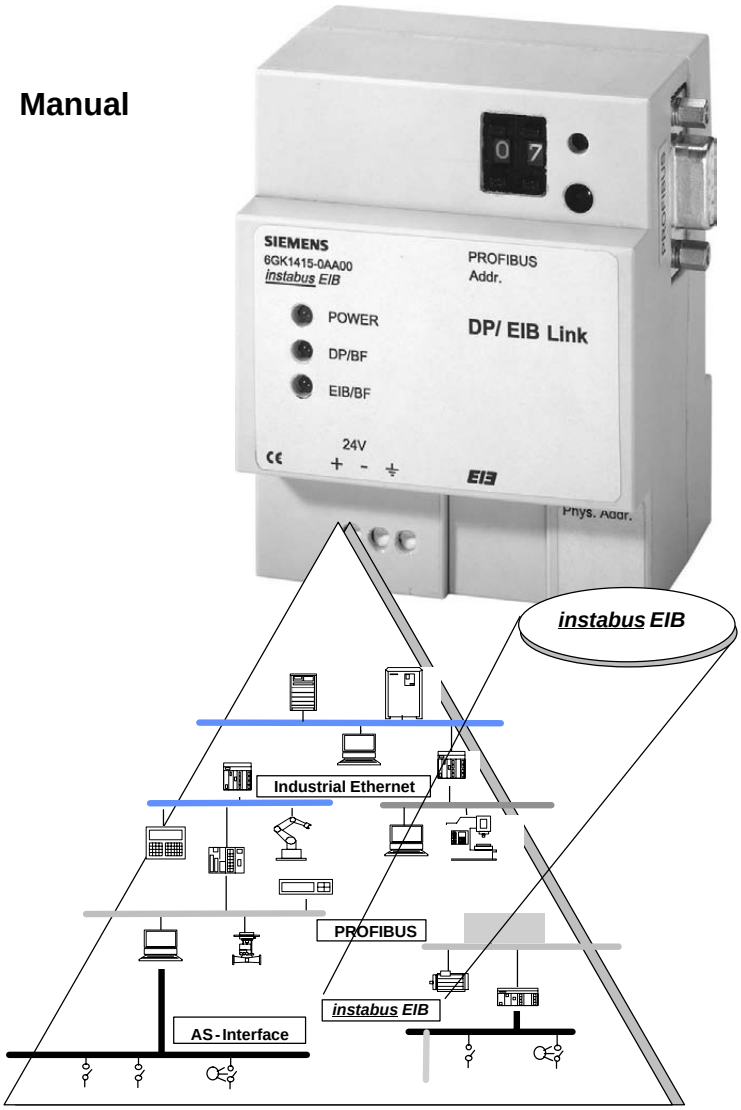
SIEMENS

SIMATIC NET

DP/*EIB* Link

Manual



Release 9/2003
C79000-G8976-C133-02

Classification of Safety-Related Notices

This manual contains notices which you should observe to ensure your own personal safety, as well as to protect the product and connected equipment. These notices are highlighted in the manual by a warning triangle and are marked as follows according to the level of danger:

Danger

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

Warning

indicates that death or severe personal injury **can** result if proper precautions are not taken.

Caution

with warning triangle indicates that minor personal injury can result if proper precautions are not taken.

Caution

without warning triangle indicates that damage to property can result if proper precautions are not taken.

Notice

indicates that an undesirable result or status can result if the relevant notice is ignored.

Note

highlights important information on the product, using the product, or part of the documentation that is of particular importance and that will be of benefit to the user.

Trademarks

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Third parties using for their own purposes any other names in this document which refer to trademarks might infringe upon the rights of the trademark owners.

Safety Instructions Regarding your Product:

Before you use the product described here, read the safety instructions below thoroughly.

Qualified Personnel

Only **qualified personnel** should be allowed to install and work on this equipment. Qualified persons are defined as persons who are authorized to commission, to ground, and to tag circuits, equipment, and systems in accordance with established safety practices and standards.

Correct Usage of Hardware Products

Note the following:

Warning

This device and its components may only be used for the applications described in the catalog or the technical description, and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens.

This product can only function correctly and safely if it is transported, stored, set up, and installed correctly, and operated and maintained as recommended.

Before you use the supplied sample programs or programs you have written yourself, make certain that no injury to persons nor damage to equipment can result in your plant or process.

EU Directive: Do not start up until you have established that the machine on which you intend to run this component complies with the directive 89/392/EEC.

Correct Usage of Software Products

Note the following:

Warning

This software may only be used for the applications described in the catalog or the technical description, and only in connection with software products, devices, or components from other manufacturers which have been approved or recommended by Siemens.

Before you use the supplied sample programs or programs you have written yourself, make certain that no injury to persons nor damage to equipment can result in your plant or process.

Prior to Startup

Prior to startup, note the following:

Caution

Prior to startup, note the information and follow the instructions in the latest documentation. You will find the ordering data for this documentation in the relevant catalogs or contact your local Siemens office.

Siemens AG
Automation and Drives
Industrial Communication
Postfach 4848, D-90327 Nuernberg

Preface

Purpose of the Manual

This manual supports you when you use the DP/*EIB* Link module. It explains how you can address *EIB* devices on *instabus EIB* from PROFIBUS DP masters via this module.

We recommend the following procedure when ...

- ...you want to install and put an *EIB* system into operation and use the DP/*EIB* Link:
  - Chapter 1 explains how to connect and operate the DP/*EIB* Link.
  - Chapter 2 explains how to configure with ETS.

- ...You want to program and configure the PROFIBUS DP master for communication with *EIB* devices via the DP/*EIB* Link:
  - Read Chapter 2 in this manual.

Requirements:

To understand the documentation, the following is assumed:

- Basic knowledge of PROFIBUS DP
- Knowledge of the functionality of *EIB* devices
- You should be familiar with the ETS2 configuration tool.

Diskette with the PROFIBUS GSD File and ETS Project File

The accompanying diskette contains the GSD file and a project file with DP/*EIB* Link. You require the GSD file for configuring the DP/*EIB* Link with your DP master.

Further Support - Who to Contact

If you have technical questions about the use of the product described here, please contact your local Siemens office or representative.

You will find the addresses:

- in our catalog IK PI
- on the Internet (http://www.ad.siemens.de)

Tip:

This symbol is used throughout the manual to highlight useful tips.

Other Documentation

This manual contains all the information necessary for operating the DP/*EIB* Link.

Please make sure that you read the product information bulletin that accompanies the DP/*EIB* Link.

For further information about installation and about EIB devices from Siemens, refer to the Siemens catalog ”Building Automation with *instabus EIB”*.

The references in the appendix of this manual also list further relevant documentation.

Further Support - Hotline

For more information on the hotline, please refer to Appendix.

- If you have problems specifically related to instabus *EIB*, you can also contact our training center at the following number:

  +49 941 790 2953

Contents

Technical Description, Installation Instructions, Commissioning

1

This chapter explains the functions of the DP/*EIB* Link device and explains how to install and commission the device.

This chapter includes the following topics:

- How to install the DP/*EIB* Link
- The displays and operator controls of the DP/*EIB* Link
- How to set the PROFIBUS address for the DP/*EIB* Link

1.1 General Guidelines and Notes

Caution

- Please make sure that you keep to the ESD guidelines when handling and installing the DP/*EIB* Link.
- Noise immunity/grounding
  To achieve the required noise immunity of the DP/*EIB* Link, the DP/*EIB* Link must be correctly grounded.

Note

With the DP/*EIB* Link, the instabus *EIB* can be configured, installed, and commissioned separate from the PROFIBUS installation.

Warning

- The device can be installed in power distribution cabinets (230/400V) along with appropriate VDE-approved devices and must only be installed and put into operation by a qualified electrician.
- The device must not be connected to 230 V.
- The relevant safety and accident prevention regulations must be adhered to.
- The device must not be opened. A defective device must be sent to the appropriate Siemens center.

1.2 Uses of the Device

DP Slave and *EIB* Device

The DP/*EIB* Link is both a PROFIBUS DP slave and *EIB* device at the same time:

- The DP/*EIB* Link connects the instabus *EIB* with PROFIBUS DP.
- Using the DP/*EIB* Link, you can access any *EIB* devices from PROFIBUS DP; you can do the following:
  - activate switches, and set or modify displays by writing data records from the DP Master;
  - query states, detect switching events, and evaluate displays by reading data records.

  To implement these functions, you use the acyclic services complying with the PROFIBUS DP standard DP V1 or the functions for reading and writing data records on the SIMATIC S7 CPU.

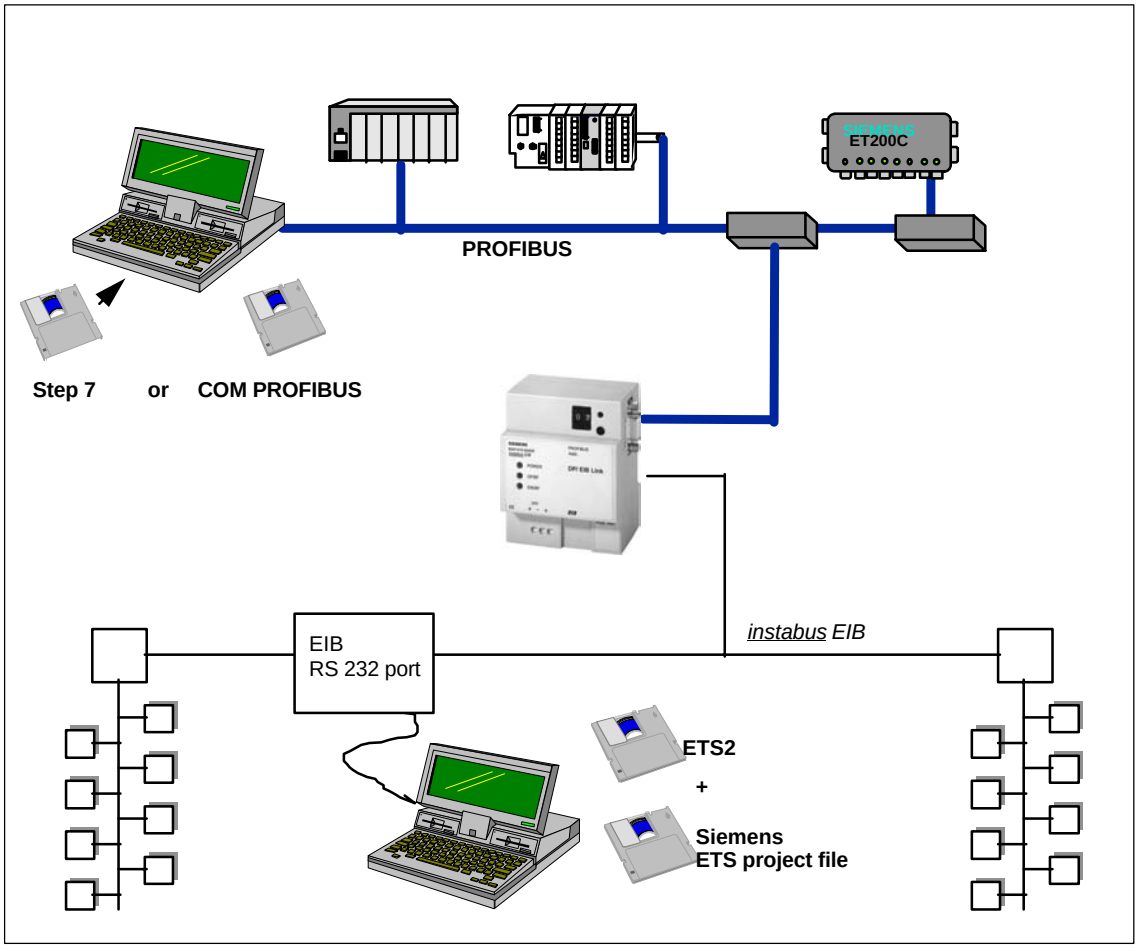


Figure 1-1 Example of a System Structure with the DP/*EIB* Link

DP Master

The possible DP masters include the following devices:

- PC/programming device with SIMATIC NET CP 5412 A2 or CP 5613 (in preparation)
- SIMATIC S7 CPU with integrated DP interface
- SIMATIC S7 PLC with SIMATIC NET CP 443-5 or CP 342-5 (in preparation)

Components of the Product

The DP/*EIB* Link is supplied with the following components:

- DP/*EIB* Link
- Product information bulletin on the DP/*EIB* Link

The documentation package includes the following components:

- Manual
- Diskette with the GSD file and ETS project file

1.3 Technical Specifications of the Device

Table 1-1

Feature	Explanation/values
Configuration of the physical *EIB* address	Using EIB tool software (ETS) and button on the front panel
Setting the PROFIBUS address	• Address range 0 to 99 • Set with BCD coding switch
DP masters supported	• S7 CPU with integrated DP interface • DP master complying with DP standard V1
Attachment to *instabus EIB*	The device is attached via standard *EIB* bus terminals
Attachment to PROFIBUS	The device is attached to Profibus by a sub-D female connector
5V DC load rating at PROFIBUS connector	max. 90 mA
Operator controls	• 1 teach-in button • BCD coding switch
Display elements	• Status display with 3 LEDs • 1 EIB LED (for programming status)
Supported data rates (transmission rate) on PROFIBUS	9.6 Kbps; 19.2 Kbps; 45.45 Kbps; 93.75 Kbps; 187.5 Kbps; 500 Kbps; 1.5 Mbps; 3 Mbps; 6 Mbps; 12 Mbps
Power supply	External via 24V (permitted range: 20.4V to 30V)
Permitted environmental conditions • Temperature during operation • Temperature during transport and storage • Relative humidity	 -5 to 60°C -40°C to +70°C max. 93% at +25°
Construction • Degree of protection • Dimensions (W x H x D) in mm • Weight	 IP 20 72 x 90 x 55[1)] Approx. 300 g
Air pressure	Operation up to 3000m above sea level

[1)] Remember that additional space (width) is required for the PROFIBUS connector!

