 600 m (1968 ft.)	
Setting a digital input	Possible	

8.1.15 Electronics Block ET 200B-8DI/8RO-AC (6ES7 133-0HH00-0XB0)

Characteristics

The ET 200B-8DI/8RO-AC electronics block has the following features:

- 8 inputs, floating in groups of 4
  8 relay outputs, floating in groups of 1
- Input voltage: 120/230 V AC
- Inputs suitable for switches and 2-wire proximity switches acc. to IEC 1131, type 1
- 8 relay outputs, floating in groups of 1
- Output load voltage: 120/230 V AC
  24 ... 150 V DC
- Output current: 4 A for outputs 0.0 and 0.7
  2 A for outputs 0.1 to 0.6
- Outputs suitable for AC/DC solenoid valves, switches, motor starters, small-power motors, motors and lamps.

Dimension Drawing

See Figure 8-17 for the precise dimensions.

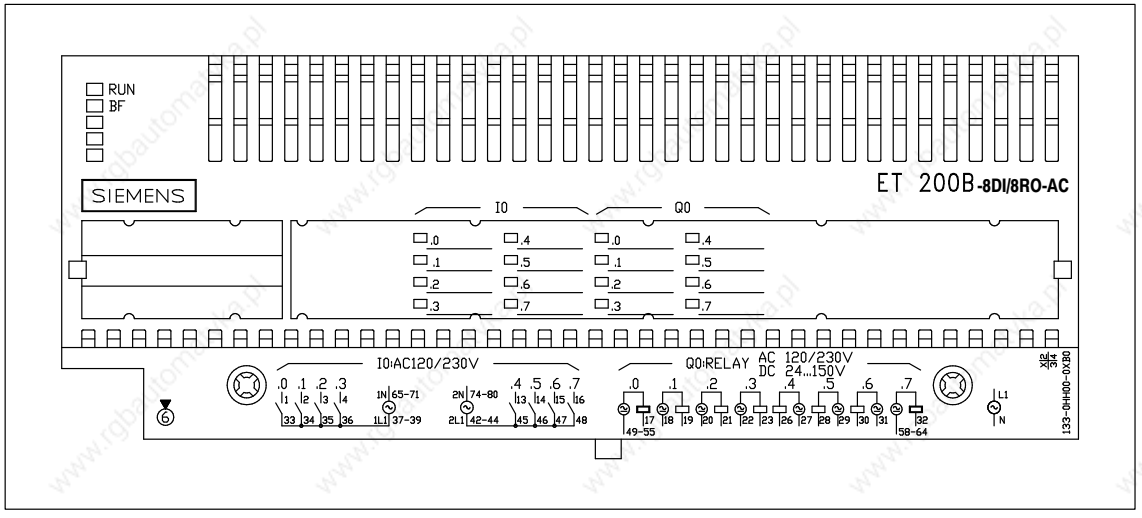


Figure 8-44 Front Elevation: ET 200B-8DI/8RO-AC (6ES7 133-0HH00-0XB0)

Electronics Block ET 200B-8DI/8RO-AC (6ES7 133-0HH00-0XB0), continued

Schematic Circuit Diagram

Simplified diagram of the potential for the ET 200B-8DI/8RO-AC and TB6/DC:

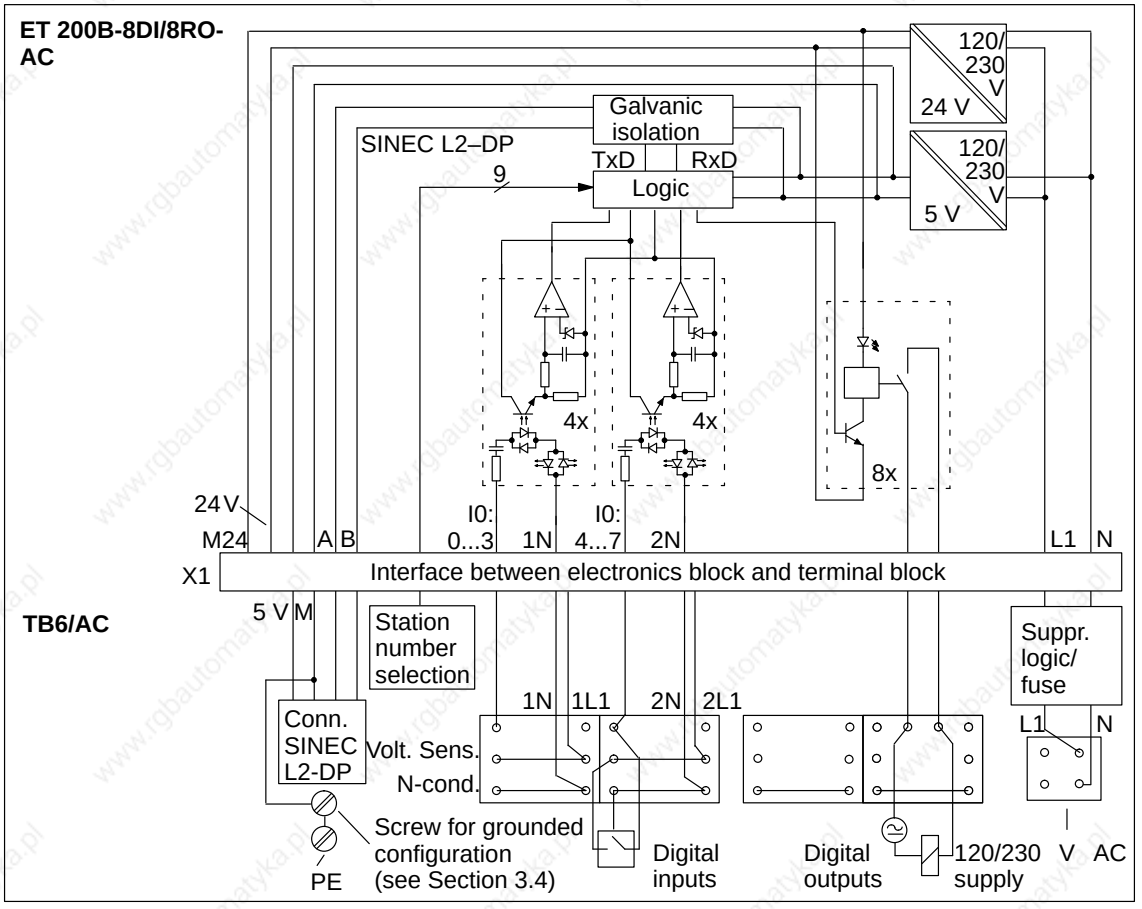


Figure 8-45 Schematic Circuit Diagram: ET 200B-8DI/8RO-AC (6ES7 133-0HH00-0XB0) and TB6/AC

Terminal Assignments

The ET 200B-8DI/8RO-AC can be plugged into the TB6/AC.

Table 8-14 contains the terminal assignments of the TB6/AC terminal block for the ET 200B-8DI/8RO-AC:

Table 8-14 Terminal Assignments of Terminal Block TB6/AC for ET 200B-8DI/8RO-AC (6ES7 133-0HH00-0XB0)

Terminal	Assignment
1 ... 4	I0: Inputs .0 3
13 ... 16	I0: Inputs .4 7
33 ... 39	Sensor supply 1L1 for channel I0: .0 3
42 ... 48	Sensor supply 2L1 for channel I0: .4 7
65 ... 71	Sensor supply 1N for channel I0: .0 3
74 ... 80	Sensor supply 2N for channel I0: .4 7
49 ... 55	Q0: Output 0/0
17	Q0: Output 0/1
18	Q0: Output 1/0
19	Q0: Output 1/1
20	Q0: Output 2/0
21	Q0: Output 2/1
22	Q0: Output 3/0
23	Q0: Output 3/1
26	Q0: Output 4/1
27	Q0: Output 4/0
28	Q0: Output 5/1
29	Q0: Output 5/0
30	Q0: Output 6/1
31	Q0: Output 6/0
32	Q0: Output 7/1
58 ... 64	Q0: Output 7/0
L1	Power supply of the internal logic
N	Power supply of the internal logic

Electronics Block ET 200B-8DI/8RO-AC (6ES7 133-0HH00-0XB0), continued

Technical specifications	
Baud rates	9,6/19,2/93,75/187,5/500/ 1500/3000*/6000*/ 12000* kBaud
Bus protocol	DP Standard
Galvanic isolation to SI-NEC L2-DP bus	Yes, 500 V DC to logic, 1500 V AC to connection terminals
Power losses	13 W
Weight (EB and TB)	811 g (29 oz)
Dimensions (EB and TB: W x H x D)	235 x 130 x 60 mm (9.17 x 5.07 x 2.34 in.)
Diagnostics functions	
Voltage monitoring	Green LED “RUN”
Bus monitoring SINEC L2-DP	Red LED “BF”
Group diagnostics for short-circuit, load voltage failure	No
Load voltage monitoring	No
Status of outputs	Green LEDs
Supply voltage for internal logic	
Supply voltage L1	
• Rated value	120/230 V AC,
• Permissible range	85 to 264 V AC
• Frequency	47 to 63 Hz
• Current consumption from L1	Typ. 165 mA
Restriction: If the module is installed in a 230 V AC system with ambient temperatures higher than 40 °C (104 °F), only 6 inputs are allowed to be used and the rated input voltage must not exceed 240 V AC.	
Note: If the module is installed in a 230 V AC system, the following must each be connected to the same phase:	

Inputs	
Number of inputs	8
Galvanic isolation	Yes (optocouplers)
• In groups of	4
Input voltage	
• Rated value	120/230 V AC
• For “0” signal	0 to 40 V AC
• For “1” signal	79 to 264 V AC
Input current for “1” signal	3 to 16 mA
• at 120, 60 Hz	Typ. 6,5 mA
• at 230 V, 50 Hz	Typ. 10,5 mA
Type of input acc. to IEC 1131	Type 1
Delay of inputs	0 to 25 ms
Connection of 2-wire BERO	No
• Permissible quiescent current	2 mA
Connection of mechanical switches	Yes
Cable length of sensors	
Cable length	Max. 600 m (1968 ft.)

* Only relevant when operating with the IM 308-C.

Relay outputs		
Number of outputs		
• High current	2 (0.0, 0.7)	
• Low current	6 (0.1 to 0.6)	
Galvanic isolation	Yes (relays)	
• In groups of	1	
Short-circuit protection	No	
Relay type	Takamisawa NY 24W-K	
Output voltage		
• Rated value	24 to 150 V DC 120/230 V AC	
• Permissible range	0,1 to 150 V DC 79 to 264 V AC	
Continuous current I_{th}	Max. 4 A (for high current points) Max. 2 A (for low current points)	
Switching capacity of contacts		
• High current points		
Resistive load	0 to 40 °C (32 to 104 ° F)	60 °C (140° F)
24 V DC/ 120/230 V AC	4 A	2 A
120 V DC	0,2 A	0,2 A
Inductive load		
24 V DC/ 120/230 V AC	2A	2A
120 V DC	0,2 A	0,2 A
• Low current points		
Resistive and inductive loads	0 to 40 °C (32 to 104 ° F)	60 °C (140° F)
24 V DC/ 120/230 V AC	2A	1 A
120 V DC	0.2 A	0.2 A

Relay outputs, continued	
Switching cycles of contacts acc. to VDE 0660, Part 200	
• DC-11	> 100 x 10^6
• AC-15	> 300 x 10^5
Switching frequency	
• Resistive load	Max. 10 Hz
• Inductive load	Max. 2 Hz
Cable length	Max. 600 m (1968 ft.)
Setting a digital input	Possible

Note:
Protect the module against inductive overvoltages at the relay contacts. Use an RC element or a varistor, switched either via the relay contact or via the load, as the overvoltage protection device. The size and values of the components must be chosen according to the magnitude and type of the load.
Overvoltage protection devices increase the service life of the relay contacts.

Note:
If the module is installed in a 230 V AC system, all the outputs belonging to a particular channel group (Q0, Q1) must be connected to the same phase.

Analog Modules

9

In this Chapter

This chapter contains the technical specifications of the analog ET 200B modules.

In addition to the technical specifications, this chapter also describes the measuring principles and the measured value representation for the analog modules.

9.1 Analog Modules

Introduction

There are analog modules available for connecting analog current sensors, voltage sensors or loads.

The tables below give an overview of the ET 200B analog modules.

List of Electronics Blocks

The following types of electronics blocks are available:

Table 9-1 Analog Electronics Blocks of the ET 200B

Electronics Block	Order No.	Description
ET 200B-4/8AI	6ES7 134-0KH00-0XB0	8 analog differential inputs **or** 4 x Pt 100 (measuring principle: integrating)
ET 200B-4AI	6ES7 134-0HF00-0XB0	4 analog differential inputs (measuring principle: successive approximation)
ET 200B-4AO	6ES7 135-0HF00-0XB0	4 analog outputs

List of Terminal Blocks

A terminal block is available for all analog electronics blocks:

Table 9-2 Analog Terminal Block of the ET 200B

Terminal Block	Order No.	Description
TB8	6ES7 193-0CD40-0XA0	4/8-channel, spring-loaded terminal

9.1.1 Setting and Parameterizing the Analog Modules

Introduction

You can set the function of the analog modules

- via the COM ET 200 parameterization software

  and

- via the coding plugs on the TB8 terminal block.

Where to Find a Description

Parameterization of the analog modules using COM ET 200 V 4.x is described in detail in Section 4.2.

COM ET 200 WINDOWS also provides extensive support for parameterizing the ET 200B-4/8AI with COM ET 200 WINDOWS through its integrated help system.

Please refer to the *ET 200 Distributed I/O System* manual (Order No. 6ES5 998-3ES12) for further information about how to use COM ET 200 WINDOWS.

Below, you will learn how to set the coding plugs.

Coding Plugs

The TB8 terminal block has a coding plug for each channel or channel group (0, 1, 2, 3,) and one for setting the compensation.

You use the coding plugs to define the input or output circuit of the TB8 depending on the measured value sensor/load connected and on the desired measuring principle.

The coding plugs can be set to: “A”, “B”, “C” and “D”.

The assignment of coding plug settings to measuring principle or measured value sensor/load can be found in the sections dealing with the individual electronics blocks (see Sections 9.1.3 to 9.1.5).

Setting and Parameterizing the Analog Modules, continued

Setting the Coding Plug

Proceed as follows if you want to change the setting of the coding plug:

1. Remove the coding plug from the TB8 via the channel group (**1**).

   Tip:

   The coding plugs can be adjusted more easily before the electronics block is hung into place.

2. Turn the coding plug to the desired setting (**2**) and insert it back into place (**3**).

   Correct Setting:

   The nose "Δ " next to the letter "A", "B", "C" or "D" must point in the direction of the electronics block.

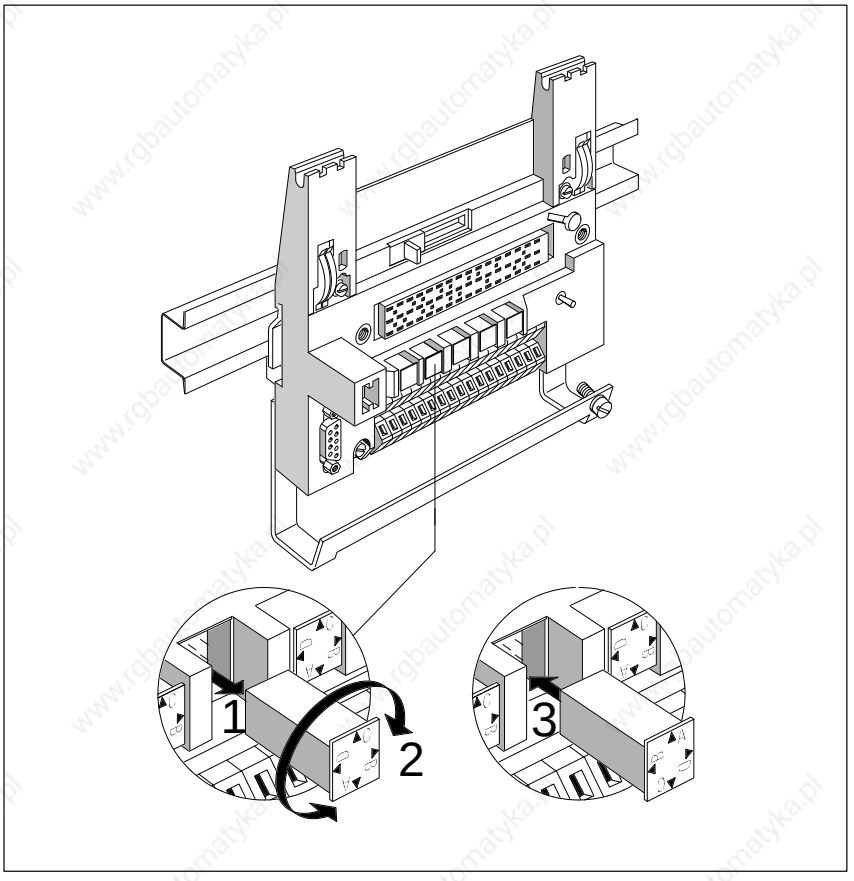


Figure 9-1 Changing the Setting of the Coding Plug

9.1.2 TB8 Terminal Block (6ES7 193-0CD40-0XA0)

Dimension Drawing TB8

Dimension Drawing: TB8 terminal block (spring-loaded terminal)

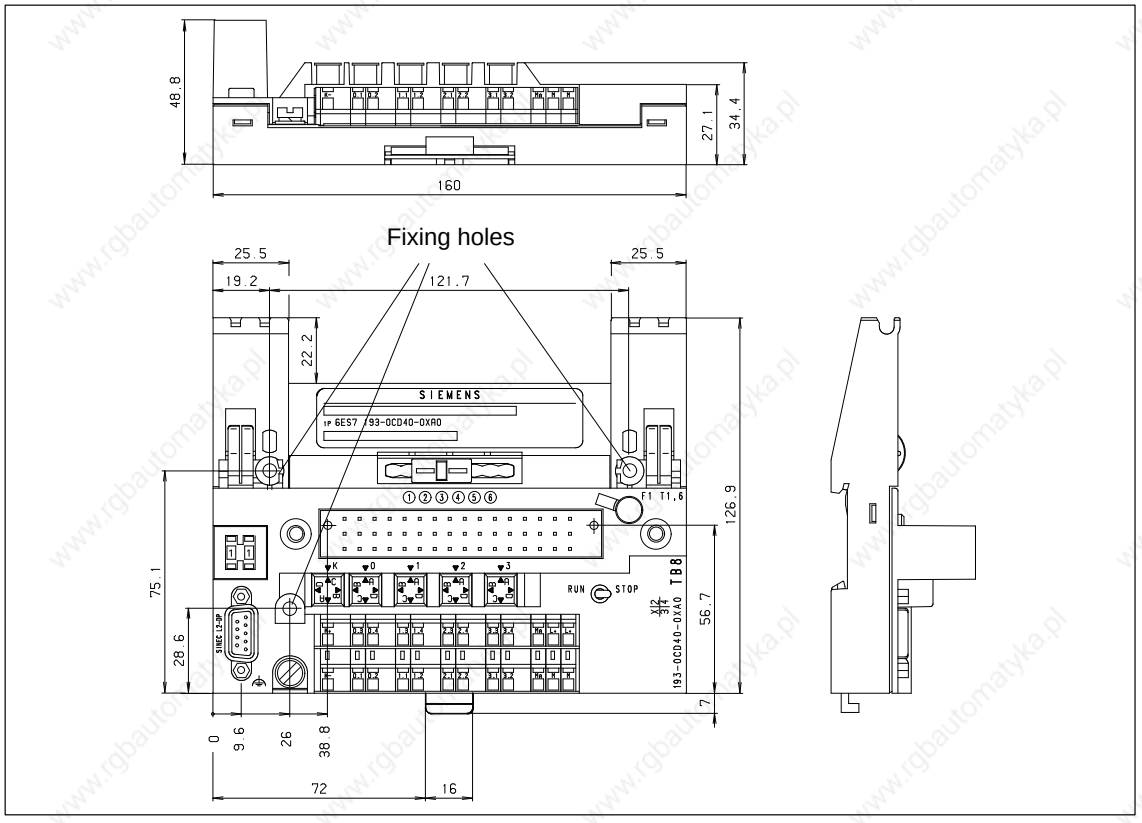


Figure 9-2 Dimension Drawing: TB8 Terminal Block (Spring-Loaded Terminal)

TB8 Terminal Block (6ES7 193-0CD40-0XA0), continued

Dimension Drawing TB8 with Bus Conn. (6ES7...)

Dimension drawing: Side elevation of theTB8 with SINEC L2 bus connector (6ES7 ...)

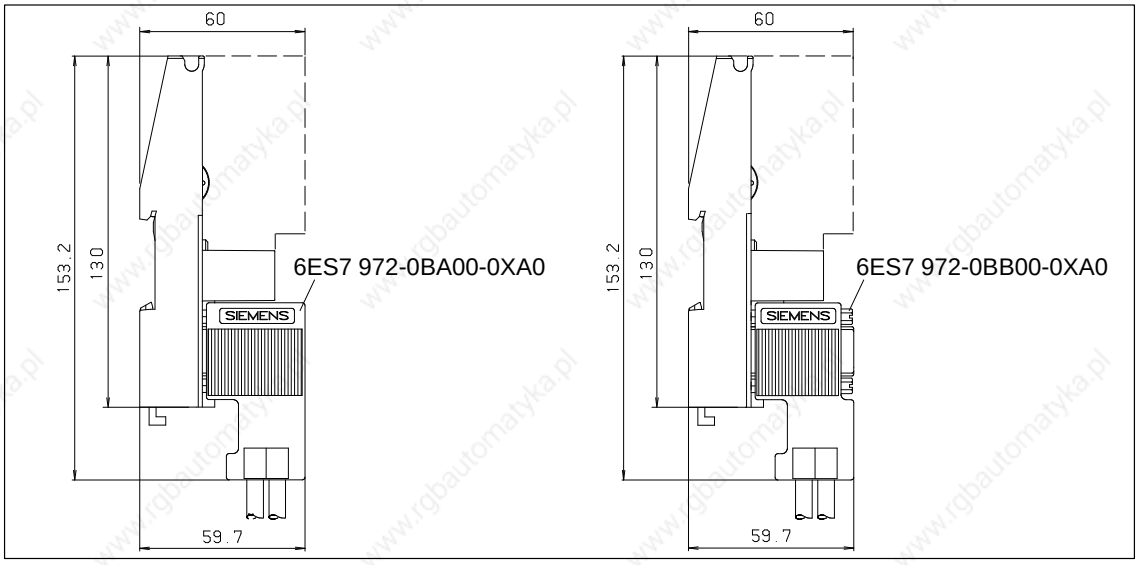


Figure 9-3 Dimension Drawing: Side Elevation of the Terminal Block TB8 with SINEC L2 Bus Connector (6ES7 972-0BA00-0XA0 and 6ES7 972-0BB00-0XA0)

Dimension Drawing TB8 with Bus Conn. (6ES5...)

Dimension drawing: Side elevation of the TB8 with SINEC L2 bus connector (6ES5...)

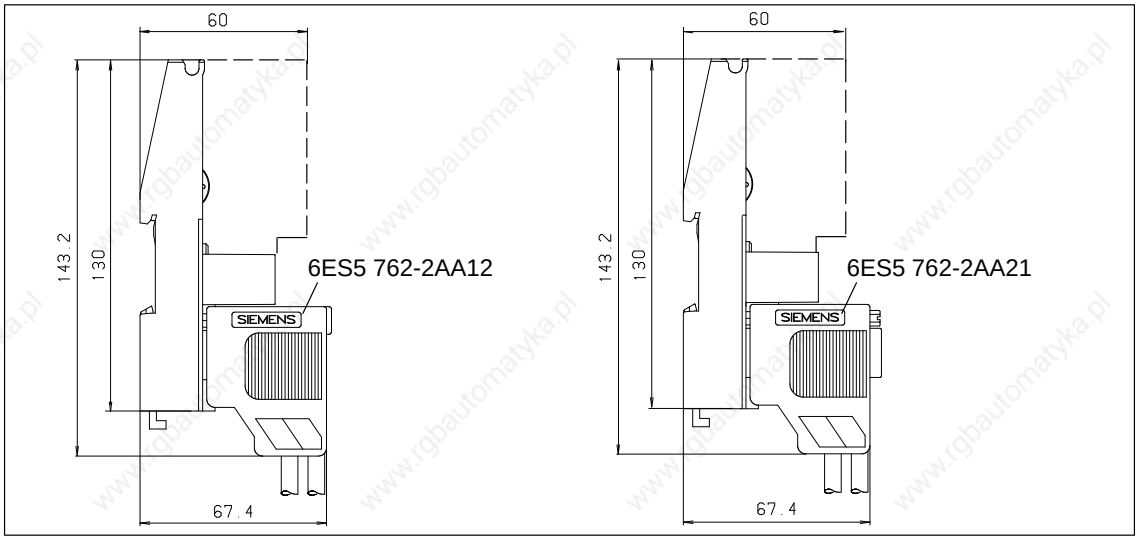


Figure 9-4 Dimension Drawing: Side Elevation of the Terminal Block TB8 with SINEC L2 Bus Connector (6ES5 762-2AA12 and 6ES5 762-2AA21)

9.1.3 Electronics Block ET 200B-4/8AI (6ES7 134-0KH00-0XB0)

Characteristics

The ET 200B-4/8AI electronics block has the following features:

- 8 differential inputs or 4 x Pt 100,
  floating to the voltage supply of the internal logic circuits
- Measuring ranges: ± 80 mV, ± 250 mV, ± 500 mV,
  ± 1000 mV, Pt 100
- Measuring principle: integrating
- Integration times: 16.7 ms, 20 ms
- Supply voltage: 24 V DC
- Connectable sensors
  - Thermocouples (type J, K, L)
  - Resistance thermometers (Pt 100)
  - Voltage sensors (2-wire connection)
- Measuring range set via COM ET 200

Dimension Drawing

Dimension drawing of the ET 200B-4/8AI:

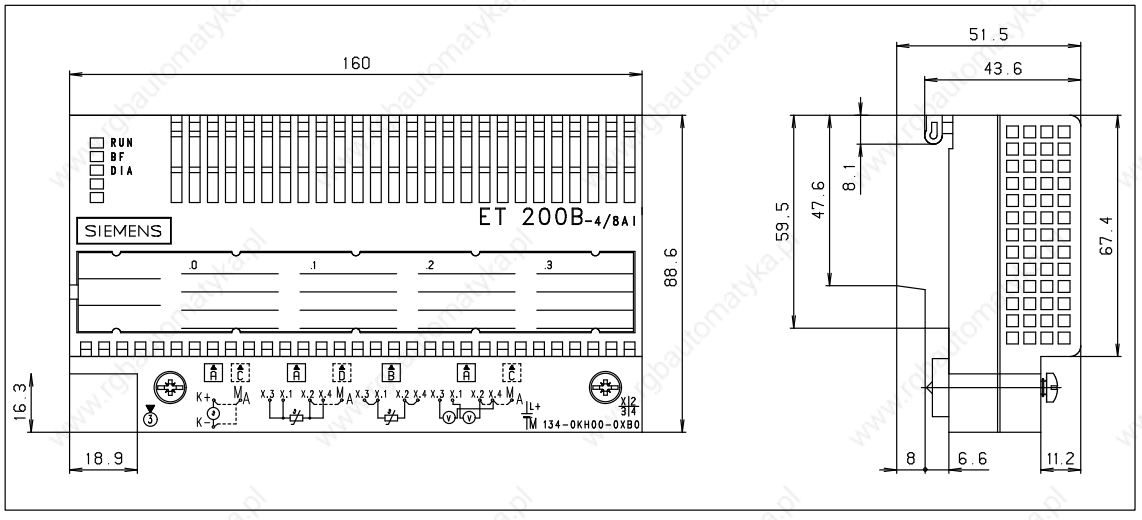


Figure 9-5 Dimension Drawing: ET 200B-4/8AI (6ES7 134-0KH00-0XB0)

Electronics Block ET 200B-4/8AI (6ES7 134-0KH00-0XB0), continued

Possible Connections

You can connect the following to the ET 200B-4/8AI electronics block:

- Up to 8 thermocouples with compensating box
- Up to 4 resistance thermometers in 2-wire or 4-wire connection
- Up to 8 voltage sensors (2-wire connection)

Simultaneous connection of different sensors is possible.

Channel Group

A channel group consists of two channels parameterized with COM ET 200 and the coding plug.

The parameters of a channel group apply generally to all channels of this group (for example input voltage, diagnostics enable, measuring method, etc.)

Measuring Methods

You have the choice of two methods of measuring analog signals from thermocouples, resistance thermometers and voltage sensors:

- Floating-ground measurement
- Ground-referenced measurement

Floating-Ground Measurement

In the case of floating-ground measurement (differential measurement), each signal line has its own signal reference conductor.

Differential measurement is required in the following cases:

- If the sensors are connected to different potentials and
- If the different signal sources are physically apart.

Note

The maximum permissible common mode voltage (V_{CM}) of the differential inputs to analog ground (M_A) is ± 1V.

The maximum permissible voltage difference between M_A and PE must not exceed 75 V DC/60 V AC.

Avoid ground loops!

Ground-Referenced Measurement

In the case of ground-referenced measurement, all signal reference conductors in the TB8 are connected to a common reference point (analog ground M_A).

To avoid ground loops, galvanically isolated and ungrounded signal sources (thermocouples, Pt 100, voltage sources) are required.

Note

Connect M_A to PE ( ) to enhance noise immunity in the case of ground-referenced measurement.

On the Following Pages

The following pages contain a connection example for every connection possibility and measuring principle. Please note the following rules.

Rules

Please note the following rules when connecting measured-value sensors to the ET 200B-4/8AI:

- The permissible potential difference at the differential input (x.1 ↔ x.2 or x.3 ↔ x.4, x = 0 to 3) must not exceed $\pm$1 V.
- The maximum permissible common mode voltage (V_{CM}) between the differential inputs (x.1 ↔ x.2, x.3 ↔ x.4, x = 0 to 3) and analog ground M_A is $\pm$ 1 V.
- The maximum permissible isolation voltage between analog ground (M_A) and PE ( ) or between the reference potential of the supply voltage (M) is 75 V DC/60 V AC.
- You must short-circuit the connection terminals of unused voltage inputs and connect them to M_A.

  If the coding plug is in the C position, the connection to M_A is not required (already jumpered internally).
- If you connect only one voltage sensor (2-wire connection) to one channel, you must also short-circuit the remaining free differential input of the channel group and connect it to M_A.

  If the coding plug is in the C position, the connection to M_A is not required (already jumpered internally).
- If you connect a compensating box, you must short-circuit terminals “K+” and “K–”. For this purpose, set the coding plug to the “C” position.

Note

Please note the explanation of shielding of analog lines in Sections 3.1 and 3.5.

Electronics Block ET 200B-4/8AI (6ES7 134-0KH00-0XB0), continued

Connecting Thermocouples with Compensating Boxes

The ET 200B-4/8AI does not have an internal compensating box. The influence of temperature on the reference junction can be countered with a compensating box.

Please note the following rules when connecting a compensating box:

- The compensating box must be connected to terminals K+ and K–.
- The compensating box must have a floating power supply. The power supply unit of the compensating box must have a grounded shielding winding.
- In the case of external compensation with one compensating box per channel, the same thermocouple type must be used for each channel group.
- External compensation where the compensating box is connected to the COMP connections of the module can only be implemented for one thermocouple type. This means you must use the same type for all channels working with this compensating box.

Figures 9-6 and 9-7 show both methods of connecting thermocouples. Up to 8 thermocouples can be connected.

Valid Compensating Boxes

We recommend the following compensating boxes for connection to the ET 200B-4/8AI:

- Compensating box type U with current stabilizer.
- Reference junction with built-in power supply unit.

The order numbers of the compensating boxes and the associated components can be found in the tables below.

Table 9-3 Compensating Box Type U with Current Stabilizer.

Accessories	Weight	Order Number
Type U compensating box		
Reference temp. 20 °C (68 °F)→ 0 mV	0.22 kg (7.7 oz.)	C70153-A502-A1
0 °C (32 °F)→ 0 mV	0.22 kg (7.7 oz.)	C70153-A502-A5
Insert for type U compensating box (as spare part and for installation in distribution boxes or similar)		
Reference temp. 20 °C (68 °F)→ 0 mV	0.09 kg (3.15 oz.)	C70153-A502-B7
0 °C (32 °F)→ 0 mV	0.09 kg (3.15 oz.)	C70153-A502-B9
Current stabilizer for feeding a compensating box for thermocouple Fe/Cu Ni, Ni Cr/Ni		
Reference temp. 20 °C (68 °F)→ 0 mV	0.25 kg (8.75 oz.)	M55232-A1
0 °C (32 °F)→ 0 mV	0.25 kg (8.75 oz.)	M55232-A2

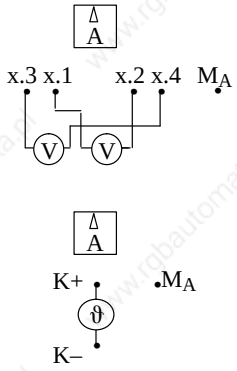
Table 9-4 Reference Junction with Built-In Power Supply Unit

Accessories		Order Number
Reference junction with built-in power supply unit, for installation on a mounting rail		M72166-□□□□□
Auxiliary power	220 V AC	B1
	110 V AC	B2
	24 V AC	B3
	24 V DC	B4
Connection of thermocouple	Fe-CuNi type L	1
	Fe/Cu Ni type J	2
	Ni Cr/Ni type K	3
Reference temperature	0 ˚C (32 ˚F)	00
	20 ˚C (68 ˚F)	20

Electronics Block ET 200B-4/8AI (6ES7 134-0KH00-0XB0), continued

Floating-Ground Measurement

Connection of thermocouples with a compensating box (floating-ground measurement) is shown below:



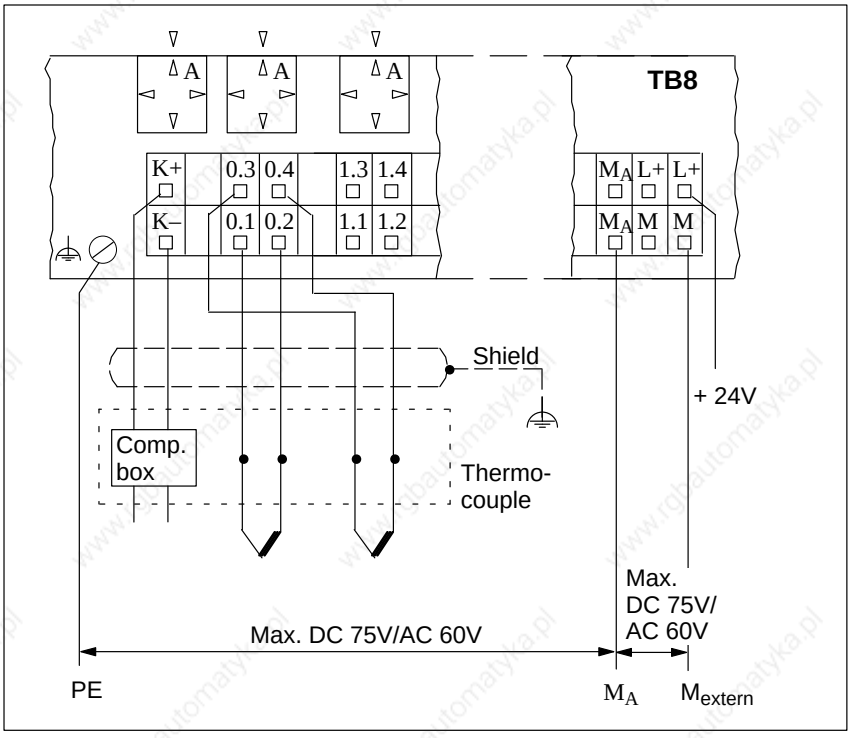


Figure 9-6 Connection of Thermocouples with a Compensating Box (Floating-Ground Measurement)

Note

The maximum permissible common mode voltage ($V_{CM} \leq \pm 1V$) must not be exceeded at any of the

Ground-Referenced Measurement

The connection of thermocouples with a compensating box (ground-referenced measurement) is shown below:

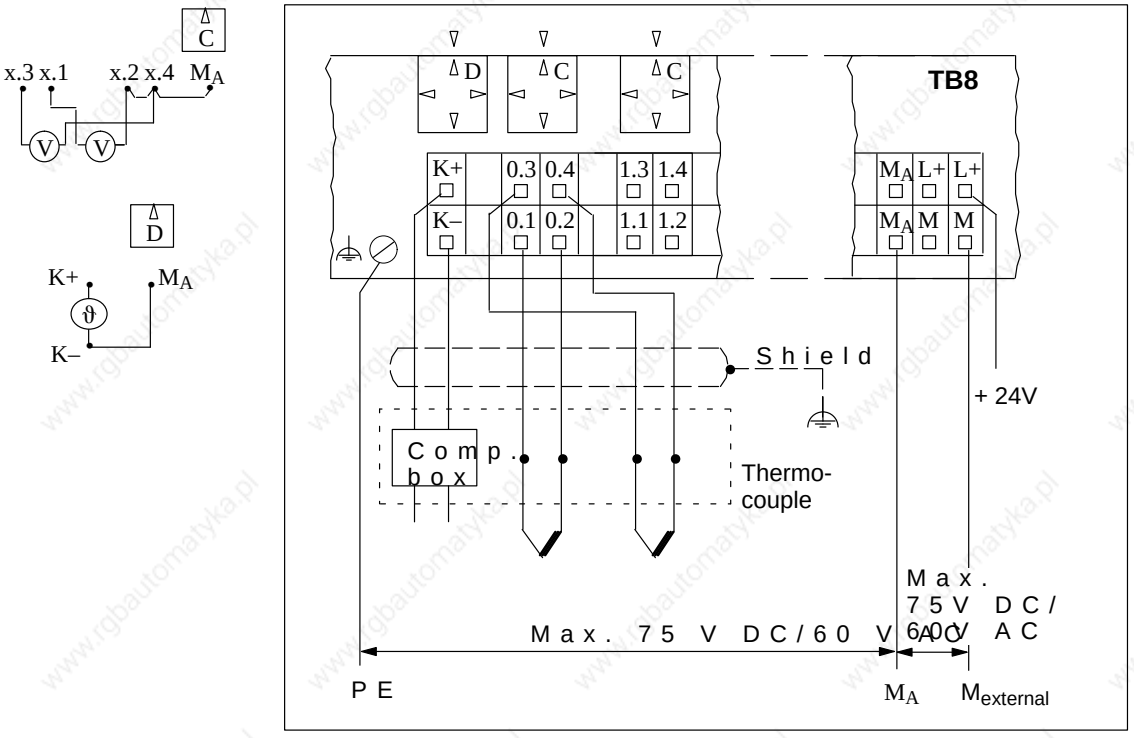


Figure 9-7 Connection of Thermocouples with a Compen (Ground-Referenced Measurement)

Electronics Block ET 200B-4/8AI (6ES7 134-0KH00-0XB0), continued

Connection of Resistance Thermometers (2-Wire Connection)

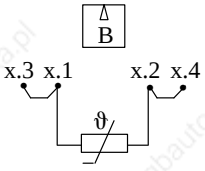
The resistance of the resistance thermometer (Pt 100) is measured via a 2-wire connection.

A constant current is fed to the resistance thermometer via terminals x.1 and x.2. Voltage drops on the measuring lines can corrupt the result of the measurement. This type of measurement is appropriate where the measuring lines are short and thick or where accuracy requirements are not stringent.

Figures 9-8 and 9-9 show both methods of connecting resistance thermometers with 2-wire connections. Up to four Pt 100s can be connected.

Floating-Ground Measurement

The connection of resistance thermometers (Pt 100) with 2-wire connections (floating-ground measurement) is shown below:



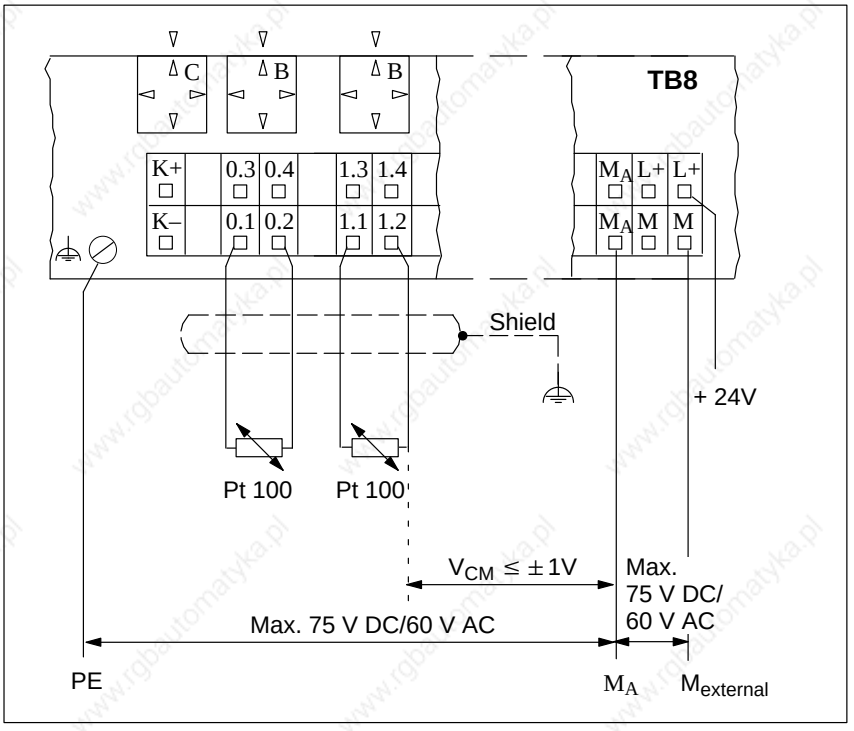
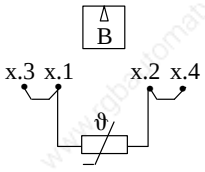


Figure 9-8 Connection of Resistance Thermometers (Pt 100) with 2-Wire Connections (Floating-Ground Measurement)

Note

The maximum permissible common mode voltage ($V_{CM} \leq \pm 1V$) must not be exceeded at any of the differential inputs with reference to M_A.