Description of the Device

On the front panel, there are two LEDs, a 2-digit BCD coding switch and the *EIB* teach-in button.

The attachment to *EIB* is via an *EIB* bus terminal.

To attach to PROFIBUS, there is a sub-D female connector on the right-hand side of the device.

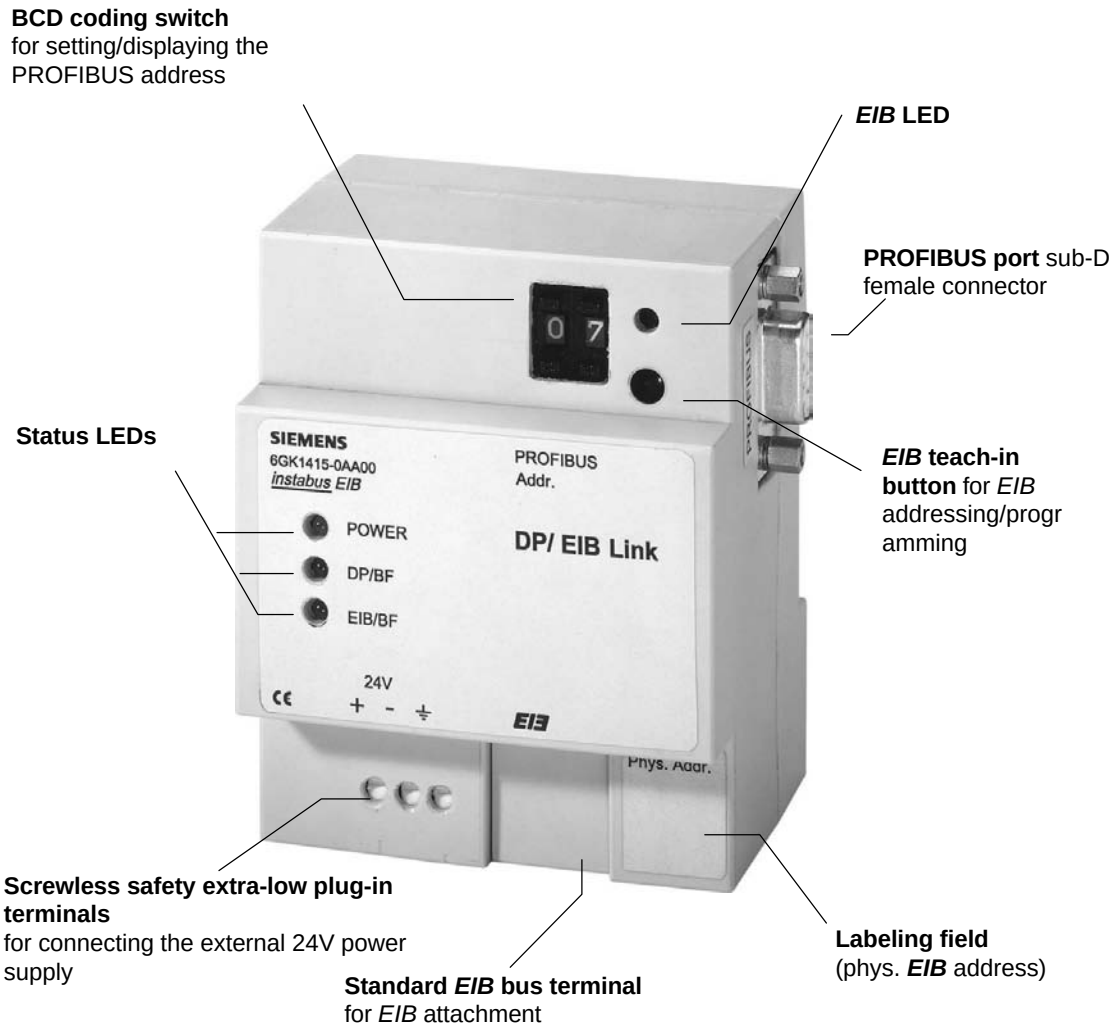
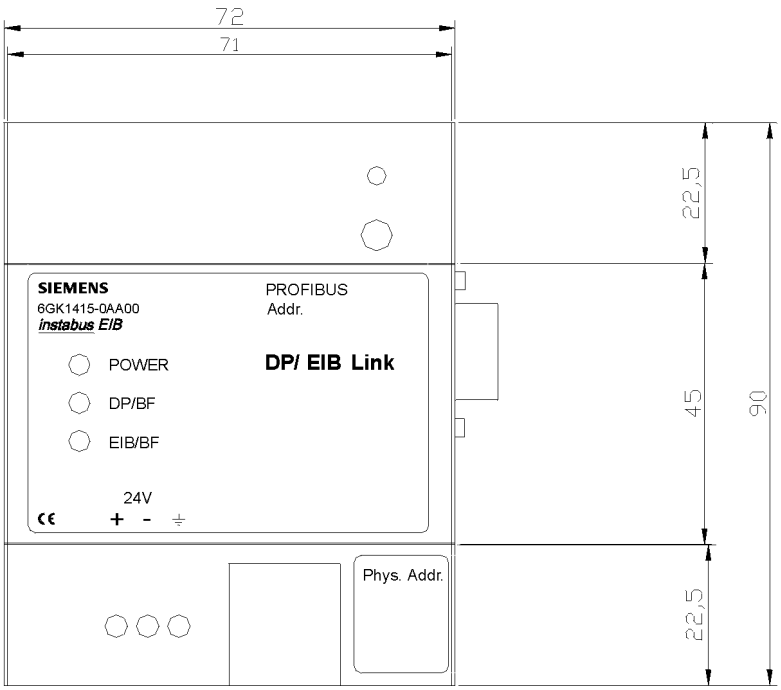
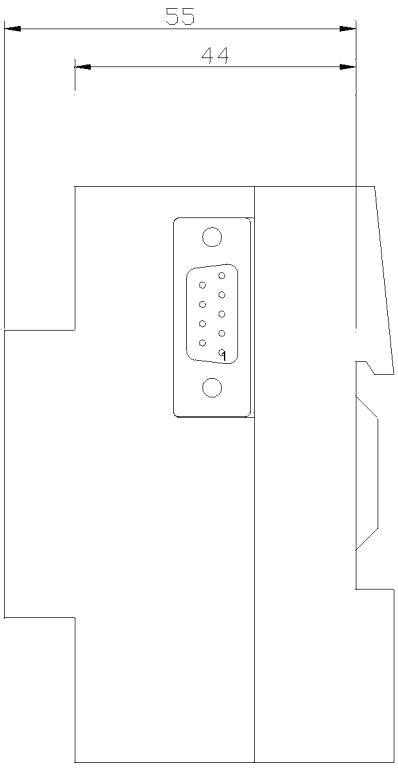


Figure 1-2 Front View of the Device

Mounting Dimensions





1.4 Installing and Connecting Up

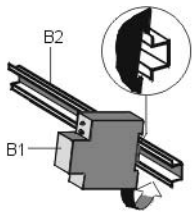
Options

You can install the rail-mounted device DP/*EIB* Link with standard dimensions (4 NW) in power distribution cabinets, on surface or concealed and anywhere where there are standard rails complying with EN 50022-35 x 7,7.

Mounting on a Standard Rail

When installing the rail-mounted device DP/*EIB* Link on the standard rail, please note the following points:

1. First place the device (B) on to the rail (B1) from above and then
2. push in the bottom part of the device until you hear the catch snap into place.

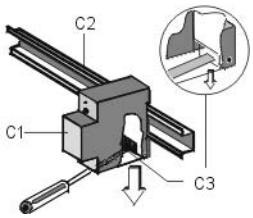


3. There must be no other rail-mounted devices to the left of the device.
4. To the right of the device, leave space for the PROFIBUS connector (sub-D female connector). The gap on the rail must be covered by a dummy panel (accessories).

Removing the Device from the Rail

Remove the device from the rail as follows:

1. Before you remove the device from the rail first turn of the power supply and remove the connected cables.
2. Then push down the catch (C3) using a screwdriver and pull out the bottom of the device from the rail (C2) and lift it off.



Connecting Up (see also Figure 1-2)

- Attachment to *EIB*

  Establish the attachment to *instabus EIB* using the 2-pin standard *EIB* bus terminal located on the front panel.

- External power supply 24V: 3 plug-in terminals

  The DP/*EIB* Link requires an additional external power supply. Connect the safety extra-low voltage terminals on the front panel, for example, to the extra-low voltage output of the N 122 power supply unit.

Warning

Note that the **EIB** bus voltage that is used for *EIB* data communication must *not* be used for the external power supply!

Notice

Ground (Terminal)

The DP/*EIB* Link has a terminal for ground. Establish a low-resistance connection from this terminal to the grounding conductor.

- Attachment to PROFIBUS (9-pin sub-D female connector)

  To attach to PROFIBUS DP, there are bus connectors available with cable outlets at different angles (0˚, 30˚ and 90˚). For more information, refer to /5/.

  Ideally, you should use a 90˚ connector.

Notice

When laying and installing PROFIBUS DP cables and handling the bus connector, follow the instructions in /5/.

1.5 Meaning of the Display Elements

Status LEDs

The three status LEDs indicate the status of the DP/*EIB* Link.

The following table shows the meaning of the different status displays:

Table 1-2 POWER LED

LED status (green when lit)	Meaning
on	The 24V power supply of the DP/*EIB* Link is OK.
off	The 24V power supply of the DP/*EIB* Link is too low or has failed.

Table 1-3 DP/BF LED for PROFIBUS

LED status (red when lit)	Meaning
on	Indicates errors on PROFIBUS DP. The LED is lit red in the following situations: • The connection between the DP master and the DP/*EIB* Link is interrupted or the DP master is not active. • The DP/*EIB* Link was not (or incorrectly) configured/assigned parameters by the DP master • Problem on the DP/*EIB* Link or on *instabus EIB*; *EIB*/BF LED is lit (see Table 1-4 below)
off	No error on PROFIBUS DP

Table 1-4 EIB/BF-LED for *instabus EIB*

LED status (red when lit)	Meaning
on	Indicates problems on the DP/*EIB* Link or on *instabus EIB*. The LED is lit red in the following situations: • The DP/*EIB* Link is not attached to *instabus EIB* • The *EIB* voltage is too low or has failed • No *EIB* application was loaded by ETS.
off	No error on *instabus EIB*.

Notice

If one or more LEDs flash after power up, an internal hardware fault was detected during startup of the DP/EIB link.

In this case, the device must be replaced.

EIB LED (programming LED)

Table 1-5 Indicates the programming status of the DP/*EIB* Link

LED (red when lit)	Status	Meaning
on	EIB startup/loading application	The LED is lit red after pressing the programming button once. The DP/*EIB* Link can now be loaded with the EIB address (physical address) or the application using ETS/*EIB*.
off	Normal operation	The DP/EIB Link is in normal operation.

1.6 Setting the PROFIBUS Address

You set and display the PROFIBUS address using the 2-digit BCD coding switch.

The address range can be selected between 0 and 99.

Address changes only take effect as follows:

- During startup following power up

  or

- After removing/inserting the PROFIBUS connector and after the DP monitoring time as elapsed

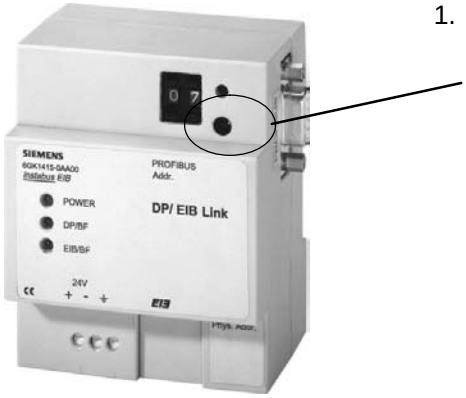
  or

- After a restart on the DP master.

1.7 Putting into Operation - Using *EIB* Functions

Overview

After you have installed the DP/*EIB* Link, follow the steps outlined below to put the device into operation:



1. To change the DP/*EIB* Link to the addressing mode or to enable loading, press the *EIB* teach-in button once.
2. Load an EIB address using ETS.
3. Load the configured application using ETS (for details of configuring the DP/*EIB* Link with ETS, please refer to Chapter 2).

   The device exits the loading status as follows:

   - When you have loaded the *EIB* address and/or the application;
   - When you press the *EIB* programming button a second time.
4. The DP/*EIB* Link can now be addressed on PROFIBUS as a DP slave.

   How to program the DP master for data exchange is described in detail in Chapter 2.

Note

If you know the current address of the DP/EIB Link, you can load a new address or an application without using the teach-in button.

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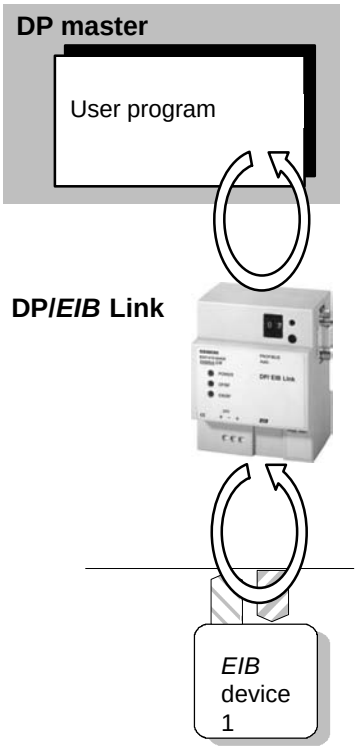
Configuring and Programming

2

This chapter contains the information you require to access *instabus EIB* from the DP master via the DP/*EIB* Link.