Ground-Referenced Measurement



In the case of ground-referenced measurement, you must connect terminal x.4 externally with analog ground (M_A).

The connection of resistance thermometers (Pt 100) with 2-wire connections (ground-referenced measurement) is shown below:

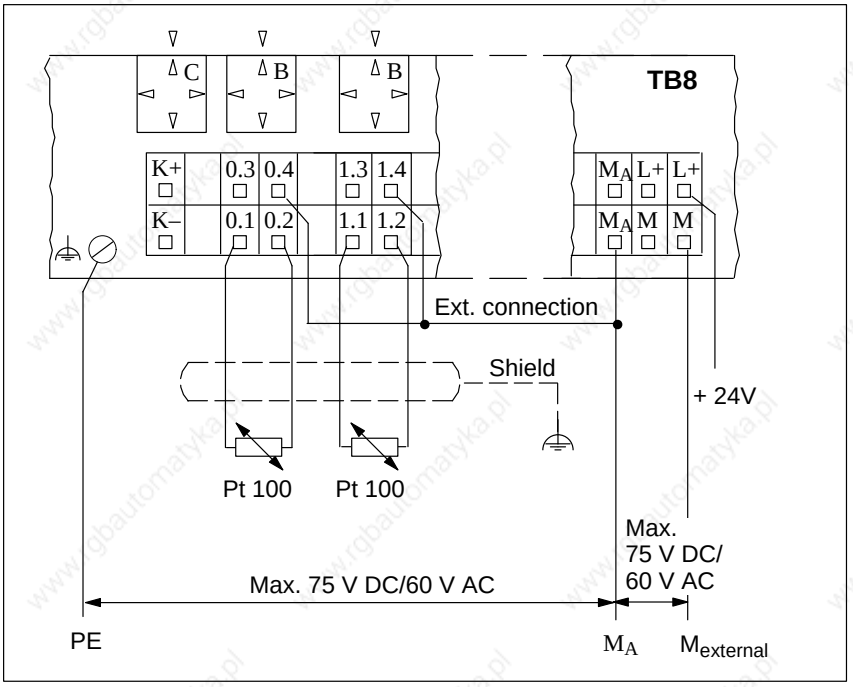


Figure 9-9 Connection of Resistance Thermometers (Pt 100) with 2-Wire Connections (Ground-Referenced Measurement)

Electronics Block ET 200B-4/8AI (6ES7 134-0KH00-0XB0), continued

Connection of Resistance Thermometers (4-Wire Connection)

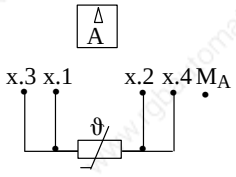
The resistance of the resistance thermometer (Pt 100) is measured via a 4-wire connection.

A constant current Ic is fed to the resistance thermometer via terminals x.1 and x.2. The voltage generated at the resistance thermometer is measured via x.3/x.4. This means that voltage drops on the “constant current lines” do not corrupt the result of the measurement. The measurement inputs have a high resistance so that only a negligible voltage drop occurs on the measuring lines.

Figures 9-10 and 9-11 show both methods of connecting resistance thermometers with 4-wire connections.

Floating-Ground Measurement

The connection of resistance thermometers (Pt 100) with 4-wire connections (floating-ground measurement) is shown below:



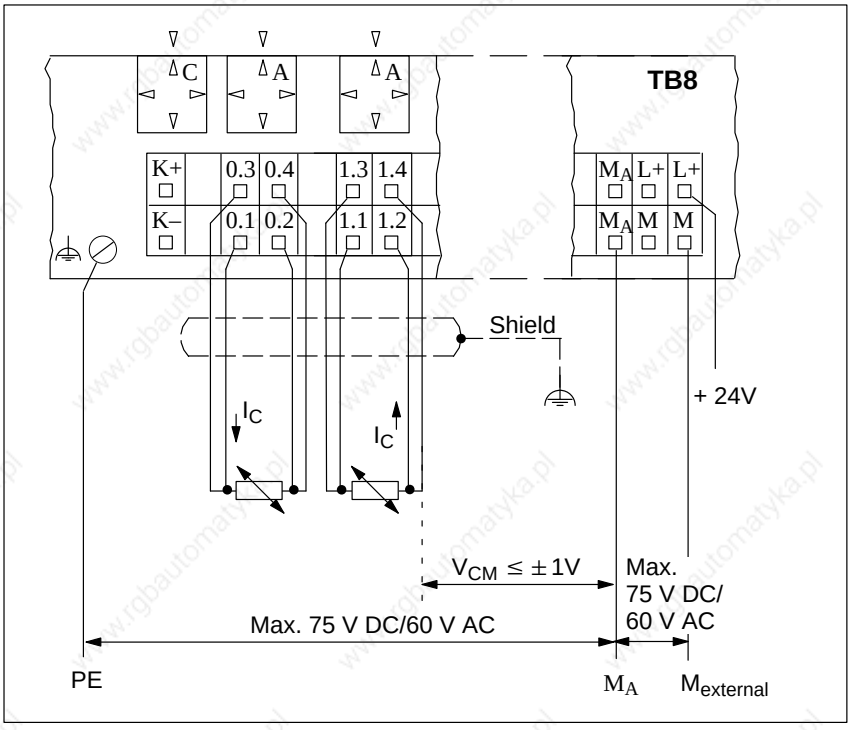


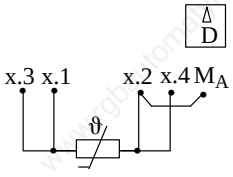
Figure 9-10 Connection of Resistance Thermometers (Pt 100) with 4-Wire Connections (Floating-Ground Measurement)

Note

The maximum permissible common mode voltage ($V_{CM} \leq \pm 1V$) must not be exceeded at any of the differential inputs with reference to M_A.

Ground-Referenced Measurement

The connection of resistance thermometers (Pt 100) with 4-wire connections (ground-referenced measurement) is shown below:



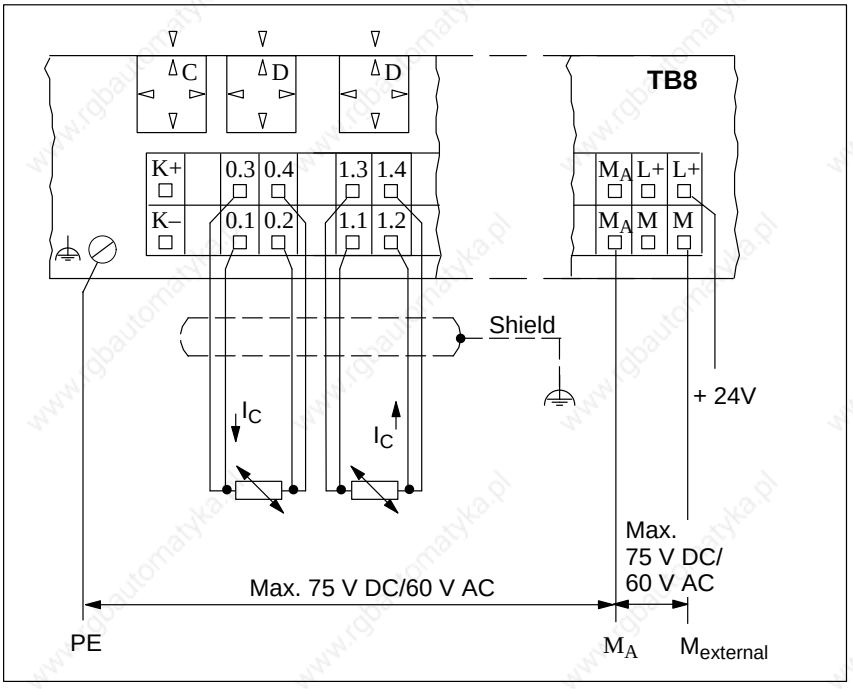


Figure 9-11 Connection of Resistance Thermometers (Pt 100) with 4-Wire Connections (Ground-Referenced Measurement)

Electronics Block ET 200B-4/8AI (6ES7 134-0KH00-0XB0), continued

Connecting Voltage Sensors

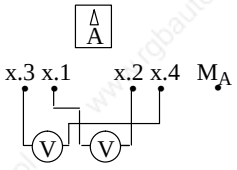
Free channels can be used for connecting voltage sensors (± 80 mV, ± 250 mV, ± 500 mV, ± 1000 mV).

Two voltage sensors per channel group can be connected.

Figures 9-12 and 9-13 show both methods of connecting voltage sensors.

Floating-Ground Measurement

Two-wire connection of voltage sensors (floating-ground measurement) is shown below:



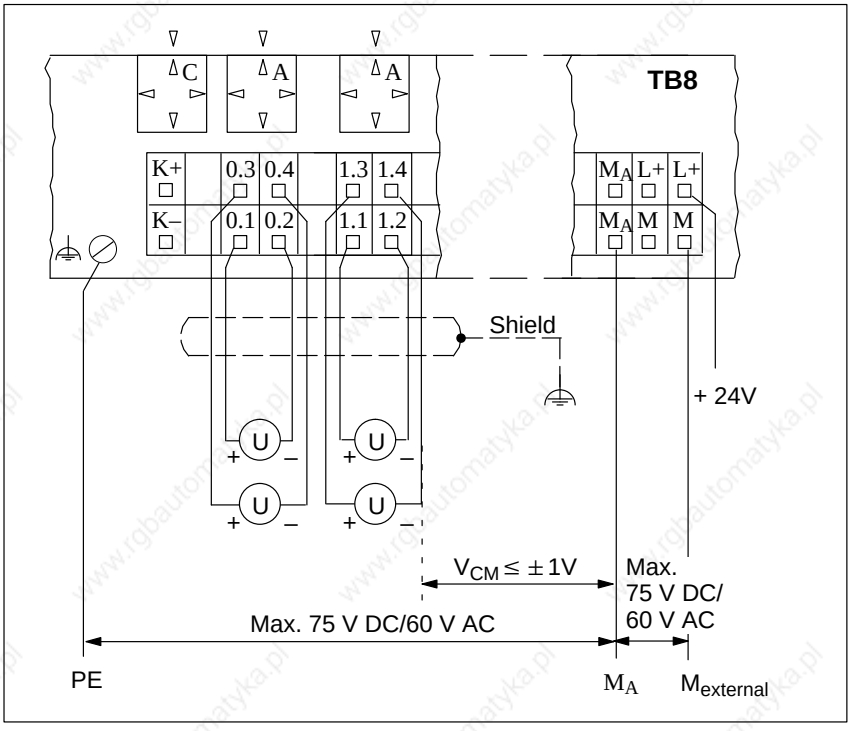


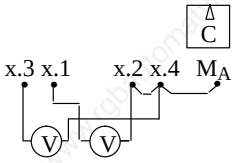
Figure 9-12 Two-Wire Connection of Voltage Sensors to 6ES7 134-0KH00-0XB0 (Floating-Ground Measurement)

Note

The maximum permissible common mode voltage ($V_{CM} \leq \pm 1V$) must not be exceeded at any of the differential inputs with reference to M_A.

Ground-Referenced Measurement

Two-wire connection of voltage sensors (ground-referenced measurement) is shown below:



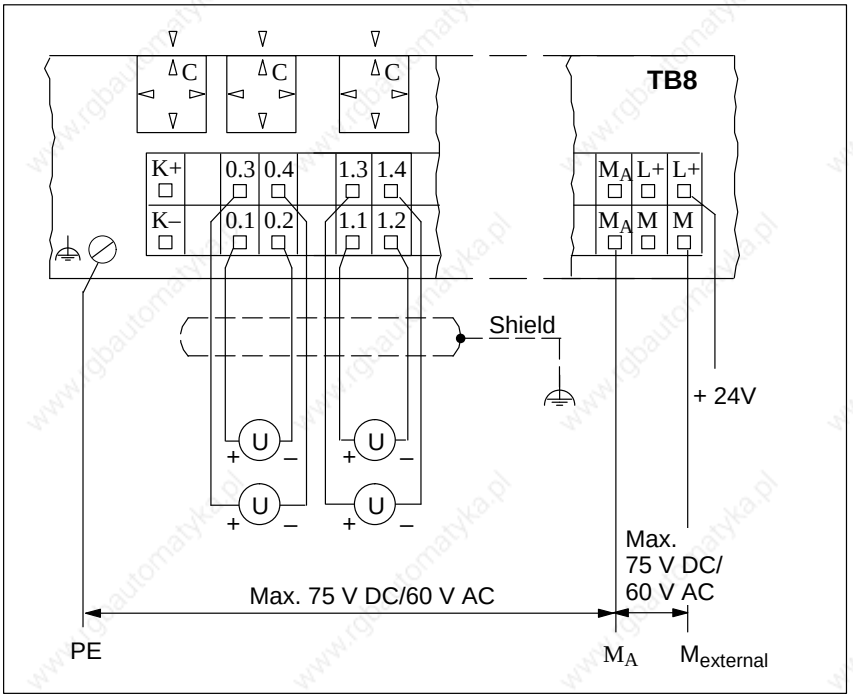


Figure 9-13 Two-Wire Connection of Voltage Sensors to 6ES7 134-0KH00-0XB0 (Ground-Referenced Measurement)

Electronics Block ET 200B-4/8AI (6ES7 134-0KH00-0XB0), continued

Parameterization

You define the functional principle of the ET 200B-4/8AI with COM ET 200 parameterization software.

Table 9-5 shows all the parameters for the ET 200B-4/8AI:

Table 9-5 Parameters for ET 200B-4/8AI

Byte[1]	Parameter	Explanation	Value Range
3 (Bit 0)	Diagnostics enable for channel group 0 (channels 0 ,1) (terminals 0.1/0.2, 0.3/0.4)	Diagnostics messages enabled separately for each channel	Disable Enable
3 (Bit 1)	Diagnostics enable for channel group 1 (kanal 2, 3) (terminals 1.1/1.2, 1.3/1.4)		
3 (Bit 2)	Diagnostics enable for channel group 2 (channels 4, 5) (terminals 2.1/2.2, 2.3/2.4)		
3 (Bit 3)	Diagnostics enable for channel group 3 (channels 6, 7) (terminals 3.1/3.2, 3.3/3.4)		
4 (Bit 0)	Wire break monitoring enable for channel group 0 (channels 0, 1) (terminals 0.1/0.2, 0.3/0.4)	Wire break monitoring enabled separately for each channel	Disable Enable
4 (Bit 1)	Wire break monitoring enable for channel group 1 (channels 2, 3) (terminals 1.1/1.2, 1.3/1.4)		
4 (Bit 2)	Wire break monitoring enable for channel group 1 (channels 4, 5) (terminals 2.1/2.2, 2.3/2.4)		
4 (Bit 3)	Wire break monitoring enable for channel group 1 (channels 6, 7) (terminals 3.1/3.2, 3.3/3.4)		
6	Integration time	Specifying the optimum integration time for the A/D converter helps suppress noise voltages	20 ms 16,7 ms
7	Measurement method and range for channel group 0 (channels 0, 1) (terminals 0.1/0.2, 0.3/0.4)	You can set the measurement method and range separately for each channel group	
8	Measurement method and range for channel group 1 (channels 2, 3) (terminals 1.1/1.2, 1.3/1.4)	For voltage measurement:	± 1 V ± 0,5 V ± 0,25 V ± 80 mV

Table 9-5 Parameters for ET 200B-4/8AI

Byte[1]	Parameter	Explanation	Value Range
9	Measurement method and range for channel group 2 (channels 4, 5) (terminals 2.1/2.2, 2.3/2.4)	For resistance thermometer with linearization:	Pt 100 standard range
10	Measurement method and range for channel group 3 (channels 6, 7) (terminals 3.1/3.2, 3.3/3.4)	For thermocouple with external reference junction:	Type J with linearization Type K with linearization Type L with linearization
23	Representation of measured values		Two's complement Amount with sign

: Default setting in parameterization frame

[1] Byte address in parameterization frame of slave

Where to Find a Description

Parameterization of the ET 200B-4/8 with COM ET 200 V4.x is described in detail in Section

COM ET 200 WINDOWS also provides extensive support for parameterizing the ET 200B-4/8AI with COM ET 200 WINDOWS through its integrated help system.

Please refer to the *ET 200 Distributed I/O System* manual (Order No. 6ES5 998-3ES12) for further information about how to use COM ET 200 WINDOWS.

Electronics Block ET 200B-4/8AI (6ES7 134-0KH00-0XB0), continued

Analog Value Representation

Analog values can be represented in two data formats with the ET 200B-4/8AI:

- 12-bit two's complement representation (range: –2048 to +2047 units)
- 11-bit amount and 1-bit sign (range: –2048 to +2047 units)

Table 9-6 shows the analog value representation of the ET 200B-4/8AI:

Table 9-6 Representing an Analog Input Value as a Bit Pattern (6ES7 134-0KH00-0XB0)

	High Byte								Low Byte							
Bit number	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Analog value representation	SI	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}	X	F	OV

Bits 0 to 2 and bit 15 have no significance for the amount of the measured value. See Table 9-7 for a detailed description of these bits.

Supplementary Bits

Bits 0 to 2 and bit 15 have the following meaning in the bit pattern of the analog input value:

Table 9-7 Description of the Bits (6ES7 134-0KH00-0XB0)

Bit	Meaning	Signal Status	Meaning of the Signal Status
OV	Overflow bit	1	Overrange[1]
F	Fault bit	1	Wire break; the measured value read in is not valid
SI	Sign	0	"+" sign
		1	"–" sign
X	Irrelevant	–	–

1 In the event of overflow at one measuring point, the overflow bits of the other channels remain unaffected; this means the values of the other channels are correct and can be evaluated.

Note

When the ET 200B-4/8AI signals a wire break (fault bit F = 1), the overflow bit OV is also set.

Measured Value Table

Tables 9-8 to 9-10 show the assignments of analog to digitized measured values for the measuring ranges: ± 80 mV, ± 250 mV, ± 500 mV and ± 1000 mV.

Table 9-8 Representation of Digitized Measured Values of the ET 200B-4/8AI (6ES7 134-0KH00-0XB0; Measuring Ranges: ± 80 mV, ± 250 mV, ± 500 mV and ± 1000 mV; **Two's Complement**)

Units	Measured Value in mV				Digitized Measured Value													X	F	OV	Range
	± 80 mV	± 250 mV	± 500 mV	± 1000 mV	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
> 2409	94.10	294.07	588.13	1176.26	0	1	0	0	1	0	1	1	0	1	0	0	1	0	0	1	Overflow
2408	94.06	293.95	587.89	1175.78	0	1	0	0	1	0	1	1	0	1	0	0	0	0	0	0	Overrange
:	:	:	:	:								:									
2049	80.04	250.12	500.24	1000.48	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
2048	80.00	250.0	500.0	1000.0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Nominal range
1024	40.00	125.00	250.00	500.00	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	0.039	0.12	0.24	0.48	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
0	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
–1	–0.039	–0.12	–0.24	–0.48	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	
–1024	–40.00	–125.00	–250.00	–500.00	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
–2048	–80.00	–250.0	–500.0	–1000.0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
–2049	–80.04	–250.12	–500.24	–1000.48	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	Overrange
:	:	:	:	:								:									
–2408	–94.06	–293.95	587.89	–1175.78	1	0	1	1	0	1	0	0	1	1	0	0	0	0	0	0	
< –2409	–94.10	–294.07	–588.13	–1176.26	1	0	1	1	0	1	0	0	1	0	1	1	1	0	0	1	Overflow

Electronics Block ET 200B-4/8AI (6ES7 134-0KH00-0XB0), continued

Table 9-9 Representation of Digitized Measured Values of the ET 200B-4/8AI (6ES7 134-0KH00-0XB0; Measuring Ranges: ± 80 mV, ± 250 mV, ± 500 mV and ± 1000 mV; **Amount and Sign**)

Units	Measured Value in mV				SI	Digitized Measured Value												X	F	OV	Range
	± 80 mV	± 250 mV	± 500 mV	± 1000 mV	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
> 2409	94.10	294.07	588.13	1176.26	0	1	0	0	1	0	1	1	0	1	0	0	1	0	0	1	Overflow
2408	94.06	293.95	587.89	1175.78	0	1	0	0	1	0	1	1	0	1	0	0	0	0	0	0	Overrange
:	:	:	:	:								:									
2049	80.04	250.12	500.24	1000.48	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
2048	80.00	250.0	500.0	1000.0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1024	40.00	125.00	250.00	500.00	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	0.039	0.12	0.24	0.48	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	Nominal range
0	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
–1	–0.039	–0.12	–0.24	–0.48	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
–1024	–40.00	–125.00	–250.00	–500.00	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
–2048	–80.00	–250.0	–500.0	–1000.0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
–2049	–80.04	–250.12	–500.24	–1000.48	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	Overrange
:	:	:	:	:								:									
–2408	–94.06	–293.95	587.89	–1175.78	1	1	0	0	1	0	1	1	0	1	0	0	0	0	0	0	
< –2409	–94.10	–294.07	–588.13	–1176.26	1	1	0	0	1	0	1	1	0	1	0	0	1	0	0	1	Overflow

Note

Bit 15 of the digitized measured value indicates the sign.

The following applies: SI = 0 → positive value; SI = 1 → negative value.

Measured Value Table

Table 9-10 shows the assignment of analog to digitized measured value for the resistance thermometer (Pt 100):

Table 9-10 Representation of Digitized Measured Values of the ET 200B-4/8AI in the Case of Resistance Thermometers (**Two's Complement**)

Units	Resistance in Ω	Temperature in °C	Digitized Measured Value													X	F	OV	Range
			15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
> 1766	> 400	> 883	0	0	1	1	0	1	1	1	0	0	1	1	0	0	0	1	Overflow
1766		883	0	0	1	1	0	1	1	1	0	0	1	1	0	0	0	1	Overrange[1]
:		:								:									
1702		851	0	0	1	1	0	1	0	1	0	0	1	1	0	0	0	1	
1700	390.26	850	0	0	1	1	0	1	0	1	0	0	1	0	0	0	0	0	Nominal range
1400	345.13	700	0	0	1	0	1	0	1	1	1	1	0	0	0	0	0	0	
1000	280.90	500	0	0	0	1	1	1	1	1	0	1	0	0	0	0	0	0	
600	212.02	300	0	0	0	1	0	0	1	0	1	1	0	0	0	0	0	0	
300	157.31	150	0	0	0	0	1	0	0	1	0	1	1	0	0	0	0	0	
200	138.50	100	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	
2	100.39	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	
–0	100.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
–40	92.16	–20	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	
–80	84.27	–40	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	
–200	60.25	–100	1	1	1	1	1	0	0	1	1	1	0	0	0	0	0	0	
–202		–101	1	1	1	1	1	0	0	1	1	0	1	1	0	0	0	1	Overrange[1]
:		:								:									
–494		–247	1	1	1	1	0	0	0	0	1	0	0	1	0	0	0	1	
< –494		< –247	1	1	1	1	0	0	0	0	1	0	0	1	0	0	0	1	Overflow

[1] In the overrange, any rise in the characteristic curve is retained when the linearized nominal range is exited.

Electronics Block ET 200B-4/8AI (6ES7 134-0KH00-0XB0), continued

Measured Value Table

Tables 9-11 to 9-13 show the assignment of analog to digitized measured values for thermocouples of types J, K and L.

Table 9-11 Representation of Digitized Measured Values of the ET 200B–4/8AI with Linearization: Thermocouple Type K (Nickel-Chromium/Nickel-Aluminum, to IEC 584) (**Two's Complement**)

Units	Thermal e. m. f. in mV[1]	Temperature in °C	Digitized Measured Value														X	F	OV	Range
			15	14	13	12	11	10	9	8	7	6	5	4	3		2	1	0	
> 2359			0	1	0	0	1	0	0	1	1	0	1	1	1		0	0	1	Overflow
1370		1370	0	0	1	0	1	0	1	0	1	1	0	1	0		0	0	1	Overrange[2]
1369	54.773	1369	0	0	1	0	1	0	1	0	1	1	0	0	1		0	0	0	
1000	41.269	1000	0	0	0	1	1	1	1	1	0	1	0	0	0		0	0	0	
500	20.640	500	0	0	0	0	1	1	1	1	1	0	1	0	0		0	0	0	
150	6.137	150	0	0	0	0	0	1	0	0	1	0	1	1	0		0	0	0	Nominal range
100	4.095	100	0	0	0	0	0	0	1	1	0	0	1	0	0		0	0	0	
1	0.039	1	0	0	0	0	0	0	0	0	0	0	0	0	1		0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	
–1	–0.039	–1	1	1	1	1	1	1	1	1	1	1	1	1	1		0	0	0	
–100	–3.553	–100	1	1	1	1	1	1	0	0	1	1	1	0	0		0	0	0	
–101	–3.584	–101	1	1	1	1	1	1	0	0	1	1	0	1	1		0	0	0	Accuracy
–150	–4.912	–150	1	1	1	1	1	0	1	1	0	1	0	1	0		0	0	0	≤ 2 K
–200	–5.891	–200	1	1	1	1	1	0	0	1	1	1	0	0	0		0	0	0	
–201		–201	1	1	1	1	1	0	0	1	1	0	1	1	1		0	0	1	Overrange[2]
–273			1	1	1	1	0	0	0	0	1	0	0	1	0		0	0	1	Overflow
X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		0	1	0	Wire break

1 For a reference temperature of 0 °C (32 °F)

2 In the overrange, any rise in the characteristic curve is retained when the linearized nominal range is exited.

Table 9-12 Representation of Digitized Measured Values of the ET 200B-4/8AI with Linearization: Thermocouple Type J (Iron/Copper-Nickel (Constantan), to IEC 584) (**Two's Complement**)

Units	**Thermal e. m. f. in mV**[1]	**Temperature in °C**	**Digitized Measured Value**														**X**	**F**	**OV**	**Range**
			15	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**		**2**	**1**	**0**	
1485			0	0	1	0	1	1	1	0	0	1	1	0	1		0	0	1	Overflow
1201		1201	0	0	1	0	0	1	0	1	1	0	0	0	1		0	0	1	Overrange[2]
1200	69.536	1200	0	0	1	0	0	1	0	1	1	0	0	0	0		0	0	0	
1000	57.942	1000	0	0	0	1	1	1	1	1	0	1	0	0	0		0	0	0	
500	27.388	500	0	0	0	0	1	1	1	1	1	0	1	0	0		0	0	0	
100	5.268	100	0	0	0	0	0	0	1	1	0	0	1	0	0		0	0	0	
1	0.05	1	0	0	0	0	0	0	0	0	0	0	0	0	1		0	0	0	Nominal range
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	
–1	–0.05	–1	1	1	1	1	1	1	1	1	1	1	1	1	1		0	0	0	
–100	–4.632	–100	1	1	1	1	1	1	0	0	1	1	1	0	0		0	0	0	
–150	–6.499	–150	1	1	1	1	1	0	1	1	0	1	0	1	0		0	0	0	
–199	–7.868	–199	1	1	1	1	1	0	0	1	1	1	0	0	1		0	0	0	
–200	–7.890	–200	1	1	1	1	1	0	0	1	1	1	0	0	0		0	0	0	
–201		–201	1	1	1	1	1	0	0	1	1	0	1	1	1		0	0	1	Overrange[2]
–273			1	1	1	1	0	1	1	1	0	1	1	1	1		0	0	1	Overflow
X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		0	1	0	Wire break

1 For a reference temperature of 0 °C (32 °F)

2 In the overrange, any rise in the characteristic curve is retained when the linearized nominal range is exited.

Electronics Block ET 200B-4/8AI (6ES7 134-0KH00-0XB0), continued

Table 9-13 Representation of Digitized Measured Values of the ET 200B-4/8AI with Linearization: Thermocouple Type L (Iron/Copper-Nickel (Constantan), to DIN 43710) (**Two's Complement**)

Units	Thermal e. m. f. in mV[1]	Temperature in °C	Digitized Measured Value														X	F	OV	Range
			15	14	13	12	11	10	9	8	7	6	5	4	3		2	1	0	
1361			0	0	1	0	1	0	1	0	1	0	0	0	1		0	0	1	Overflow
901		901	0	0	0	1	1	1	0	0	0	0	1	0	1		0	0	1	Over-range[2]
900	53.14	900	0	0	0	1	1	1	0	0	0	0	1	0	0		0	0	0	
500	27.85	500	0	0	0	0	1	1	1	1	1	0	1	0	0		0	0	0	
250	13.75	250	0	0	0	0	0	1	1	1	1	1	0	1	0		0	0	0	
100	+5.37	100	0	0	0	0	0	0	1	1	0	0	1	0	0		0	0	0	
1	0.05	1	0	0	0	0	0	0	0	0	0	0	0	0	1		0	0	0	Nominal range
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	
–1	–0.05	–1	1	1	1	1	1	1	1	1	1	1	1	1	1		0	0	0	
–100	–4.75	–100	1	1	1	1	1	1	0	0	1	1	1	0	0		0	0	0	
–150	–6.60	–150	1	1	1	1	1	0	1	1	0	1	0	1	0		0	0	0	
–190	–7.86	–190	1	1	1	1	1	0	1	0	0	0	0	1	0		0	0	0	
–199	–8.12	–199	1	1	1	1	1	0	0	1	1	1	0	0	1		0	0	0	
–200		–200	1	1	1	1	1	0	0	1	1	1	0	0	0		0	0	1	Over-range[2]
–273			1	1	1	1	0	1	1	1	0	1	1	1	1		0	0	1	Overflow
X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		0	1	0	Wire break

1 For a reference temperature of 0 °C (32 °F)
2 In the overrange, any rise in the characteristic curve is retained when the linearized nominal range is exited.

Schematic Circuit Diagram

Simplified representation of potential for the ET 200B-4/8AI and TB8:

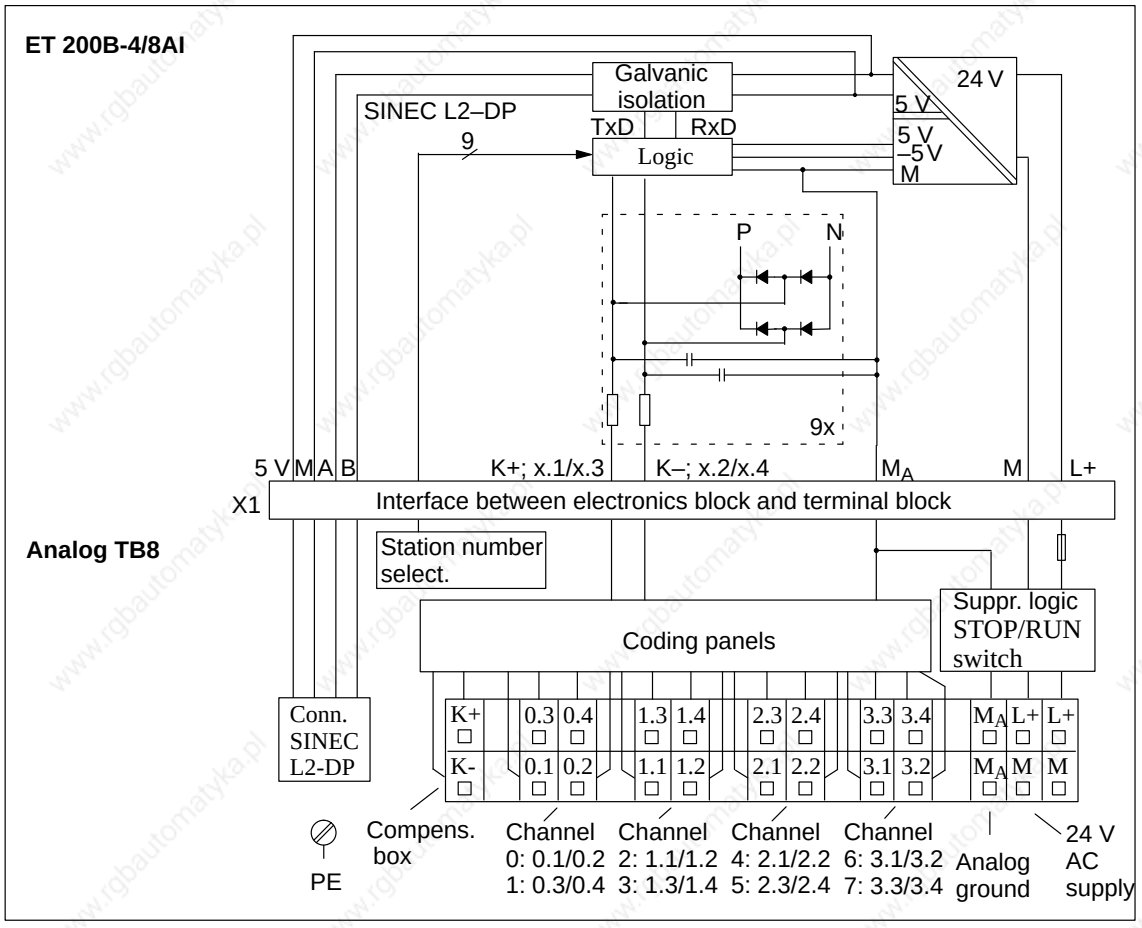


Figure 9-14 Schematic Circuit Diagram: ET 200B-4/8AI (6ES7 134-0KH00-0XB0) and TB8

Electronics Block ET 200B-4/8AI (6ES7 134-0KH00-0XB0), continued

Terminal Assignments

The ET 200B-4/8AI is plugged into the TB8.

Table 9-14 contains the terminal assignments of the TB8 for the ET 200B-4/8AI depending on the sensor connected.

Table 9-14 Terminal Assignments of the TB8 for ET 200B-4/8AI (6ES7 134-0KH00-0XB0)

Terminal	Assignment When the Following are Connected		
	Thermocouple	**Resistance Thermometer**	**Voltage Sensor**
K+	Compensating box	Unassigned	Unassigned
K–	Compensating box	Unassigned	Unassigned
x.1	Measuring line (+)	Constant current line I_C+	Measuring line (+)
x.2	Measuring line (–)	Constant current line I_C–	Measuring line (–)
x.3	Measuring line (+)	Measuring line (+)	Measuring line (+)
x.4	Measuring line (–)	Measuring line (–)	Measuring line (–)
M_A	Analog ground (M_A)		
L+	Voltage supply for internal logic		
M	Voltage supply for internal logic		

x = 0, 1, 2, 3

Note

You must make additional settings for the input circuits of the TB8 via coding plugs. See Figures 9-12 and 9-13 for the necessary settings of the coding plugs.

Technical specifications	
Baud rates	9.6/19.2/93.75/187.5/500/ 1500 kbps
Bus protocol	DP Standard
Galvanic isolation to SINEC L2-DP bus	Yes
Power losses	Typ. 2 W
Weight (EB and TB)	Approx. 550 g (19.25 oz.)
Dimensions (EB and TB: W x H x D)	160 x 130 x 60 mm (6.24 x 5.07 x 2.34 in.)
Diagnostics functions	
Voltage monitoring	Green “RUN” LED
Bus monitoring SINEC L2-DP	Red “BF” LED
Group diagnostics	Red “DIA” LED, parameterizable
Supply voltage for inputs and internal logic	
Supply voltage (L+)	
• Rated value	24 V DC
• Permissible range	18.5 to 30.2 V
• Value for t < 0.5s	35 V
Current consumption from L+	
• Logic	80 mA
Inputs	
Number of inputs	8 voltage inputs or 4 inputs for Pt 100 or 8 inputs for thermocouple types K, J, L
Galvanic isolation to internal electronic circuits	No
Galvanic isolation to voltage supply of internal electronic logic	Yes
Measured value ranges	
• Voltage sensors	± 80 mV, ± 250 mV, ± 500 mV, ± 1000 mV
• Resistance-type sensors	0 to 400 Ω
Permissible input voltage for voltage input (destruction limit)	32 V

Inputs, continued		
Characteristic curve linearization for following thermocouples		
• Nickel-chromium/ nickel-aluminum (type K)	To IEC 584	
• Iron/copper-nickel (type J)	To IEC 584	
• Iron/copper-nickel (type L)	To DIN 43710	
Linearization accuracy in nominal range (for types K, J, L)	±1°C (33.8 °F)	
Method of connecting signal sensors	2-wire connection; 4-wire connection for Pt 100	
Input resistance	≥ 10 MΩ	
Measured value representation	Can be switched between following data formats: 12-bit two’s complement, 11-bit amount with sign	
Overrange	Approx. 17.5 %	
Measuring method	Integrating	
Integration/conversion time/resolution (per channel)		
• Parameterizable	Yes	
• Integration time in ms	$16^2/_3$	20
• Basic conversion time incl. integration time and offset measuring time in ms	34	44
or additional conversion time for wire break monitoring in ms	10	10
• Noise suppression for interference frequency f1 in Hz	60	50
Permissible potential difference		
• Inputs to each other	Max. ±1 V	
• Inputs to M_A (V_{CM})	Max. ±1 V	
• M_A to PE or M	Max. 75 V DC/60 V AC	

Electronics Block ET 200B-4/8AI (6ES7 134-0KH00-0XB0), continued

Inputs, continued	
Fault message in event of	
• Overrange	Yes
• Wire break of signal sensor lines	Yes for Pt 100, ± 80 mV, thermocouple types K, J, L (can be set with COM ET 200)
Noise suppression for f = n x (f1 ± 1%) (f1 = interference frequency)	
• Common mode noise (V_{PP} <3 V)	> 70 dB
• Series-mode noise (peak value of interference < rated value of input range)	> 40 dB
Crosstalk between the inputs	
• At 50 Hz	50 dB
• At 60 Hz	50 dB
Working error limit (over entire temperature range in relation to input range)	
• 80 mV	± 1%
• From 250 to 1000 mV	± 0.6%
• Thermocouples	± 10 K
• Resistance	± 5 K

Inputs, continued	
Basic error limit (working error limit at 25 ˚C (77˚C) in relation to input range	
• 80 mV	± 0.6%
• From 250 to 1000 mV	± 0.4%
• Thermocouples	± 7 K
• Resistance	± 3 K
Temperature error (in relation to input range)	± 0.005%/K
Linearity error (in relation to input range)	± 0.05%
Repeatability (in steady-state condition at 25°C (77˚F), in relation to input range)	± 0.05%
Cable length	
• Shielded	Max. 100 m (328 ft.)

9.1.4 Electronics Block ET 200B-4AI (6ES7 134-0HF00-0XB0)

Characteristics

The ET 200B-4AI electronics block has the following features:

- 4 inputs, floating to the supply voltage of the internal logic
- Measuring ranges: ± 1.25 V, ± 2.5 V, ± 5 V, ± 10 V, 0 to 20 mA, 4 to 20 mA, ± 20 mA
- Measuring principle: successive approximation
- Supply voltage: 24 V DC
- Connectable sensors
  - Voltage sensors (2-wire connection)
  - Current sensors (2-wire connection)
- Measuring range set using COM ET 200

Dimension Drawing

See Figure 9-5 for the precise dimensions.

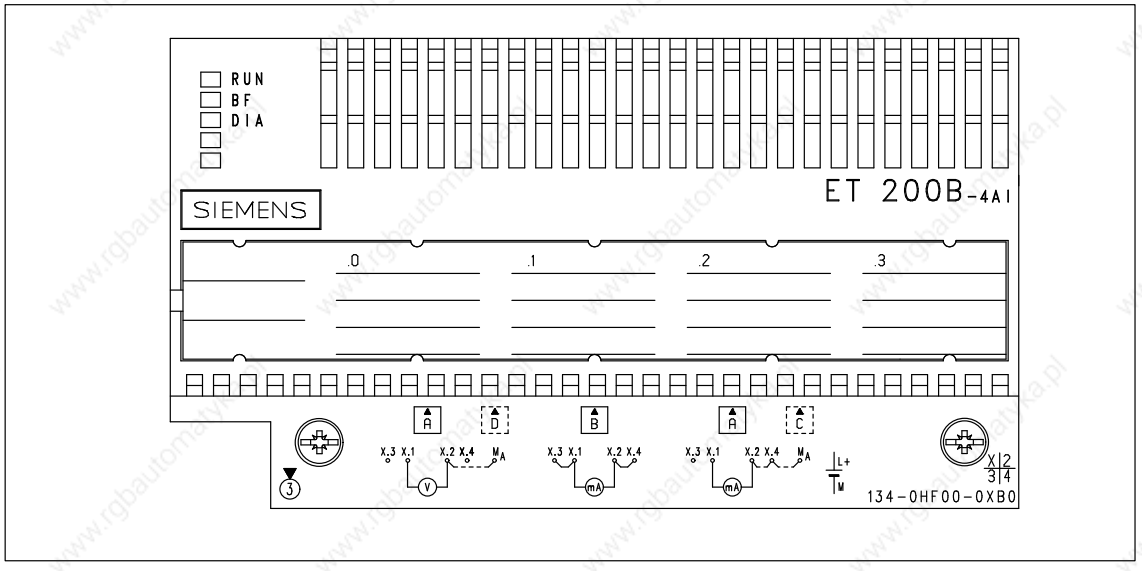


Figure 9-15 Front Elevation: ET 200B-4AI (6ES7 134-0HF00-0XB0)

Electronics Block ET 200B-4AI (6ES7 134-0HF00-0XB0), continued

Possible Connections

You can connect the following to the ET 200B-4AI:

- Up to 4 voltage sensors (2-wire connection)
- Up to 4 current sensors (2-wire connection)

Mixed connection of current and voltage sensors is possible.

Measuring Methods

You have the choice of two methods of measuring analog signals from current/voltage sensors:

- Floating-ground measurement
- Ground-referenced measurement

Floating-Ground Measurement

In the case of floating-ground measurement (differential measurement), each signal line has its own signal reference conductor.

Differential measurement is required in the following cases:

- If the sensors are connected to different potentials and
- If the different signal sources are physically apart.