Generally, you create a user program for the DP master.

In the user program, you can read and write the *EIB* communication objects.

The DP/*EIB* Link sends and receives frames on *instabus EIB. Before this is possible, you must configure the DP/EIB Link with ETS (EIB tool software).*

2.1 How the Interfaces Function

Accessing *instabus EIB* Via PROFIBUS DP

The DP master communicates with the *EIB* devices via the DP/*EIB* Link. The *EIB* communication objects are mapped in a continuous data area on the DP master for input and output data.

The DP/*EIB* Link has two interfaces:

1. **Interface to the DP Master : PROFIBUS**

   On the PROFIBUS side, the acyclic services of PROFIBUS DP V1 are used: These services are known in the remainder of this chapter as read_data_record and write_data_record.

   Up to 240 *EIB* communication objects can be transferred “event-driven”.

2. **Interface to the *EIB* Devices : *instabus EIB***

   On the *EIB* side, the DP/*EIB* Link behaves like a standard *EIB* device whose communication objects are configured with ETS.

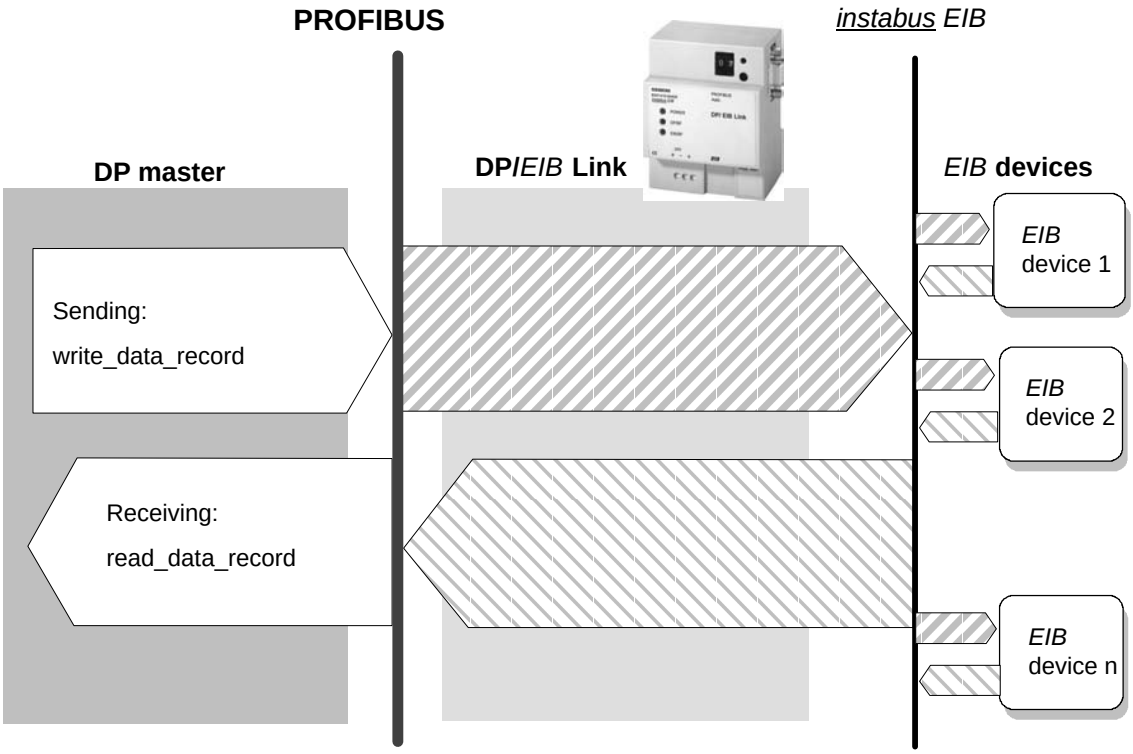


Figure 2-1

Interface to the DP Master - Acyclic Services

With the read_data_record and write_data_record functions, the DP master providesup to a maximum of 211 input and 211 output bytes on the interface to the

DP/*EIB* Link. These bytes map the communication objects and control bits for event-driven control.

Note: In this description, the terms input and output data are always used from the point of view of the DP master.

Depending on the requirements (DP master), you can select one of five levels to determine the extent of the interface based on a profile selection (parameter on the programming interface).

With the profile, you specify not only the data record length but also the structure of the input and output data area for the DP slave. The name of the profile indicates the number of available *EIB* communication objects.

Table 2-1

Profile	Number of *EIB* Communication Objects	Data Record Number or Index (Specified on the DP Master)	Data Record Length (net) in the Input and Output Data Area
Profile_240	240	DS 2	211 bytes
Profile_178	178	DS 3	152 bytes
Profile_118	118	DS 4	103 bytes
Profile_60	60	DS 5	50 bytes
Profile_32	32	DS 6	28 bytes

The addressing of these bytes within the DP master (in the user program etc.) depends on the PROFIBUS DP master being used.

For more detailed information refer to /3/ and the manuals for the PROFIBUS DP master you are using.

For more information about the data structure, refer to Chapter 2.5.6.

Interface to the *EIB* Devices: *EIB* Communication Objects

On the *EIB* side, the DP/*EIB* Link behaves like any other *EIB* device:

You select *EIB* communication objects with a suitable data type and assign a group address to them. With this address assignment, you link the *EIB* devices with the DP/*EIB* Link device and therefore indirectly with the DP master.

Each communication object provided on the interface by DP/*EIB* Link can be used both for sending and receiving.

Event-Driven Transmission with Control Bits

The *instabus* *EIB* then generally transfers information (frames) when device states have changed or when switching signals are triggered. This event-driven behavior is then also adopted on the interface to the DP master.

In the user program of the DP master, this event-driven control is implemented by control bits.

- Receiving data

  An event bit is assigned to each *EIB* communication object. Once this bit has been set by the DP/*EIB* Link, you can recognize the reception of a frame for the relevant *EIB* communication object on the *EIB* side.

- Sending data

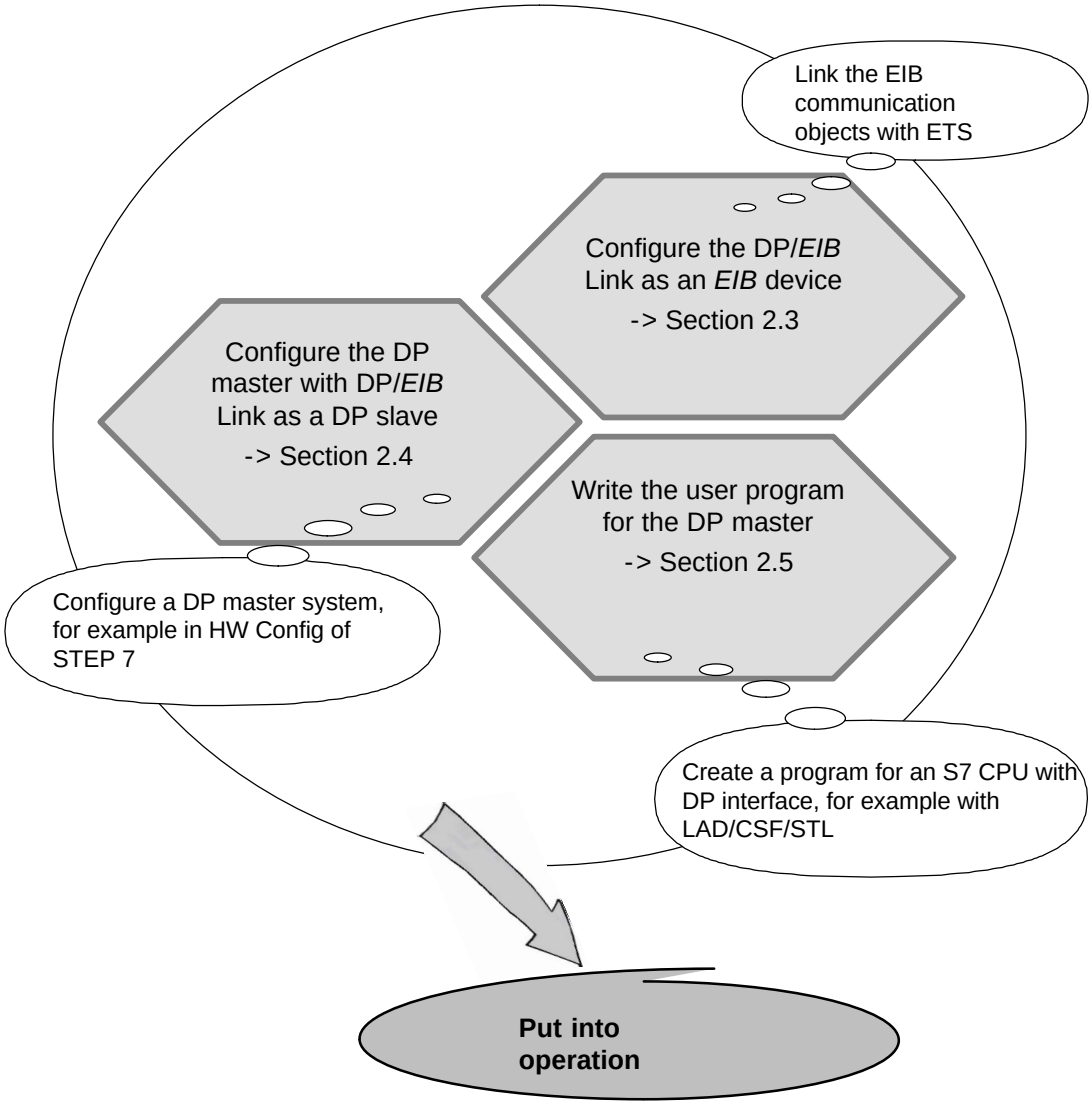
  On the one hand, the DP/*EIB* Link automatically recognizes when values set by the DP master have changed and then sends a frame for the relevant *EIB* communication object.

  In addition to this, each *EIB* communication object has a repeat bit assigned to it. Setting this bit signals a send request for the relevant communication object. This means that you can also trigger a send frame on the *EIB* side even when the value of the *EIB* communication object has not changed; this is why it is called the “repeat bit”.

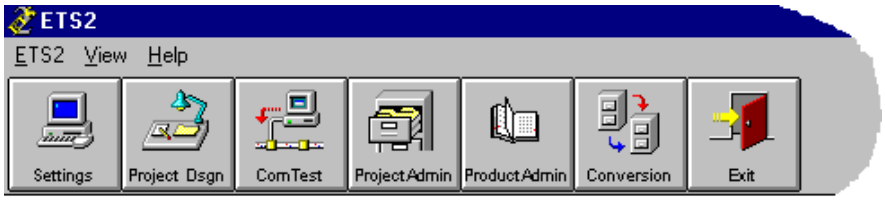
  Each send request automatically means that the corresponding event bit is set and that the data value sent is written back to the corresponding input area of the DP master. For more information on this “acknowledgment mechanism”, refer to Section 2.5.

2.2 Preparations - an Overview

The following sections cover the steps prior to putting the device into operation. This basically involves three preparatory and independent steps that must be completed before you can put the device into operation.



2.3 Configuring the DP/*EIB* Link as an *EIB* Device with *EIB* Communication Objects



2.3.1 Inserting the DP/EIB Link in the Project

Requirements

Follow the steps outlined below:

1. Select Project Admin in ETS.
2. Using the menu command **Project▸Import**, import the file DP*EIB* A1.Vdeib_a1.pr11D supplied on the diskette.

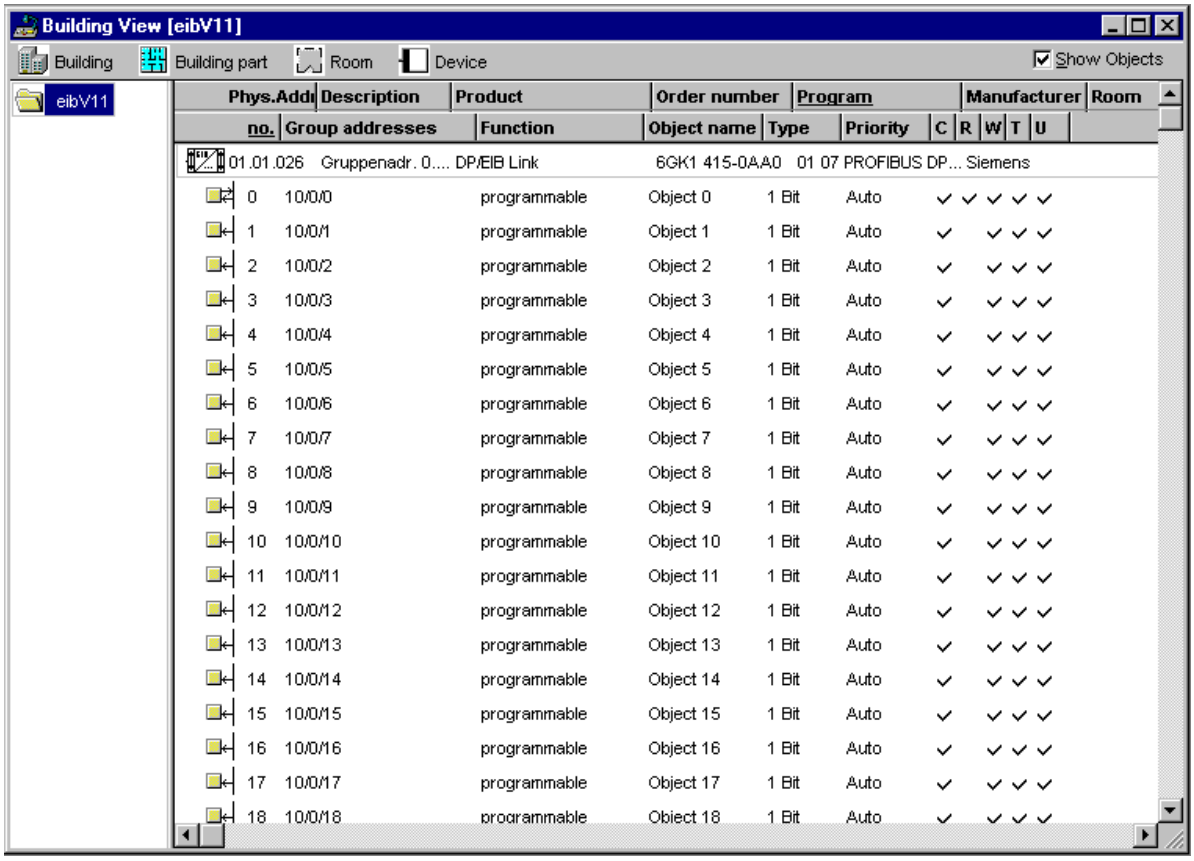
Note

The ETS dialogs shown here are simply examples; depending on the ETS version and selected ETS view, the dialogs on your screen may appear differently.

2.3.2 Including the DP/*EIB* Link in the Project

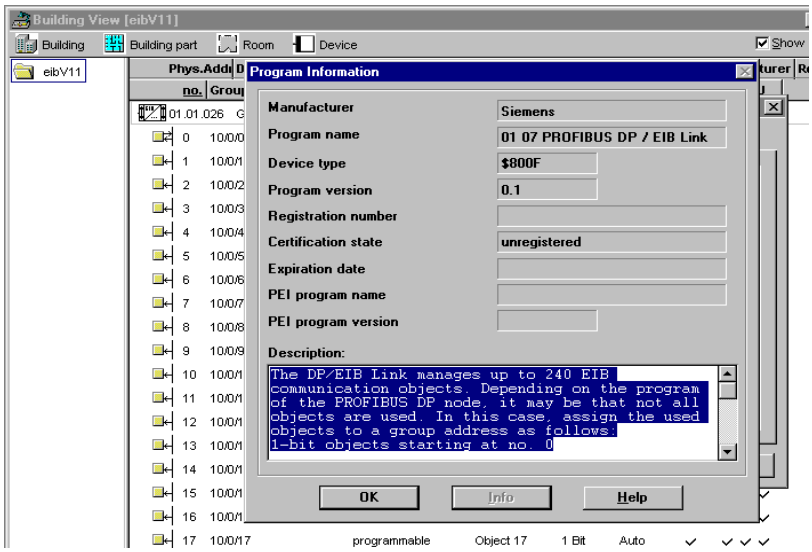
1. Select Project Design in ETS.

The DP/*EIB* Link is available in **one** configuration with 240 *EIB* communication objects. This means that you always have the maximum number of DP/*EIB Link* communication objects available during configuration.



Application Information

2. With the menu **Edit ▸ Change**, you open the “Edit Device” dialog box. Click the “...” button (beside the “Change Program” button) to obtain further application information. You will find, among other things, a device description.



2.3.3 Linking *EIB* Communication Objects using Group Addresses

Procedure

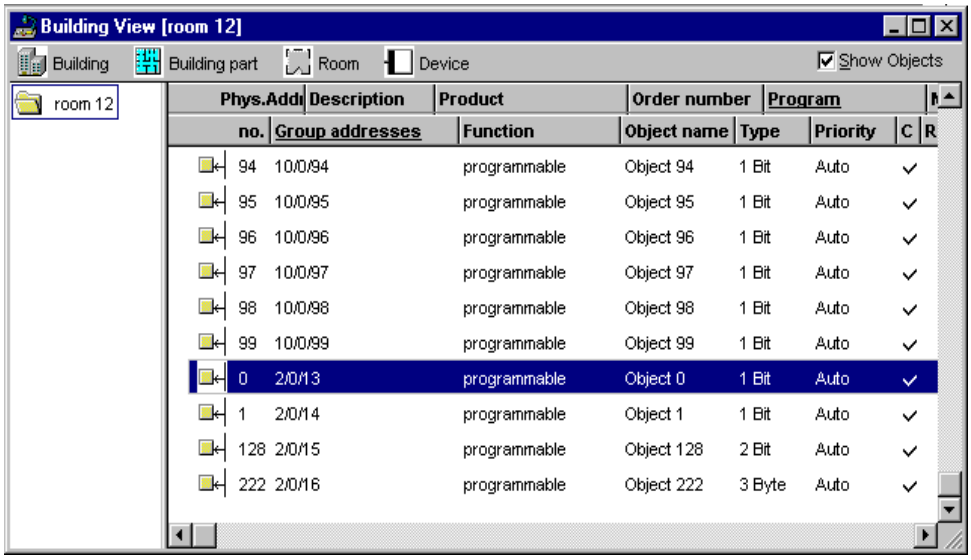
1. Select the objects according to the required data types and specify the group address.

Note

The configuration tool prevents you from assigning group addresses with incompatible data types!

Tip:

It is best to assign the communication objects for the individual data types from top to bottom. If you avoid leaving gaps, you can later select the optimum profile for your configuration (= smallest possible number of bytes) on the interface to the DP master.



Tip:

By sorting the list according to group addresses (click on the group addresses column), you can see the communication objects that have already been assigned in a continuous area at the end of the list.

2.3.4 Checking or Setting Further Device Properties

Note

The following parameter settings do not normally need to be changed.

Open the “Edit Parameters” Dialog

1. First select the DP/*EIB* Link in the device view.
2. Select the menu command **Edit ▸ Parameters** or double-click the object.

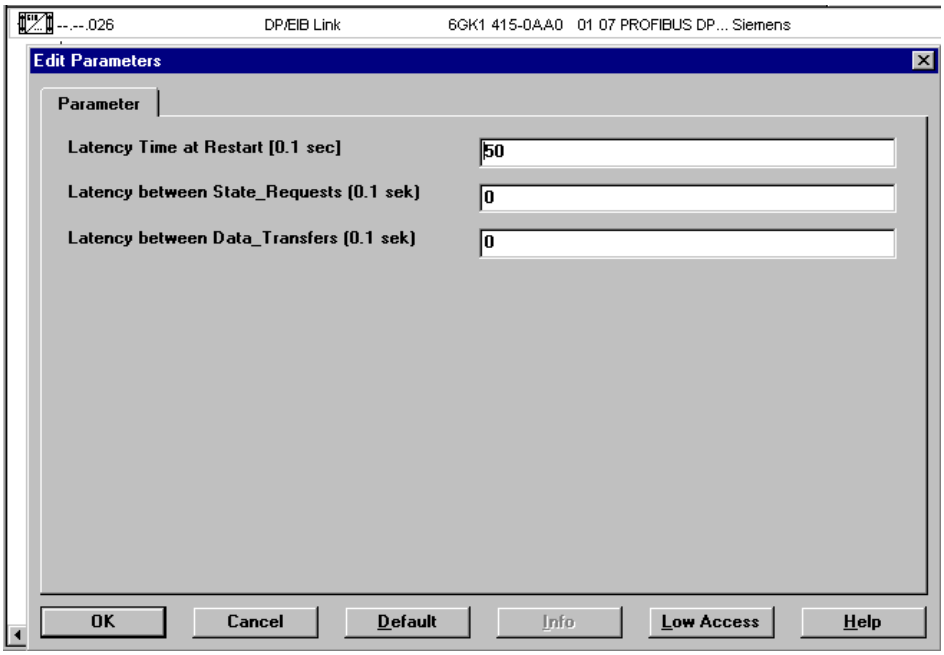


Table 2-2

Parameter	Default	Meaning/Recommended Setting
Latency time at restart	50	After turning on the EIB power, the DP/EIB Link waits for the time set here before it becomes active on instabus EIB. This avoids excessive frame traffic during startup. The wait time specified here is activated only after the DP/EIB Link runs through a self-test that itself takes approximately 5 seconds.

Table 2-2 , continued

Parameter	Default	Meaning/Recommended Setting
Latency between state requests	0	This is the minimum interval between individual frames in a status round. In a status round, the DP/*EIB* Link requests all nodes with read frames to send a response frame. Received values are transferred to the input area. A status round is executed in the following situations: • After power up of the *EIB* power supply; • After power up of the *EIB* bus power supply; • After loading an *EIB* application with ETS
Latency between data transfers	0	This is the minimum interval between two individual frames that must be maintained in normal operation.

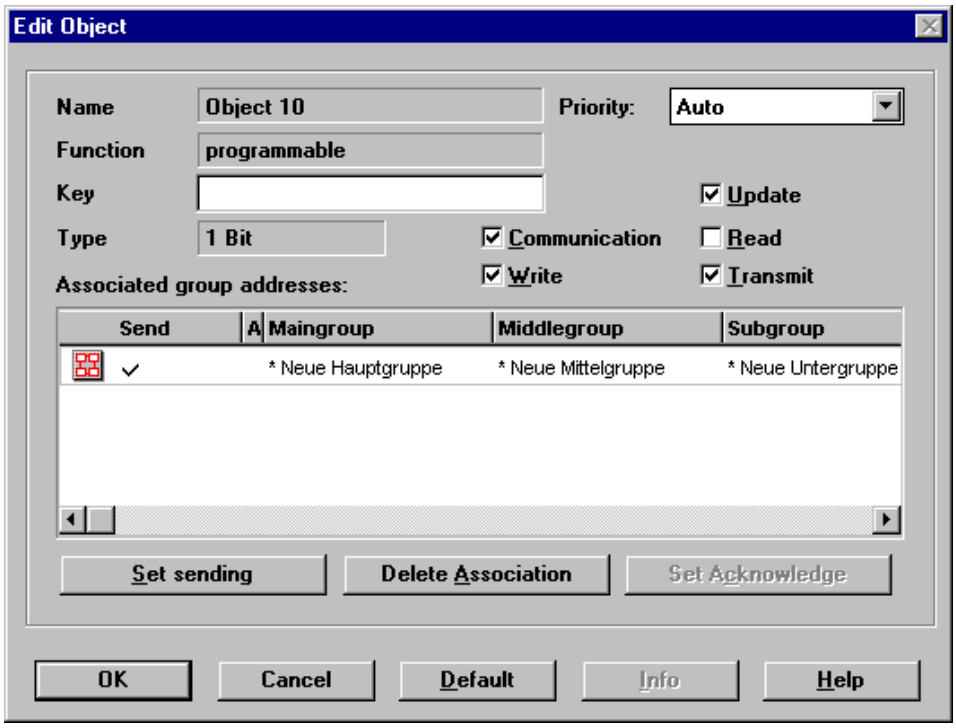
2.3.5 Checking or Setting Further Object Properties

Meaning

The following parameter settings do not normally need to be changed.

Response of the *EIB* Communication Objects

1. First, select the *EIB* communication object of the DP/EIB Link whose response you want to set in the device view.
2. Select the menu command **Edit▸Modify** or double-click the object.



The meaning of the parameters is explained in detail in the ETS online help.

You should, however, note the following additional information about the settings of the EIB communication object flags for the DP/EIB Link.

Table 2-3

EIB Communication Object Flag	Default	Meaning
Update	Yes	If the flag is set (yes), a read response frame leads to updating of the corresponding input value.
Communication	Yes	The flag must always be set to allow the transmission of frames on *instabus EIB*.
Write	Yes	*EIB* frames can only be received and passed on to the DP master as received values when this flag is set.
Read	No	The flag does not need to be set for the standard mode - sending and receiving of *EIB* frames. If necessary, when another EIB application wants to access an EIB communication object of the DP/EIB Link with a read job, the flag can be set.
Transmit	Yes	Send jobs of the DP master are only converted to *EIB* frames when this flag is set.

2.4 Configuring the DP/*EIB* Link as a DP Slave on the DP Master

Available Configuration Tools

- COM PROFIBUS (ET 200)
- STEP 7 (SIMATIC S7)
- Other products

Properties of the DP Master

To operate the DP/*EIB* Link, you require the following:

- A DP master with DPV1 functionality

or

- A SIMATIC S7 CPU with integrated PROFIBUS DP interface.

Note

For more information about other SIMATIC components that can be used, for example the CP 342-5, please contact your SIMATIC NET representative or the address listed in Appendix LEERER MERKER in Support and Training.

Special features when Operating the DP Master

The DP/*EIB* Link occupies one byte in the input data area used for **cyclic** operation (for data transfer, the acyclic services are used!).

The content of the byte used for cyclic operation is irrelevant for the user program. You specify the address of this byte when you configure the DP master.

Requirement: Import of the GSD file

Before you can configure the DP/*EIB* Link on the DP master, you must first import the type or GSD file into the configuration tool of the DP master. Only then can the DP/*EIB* Link be configured. Refer to the information in the manual of the corresponding configuration tool.

Note

With newer configuration tools, it is not normally necessary to import the GSD file.

GSD File

The GSD file **SIEM8099.GSD** also contains the information on the DP/*EIB* Link required by the configuration tool (for example STEP 7 or COM PROFIBUS).

The GSD file is supplied on diskette with this manual and can also be downloaded via a modem from the interface center Fürth by dialing the telephone number +49-911-737972.

The GSD can also be downloaded from the Internet address http://www.ad.siemens.de/csinfo/ (under “All Downloads...”).

BMP File (Bitmap)

To represent the DP/*EIB* Link graphically, some configuration tools (for example STEP 7) use bitmap files. These are also included on the diskette supplied with the manual.

- EIB8099n.bmp or EIB8099n.dib

  The bitmap file EIB8099n.dib is used for graphic visualization in error-free normal operation of the DP/*EIB* Link.