Note

The maximum permissible common mode voltage (V_{CM}) of the differential inputs to analog ground (M_A) is $\pm$ 1 V.

The maximum permissible voltage difference between M_A and PE must not exceed 75 V DC/60 V AC.

Avoid ground loops!

Ground-Referenced Measurement

In the case of ground-referenced measurement, all signal reference conductors in the TB8 are connected to a common reference point (analog ground M_A).

To avoid ground loops, galvanically isolated and ungrounded signal sources (thermocouples, Pt 100, voltage sources) are required.

Note

Connect M_A to PE(⏚) to enhance noise immunity in the case of ground-referenced measurement.

On the Following Pages

The following pages contain a connection example for every connection possibility and measuring principle. Please note the following rules.

Rules

Please note the following rules when connecting measured-value sensors to the ET 200B-4AI:

- The permissible potential difference at the differential input (x.1<–>x.2, x = 0 to 3) must not exceed $\pm$10 V.
- The maximum permissible common mode voltage (V_{CM}) between the differential inputs (x.1<–>x.2, x=0 to 3) and analog ground M_A is $\pm$1 V.
- The maximum permissible isolation voltage between analog ground (M_A) and PE ( ) or between the reference potential of the supply voltage (M) is 75 V DC/60 V AC.
- You must short-circuit the connection terminals of unused voltage inputs and connect them to M_A (coding plug at position “D” for voltage sensors; position “C” implements the connection to M_A for current sensors).
- You must short-circuit terminals “K+” and “K–”. For this purpose, set the coding plug to the “C” position.

Note

Please note the explanation of shielding of analog lines in Sections 3.1 and 3.5.

Electronics Block ET 200B-4AI (6ES7 134-0HF00-0XB0), continued

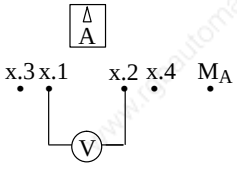
Connecting Voltage Sensors

Voltage sensors for the following measured value ranges can be connected:
± 1.25 V, ± 2.5 V, ± 5 V, ± 10 V

Figures 9-16 and 9-17 show the two methods of connecting voltage sensors.

Floating-Ground Measurement

Figure 9-16 shows the 2-wire connection of voltage sensors (floating-ground measurement):



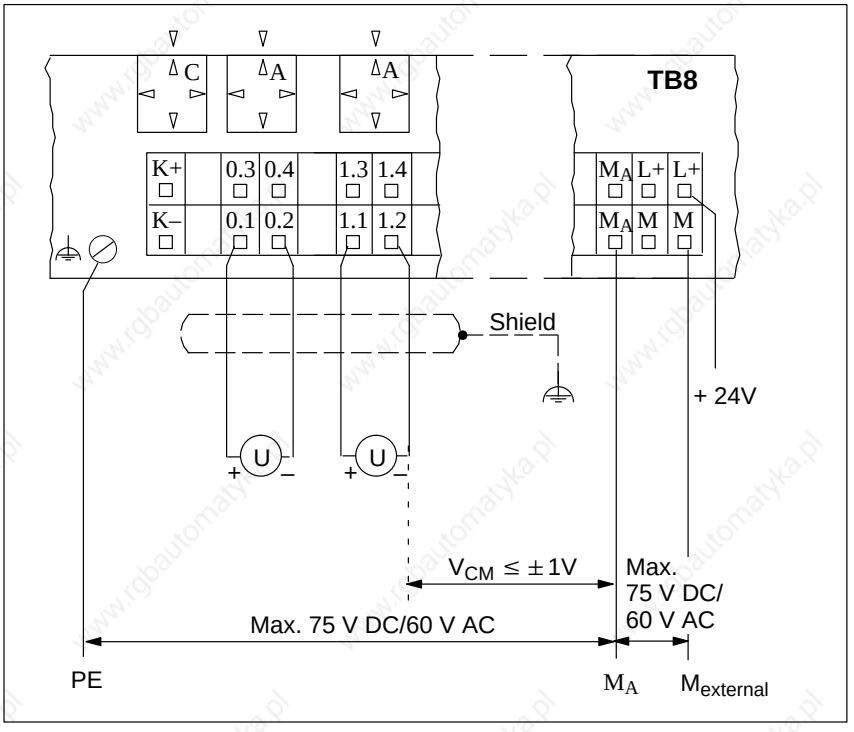


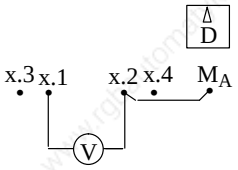
Figure 9-16 Two-Wire Connection of Voltage Sensors to 6ES7 134-0HF00-0XB0 (Floating-Ground Measurement)

Note

The maximum permissible common mode voltage ($V_{CM} \leq \pm 1$ V) must not be exceeded at any of the differential inputs with reference to M_A.

Ground-Referenced Measurement

The 2-wire connection of voltage sensors (ground-referenced measurement) is shown below:



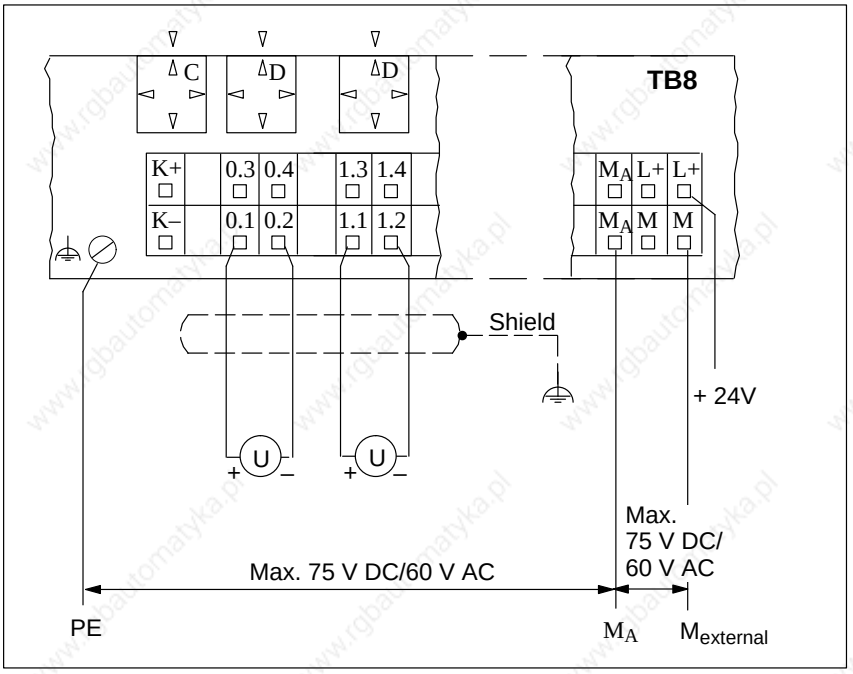


Figure 9-17 Two-Wire Connection of Voltage Sensors 6ES7 134-0HF00-0XB0 (Ground-Referenced Measurement)

Electronics Block ET 200B-4AI (6ES7 134-0HF00-0XB0), continued

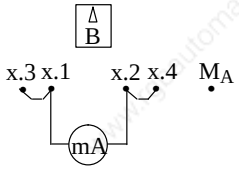
Connecting Current Sensors

Current sensors for the following measured value ranges can be connected:
0 to 20 mA, 4 to 20 mA, ± 20 mA

Figures 9-18 and 9-19 show the two methods of connecting current sensors.

Floating-Ground Measurement

The 2-wire connection of current sensors (floating-ground measurement) is shown below:



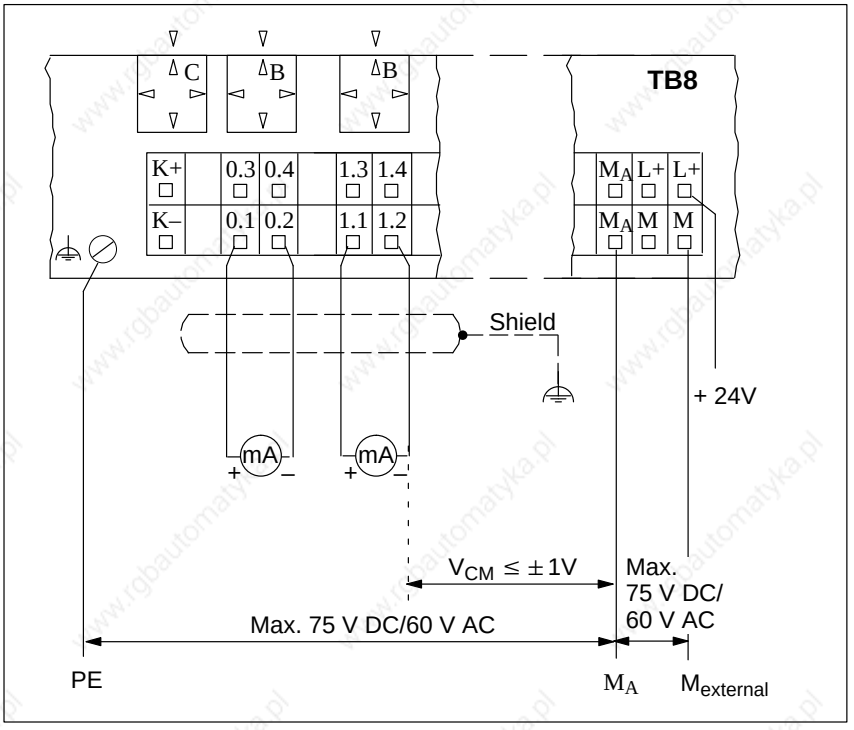


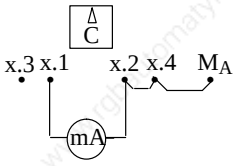
Figure 9-18 Two-Wire Connection of Current Sensors (Floating-Ground Measurement)

Note

The maximum permissible common mode voltage ($V_{CM} \leq \pm 1$ V) must not be exceeded at any of the differential inputs with reference to M_A.

Ground-Referenced Measurement

The 2-wire connection of current sensors (ground-referenced measurement) is shown below:



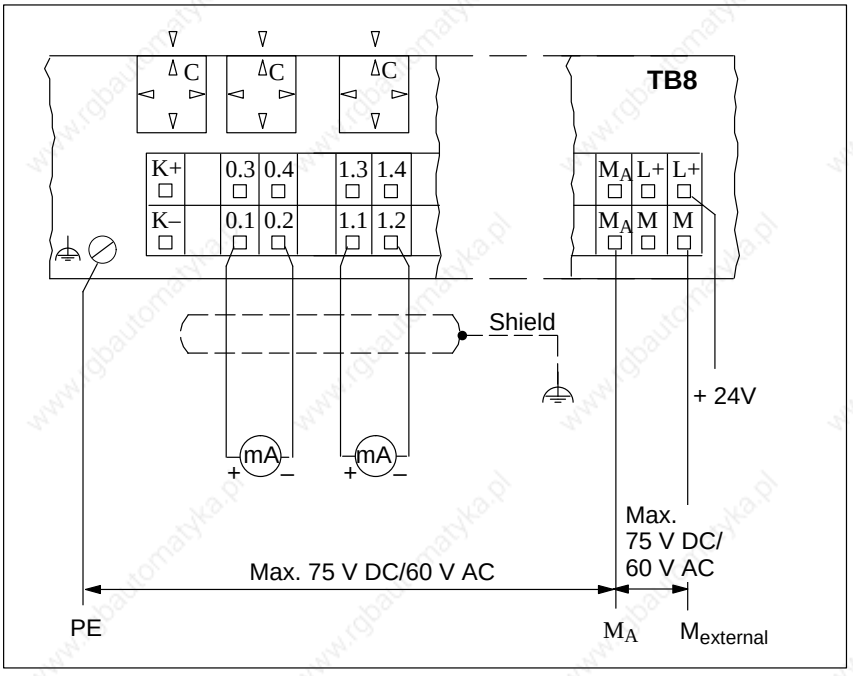


Figure 9-19 Two-Wire Connection of Current Sensors (Ground-Referenced Measurement)

Electronics Block ET 200B-4AI (6ES7 134-0HF00-0XB0), continued

Parameterization

You can define the functional principle of the ET 200B-4AI with the COM ET 200 parameterization software.

Table 9-15 shows all the parameters for the ET 200B-4AI:

Table 9-15 Parameter für ET 200B-4AI

Byte[1]	Parameter	Explanation	Value Range
3 (Bit 0)	Diagnostic enable for channel 0 (terminals 0.1/0.2)	Diagnostics messages enabled separately for each channel	Disable Enable
3 (Bit 1)	Diagnostic enable for channel 1 (terminals 1.1/1.2)		
3 (Bit 2)	Diagnostic enable for channel 2 (terminals 2.1/2.2)		
3 (Bit 3)	Diagnostic enable for channel 3 (terminals 3.1/3.2)		
7	Measurement method and range for channel 0 (terminals 0.1/0.2)	You can set the measurement method and range separately for each channel. For voltage measurement: For current measurement:	 ± 10 V ± 5 V ± 2,5 V ± 1,25 mV ± 20 mA 0 to 20 mA 4 to 20 mA
8	Measurement method and range for channel 1 (terminals 1.1/1.2)		
9	Measurement method and range for channel 2 (terminals 2.1/2.2)		
10	Measurement method and range for channel 3 (terminals 3.1/3.2)		
23	Representation of measured values		Two's complement Amount with sign Binary

: Default setting in parameterization frame

[1] Byte address in parameterization frame of slave

Where to Find a Description

Parameterization of the ET 200B-4AI with COM ET 200 V 4.x is described in detail in Section 4.2.

COM ET 200 WINDOWS also provides extensive support for parameterizing the ET 200B-4AI with COM ET 200 WINDOWS through its integrated help system.

Please refer to the *ET 200 Distributed I/O System* manual (Order No. 6ES5 998-3ES12) for further information about how to use COM ET 200 WINDOWS.

Analog Value Representation

Analog values can be represented in three data formats with the ET 200B-4AI:

- 12-bit two's complement representation (range: –2048 to +2047 units)
- 11-bit amount and 1-bit sign (range: –2048 to +2047 units)
- 12-bit binary number (range: 0 to 4095 units)

Table 9-16 shows the analog value representation of the ET 200B-4AI:

Table 9-16 Representing an Analog Input Value as a Bit Pattern (6ES7 134-0HF00-0XB0)

	High Byte								Low Byte							
Bit number	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Analog value representation	SI	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}	X	X	OV

Bits 0 to 2 and bit 15 have no significance for the amount of the measured value. See Table 9-17 for a detailed description of these bits.

Supplementary Bits

Bits 0 to 2 and bit 15 have the following meaning in the bit pattern of the analog input value:

Table 9-17 Description of the Bits (6ES7 134-0HF00-0XB0)

Bit	Meaning	Signal Status	Meaning of the Signal Status
OV	Overflow bit	1	Overrange[1]
SI	Sign	0	"+" sign
		1	"–" sign
X	Irrelevant	–	–

[1] In the event of overflow at one measuring point, the overflow bits of the other channels remain unaffected; this means the values of the other channels are correct and can be evaluated.

Electronics Block ET 200B-4AI (6ES7 134-0HF00-0XB0), continued

Measured Value Table

Tables 9-18 to 9-20 show the assignments of analog to digitized measured values for the measuring ranges:
± 1.25 V, ± 2.5 V, ± 5 V, ± 10 V.

The ET 200B-4AI module (6ES7 134-0HF00-0XB0) has no overrange.

Table 9-18 Representation of Digitized Measured Values of the ET 200B-4AI (6ES7 134-0HF00-0XB0; Measuring Ranges: ± 1.25 V, ± 2.5 V, ± 5 V, ± 10 V; **Two's Complement**)

Units	Measured Value in V				Digitized Measured Value													X	X	OV	Range
	±1.25V	±2.5V	±5V	±10V	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
2047	1.2494	2.4988	4.9976	9.9951	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	1	
2046	1.2488	2.4975	4.9951	9.9902	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	
:	:	:	:	:								:									
1	0.0006	0.0012	0.0024	0.0049	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	Nominal range
0	0.0000	0.0000	0.0000	0.0000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
–1	–0.0006	–0.0012	–0.0024	–0.0049	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	
:	:	:	:	:								:							:		
–2047	–1.2494	–2.4988	–4.9976	–9.9951	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
–2048	–1.2500	–2.5000	–5.0000	–10.000	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	

Table 9-19 Representation of Digitized Measured Values of the ET 200B-4AI (6ES7 134-0HF00-0XB0; Measuring Ranges: ± 1.25 V, ± 2.5 V, ± 5 V, ± 10 V; **Amount and Sign**)

Units	Measured Value in V				SI	Digitized Measured Value												X	X	OV	Range
	±1.25V	±2.5V	±5V	±10V	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
2047	1.2494	2.4988	4.9976	9.9951	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	1	
2046	1.2488	2.4975	4.9951	9.9902	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	
:	:	:	:	:								:									
1	0.0006	0.0012	0.0024	0.0049	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	Nominal range
0	0.0000	0.0000	0.0000	0.0000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
–1	–0.0006	–0.0012	–0.0024	–0.0049	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
:	:	:	:	:								:									
–2047	–1.2494	–2.4988	–4.9976	–9.9951	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	
–2048	–1.2500	–2.5000	–5.0000	–10.000	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	

Table 9-20 Representation of Digitized Measured Values of the ET 200B-4AI (6ES7 134-0HF00-0XB0; Measuring Ranges: ± 1.25 V, ± 2.5 V, ± 5 V, ± 10 V; **Binary**)

Units	**Measured Value in V**				**Digitized Measured Value**													**X**	**X**	**OV**	**Range**
	±1.25V	**±2.5V**	**±5V**	**±10V**	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**	
4095	1.2494	2.4988	4.9976	9.9951	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	
4094	1.2488	2.4975	4.9951	9.9902	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	
:	:	:	:	:								:									
2049	0.0006	0.0012	0.0024	0.0049	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	Nominal range
2048	0.0000	0.0000	0.0000	0.0000	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2047	–0.0006	–0.0012	–0.0024	–0.0049	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	
:	:	:	:	:								:							:		
1	–1.2494	–2.4988	–4.9976	–9.9951	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
0	–1.2500	–2.5000	–5.0000	–10.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	

Electronics Block ET 200B-4AI (6ES7 134-0HF00-0XB0), continued

Measured Value Table

Tables 9-21 to 9-25 show the assignments of analog to digitized measured values for the measuring ranges:
0 to 20 mA, 4 to 20 mA, ± 20 mA.

The ET 200B-4AI module (6ES7 134-0HF00-0XB0) has no overrange.

Table 9-21 Representation of Digitized Measured Values of the ET 200B-4AI (6ES7 134-0HF00-0XB0; Measuring Range: ± 20 mA; **Two's Complement**)

Units	Measured Value in mA	Digitized Measured Value														X	X	OV	Range
	± 20 mA	15	14	13	12	11	10	9	8	7	6	5	4	3		2	1	0	
2047	19.9902	0	0	1	1	1	1	1	1	1	1	1	1	1		0	0	1	
2046	19.9804	0	0	1	1	1	1	1	1	1	1	1	1	0		0	0	0	
:	:								:										
1	0.00976	0	0	0	0	0	0	0	0	0	0	0	0	1		0	0	0	Nominal range
0	0.0000	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	
–1	–0.00976	1	1	1	1	1	1	1	1	1	1	1	1	1		0	0	0	
:	:								:										
–2047	–19.9902	1	1	0	0	0	0	0	0	0	0	0	0	1		0	0	0	
–2048	–20.0000	1	1	0	0	0	0	0	0	0	0	0	0	0		0	0	1	

Table 9-22 Representation of Digitized Measured Values of the ET 200B-4AI (6ES7 134-0HF00-0XB0; Measuring Range: ± 20 mA; **Amount and Sign**)

Units	Measured Value in mA	SI	Digitized Measured Value												X	X	OV	Range
	± 20 mA	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
2047	19.9902	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	1	
2046	19.9804	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	
:	:								:									
1	0.00976	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	Nominal range
0	0.0000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
–1	–0.00976	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
:	:								:									
–2047	–19.9902	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	
–2048	–20.0000	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	

Table 9-23 Representation of Digitized Measured Values of the ET 200B-4AI (6ES7 134-0HF00-0XB0; Measuring Range: ± 20 mA; **Binary**)

Units	Measured Value in mA	Digitized Measured Value													X	X	OV	Range
	± 20 mA	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
4095	19.9902	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	
4094	19.9804	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	
:	:								:									
2049	0.00976	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	Nominal range
2048	0.0000	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2047	–0.00976	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	
:	:								:									
1	–19.9902	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
0	–20.0000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	

Electronics Block ET 200B-4AI (6ES7 134-0HF00-0XB0), continued

Table 9-24 Representation of Digitized Measured Values of the ET 200B-4AI (6ES7 134-0HF00-0XB0; Measuring Range: 0 to 20 mA)

Units	Measured Value in mA	Digitized Measured Value[1]														X	X	OV	Range
	0 to 20 mA	15	14	13	12	11	10	9	8	7	6	5	4	3		2	1	0	
4095	19.9951	0	1	1	1	1	1	1	1	1	1	1	1	1		0	0	1	Nominal range
4094	19.9902	0	1	1	1	1	1	1	1	1	1	1	1	0		0	0	0	
:	:								:										
1	0.00488	0	0	0	0	0	0	0	0	0	0	0	0	1		0	0	0	
0	0 . 0 0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	1	

[1] Same representation for two's complement, amount and sign, and binary

Table 9-25 Representation of Digitized Measured Values of the ET 200B-4AI (6ES7 134-0HF00-0XB0; Measuring Range: 4 to 20 mA)

Units	Measured Value in mA	Digitized Measured Value[1]														X	X	OV	Range
	4 to 20 mA	15	14	13	12	11	10	9	8	7	6	5	4	3		2	1	0	
2559	19.992	0	1	0	0	1	1	1	1	1	1	1	1	1		0	0	1	Nominal range
2048	16.000	0	1	0	0	0	0	0	0	0	0	0	0	0		0	0	0	
512	4.000	0	0	0	1	0	0	0	0	0	0	0	0	0		0	0	0	
511	3.992	0	0	0	0	1	1	1	1	1	1	1	1	1		0	0	0	
384	3.000	0	0	0	0	1	1	0	0	0	0	0	0	0		0	0	0	
383	2.992	0	0	0	0	1	0	1	1	1	1	1	1	1		0	0	0	
0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	1	

[1] Same representation for two's complement, amount and sign, and binary

Note

The measuring range 4 to 20 mA is resolved to 2048 units in the interval 512 to 2560. For a representation in the range 0 to 2048 units, 512 units must be subtracted per software.

Schematic Circuit Diagram

Simplified representation of potential for the ET 200B-4AI and TB8:

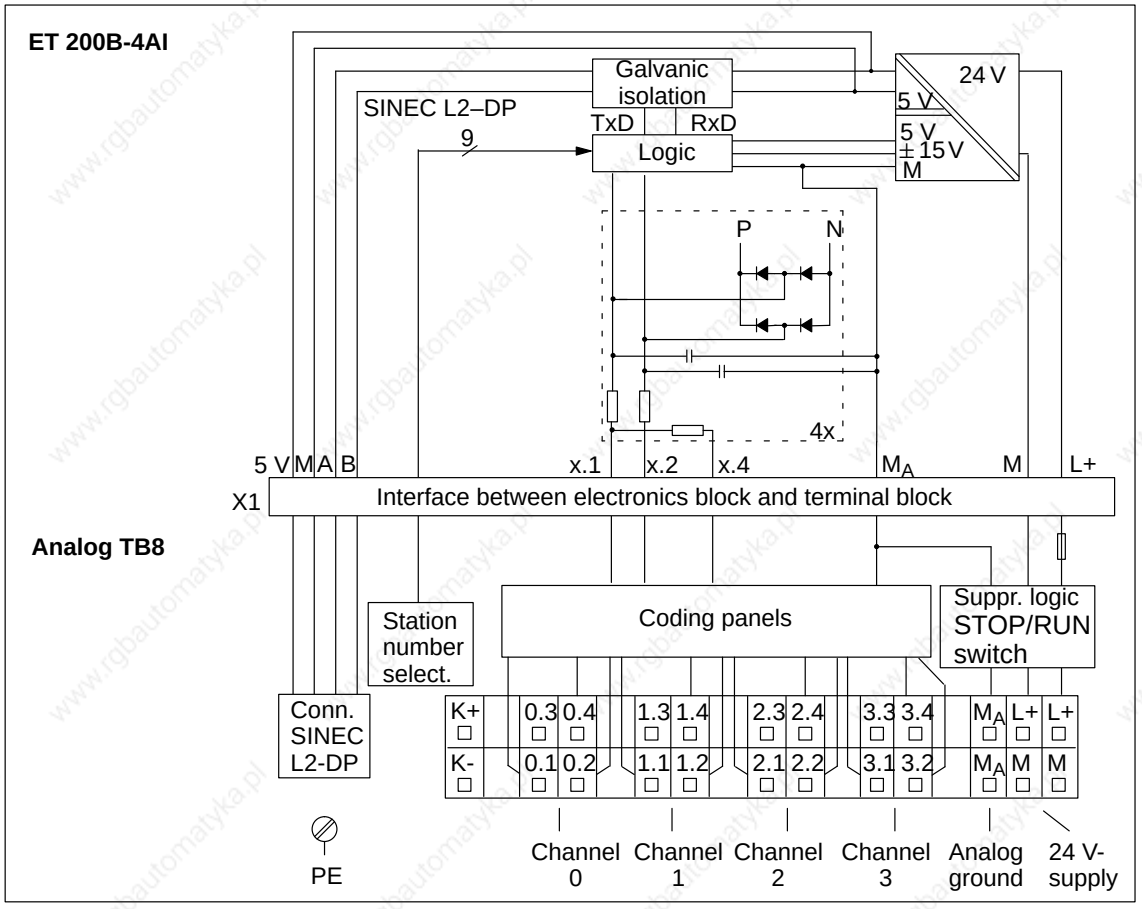


Figure 9-20 Schematic Circuit Diagram: ET 200B-4AI (6ES7 134-0HF00-0XB0) and TB8

Electronics Block ET 200B-4AI (6ES7 134-0HF00-0XB0), continued

Terminal Assignments

The ET 200B-4AI is plugged into the TB8.

Table 9-26 contains the terminal assignments of the TB8 for the ET 200B-4AI.

Table 9-26 Terminal Assignments of the TB8 for ET 200B-4AI (6ES7 134-0HF00-0XB0)

Terminal	Assignment
K+	Unassigned
K–	Unassigned
x.1	Measuring line (+)
x.2	Measuring line (–)
x.3	Unassigned
x.4	Connection of current resistance
M_A	Analog ground (M_A)
L+	Voltage supply for internal logic
M	Voltage supply for internal logic

x = 0, 1, 2, 3

Note

You must make additional settings for the input circuits of the TB8 via coding plugs. See Figures 9-16 to 9-19 for the necessary settings of the coding plugs.

Technical specifications	
Baud rates	9.6/19.2/93.75/187.5/500/ 1500 kbps
Bus protocol	DP Standard
Galvanic isolation to SINEC L2-DP bus	Yes
Power losses	Typ. 1.8 W
Weight (EB and TB)	Approx. 550 g (19.25 oz.)
Dimensions (EB and TB: W x H x D)	160 x 130 x 60 mm (6.24 x 5.07 x 2.34 in.)
Diagnostics functions	
Voltage monitoring	Green “RUN” LED
Bus monitoring SINEC L2-DP	Red “BF” LED
Group diagnostics	Red “DIA” LED, parameterizable
Supply voltage for inputs and internal logic	
Supply voltage (L+)	
• Rated value	24 V DC
• Permissible range	18.5 to 30.2 V
• Value for t < 0.5s	35 V
Current consumption from L+	
• Logic	70 mA
Inputs	
Number of inputs	4
Galvanic isolation to internal electronic circuits	No
Galvanic isolation to voltage supply of internal logic	Yes
Measured value ranges	
• Voltage sensors	± 1.25 V, ± 2.5 V, ± 5 V, ± 10 V
• Current sensors	0 to 20 mA, 4 to 20 mA, ± 20 mA
Method of connecting signal sensors	2-wire connection
Input resistance	
• Voltage measurement	≥ 100 kΩ
• Current measurement	125 Ω

Inputs, continued	
Measured value representation	Can be switched between following data formats: 12-bit two’s complement, 11-bit amount with sign, 12-bit binary
Measuring principle	Successive approximation
Conversion time	Max. 100 µs
Module cycle time	Approx. 2 ms
Permissible potential difference	
• Inputs to each other	Max. ± 10 V
• Inputs to M_A (V_{CM})	Max. ± 1 V
• M_A to PE or M	Max. 75 V DC/60 V AC
Fault message in event of	
• Overrange	Yes
• Wire break of signal sensor lines	No
Noise suppression for f = n x (50/60 Hz ±1%) n = 1, 2, ...	
• Common mode noise (V_{PP} < 1 V)	Min. 70 dB
Basic error limit	
• Voltage ranges	0.15 %
• Current range	0.20 %
Working error limit (0 to 60 °C) (32 to 140 °F)	
• Voltage ranges	0.32 %
• Current range	0.41 %
Permissible input voltage (destruction limit)	Max. ± 30 V (static) **or** ± 75 V (pulse for max. 1 ms and mark-space ratio 1:20)
Permissible input current (destruction limit)	Max. 40 mA
Cable length	
• Shielded	Max. 100 m (328 ft.)

9.1.5 Electronics Block ET 200B-4AO (6ES7 135-0HF00-0XB0)

Characteristics

The ET 200B-4AO electronics block has the following features:

- 4 inputs, floating to the supply voltage of the internal logic
- Output ranges: ± 10 V, 0 to 10 V, ± 20 mA, 0 to 20 mA, 4 to 20 mA
- Supply voltage: 24 V DC
- Loads connectable in
  - 4-wire connection
  - 2-wire connection
- Measuring range set via COM ET 200

Dimension Drawing

See Figure 9-5 for the precise dimensions.

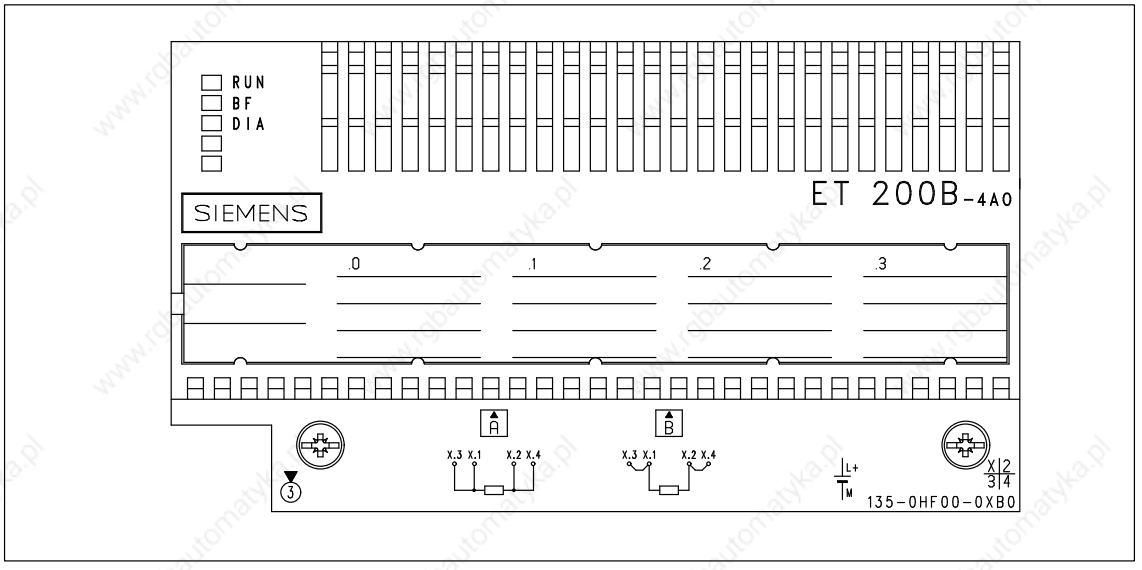


Figure 9-21 Front Elevation: ET 200B-4AO (6ES7 135-0HF00-0XB0)

Possible Connections

There are two methods of connecting loads to the ET 200B-4AO:

- 4-wire connection of loads
- 2-wire connection of loads

On the Following Pages

The following pages contain a connection example for every connection possibility. Please note the following rules.

Rules

Please note the following rules when connecting loads to the ET 200B-4AO:

- The output terminals x.2 (x = 0 to 3) have a fixed connection to analog ground (M_A).
  If non-floating loads are connected to a common reference potential, please ensure minimum potential differences. Failure to do so can lead to undesired transient currents across the output module.
- You are recommended to connect floating-ground loads which are floating with reference to each other. In such cases, connect analog ground (M_A) with PE ( ) to enhance noise immunity.
- The connection terminals of unused outputs are left open.
- You must short-circuit terminals “K+” and “K–”. For this purpose, set the coding plug to the “C” position.

Caution

If the supply voltage is below the lower tolerance limit, the output analog values can deviate from the specified values.

Note

Please note the explanation of shielding of analog lines in Sections 3.1 and 3.5.

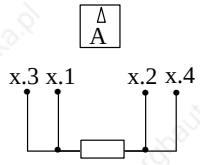
Electronics Block ET 200B-4AO (6ES7 135-0HF00-0XB0), continued

4-Wire Connection of Loads (Voltage Output)

The voltage on the load is re-adjusted via two high-resistance sensor lines per channel (S+, S– at terminals x.3 and x.4). In this way, voltage drops of up to 3 V per line can be re-adjusted.

Please ensure that the sensor lines are connected directly to the load.

4-wire connection of loads in the case of voltage output is shown below:



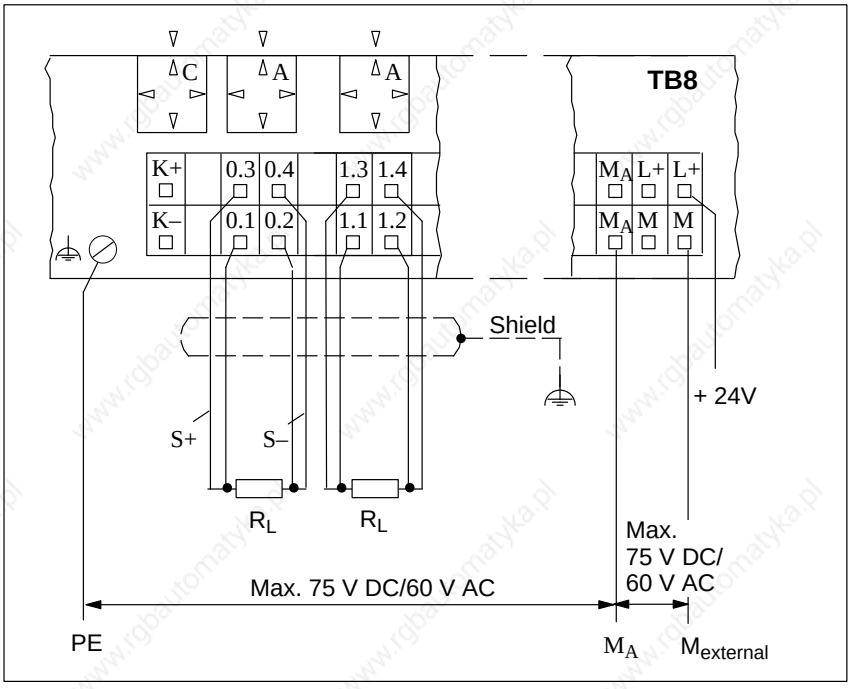
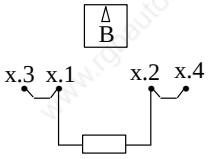


Figure 9-22 4-Wire Connection of Loads in the Case of Voltage Output

2-Wire Connection of Loads (Voltage Output)

The sensor lines are not required for 2-wire connection. Two-wire connection is possible for voltage output if the line resistance of the signal lines is negligible compared to the load resistance.

2-wire connection of loads in the case of voltage output is shown below:



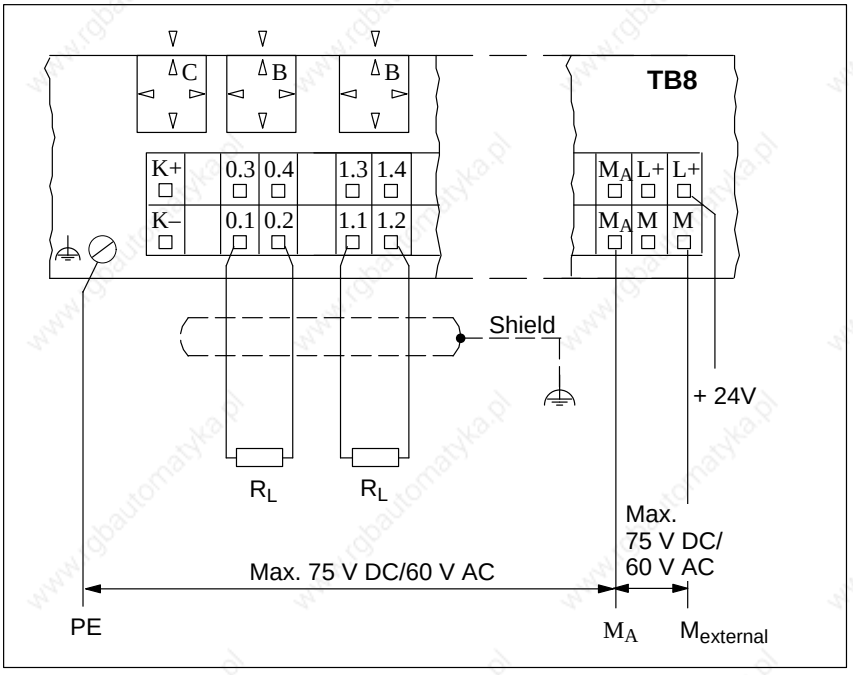
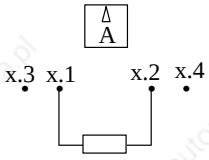


Figure 9-23 2-Wire Connection of Loads in the Case of Voltage Output

Electronics Block ET 200B-4AO (6ES7 135-0HF00-0XB0), continued

Two-Wire Connection of Loads (Current Output)



Two-wire connection of loads in the case of current output is shown below:

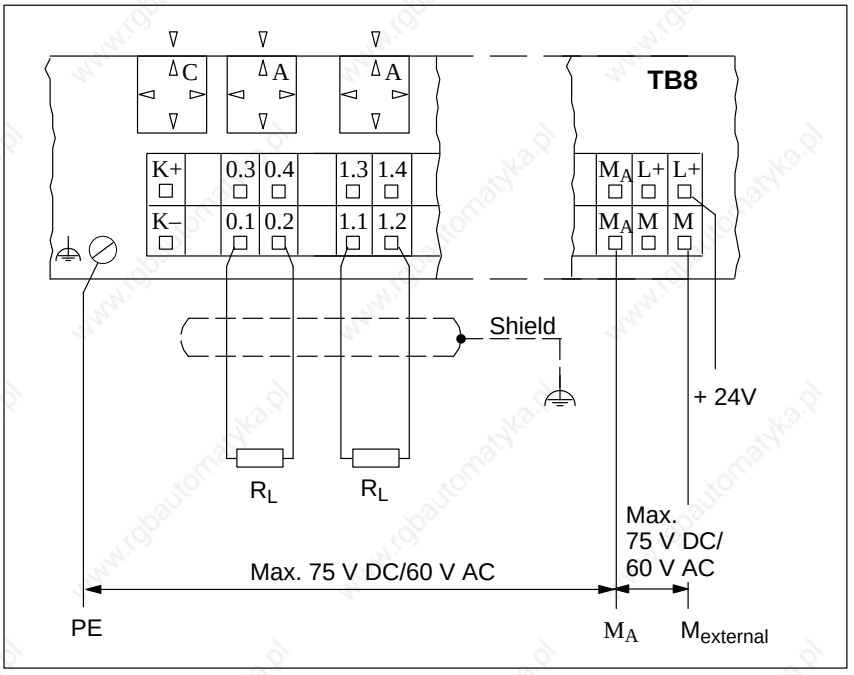


Figure 9-24 2-Wire Connection of Loads in the Case of Current Output

Parameterization

You can define the functional principle of the ET 200B-4AO with the COM ET 200 parameterization software.

Table 9-27 shows all the parameters for the ET 200B-4AO:

Table 9-27 Parameters for the ET 200B-4AO

Byte[1]	Parameter	Explanation	Value Range
3 (Bit 0)	Diagnostics enable for channel 0 (terminals 0.1/0.2)	Diagnostics messages enabled separately for each channel	Disable Enable
3 (Bit 1)	Diagnostics enable for channel 1 (terminals 1.1/1.2)		
3 (Bit 2)	Diagnostics enable for channel 2 (terminals 2.1/2.2)		
3 (Bit 3)	Diagnostics enable for channel 3 (terminals 3.1/3.2)		
7	Output method and range for channel 0 (terminals 0.1/0.2)	You can set the output method and range separately for each channel	
8	Output method and range for channel 1 (terminals 1.1/1.2)	For voltage output:	± 10 V 0 to 10 V
9	Output method and range for channel 2 (terminals 2.1/2.2)	For current output:	± 20 mA 0 to 20 mA 4 to 20 mA
10	Output method and range for channel 3 (terminals 3.1/3.2)		

: Default setting in parameterization frame

[1] Byte address in parameterization frame of slave

Where to Find a Description

Parameterization of the ET 200B-4AO with COM ET 200 V 4.xis described in detail in Section 4.2.

COM ET 200 WINDOWS also provides extensive support for parameterizing the ET 200B-4AO with COM ET 200 WINDOWS through its integrated help system.

Please refer to the *ET 200 Distributed I/O System* manual (Order No. 6ES5 998-3ES12) for further information about how to use COM ET 200 WINDOWS.

Electronics Block ET 200B-4AO (6ES7 135-0HF00-0XB0), continued

Analog Value Representation

Analog values can be represented in two's complement with the ET 200B-4AO.