- EIB8099s.bmp or EIB8099s.dib

  The bitmap file EIB8099s.dib is used for graphic visualization in special operating states of the DP/*EIB* Link.

Parameter Assignment/Configuration Frame

If your DP master is not able to process GSD files, you may be able to enter the parameter assignment frame and configuration frame for the DP/*EIB* Link directly during configuration of the DP master. The structure of the parameter assignment and configuration frame for the DP/*EIB* Link is explained in Appendix B.

2.5 User Program on the DP Master

Principle of Communication via the User Program

Starting with the jobs in the user program of the DP master, the DP/*EIB* Link responds as follows:

- Data reception is indicated by the event bit
- The device sends as a result of value changes; send jobs can also be triggered by repeat bits regardless of a value change.
- The sent DP jobs are “acknowledged” by event bits.

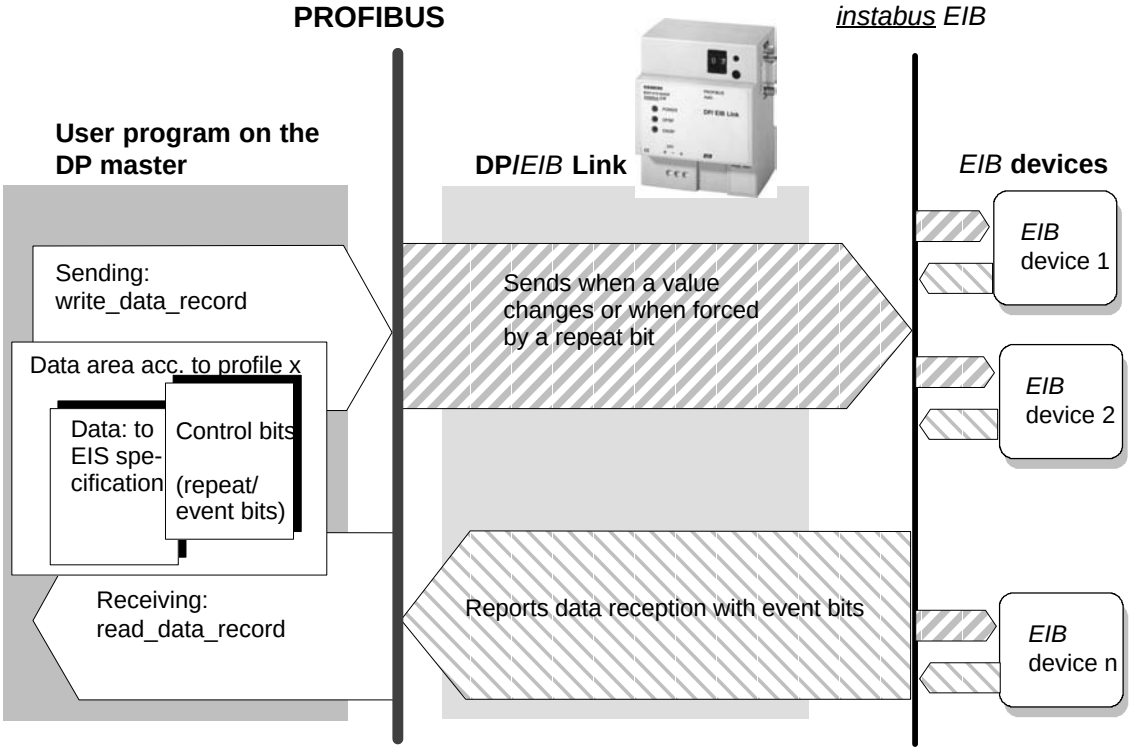


Figure 2-2

You receive the following information:

- Calls for cyclic services in the user program

  Which call types and call parameters must be used.
- Structure of the interface - selecting profiles

  Which profile you can select for the I/O data area using the data record number.
- Assigning *EIB* communication objects to the DP interface

  Where the EIB communication objects are mapped in the I/O data area.

- Receiving data/sending data

  How to react in the user program: Event-driven control using the control bit mechanism (event/repeat bit).

2.5.1 Calling Acyclic Services

DP Master with Acyclic Services

The acyclic services complying with the DP standard DP-V1 for PROFIBUS DP allow individual jobs to be initiated to send output data to the DP slaves or to acquire (receive) input data of the DP slaves.

Section 2.4 explained which devices support these acyclic services and can be used as the DP master for EIB communication.

Calls

Table 2-4

Call	In SIMATIC S7	On the DP programming interface
read_data_record	SFC 59	dpc*_read
write_data_record	SFC 58	dpc*_write

Call Parameters

Certain parameters must be assigned values to specify the job. The name of such parameters and the way in which they are assigned varies depending on the type of DP master.

The following table provides you with an overview of the parameters according to the DP-V1 specification and as an example their mapping on the parameter assignment in a user program for a SIMATIC S7 CPU and a user program for a PC/PG in which the SIMATIC NET programming interface is used.

Table 2-5 Parameters for Sending/Receiving

DP-V1	SIMATIC S7 (SFC 58/59)	For PC: DP programming interface (dpc*_read/write)	Meaning
PROFIBUS address	LADDR (The address of the cyclic input byte of the DP/*EIB* Link must be specified (see also Section 2.4). The S7 CPU calculates the PROFIBUS address from this information.)	C_Ref	PROFIBUS address of the DP/*EIB* Link (DP slave)
	IOID Here, the following fixed value must be entered: B#16#54	-	Fixed value
Slot_number	Is calculated from LADDR; Not an SFC parameter	Slot_number	With DP/*EIB* Link: any value
Index	RECNUM	Index	Data record number; specifies the profile used.
Length	RECORD Referenced by any pointer	Length_s	Length of the input/output data area
Data	RECORD Referenced by any pointer	Data_s	Address of the input/output data area
	RET_VAL BUSY		Return parameter to check execution of a job

You will find programming examples for SIMATIC S7 in Section 2.5.7

2.5.2 Structure of the Interface - Selecting a Profile

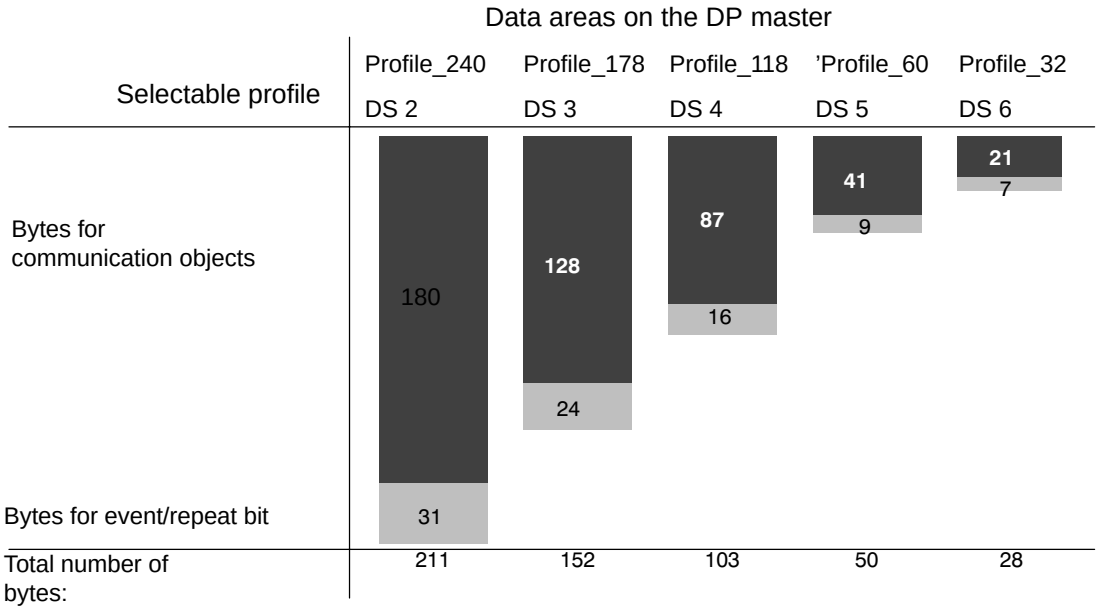
Utilization of the Data Areas on the DP Master

In total, the maximum 240 communication objects occupy up to 211 bytes of input data and 211 bytes of output data (refer to the schematic below).

The input/output area is divided into an area for object values and a data area for event bits (input data) or repeat bits (output data).

The actual base addresses of the input or output areas depend on the data organization on the PROFIBUS DP master. Generally, you would plan one data block each for the input and output data.

The schematic below shows the number of bytes required in total and the number of bytes required for the communication objects and control bits in the various profiles in the input and output data area.



When to Use Which Profile?

If you do not use the full number of communication objects available for your application that can be used by DP/EIB Link and if you also want to keep down the data areas used on the DP master, you can select smaller data areas using the appropriate profile.

You select one of the profiles by specifying a data record number (index) in the write/read job.

Notice

The data record number selected with the first read_data_record or write_data_record after the DP/*EIB* Link is activated by the DP master determines the profile used.

You can only select a new profile after a DP interruption and reactivation.

Deciding on a Profile for the DP Interface

On completion of the configuration you can decide which profile you should use in the user program of the DP master and should specify in the jobs for read_data_record and write_data_record based on the table below.

The detailed assignment of the *EIB* communication objects to the DP data areas required for programming the DP master is shown in tables 2-7 to 2-13 in Section 2.5.1.

Recommendation:
If the length of the data buffer is unimportant in your application, you should use Profile_240.

Table 2-6

Data type	*EIB* Communication Objects									
	Profile_240 (DS 2)		Profile_178 (DS 3)		Profile_118 (DS 4)		Profile_60 (DS 5)		Profile_32 (DS 6)	
	Number	Object no.	Number	Object no.	Number	Object no.	Number	Object no.	Number	Object no.
1 Bit	128	0-127	96	0-95	64	0-63	32	0-31	16	0-15
2 bit	8	128-135	8	128-135	4	128-131	4	128-131	4	128-131
4 bit	32	136-167	24	136-159	16	136-151	8	136-143	4	136-139
1 byte	32	168-199	24	168-191	16	168-183	8	168-175	4	168-171
2 byte	22	200-221	12	200-211	8	200-207	4	200-203	2	200-201
3 byte	2	222-223	2	222-223	2	222-223	0	-	0	-
4 byte	16	224-239	12	224-235	8	224-231	4	224-227	2	222-225

Example:
As a result of your assignment of *EIB* group addresses, you have occupied the following communication objects:

94 x 1 bit in the range from 0-93; 4 x 2 bits in the range from 128-131; 2 x 2 bytes in the range from 200-201.

Table 2-6 shows that you can select Profile 240 and 178 since only these provide the required number of 1 bit communication objects.

2.5.3 Assigning *EIB* Communication Objects to the DP Interface.

Mapping

In the tables below, you can see the bits or bytes in the DP input or output data area in which the *EIB* communication objects are stored.

The tables are divided into the available data types:

1-bit, 2-bit, 4-bit
1-byte, 2-byte, 3-byte, 4-byte

Example - *EIB* Communication Object *69*

Based on an example, the scheme soon becomes clear.

To find out which data type *EIB* communication object 69 is, and in which bit in the DP data area of this *EIB* communication object it is mapped, go to the left table column “*EIB* communication object bit assignment”.

- You will find the *EIB* communication object 69 in the 1-bit table.
- The *EIB* communication object 69 is mapped in bit 5 in byte 8.
- The *EIB* communication object 69 is only available if you use Profile 240 or 178.

1-Bit Area

Table 2-7

***EIB* Communication Object Bit Assignment**								**Byte No. in DP Data Area for Profile**				
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**	**240**	**178**	**118**	**60**	**32**
7	6	5	4	3	2	1	0	0	0	0	0	0
15	14	13	12	11	10	9	8	1	1	1	1	1
23	22	21	20	19	18	17	16	2	2	2	2	
31	30	29	28	27	26	25	24	3	3	3	3	
39	38	37	36	35	34	33	32	4	4	4		
47	46	45	44	43	42	41	40	5	5	5		
55	54	53	52	51	50	49	48	6	6	6		
63	62	61	60	59	58	57	56	7	7	7		
71	70	69	68	67	66	65	64	8	8			
79	78	77	76	75	74	73	72	9	9			

Table 2-7 , continued

***EIB* Communication Object Bit Assignment**								**Byte No. in DP Data Area for Profile**				
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**	**240**	**178**	**118**	**60**	**32**
87	86	85	84	83	82	81	80	10	10			
95	94	93	92	91	90	89	88	11	11			
103	102	101	100	99	98	97	96	12				
111	110	109	108	107	106	105	104	13				
119	118	117	116	115	114	113	112	14				
127	126	125	124	123	122	121	120	15				

2-Bit Area

Table 2-8

***EIB* Communication Object Bit Assignment**								**Byte No. in DP Data Area for Profile**				
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**	**240**	**178**	**118**	**60**	**32**
131		130		129		128		16	12	8	4	2
135		134		133		132		17	13			

4-Bit Area

Table 2-9

***EIB* Communication Object/ Bit Assignment in the DP Data Area**								**Byte No. in DP Data Area for Profile**				
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**	**240**	**178**	**118**	**60**	**32**
137				136				18	14	9	5	3
139				138				19	15	10	6	4
141				140				20	16	11	7	
143				142				21	17	12	8	
145				144				22	18	13		
147				146				23	19	14		
149				148				24	20	15		
151				150				25	21	16		
153				152				26	22			
155				154				27	23			

Table 2-9 , continued

***EIB* Communication Object/ Bit Assignment in the DP Data Area**								**Byte No. in DP Data Area for Profile**				
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**	**240**	**178**	**118**	**60**	**32**
157				156				28	24			
159				158				29	25			
161				160				30				
163				162				31				
165				164				32				
167				166				33				

1-Byte Area

Table 2-10

***EIB* Communication Object/ Byte Assignment in the DP Data Area**	**Byte No. in DP Data Area for Profile**				
	240	**178**	**118**	**60**	**32**
168	34	26	17	9	5
169	35	27	18	10	6
170	36	28	19	11	7
171	37	29	20	12	8
172	38	30	21	13	
173	39	31	22	14	
174	40	32	23	15	
175	41	33	24	16	
176	42	34	25		
177	43	35	26		
178	44	36	27		
179	45	37	28		
180	46	38	29		
181	47	39	30		
182	48	40	31		
183	49	41	32		
184	50	42			
185	51	43			
186	52	44			
187	53	45			
188	54	46			
189	55	47			
190	56	48			
191	57	49			
192	58				
193	59				
194	60				
195	61				
196	62				
197	63				
198	64				
199	65				

2-Byte Area

Table 2-11

***EIB* Communication Object/ Byte Assignment in the DP Data Area**		**Byte No. in DP Data Area for Profile**				
High byte n (e.g. 66)	Low byte n+1 (e.g. 67)	**240**	**178**	**118**	**60**	**32**
200		66,67	50,51	33,34	17,18	9,10
201		68,69	52,53	35,36	19,20	11,12
202		70,71	54,55	37,38	21,22	
203		72,73	56,57	39,40	23,24	
204		74,75	58,59	41,42		
205		76,77	60,61	43,44		
206		7879	62,63	45,46		
207		80,81	64,65	47,48		
208		82,83	66,67			
209		84,85	68,69			
210		86,87	70,71			
211		88,89	72,73			
212		90,91				
213		92,93				
214		94,95				
215		96,97				
216		98,99				
217		100,101				
218		102,103				
219		104,105				
220		106,107				
221		108,109				

3-Byte Area

Table 2-12

***EIB* Communication Object/ Byte Assignment in the DP Data Area**			**Byte No. in DP Data Area for Profile**				
High byte n (e.g. 110)	Low byte n+1 (e.g. 111)	Low byte n+2 (e.g. 112)	**240**	**178**	**118**	**60**	**32**
222			110-112	74-76	49-51		
223			113-115	77-79	52-54		

4-Byte Area

Table 2-13

Assignment to the *EIB* Communication Object				**Byte No. in DP Data Area for Profile**				
High byte, high word n (e.g. 116)	Low byte, high word n+1 (e.g. 117)	High byte, low word n+2 (e.g. 118)	Low byte, low word n+3 (e.g. 119)	**240**	**178**	**118**	**60**	**32**
224				116-119	80-83	55-58	25-28	13-16
225				120-123	84-87	59-62	29-32	17-20
226				124-127	88-91	63-66	33-36	
227				128-131	92-95	67-70	37-40	
228				132-135	96-99	71-74		
229				136-139	100-103	75-78		
230				140-143	104-107	79-82		
231				144-147	108-111	83-86		
232				148-151	112-115			
233				152-155	116-119			
234				156-159	120-123			
235				160-163	124-127			
236				164-167				
237				168-171				
238				172-175				
239				176-179				

2.5.4 Receiving Data

Mechanism and Sequence

By evaluating the event bits in the DP input data area, you can detect the *EIB* communication objects for which data were received via the DP/*EIB*-Link.

The following flow chart illustrates the mechanism for receiving:

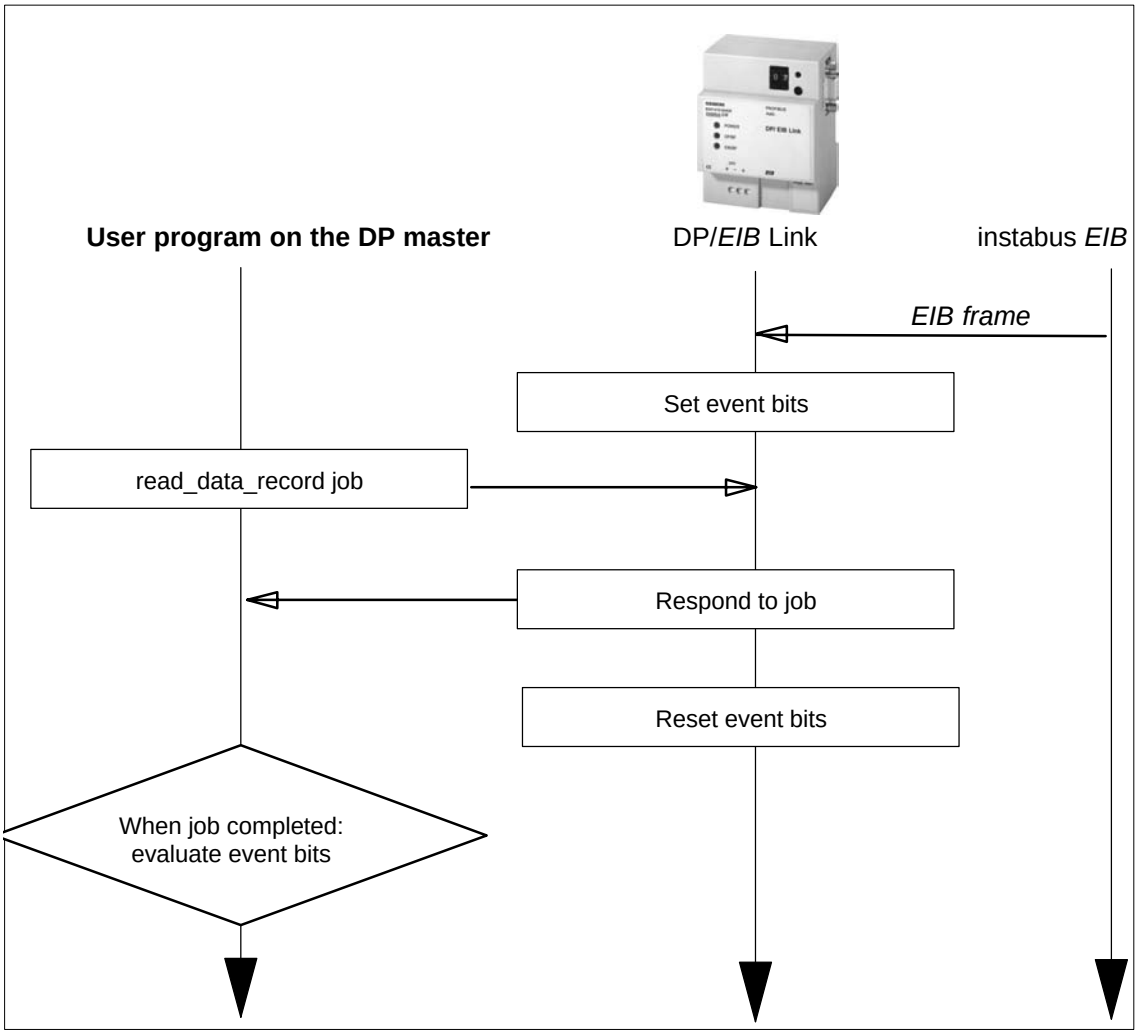


Figure 2-3

Evaluating Event Bits

Each event bit is assigned to an *EIB* communication object.

A set event bit means one of the following:

- **Signal data reception**
  A new value was received for the corresponding *EIB* communication object; the DP master now evaluates this new object value
- **Confirmation of a send job**
  The DP master has sent an object value for the corresponding *EIB* communication object. Refer also to the topic of sending data in the next section.

Assigning the Event Bit to the *EIB* Communication Object

To allow you to handle the bits in the user program of the DP master, the following table shows which event bit belongs to which *EIB* communication object:

Table 2-14

Data type	Event bit belongs to *EIB* communication object								Byte in the DP input area for profile				
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**	**240**	**178**	**118**	**60**	**32**
1 Bit	7	6	5	4	3	2	1	0	180	128	87	41	21
	15	14	13	12	11	10	9	8	181	129	88	42	22
	23	22	21	20	19	18	17	16	182	130	89	43	
	31	30	29	28	27	26	25	24	183	131	90	44	
	39	38	37	36	35	34	33	32	184	132	91		
	47	46	45	44	43	42	41	40	185	133	92		
	55	54	53	52	51	50	49	48	186	134	93		
	63	62	61	60	59	58	57	56	187	135	94		
	71	70	69	68	67	66	65	64	188	136			
	79	78	77	76	75	74	73	72	189	137			
	87	86	85	84	83	82	81	80	190	138			
	95	94	93	92	91	90	89	88	191	139			
	103	102	101	100	99	98	97	96	192				
	111	110	109	108	107	106	105	104	193				
	119	118	117	116	115	114	113	112	194				
	127	126	125	124	123	122	121	120	195				
2 bit	135	134	133	132	131	130	129	128	196	140	95[2)]	45[2)]	23[2)]

Table 2-14 , continued

Data type	Event bit belongs to *EIB* communication object								Byte in the DP input area for profile				
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**	**240**	**178**	**118**	**60**	**32**
4 bit	143	142	141	140	139	138	137	136	197	141	96	46	24[2)]
	151	150	149	148	147	146	145	144	198	142	97		
	159	158	157	156	155	154	153	152	199	143			
	167	166	165	164	163	162	161	160	200				
1 byte	175	174	173	172	171	170	169	168	201	144	98	47	25[2)]
	183	182	181	180	179	178	177	176	202	145	99		
	191	190	189	188	187	186	185	184	203	146			
	199	198	197	196	195	194	193	192	204				
2 byte	207	206	205	204	203	202	201	200	205	147	100[3)]	48[2)]	26[1)]
	215	214	213	212	211	210	209	208	206	148			
			221	220	219	218	217	216	207[3)]				
3 byte							223	222	208[1)]	149[1)]	101[1)]		
4 byte	231	230	229	228	227	226	225	224	209	150	102	49[2)]	27[1)]
	239	238	237	236	235	234	233	232	210	151[2)]			

[1)] Bits 2 to 7 irrelevant

[2)] Bits 4 to 7 irrelevant

[3)] Bits 6 and 7 irrelevant

2.5.5 Sending Data

Mechanism and Sequence

You send data to the DP/*EIB* Link by initiating a write job in the user program and specifying the DP output data area with the write job. The DP/EIB Link then generates an *EIB* frame on instabus *EIB* for all *EIB* communication objects whose object value has changed since the last write job.

The following flow chart illustrates the send mechanism:

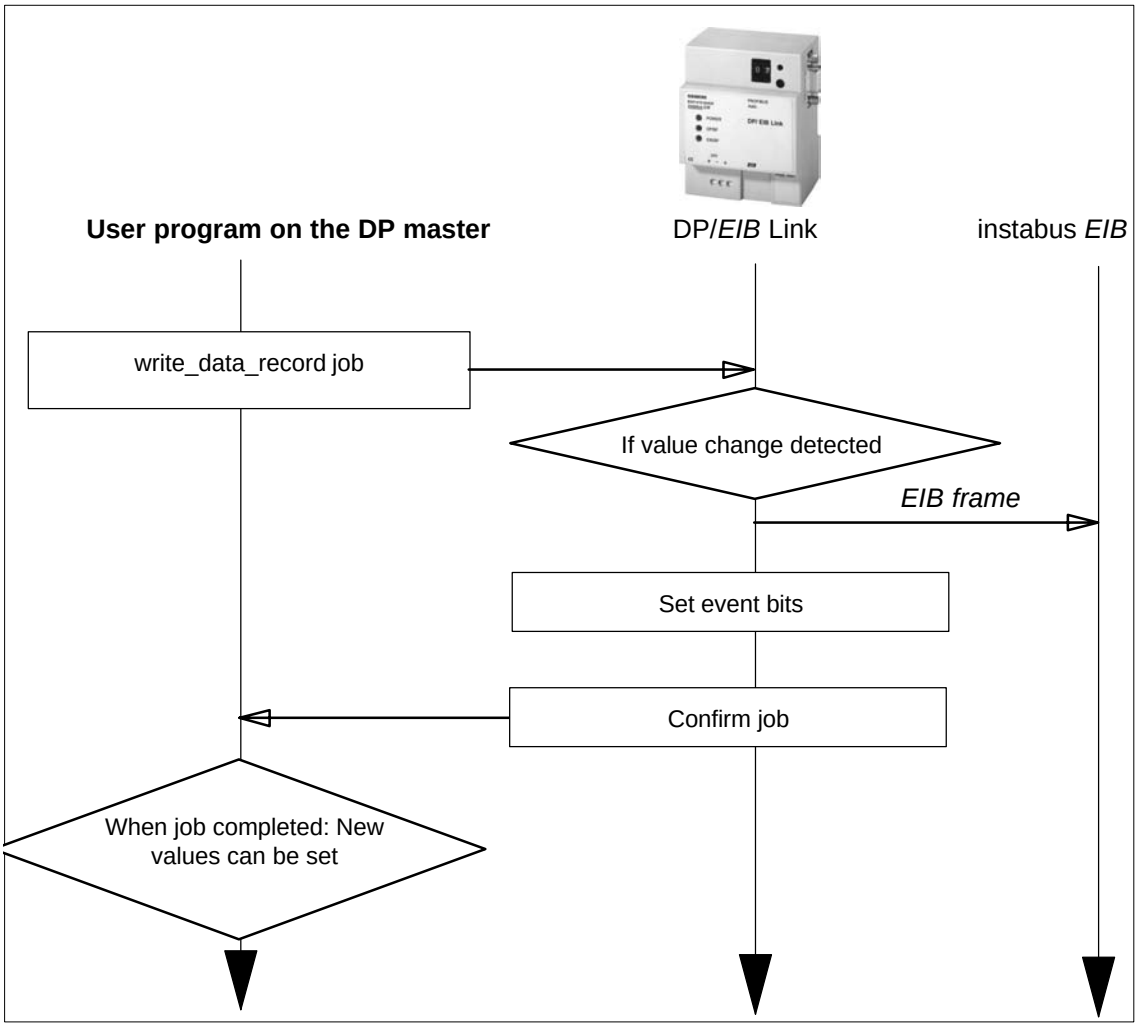


Figure 2-4

In this flow diagram, you can also see that the DP/EIB Link sets the corresponding event bit for each *EIB* communication object if there was a value change and therefore an *EIB* frame was sent to instabus *EIB*.