Table 9-28 shows the analog value representation of the ET 200B-4AO:

Table 9-28 Representing an Analog Input Value as a Bit Pattern (6ES7 135-0HF00-0XB0)

	High Byte								Low Byte							
Bit number	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Analog value representation	SI	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}	X	X	X	X

Bits 0 to 3 and bit 15 have no significance for the amount of the measured value. See Table 9-29 for a detailed description of these bits.

Supplementary Bits

Bits 0 to 3 and bit 15 have the following meaning in the bit pattern of the analog input value:

Table 9-29 Description of the Bits (6ES7 135-0HF00-0XB0)

Bit	Meaning	Signal Status	Meaning of the Signal Status
SI	Sign	0	"+" sign
		1	"–" sign
X	Irrelevant	–	–

Measured Value Table

Table 9-30 shows the assignments of analog to digitized output signals for the value ranges: ± 10 V, 0 to 10 V, ± 20 mA, 0 to 20 mA, 4 to 20 mA.

Table 9-30 Analog Output Signals of the ET 200B-4AO (Value Ranges: ± 10 V, 0 to 10 V, ± 20 mA, 0 to 20 mA, 4 to 20 mA; **Two's Complement**)

Units	Measured Value in mV					Digitized Measured Value												Range
	0 to 20 mA	4 to 20 mA	± 20 mA	0 to 10 V	± 10V	15	14	13	12	11	10	9	8	7	6	5	4	
1249		23.52				0	1	0	0	1	1	1	0	0	0	0	1	Over-range
1204	23.52	:	23.52	11.758	11.758	0	1	0	0	1	0	1	1	0	1	0	0	
:	:	:	:	:	:								:					
1025	20.0195	20.016	20.2	10.0098	10.0098	0	1	0	0	0	0	0	0	0	0	0	1	
1024	20.0	20.0	20.0	10.00	10.00	0	1	0	0	0	0	0	0	0	0	0	0	
1023	19.98	19.98	19.98	9.99	9.990	0	0	1	1	1	1	1	1	1	1	1	1	
512	10.0	12.0	10.0	5.00	5.000	0	0	1	0	0	0	0	0	0	0	0	0	
256	5.0	8.00	5.0	2.50	2.500	0	0	0	1	0	0	0	0	0	0	0	0	
1	0.0195	4.015	0.02	0.0098	0.0098	0	0	0	0	0	0	0	0	0	0	0	0	Nominal range
0	0.0	4.0	0.0	0.0	0.000	0	0	0	0	0	0	0	0	0	0	0	0	
–1	0.0	3.984	–0.02	0.0	–0.0098	1	1	1	1	1	1	1	1	1	1	1	1	
–256	0.0	0.0	–05.0	0.0	–2.500	1	1	1	1	0	0	0	0	0	0	0	0	
–512	0.0	0.0	–10.0	0.0	–5.000	1	1	1	0	0	0	0	0	0	0	0	0	
–1024	0.0	0.0	–20.00	0.0	–10.000	1	1	0	0	0	0	0	0	0	0	0	0	
–1025	0.0	0.0	–20.02	0.0	–10.009	1	0	1	1	1	1	1	1	1	1	1	1	Over-range
:	:	:	:	:	:								:					
–1204	0.0	0.0	–23.52	0.0	–11.758	1	0	1	1	0	1	0	0	1	1	0	0	

Electronics Block ET 200B-4AO (6ES7 135-0HF00-0XB0), continued

Schematic Circuit Diagram

Simplified representation of potential for the ET 200B-4AO and TB8:

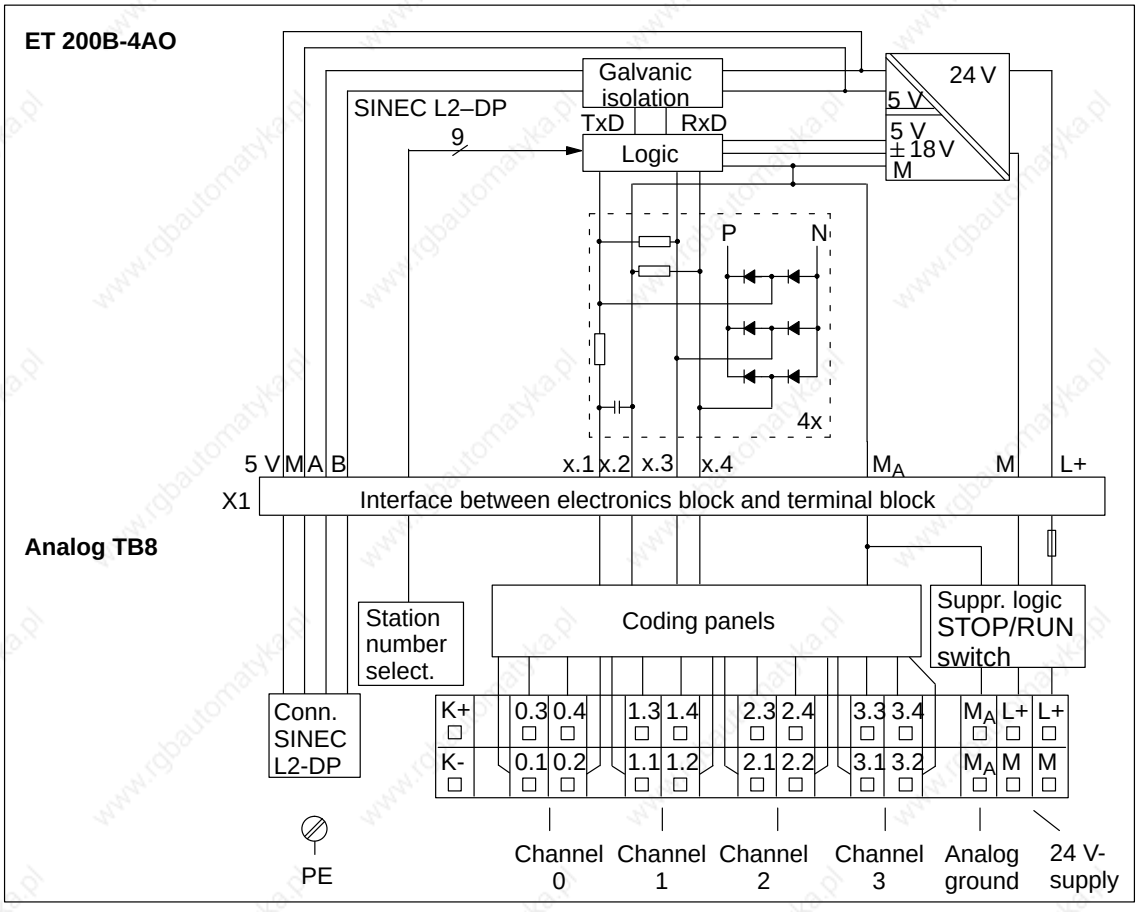


Figure 9-25 Schematic Circuit Diagram: ET 200B-4AO (6ES7 135-0HF00-0XB0) and TB8

Terminal Assignments

The ET 200B-4AO is plugged into the TB8.

Table 9-31 contains the terminal assignments of the TB8 for the ET 200B-4AO depending on the connection method.

Table 9-31 Terminal Assignments of the TB8 for ET 200B-4AO (6ES7 135-0HF00-0XB0)

Terminal	4-Wire Connection	2-Wire Connection
K+	Unassigned	
K–	Unassigned	
x.1	Analog output “voltage” (+)	Analog output “current or voltage” (+)
x.2	Analog output “voltage” (–)	Analog output “current or voltage” (–)
x.3	Sensor line (S+)	Unassigned
x.4	Sensor line (S–)	Unassigned
M_A	Analog ground (M_A)	
L+	Voltage supply for internal logic	
M	Voltage supply for internal logic	

x = 0, 1, 2, 3

Note

You must make additional settings for the input circuits of the TB8 via coding plugs. See Figures 9-22 and 9-24 for the necessary settings of the coding plugs.

Electronics Block ET 200B-4AO (6ES7 135-0HF00-0XB0), continued

Technical specifications	
Baud rates	9.6/19.2/93.75/187.5/500/1500 kbps
Bus protocol	DP Standard
Galvanic isolation to SINEC L2-DP bus	Yes
Power losses	Typ. 2.4 W
Weight (EB and TB)	Approx. 550 g (19.25 oz.)
Dimensions (EB and TB: W x H x D)	160 x 130 x 60 mm (6.24 x 5.07 x 2.34 in.)
Diagnostics functions	
Voltage monitoring	Green “RUN” LED
Bus monitoring SINEC L2-DP	Red “BF” LED
Group diagnostics	Red “DIA” LED, parameterizable
Supply voltage for outputs and internal logic	
Supply voltage (L+)	
• Rated value	24 V DC
• Permissible range	18.5 to 30.2 V
• Value for t < 0.5s	35 V
Current consumption from L+	
• Logic	Max. 200 mA
Outputs	
Number of outputs	4
Galvanic isolation to internal electronic circuits	No
Galvanic isolation to voltage supply of internal logic	Yes
Output ranges	
• Voltage range	± 10 V, 0 to 10 V
• Current range	± 20 mA, 0 to 20 mA, 4 to 20 mA
Method of connecting signal sensors	2-wire or 4-wire connection
Load resistance	
• Voltage output	Min. 3.3 kΩ
• Load impedance in case of current output	Max. 300 Ω
• Capacitive load	Max. 1 µF
• Inductive load	Max. 1 mH

Outputs, continued	
Data input format	11-bit two’s complement
Overrange	Approx. 17.5 %
Conversion time	Approx. 1 ms
Settling time	
• For resistive load	0.1 ms
• For capacitive load	3.3 ms
• For inductive load	0.5 ms
Permissible potential difference	
• M_A to PE or M	Max. 75 V DC/60 V AC
Crosstalk between outputs	40 dB
Working error limit (over entire temperature range in relation to output range)	
• Voltage	± 0.5 %
• Current	± 1 %
Basic error limit (working error limit at 25°C (77 °F) in relation to output range)	
• Voltage	± 0.2 %
• Current	± 0.3 %
Temperature error (in relation to output range)	± 0.02 %/K
Linearity error (in relation to output range)	± 0.05 %
Repeatability (in steady-state condition at 25°C (77 °F), in relation to output range)	± 0.05 %
Output ripple (in relation to output range)	± 0.05 %
Voltage output	
• Short-circuit protection	Yes, max. 1 output simultaneously
• Short-circuit current	Max. 25 mA
Current output	
• Idle voltage	Max. 18 V
Cable length	
• Shielded	Max. 100 m (.328 ft.)

Type Files

A

Installing the Type Files

All the type files required for starting up the ET 200B with COM ET 200 V4.x and COM ET 200 WINDOWS are made available centrally in the Interface Center, from where you can pick them up by modem under the following mailbox number:

Tel.: (Germany) 0911/73-7972

Installing the GSD Files

You need a device master data file (GSD file) in accordance with DIN E 19245, Part 3, to connect ET 200B modules to DP masters which are not able to process the type files (e.g. DP masters not manufactured by Siemens). All the device master data for the ET 200U/B/C is available on floppy disk and can be ordered under the following number:

Device master data disk: 6ES7 190-1AA00-0AA0

You can also pick up all device master data from the Interface Center by modem under the following mailbox number:

Tel.: (Germany) 0911/73-7972

In this Chapter

The contents of all the type files needed to start up the system with COM ET 200 V4.x are reproduced in this chapter. If any of the files for this version of COM ET 200 are missing, you can thus create them yourself if necessary using an ASCII editor.

Please refer to Section 4.1 for further information about installing the type files for COM ET 200 V4.x.

All the type files necessary to start up the ET 200B with COM ET 200 WINDOWS are component parts of COM ET 200 WINDOWS; you thus do not need to install them separately.

A.1 Contents of the type file for the COM ET 200 V4.x

Introduction

The contents of the type files for all the ET 200B station types are reproduced in this chapter.

Please pay careful attention to the blanks and line breaks if you edit the type files. If you edit a type file incorrectly, COM ET 200 V4.x will output the following message:
”File format incorrect”

Please use the file names specified next to the station types for the type files (e.g. SI0001TD.200 for the ET 200B-16DI) and copy the files to the COM ET 200 directory.

SI0001TD.200 Contents of the type file for the ET 200B-16DI (6ES7 131-0BH00-0XB0):

Type file for ET 200B-16DI: SI0001TD.200:	[No. of char]
ET200B–16DI 3ms, MLFB<6ES7 131–0BH00–0XB0>, Siemens slave	[80 characters]
V4.0;	[4 characters]
B–16DI 3.0 DP;	[17 characters]
SIEMENS ;	[10 characters]
SIMATIC ;	[10 characters]
ET 200 ;	[10 characters]
ET200B/24V/DP ;	[15 characters]
00001;	[5 characters]
J;	[1 character]
J;	[1 character]
N;	[1 character]
J;	[1 character]
J;	[1 character]
J;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
00000;	[5 characters]
1111011111;	[10 characters]
032;	[3 characters]
032;	[3 characters]
032;	[3 characters]
016;	[3 characters]
012;	[3 characters]
PV005;	[5 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
PSL000;	[6 characters]
KV000;	[5 characters]
SY;	[2 characters]
DKM000;	[6 characters]

Type Files for COM ET 200 V4.x (continued)

SI0004TD.200 Contents of the type file for the ET 200B-32DI (6ES7 131-0BL00-0XB0):

Type file for ET 200B-32DI: SI0004TD.200	[No. of char]
ET200B–32DI, MLFB<6ES7 131–0BL00–0XB0>, Siemens slave	[80 characters]
V4.0;	[4 characters]
B–32DI DP;	[17 characters]
SIEMENS ;	[10 characters]
SIMATIC ;	[10 characters]
ET 200 ;	[10 characters]
ET200B/24V/DP ;	[15 characters]
00004;	[5 characters]
J;	[1 character]
J;	[1 character]
N;	[1 character]
J;	[1 character]
J;	[1 character]
J;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
00000;	[5 characters]
1111011111;	[10 characters]
032;	[3 characters]
032;	[3 characters]
032;	[3 characters]
016;	[3 characters]
012;	[3 characters]
PV005;	[5 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
PSL000;	[6 characters]
KV000;	[5 characters]
SY;	[2 characters]
DKM000;	[6 characters]

SI000CTD.200 Contents of the type file for the ET 200B-32DI 0.2ms (6ES7 131-0BL10-0XB0):

Type file for ET 200B-32DI 0.2ms: SI000CTD.200	[No. of char]
ET200B–32DI 0,2ms, MLFB<6ES7 131–0BL10–0XB0>, Siemens slave	[80 characters]
V4.0;	[4 characters]
B–32DI.2 DP;	[17 characters]
SIEMENS ;	[10 characters]
SIMATIC ;	[10 characters]
ET 200 ;	[10 characters]
ET200B/24V/DP ;	[15 characters]
00012;	[5 characters]
J;	[1 character]
J;	[1 character]
N;	[1 character]
J;	[1 character]
J;	[1 character]
J;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
00000;	[5 characters]
1111011111;	[10 characters]
032;	[3 characters]
032;	[3 characters]
032;	[3 characters]
016;	[3 characters]
012;	[3 characters]
PV005;	[5 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
PSL000;	[6 characters]
KV000;	[5 characters]
SY;	[2 characters]
DKM000;	[6 characters]

Type Files for COM ET 200 V4.x (continued)

SI0002TD.200 Contents of the type file for the ET 200B-16DO (6ES7 132-0BH00-0XB0):

Type file for ET 200B-16DO: SI0002TD.200	[No. of char]
ET200B–16DO 0,5A, MLFB<6ES7 132–0BH00–0XB0>, Siemens slave	[80 characters]
V4.0;	[4 characters]
B–16DO 0,5A DP;	[17 characters]
SIEMENS ;	[10 characters]
SIMATIC ;	[10 characters]
ET 200 ;	[10 characters]
ET200B/24V/DP ;	[15 characters]
00002;	[5 characters]
J;	[1 character]
J;	[1 character]
N;	[1 character]
J;	[1 character]
J;	[1 character]
J;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
00000;	[5 characters]
1111011111;	[10 characters]
032;	[3 characters]
032;	[3 characters]
032;	[3 characters]
016;	[3 characters]
012;	[3 characters]
PV005;	[5 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
PSL000;	[6 characters]
KV000;	[5 characters]
SY;	[2 characters]
DKM000;	[6 characters]

SI0005TD.200 Contents of the type file for the ET 200B-16DO/2A (6ES7 132-0BH10-0XB0):

Type file for ET 200B-16DO/2A: SI0005TD.200	[No. of char.]
ET200B–16DO, MLFB<6ES7 132–0BH10–0XB0>, Siemens slave	[80 characters]
V4.0;	[4 characters]
B–16DO 2A DP;	[17 characters]
SIEMENS ;	[10 characters]
SIMATIC ;	[10 characters]
ET 200 ;	[10 characters]
ET200B/24V/DP ;	[15 characters]
00005;	[5 characters]
J;	[1 character]
J;	[1 character]
N;	[1 character]
J;	[1 character]
J;	[1 character]
J;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
00000;	[5 characters]
1111011111;	[10 characters]
032;	[3 characters]
032;	[3 characters]
032;	[3 characters]
016;	[3 characters]
012;	[3 characters]
PV005;	[5 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
PSL000;	[6 characters]
KV000;	[5 characters]
SY;	[2 characters]
DKM000;	[6 characters]

Type Files for COM ET 200 V4.x (continued)

SI000DTD.200 Contents of the type file for the ET 200B-32DO (6ES7 132-0BL00-0XB0):

Type file for ET 200B-32DO: SI000DTD.200	[No. of char.]
ET200B–32DO, MLFB<6ES7 132–0BL00–0XB0>, Siemens slave	[80 characters]
V4.0;	[4 characters]
B–32DO DP;	[17 characters]
SIEMENS ;	[10 characters]
SIMATIC ;	[10 characters]
ET 200 ;	[10 characters]
ET200B/24V/DP ;	[15 characters]
00013;	[5 characters]
J;	[1 character]
J;	[1 character]
N;	[1 character]
J;	[1 character]
J;	[1 character]
J;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
00000;	[5 characters]
1111011111;	[10 characters]
032;	[3 characters]
032;	[3 characters]
032;	[3 characters]
016;	[3 characters]
012;	[3 characters]
PV005;	[5 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
PSL000;	[6 characters]
KV000;	[5 characters]
SY;	[2 characters]
DKM000;	[6 characters]

SI0003TD.200 Contents of the type file for the ET 200B-8RO (6ES7 132-0GF00-0XB0):

Type file for ET 200B-8RO: SI0003TD.200	[No. of char.]
ET200B 8RO , MLFB<6ES7 132–0GF00–0XB0>, Siemens slave	[80 characters]
V4.0;	[4 characters]
B– 8RO DP;	[17 characters]
SIEMENS ;	[10 characters]
SIMATIC ;	[10 characters]
ET 200 ;	[10 characters]
ET200B/24V/DP ;	[15 characters]
00003;	[5 characters]
J;	[1 character]
J;	[1 character]
N;	[1 character]
J;	[1 character]
J;	[1 character]
J;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
00000;	[5 characters]
1111011111;	[10 characters]
032;	[3 characters]
032;	[3 characters]
032;	[3 characters]
016;	[3 characters]
012;	[3 characters]
PV005;	[5 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
PSL000;	[6 characters]
KV000;	[5 characters]
SY;	[2 characters]
DKM000;	[6 characters]

Type Files for COM ET 200 V4.x (continued)

SI000BTD.200 Contents of the type file for the ET 200B-8DI/8DO (6ES7 133-0BH00-0XB0):

Type file for ET 200B-8DI/8DO: SI000BTD.200	[No. of char.]
ET200B–8DI/8DO, MLFB<6ES7 133–0BH00–0XB0>, Siemens slave	[80 characters]
V4.0;	[4 characters]
B–8DI/8DO DP;	[17 characters]
SIEMENS ;	[10 characters]
SIMATIC ;	[10 characters]
ET 200 ;	[10 characters]
ET200B/24V/DP ;	[15 characters]
00011;	[5 characters]
J;	[1 character]
J;	[1 character]
N;	[1 character]
J;	[1 character]
J;	[1 character]
J;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
00000;	[5 characters]
1111011111;	[10 characters]
032;	[3 characters]
032;	[3 characters]
032;	[3 characters]
016;	[3 characters]
012;	[3 characters]
PV005;	[5 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
PSL000;	[6 characters]
KV000;	[5 characters]
SY;	[2 characters]
DKM000;	[6 characters]

SI000FTD.200 Contents of the type file for the ET 200B-24DI/8DO (6ES7 133-0BN00-0XB0):

Type file for ET 200B-24DI/8DO: SI000FTD.200	[No. of char.]
ET200B–24DI/8DO 3ms, MLFB<6ES7 133–0BN00–0XB0>, Siemens slave	[80 characters]
V4.0;	[4 characters]
B–24DI/8DO DP;	[17 characters]
SIEMENS ;	[10 characters]
SIMATIC ;	[10 characters]
ET 200 ;	[10 characters]
ET200B/24V/DP ;	[15 characters]
00015;	[5 characters]
J;	[1 character]
J;	[1 character]
N;	[1 character]
J;	[1 character]
J;	[1 character]
J;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
00000;	[5 characters]
1111011111;	[10 characters]
032;	[3 characters]
032;	[3 characters]
032;	[3 characters]
016;	[3 characters]
012;	[3 characters]
PV005;	[5 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
PSL000;	[6 characters]
KV000;	[5 characters]
SY;	[2 characters]
DKM000;	[6 characters]