Forcing a Send Job with Repeat Bits

If you want to trigger a send job on the *instabus EIB*, without the object value having changed, you can do this by setting the repeat bit.

The repeat bit must be set on the DP master and **reset** again after the job has been executed!

The rest of the sequence corresponds to sending as a result of a value change.

The following flow chart illustrates the send mechanism:

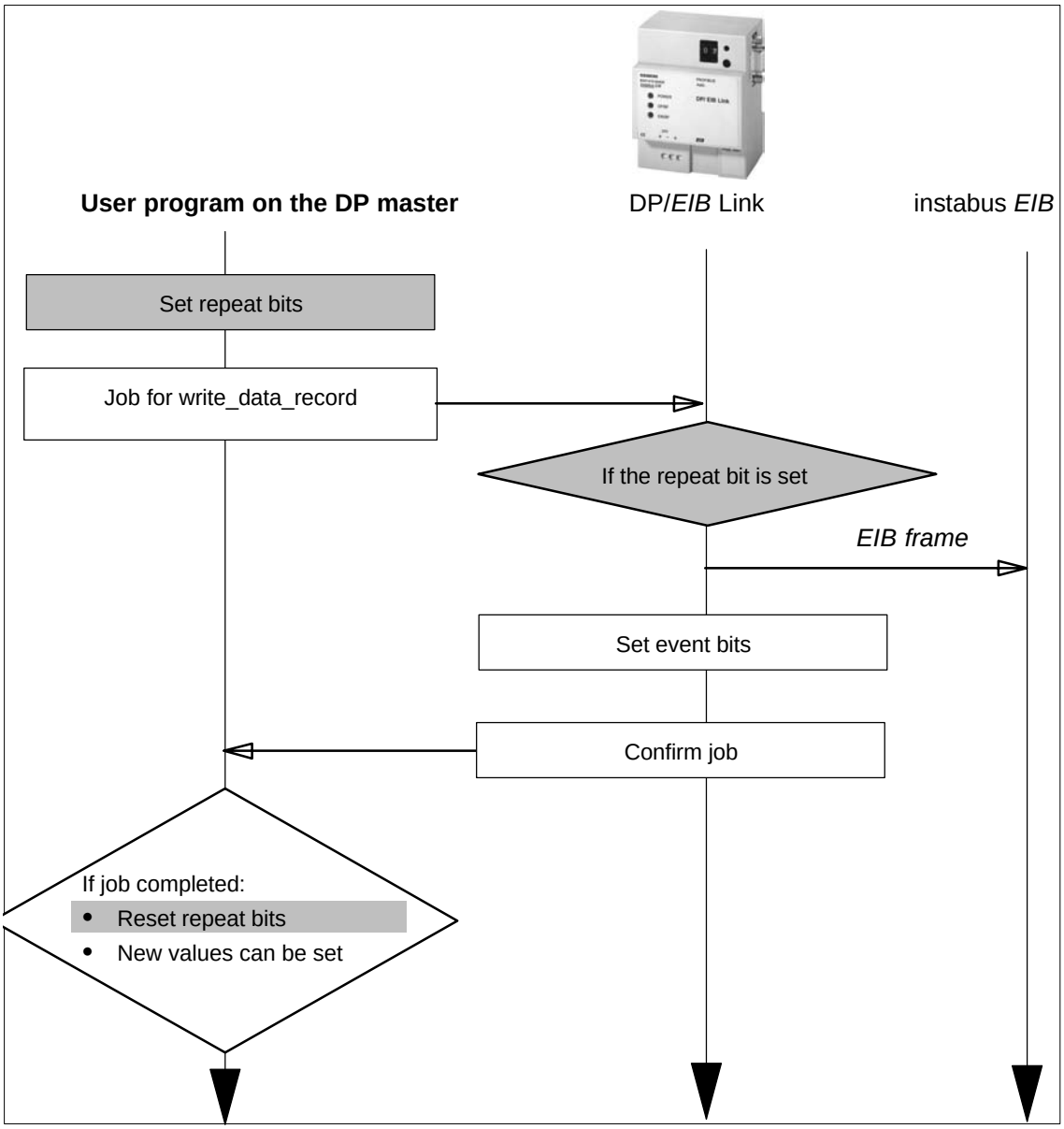


Figure 2-5

Notice

Remember that the DP output data area can only be written to again after the job has been confirmed (with a SIMATIC S7 application: Busy Bit=False). Otherwise, you risk an inconsistent data transfer or data loss.

Assigning the Repeat Bit to the *EIB* Communication Object

The repeat bits in the DP data area (outputs) are assigned to the *EIB* communication objects as shown in the table below. Each set repeat bit triggers one send job for the *EIB* communication object assigned to it.

To allow handling in the user program of the DP master, the following table shows which repeat bit is assigned to which *EIB* communication object:

Table 2-15

Data type	Repeat Bit Belongs to *EIB* Communication Object								Byte in the DP Output Data Area for Profile				
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	240	178	118	60	32
1 Bit	7	6	5	4	3	2	1	0	180	128	87	41	21
	15	14	13	12	11	10	9	8	181	129	88	42	22
	23	22	21	20	19	18	17	16	182	130	89	43	
	31	30	29	28	27	26	25	24	183	131	90	44	
	39	38	37	36	35	34	33	32	184	132	91		
	47	46	45	44	43	42	41	40	185	133	92		
	55	54	53	52	51	50	49	48	186	134	93		
	63	62	61	60	59	58	57	56	187	135	94		
	71	70	69	68	67	66	65	64	188	136			
	79	78	77	76	75	74	73	72	189	137			
	87	86	85	84	83	82	81	80	190	138			
	95	94	93	92	91	90	89	88	191	139			
	103	102	101	100	99	98	97	96	192				
	111	110	109	108	107	106	105	104	193				
	119	118	117	116	115	114	113	112	194				
	127	126	125	124	123	122	121	120	195				
2 bit	135	134	133	132	131	130	129	128	196	140	95[2)]	45[2)]	23[2)]
4 bit	143	142	141	140	139	138	137	136	197	141	96	46	24[2)]
	151	150	149	148	147	146	145	144	198	142	97		
	159	158	157	156	155	154	153	152	199	143			
	167	166	165	164	163	162	161	160	200				

Table 2-15 , continued

Data type	Repeat Bit Belongs to *EIB* Communication Object								Byte in the DP Output Data Area for Profile				
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**	**240**	**178**	**118**	**60**	**32**
1 byte	175	174	173	172	171	170	169	168	201	144	98	47	25[2)]
	183	182	181	180	179	178	177	176	202	145	99		
	191	190	189	188	187	186	185	184	203	146			
	199	198	197	196	195	194	193	192	204				
2 byte	207	206	205	204	203	202	201	200	205	147	100[3)]	48[2)]	26[1)]
	215	214	213	212	211	210	209	208	206	148			
			221	220	219	218	217	216	207[3)]				
3 byte							223	222	208[1)]	149[1)]	101[1)]		
4 byte	231	230	229	228	227	226	225	224	209	150	102	49[2)]	27[1)]
	239	238	237	236	235	234	233	232	210	151[2)]			

[1)] Bits 2 to 7 irrelevant

[2)] Bits 4 to 7 irrelevant

[3)] Bits 6 and 7 irrelevant

Failure of the DP Master / Restart

If the DP master fails (for example PROFIBUS cable break), the values of the EIB communication objects (outputs) remain unchanged. As soon as the DP master returns to the bus, communication is automatically established and data exchange can be continued.

2.5.6 Structure of the Data Types - EIS Specification

The Crux of the Matter

To be able to structure and handle data in the user program of the DP master, you should know the following:

- The data type of the communication object with which you want to communicate;
- The meaning of the data value that you want to receive and evaluate or that you want to send to trigger a switching or display function.

The table below lists the following:

- The possible *EIB* functions,
- The corresponding data types,
- The corresponding EIS number for the detailed specification.

Before you can program, you also require the detailed specification; an excerpt of this is included in Appendix 2 of this manual and also in /1/.

For further information, contact the manufacturer of the EIB device you want to use for communication.

The best procedure is as follows:

1. Find out the data type of the *EIB* communication object with which you want to communicate (linked via the group address); for example 4-bit area.
2. Based on the intended function, find out the suitable *EIB* function in Table 2-16 ; for example dimmer function with the subfunctions: “dimming”.
3. Then assign the function value according to the detailed specification in Appendix A; based on the EIS number in Table 2-16, you will find the corresponding detail specification in Appendix A.
4. Find out the address of the *EIB* communication object in your data area based on the tables in Section 2.5.3.

Table 2-16

EIB **Function**		**Data type**	**EIS No.**	**Meaning**
Main Function	**Subfunction**			
switching		1 Bit	EIS 1	On/off switch
dimming			EIS 2	Dimmer function with subfunctions for:
	position	1 Bit	(value complying with EIS 1)	• on/off
	control	4 bit		• Continuous value change
	value	1 byte		• Absolute value
time		3 byte	EIS 3	Time value
date		3 byte	EIS 4	Date value
value		2 byte	EIS 5	Any (physical) absolute value
scaling		1 byte	EIS 6	Any (physical) relative value
drive control			EIS 7	Control function for drives with subfunctions for:
	move	1 Bit		• Turn on or change direction
	step	1 Bit		• Stop or step function
priority			EIS 8	Conditional turning on/off with subfunctions for
	priority_position	1 Bit	(value complying with EIS 1)	• On/off switch
	priority_control	2 bit		• Disable or enable on/off switch
float value		4 byte	EIS 9	Any (physical) absolute value in floating-point representation
16-bit counter value		2 byte	EIS 10	Counted value as integer with sign (16-bit)
32-bit counter value		4 byte	EIS 11	Counted value as integer with sign (32-bit)

For detailed information, refer to Appendix A.

2.5.7 Programming Examples

Example for SIMATIC S7

Below, you will find a brief group of examples for a SIMATIC S7 DP master.

From the schematic below, you can see how to organize the sequence of program sections in this example.

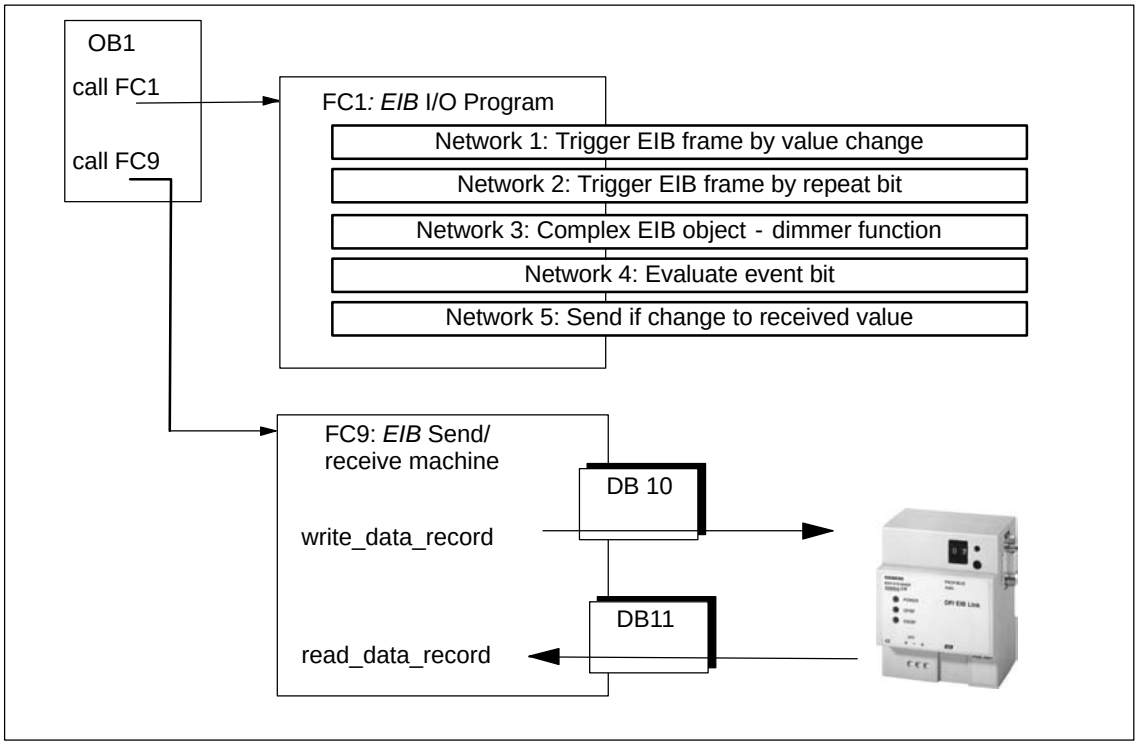


Figure 2-6

OB1: Organization of Execution

The block OB1 is activated cyclically and calls the *EIB* I/O program FC1 and the EIB send/receive machine FC9.