Type Files for COM ET 200 V4.x (continued)

SI000ETD.200 Contents of the type file for the ET 200B-24DI/8DO 0.2ms (6ES7 133-0BN10-0XB0):

Type file for ET 200B-24DI/8DO 0.2ms: SI000ETD.200	[No. of char.]
ET200B-24DI/8DO 0,2ms, MLFB<6ES7 133-0BN10-0XB0>, Siemens slave	[80 characters]
V4.0;	[4 characters]
B–24DI/8DO.2 DP;	[17 characters]
SIEMENS ;	[10 characters]
SIMATIC ;	[10 characters]
ET 200 ;	[10 characters]
ET200B/24V/DP ;	[15 characters]
00014;	[5 characters]
J;	[1 character]
J;	[1 character]
N;	[1 character]
J;	[1 character]
J;	[1 character]
J;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
00000;	[5 characters]
1111011111;	[10 characters]
032;	[3 characters]
032;	[3 characters]
032;	[3 characters]
016;	[3 characters]
012;	[3 characters]
PV005;	[5 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
PSL000;	[6 characters]
KV000;	[5 characters]
SY;	[2 characters]
DKM000;	[6 characters]

SI0019TD.200 Contents of the type file for the ET 200B-16DI-AC (6ES7 131-0HF00-0XB0):

Type file for ET 200B-16DI-AC: SI0019TD.200	[No. of char.]
ET200B–16DI–AC, MLFB<6ES7 131–0HF00–0XB0>, Siemens slave	[80 characters]
V4.0;	[4 characters]
B–16DI–AC DP;	[17 characters]
SIEMENS ;	[10 characters]
SIMATIC ;	[10 characters]
ET 200 ;	[10 characters]
ET200B/AC ;	[15 characters]
00025;	[5 characters]
J;	[1 character]
J;	[1 character]
N;	[1 character]
J;	[1 character]
J;	[1 character]
J;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
00000;	[5 characters]
1111011111;	[10 characters]
032;	[3 characters]
032;	[3 characters]
032;	[3 characters]
016;	[3 characters]
012;	[3 characters]
PV005;	[5 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
PSL000;	[6 characters]
KV000;	[5 characters]
SY;	[2 characters]
DKM000;	[6 characters]

Type Files for COM ET 200 V4.x (continued)

SI001ATD.200 Contents of the type file for the ET 200B-16DO-AC (6ES7 132-0HF00-0XB0):

Type file for ET 200B-16DO-AC: SI001ATD.200	[No. of char.]
ET200B–16DO–AC, MLFB<6ES7 132–0HF00–0XB0>, Siemens slave	[80 characters]
V4.0;	[4 characters]
B–16DO–AC DP;	[17 characters]
SIEMENS ;	[10 characters]
SIMATIC ;	[10 characters]
ET 200 ;	[10 characters]
ET200B/AC ;	[15 characters]
00026;	[5 characters]
J;	[1 character]
J;	[1 character]
N;	[1 character]
J;	[1 character]
J;	[1 character]
J;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
00000;	[5 characters]
1111011111;	[10 characters]
032;	[3 characters]
032;	[3 characters]
032;	[3 characters]
016;	[3 characters]
012;	[3 characters]
PV005;	[5 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
PSL000;	[6 characters]
KV000;	[5 characters]
SY;	[2 characters]
DKM000;	[6 characters]

SI001CTD.200 Contents of the type file for the ET 200B-16RO-AC (6ES7 132-0HH00-0XB0):

Type file for ET 200B-16RO-AC: SI001CTD.200	[No. of char.]
ET200B–16RO–AC, MLFB<6ES7 132–0HH00–0XB0>, Siemens slave	[80 characters]
V4.0;	[4 characters]
B–16RO–AC DP;	[17 characters]
SIEMENS ;	[10 characters]
SIMATIC ;	[10 characters]
ET 200 ;	[10 characters]
ET200B/AC ;	[15 characters]
00028;	[5 characters]
J;	[1 character]
J;	[1 character]
N;	[1 character]
J;	[1 character]
J;	[1 character]
J;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
00000;	[5 characters]
1111011111;	[10 characters]
032;	[3 characters]
032;	[3 characters]
032;	[3 characters]
016;	[3 characters]
012;	[3 characters]
PV005;	[5 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
PSL000;	[6 characters]
KV000;	[5 characters]
SY;	[2 characters]
DKM000;	[6 characters]

Type Files for COM ET 200 V4.x (continued)

SI001DTD.200 Contents of the type file for the ET 200B-8DI/8DO-AC (6ES7 133-0HH00-0XB0):

Type file for ET 200B-8DI/8RO-AC: SI001DTD.200	[No. of char.]
ET200B–8DI/8RO–AC, MLFB<6ES7 133–0HH00–0XB0>, Siemens slave	[80 characters]
V4.0;	[4 characters]
B–8DI/8RO–AC DP;	[17 characters]
SIEMENS ;	[10 characters]
SIMATIC ;	[10 characters]
ET 200 ;	[10 characters]
ET200B/AC ;	[15 characters]
00029;	[5 characters]
J;	[1 character]
J;	[1 character]
N;	[1 character]
J;	[1 character]
J;	[1 character]
J;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
00000;	[5 characters]
1111011111;	[10 characters]
032;	[3 characters]
032;	[3 characters]
032;	[3 characters]
016;	[3 characters]
012;	[3 characters]
PV005;	[5 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
PSL000;	[6 characters]
KV000;	[5 characters]
SY;	[2 characters]
DKM000;	[6 characters]

SI801ATD.200 Contents of the type file for the ET 200B-4/8AI (6ES7 134-0KH00-0XB0):

Type file for ET 200B-4/8AI: SI801ATD.200	[No. of char.]
ET200B–4/8AI, MLFB<6ES7 134–0KH00–0XB0>, Siemens slave	[80 characters]
V4.0;	[4 characters]
B–4/8AI DP;	[17 characters]
SIEMENS ;	[10 characters]
SIMATIC ;	[10 characters]
ET200 ;	[10 characters]
ET200B/ANALOG ;	[15 characters]
32794;	[5 characters]
J;	[1 character]
J;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
J;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 characters]
N;	[1 character]
00020;	[5 characters]
0001011111;	[10 characters]
032;	[3 characters]
032;	[3 characters]
032;	[3 characters]
016;	[3 characters]
032;	[3 characters]
PV025;	[5 characters]
13;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
AA;	[2 characters]
14;	[2 characters]
14;	[2 characters]
14;	[2 characters]
14;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
06;	[2 characters]
FF;	[2 characters]
00;	[2 characters]

Type Files for COM ET 200 V4.x (continued)

(Type file SI801ATD.200, continued)

```
00;                                    [2 characters]
00;                                    [2 characters]
00;                                    [2 characters]
PSL000;                                [6 characters]
KV000;                                 [5 characters]
SY;                                    [2 characters]
DKM000;                                [6 characters]
```

SI8019TD.200 Contents of the type file for the ET 200B-4AI (6ES7 134-0HF00-0XB0):

Type file for ET 200B-4AI: SI8019TD.200	[No. of char.]
ET200B–4AI, MLFB<6ES7 134–0HF00–0XB0>, Siemens slave	[80 characters]
V4.0;	[4 characters]
B–4AI DP;	[17 characters]
SIEMENS ;	[10 characters]
SIMATIC ;	[10 characters]
ET200 ;	[10 characters]
ET200B/ANALOG ;	[15 characters]
32793;	[5 characters]
J;	[1 character]
J;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
J;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
00020;	[5 characters]
0001011111;	[10 characters]
032;	[3 characters]
032;	[3 characters]
032;	[3 characters]
016;	[3 characters]
032;	[3 characters]
PV025;	[5 characters]
13;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
19;	[2 characters]
19;	[2 characters]
19;	[2 characters]
19;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
06;	[2 characters]
FF;	[2 characters]
00;	[2 characters]

Type Files for COM ET 200 V4.x (continued)

(Type file SI8019TD.200, continued)

```
00;                                                    [2 characters]
00;                                                    [2 characters]
00;                                                    [2 characters]
PSL000;                                                [6 characters]
KV000;                                                 [5 characters]
SY;                                                    [2 characters]
DKM000;                                                [6 characters]
```

SI8018TD.200 Contents of the type file for the ET 200B-4AO (6ES7 135-0HF00-0XB0):

Type file for ET 200B-4AO: SI8018TD.200	[No. of char.]
ET200B–4AO, MLFB<6ES7 135–0HF00–0XB0>, Siemens slave	[80 characters]
V4.0;	[4 characters]
B–4AO DP;	[17 characters]
SIEMENS ;	[10 characters]
SIMATIC ;	[10 characters]
ET200 ;	[10 characters]
ET200B/ANALOG ;	[15 characters]
32792;	[5 characters]
J;	[1 character]
J;	[1 charactes]
N;	[1 character]
N;	[1 character]
N;	[1 character]
J;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
N;	[1 character]
00020;	[5 characters]
0001011111;	[10 characters]
032;	[3 characters]
032;	[3 characters]
032;	[3 characters]
016;	[3 characters]
032;	[3 characters]
PV025;	[5 characters]
13;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
19;	[2 characters]
19;	[2 characters]
19;	[2 characters]
19;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
00;	[2 characters]
06;	[2 characters]
FF;	[2 characters]
00;	[2 characters]

Type Files for COM ET 200 V4.x (continued)

(Type file SI8018TD.200, continued)

```
00;                                    [2 characters]
00;                                    [2 characters]
00;                                    [2 characters]
PSL000;                                [6 characters]
KV000;                                 [5 characters]
SY;                                    [2 characters]
DKM000;                                [6 characters]
```

Safety-Related Guidelines

B

In this Chapter

The following guidelines are designed to help you avoid injury to personnel and damage either to the product described or to connected devices.

B.1 Active and Passive Faults in Automation Equipment

Active and Passive Faults

Depending on the particular task for which the electronic automation equipment is used, both **active** as well as **passive** faults can result in a **dangerous** situation. For example, in drive control, an active fault is generally dangerous because it can result in an unauthorized startup of the drive. On the other hand, a passive fault in a signalling function can result in a dangerous operating state not being reported to the operator.

This differentiation of the possible faults and their classification into dangerous and non-dangerous faults, depending on the particular task, is important for all safety considerations with respect to the product supplied.

Warning

In all cases where a fault in automation equipment can result in severe personal injury or substantial damage to property. i.e. where a dangerous fault can occur, additional external measures must be taken or equipment provided to ensure or enforce safe operating conditions, even in the event of a fault (e.g. by means of independent limit monitors, mechanical interlocks, etc.).

Procedures for Maintenance and Repair

If measurement or testing work is to be carried out on the **ET 200B distributed I/O station**, the rules and regulations contained in the ”VBG 4.0 Accident Prevention Regulations” of the German employers liability assurance association (Berufsgenossenschaft) must be observed. Particular attention is drawn to paragraph 8 ”Permissible deviations when working on live parts”.

Repairs to an item of automation equipment may only be carried out by **SIEMENS service personnel** or **repair shops authorized by SIEMENS** to carry out such repairs.

B.2 Guidelines for the Planning and Installation of the Product

Warnings

The product generally forms a part of larger systems or plants. These guidelines are intended to help integrate the product into its environment without it constituting a source of danger.

Warning

- Follow strictly the safety and accident prevention rules that apply in each particular case.
- In the case of equipment with a permanent power connection (stanionary equipment/systems) which is not provided with an isolating switch and/or fuses which disconnect all poles, a suitable isolating switch or fuses must be provided in the building wiring system (distribution board). Furthermore, the equipment must be connected to a protective ground (PE) conductor.
- Before switching on the equipment which is operated with power system voltage, make sure that the voltage range setting on the equipment corresponds to the local power system voltage.
- In the case of equipment operating on 24 V DC, make sure that proper electrical isolation is provided between the mains supply and the 24 V supply. Only use power supply units to IEC 364-4-41 or HD 384.04.41 (VDE 0100 Part 410).
- Fluctuations or deviations of the power supply voltage from the rated value must not exceed the tolerances specified in the technical specifications. Otherwise, functional failures or dangerous conditions can occur in the electronic modules/equipment.
- Suitable measures must be taken to make sure that programs that are interrupted by a voltage dip or power supply failure resume proper operation when the power supply is restored. Care must be taken to ensure that dangerous operating conditions do not occur even momentarily. If necessary, the equipment must be forced into the ”emergency stop” state.
- Emergency stop devices in accordance with EN 60204/IEC 204 (VDE 0113) must be effective in all operating modes of the automation equipment. Resetting the emergency stop device must not result in any uncontrolled or undefined restart of the equipment.
- Install the power supply and signal cables in such a manner as to prevent inductive and capacitive interference voltages from affecting the automation functions.
- Automation equipment and its operating elements must be installed in such a manner as to prevent unintentional operation.
- Automation equipment can assume an undefined state in the event of a wire break in the signal lines. To prevent this, suitable hardware and software measures must be taken when interfacing the inputs and outputs of the automation equipment.

Glossary

A

Active nodes

Active nodes may send data to other nodes, when authorized to send, and request data from other nodes (= master station).

The IM 308-C master interface module, for example, is an active node.

B

Baud rate

Data transmission speed; specifies the number of bits transferred per second (baud rate = bit rate).

Bus

Common transmission path connecting all nodes; possesses two defined ends.

Bus connector

Physical connection between bus nodes and bus cable.

Bus node

Device which can send, receive or amplify data over the bus, e.g. master station, slave station, programming device or ET 200 Handheld, repeater, active star coupler, etc.

Bus segment

→ Segment

C

Chassis

Chassis defines the entire range of interconnected inactive parts of a device that are not subject to any dangerous touch voltages, even in the case of a fault.

Coding plug

You determine the input/output circuits of the analog modules via coding plugs.

Coding slide switch

The setting of the coding slide switch on the → terminal block determines the → electronics block that can be attached.

Configuring

Configuring refers to address assignment for inputs/outputs of a slave station.

Control command

A DP master can send commands to a group of slaves simultaneously for the purpose of synchronizing the slave stations.

Event-driven synchronization of slave stations is possible using the control commands -> FREEZE and -> SYNC.

CP 5410 S5-DOS/ST

Programming device interface for connecting SINEC L2 and also SINEC L2-DP. The CP5410 S5-DOS/ST can only be plugged into the PG 730, 740, 750 and 770 programming devices.

Cyclic processing

In cyclic processing the master regularly accesses the slave station.

The master (e.g. the IM 308-C) reads the input data of the slaves and passes on output data to the slaves.

D

Device-related diagnostics

Top level of slave-specific diagnostics. Device-related diagnostics refer to the entire slave.

Diagnostics

Detection, location, classification, display and further evaluation of errors, faults and signals.

Diagnostics offer monitoring functions which execute automatically during system operation.

Application: enhancement of plant availability by reducing startup times and down times.

DP Master →Active node which communicates with the slave stations according to a fixed algorithm and provides data for the user.

DP Siemens Bus protocol developed by Siemens AG.

DP Slave →DP Standard slave

DP Standard Abbreviation for Draft Standard DIN 19245; Part 3.

DP Standard slave →Passive node which behaves in accordance with Draft Standard DIN 19245; Part 3.

E

Electronics block Upper section of the ET 200B distributed I/O station. The electronics block contains the logic and is plugged into the→ terminal block.

ET 200 Distributed I/O system for connecting distributed I/O to the S5-115U to S5-155U programmable controllers or an adequate master. ET 200 is characterized by high-speed response times since only a small amount of data (bytes) is transferred.

ET 200 is based on the PROFIBUS Standard (DIN 19245/Part 1) and the PROFIBUS-DP Draft Standard (DIN 19245/Part 3).

ET 200 works according to the→ master-slave access method. The master can be an IM 308-C master interface module or a host containing the CP 5480-DP.

Slaves can be the ET 200B distributed I/O station, the ET 200C, the ET 200U or non-Siemens devices.

F

Floating

In the case of floating I/O modules, the reference potentials of control and load circuits are galvanically isolated by, for example, optocouplers, relay contacts or line transformers. Input and output circuits can be grouped.

Floating-ground configuration

Configuration without galvanic connection to ground. In most cases, an RC element is used to divert interference currents. (manual entitled ”Guidelines for Interference – Free Installation of Stored-Program Controllers”).

Floating-ground measurement

With floating-ground measurement, each signal line has its own signal reference line.

Floating-ground measurement is required in the following cases:

- If the sensors are connected to different potentials and
- If different signal sources are physically apart.

FREEZE

A control command from the master to the slave.

Using this control command, the master can freeze the statuses of the inputs at any given instant. The input data is then updated again only when the master sends the control command UNFREEZE.

G

Ground

Conducting ground whose potential at every point can be set to zero.

Ground (v.)

To connect an electrically conducting part via a ground system to ground.

Ground-referenced measurement

With ground-referenced measurement, all signal reference lines are run to a common → reference potential.

GSD file

Device master data file; file in which the slave-specific characteristics such as the number of inputs or outputs, number of diagnostics bytes, SYNC capability, etc. are defined. There is a GSD file for every Siemens DP standard slave.

You only require this file if you want to connect a DP standard slave to a non-Siemens DP master. If you are using a Siemens DP master, you do not need a GSD file. The device master data for Siemens DP masters is defined in the → type file (COM ET-specific format).

I

IP 20

Degree of protection to DIN 40050: protection against touch and the ingress of foreign bodies with a diameter of over 12 mm ∅.

M

Master interface module

Module for distributed configuration. The distributed I/O is ”connected” to the PLC using the IM 308-C master interface module.

Master-slave access method

Bus access method according to which only one node is → active at any time and all others are → passive.

N

Non-floating

The reference potentials of control and load circuits are electrically connected in the case of non-floating I/O modules.

O

Overview diagnostics

Overview diagnostics show which slave station has a diagnostics message.

P

Parameterization master

The master authorized to parameterize a slave station.

Passive nodes

Passive nodes can only exchange data with an active node after a request to do so from the active node.

Examples of passive nodes are all slaves such as ET 200B, ET 200C, etc.

PROFIBUS

PROcess FIeld BUS, German process and field bus standard defined by the PROFIBUS standard (DIN 19245).

It specifies functional, electrical and mechanical characteristics for a bit-serial field bus system.

PROFIBUS-DP

Draft standard PROFIBUS-DP (DIN 19245, Part 3) on which the ET 200 distributed I/O system is based.

Protective ground conductor

A conductor required as a protection measure against electric shock currents. The symbol for the protective ground conductor is PE.

R

Reference potential

Potential in relation to which the voltages of the circuits concerned are observed and/or measured.

Response time

Interval between an edge change at the input and the assigned output signal change. Response times are described in the ”ET 200 Distributed I/O System” manual.

S

Segment

The bus cable between two terminating resistances forms a segment. A segment contains 0 to 32→ bus nodes. Segments can be linked via → repeaters.

Short circuit

A short circuit is a fault causing a connection between conductors that are energized in normal operation if no resistance is inserted in the faulty circuit.

SINEC L2

Bus system; networks PROFIBUS-compatible automation systems and field devices at the cell and field levels.

SINEC L2-DP

SINEC L2 bus system with the DP protocol. DP stands for distributed I/O. ET 200 corresponds to SINEC L2-DP.

Standard sectional rail

Standard metal section to DIN EN 50022.

The standard sectional rail is used for fixing devices in the SIMATIC family such as the S5-95U I/O modules, the ET 200B, etc.

Station number

Each ET 200 bus node must receive a station number. The programming device is accessed with the station number ”0”.

The master and slave have a station number in the range 3 to 125. Exception: the ET 200B has a station number in the range 3 to 99.

STOP

STOP is a master operating mode. Data exchange between the master and slaves does not take place.

SYNC

SYNC is a → control command issued by the master to a slave.

Using this control command, the master can freeze the outputs at an instantaneous value. The output data for subsequent frames is stored, but the statuses of the outputs remain unchanged. The outputs are not updated again until the master sends the UNSYNC command.

T

Terminal block

The terminal block carries the permanent wiring. The → electronics block is plugged into the terminal block.

Terminating resistance

Resistance for matching the impedance of bus cables; terminating resistances are always required on cable ends or segment ends.

Threshold monitoring time

This is a slave parameter in COM ET 200. If a slave station is not accessed within the threshold monitoring time, it changes to the safe state, that is, all outputs are set to ”0”.

Type file

File required by COM ET 200 for configuring a slave station. The slave-specific characteristics such as the number of inputs/outputs, number of diagnostics bytes, SYNC capability, etc., are defined in the type file.

For every ET 200B station type there is a type file which is generated by Siemens, forms a component part of COM ET 200 (from Version 4.1) or is supplied with the manual.

U

UNFREEZE →FREEZE

UNSYNC →SYNC

W

Wire break This means there is a break in the lines to the sensor or a fault in the sensor itself.

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