Table 2-17

STL			Explanation
AN	M	22.0	//WR_REC busy bit
CC	FC	1	//EIB I/O program
CALL	FC	9	//EIB Send/receive machine

FC9: *EIB* Send/Receive Machine

Table 2-18 Send Call

STL	Explanation
CALL "WR_REC"	//SFC58
REQ :=TRUE	
IOID :=B#16#54	//Fixed value
LADDR :=W#16#2	//Input byte address of DP/EIB Link
RECNUM :=B#16#2	//Profile: Data rec. no. (DSNR) here 2
RECORD :=P#DB10.DBX 0.0 BYTE 211	//Send data 211 bytes
RET_VAL:=MW20	//Return parameter
BUSY :=M22.0	//Return parameter
	//WR_REC end check
A M 22.0	//(negative edge of WR_REC BUSY)
FN M 22.1	
JCN recv	
	//If DS write complete:
L DW#16#0	//Delete repeat bits
T DB10.DBD 180	
T DB10.DBD 184	
T DB10.DBD 188	
T DB10.DBD 192	
T DB10.DBD 196	
T DB10.DBD 200	
T DB10.DBD 204	
T DB10.DBD 208	

Table 2-19 Receive Call

STL	Explanation
recv: NOP 0	
CALL "RD_REC"	//SFC59
REQ :=TRUE	
IOID :=B#16#54	//Fixed value
LADDR :=W#16#2	//Input byte address of DP/EIB Link
RECNUM :=B#16#2	//Profile: Data rec. no. (DSNR) here 2
RET_VAL:=MW30	//Return parameter
BUSY :=M32.0	//Return parameter
RECORD :=P#DB11.DBX 0.0 BYTE 211	//Receive data 211 bytes

FC1*: EIB* I/O Program

- **Network: 1**

  This program section demonstrates the situation in which a value change in the output data area leads to the sending of an *EIB* frame on *instabus EIB*. Each change at input 0.0 (triggered by a switch, test program etc.), brings about a value change in the EIB communication object 0.

  - Based on Table 2-7 (1-bit area), you can find the assignment of EIB communication object 0 to bit 0 in the DP data area.

Table 2-20 Network 1: Trigger EIB Frame on Value Change

```
STL                                          Explanation
      A     I         0.0
      =     DB10.DBX    0.0                  //Object 0
```

- **Network: 2**

  This program section demonstrates the situation in which the sending of an EIB frame on *instabus EIB* is forced.

  A positive edge at I 0.1 forces the sending of a “1” for EIB object 1.
  A positive edge at I 0.2 forces the sending of a “0” for EIB object 1.
  (The repeat bits are reset in FC9 after the data transfer)

  You can also monitor or check this behavior using the receive procedure described below in Network 4.

  - Based on Table 2-7 (1-bit area), you can find the assignment of EIB communication object 1 to bit 1 in the DP data area.
  - Based on Table 2-15, you can find the assignment of EIB communication object 1 to repeat bit 1 in byte 180 (Profile_240) in the DP data area.

Table 2-21 Network 2: Trigger EIB Frame by Repeat Bit

```
STL                                          Explanation
      A     I      0.1
      FP    M     10.1

      S     DB10.DBX    0.1                  //Object 1 = 1
      S     DB10.DBX  180.1                  //Repeat bit Object 0 = 1

      A     I      0.2
      FP    M     10.2
      R     DB10.DBX    0.1                  //Object 1 = 0
      S     DB10.DBX  180.1                  //Repeat bit, Object 0 = 1
```

- **Network: 3**

  This program section demonstrates the situation in which a dimmer function is triggered. Communication is via the *EIB* communication object 136.

  - Based on the specification in Section 2.5.6 and in Appendix A, you can see that the “control” subfunction with data type 4-bit is necessary.
  - Based on Table 2-9 (4-bit area), you can find the assignment of *EIB* communication object 136 to byte 18 in the DP data area.

Table 2-22 Network 3: EIB communication object in the 4-bit area - dimmer function

```
STL                                          Explanation
      A     I      0.3                       //Brighter
      S     DB10.DBX   18.0
      R     DB10.DBX   18.1
      R     DB10.DBX   18.2
      S     DB10.DBX   18.3
      A     I      0.4                       //Darker
      S     DB10.DBX   18.0
      R     DB10.DBX   18.1
      R     DB10.DBX   18.2
      R     DB10.DBX   18.3
      AN    I      0.3                       //stop
      AN    I      0.4
      R     DB10.DBX   18.0
      R     DB10.DBX   18.1
      R     DB10.DBX   18.2
      R     DB10.DBX   18.3
```

- **Network: 4**

  This program section demonstrates the situation in which an event bit is evaluated via the receive area. The queried event bit relates to the same *EIB* communication object as in Network 1. The event bit therefore shows whether a send frame for the *EIB* communication object 1 was triggered by a repeat bit in Network 2.

  EIB communication object 200 counts how many frames were sent or received on for *EIB* communication object 1.

  - Based on Table 2-11 (2-byte area), you can find the assignment of EIB communication object 200 to byte 66 and 67 in the DP data area.
  - Based on Table 2-14, you will find the assignment of EIB communication object 1 to event bit 1 in byte 180 (Profile_240) in the DP data area.

Table 2-23 Network 4: Evaluate Event Bit - Example 1

```
STL                                          Explanation
      A     DB11.DBX  180.1                  //Event bit Object 1
      NOT
      JC   end5
      R     DB11.DBX  180.1
      L     DB10.DBW   66                    //Object 200
      +     1
      T     DB10.DBW   66
      end5: NOP   0
```

- **Network: 5**

  This program section once again demonstrates the situation in which an *EIB* frame is sent on *instabus* *EIB* when the data value has changed.

  The data value sent in the *EIB* communication object 200 in Network 4 can be read in the corresponding DP receive data area. It is incremented and sent again as *EIB* communication object 201.

  - Based on Table 2-11 (2-byte area), you can find the assignment of EIB communication object 200 to byte 66 and 67 in the DP data area and the assignment of EIB communication object 201 to byte 68 and 69 in the DP data area.

Table 2-24 Network 5: Evaluate Event Bit - Example 2

```
STL                                          Explanation
      L     DB11.DBW   66
      +     1
      T     DB10.DBW   68
```

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EIB Data Specification (EIS) A

This appendix section contains an excerpt of the EIS data specification. The description is detailed enough so that you can set or interpret values in the user program of the DP master for the most important applications without needing further reference material.

This symbol indicates that the EIS Specification contains further information.

To use EIB devices on the *instabus EIB*, you do **not** require this information.

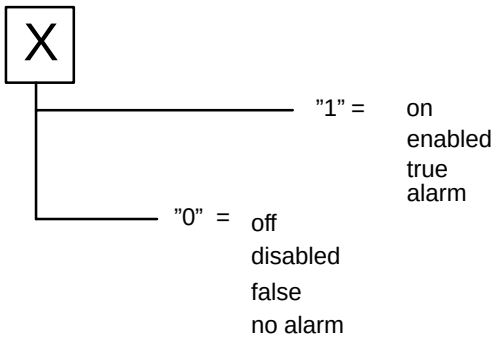
A.1 EIB Function EIS 1: switching

Description

This function allows you to trigger switches. You can also use the function to set flags or to enable and disable other functions.

Value Format

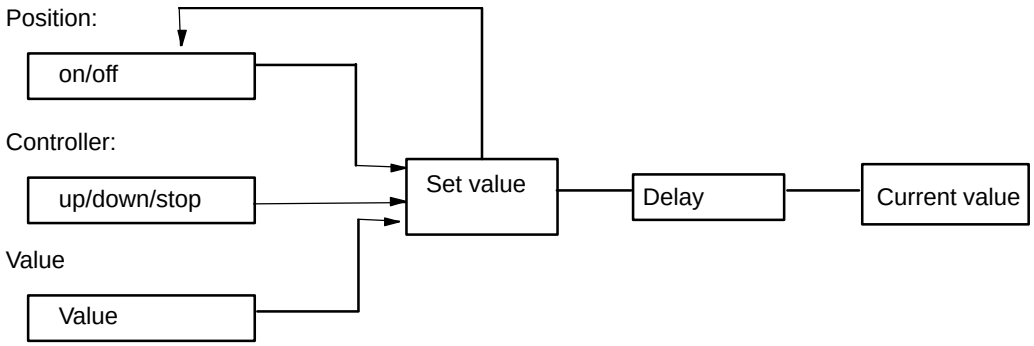
1 bit



A.2 EIB Function EIS 2: dimming

Description

This function is used to control gradual on/off actions (dimmer). It consists of three subfunctions:



Under the topic “Behavior”, the EIS Specification contains more detailed information about handling the dimming function.

Subfunctions

- EIB subfunction ”Position”

  The subfunction allows you to turn the dimmer on or off.

  1 bit

  On/off -> see EIS 1 in Section A.1

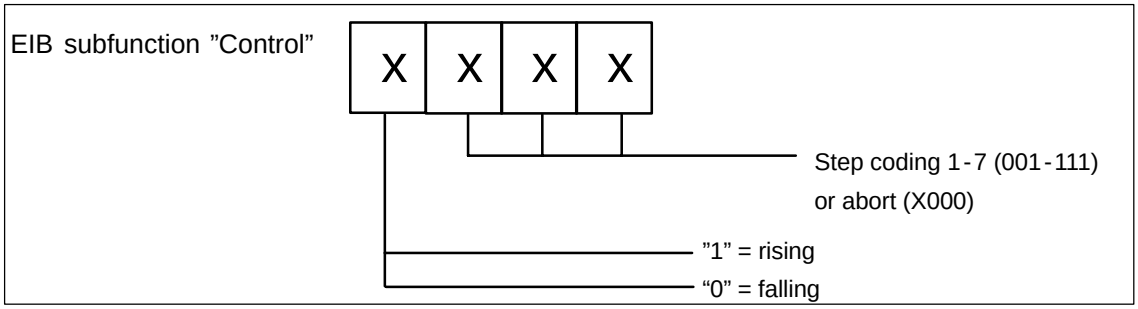
- EIB subfunction ”Control”

  This subfunction allows the step-by-step raising or lowering of the actual value. An additional coding allows the step-by-step value change to be halted.

  4 bits

  The step coding specifies the length of the interval relative to the entire range of 0 to 100%.

  Where: Number of intervals = 2 x (step coding - 1)



- EIB subfunction ”Value”

  This subfunction allows you to set the current value directly (in contrast to gradual value change).

  8 bits -> see EIS 6 in Section A.6

A.3 EIB Function EIS 3: time

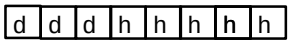
Description

This function provides all addressed components with the current time.

Value Format

3 bytes

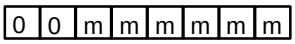
1st byte



d= day, for example (1 = Monday, 7 = Sunday, 0 = no day)

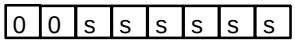
h = hours (binary)

2nd byte



m = minutes (binary)

3rd byte



s = seconds (binary)

A.4 EIB Function EIS 4: date

Description

This function supplies all address components with the current date.

Value Format

3 bytes

1st byte

0	0	0	D	D	D	D	D

D= day (binary 1 to 31)

2nd byte

0	0	0	0	M	M	M	M

M = month (binary 1 to 12)

3rd byte

Y	Y	Y	Y	Y	Y	Y	Y

Y = year (binary 0 to 255)

A.5 EIB Function EIS 5: value

Description

This function is used to transfer physical values (16 bits).

Under “Remarks” and “Units of measurement”, the EIS Specification supplies values and contains further information about coding values.

Value Format

2 bytes

S	E	E	E	E	M	M	M		M	M	M	M	M	M	M	M

S = sign of the mantissa

E = exponent Base 2 (0 to 15).

M = mantissa in two’s complement (-2048 to 0 to 2047)

EIB_Value = $(-1)^{(S)} * (0.01*M) * 2^{(E)}$

Range of values: -671 088.64...0...+670 760.96

Resolution: $0.01 * 2^{(\text{exponent})}$

A.6 EIB Function EIS 6: scaling

Description

This function is used to transfer relative values with a resolution of 8 bits (the range ”Lowest value” to 100% corresponds to the bit range 1 to 255).

Under “Units of measurement”, the EIS Specification supplies values and contains further information about coding values.

Value Format

8 bits

EIB_Scaling:

X	X	X	X	X	X	X	X

0	0	0	0	0	0	0	0	= in use/off
0	0	0	0	0	0	0	1	= “lower value”
		...						
1	1	1	1	1	1	1	1	= 100%

A.7 EIB Function EIS 7: drive control

Description

This function is used to control drives. The subfunctions turn the drive on and off and control the direction of movement.

Under “Behavior”, the EIS Specification contains further information about coding; you will also find a state chart from which you can see the effect of the signals on the drive.

- EIB subfunction ”Move”
  - Value Format

    Initiates a movement and controls the direction of movement.

    1 bit

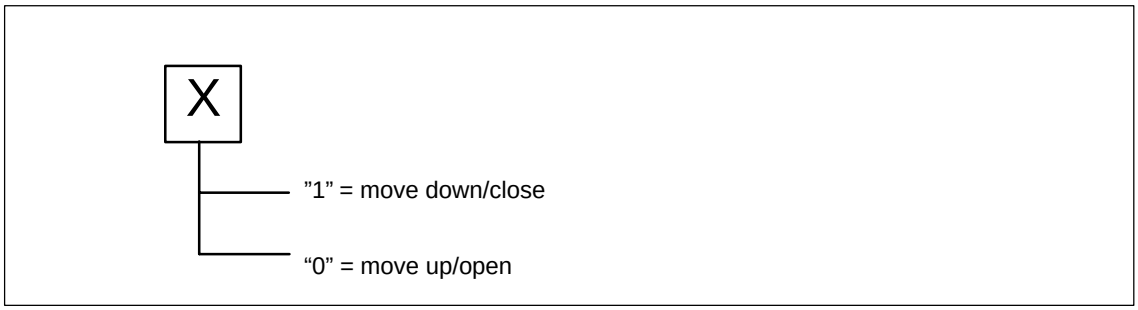


Figure A-1

- EIB subfunction ”Step”

  Turns off an initiated movement or initiates a single step movement.
  - Value Format

    1 bit

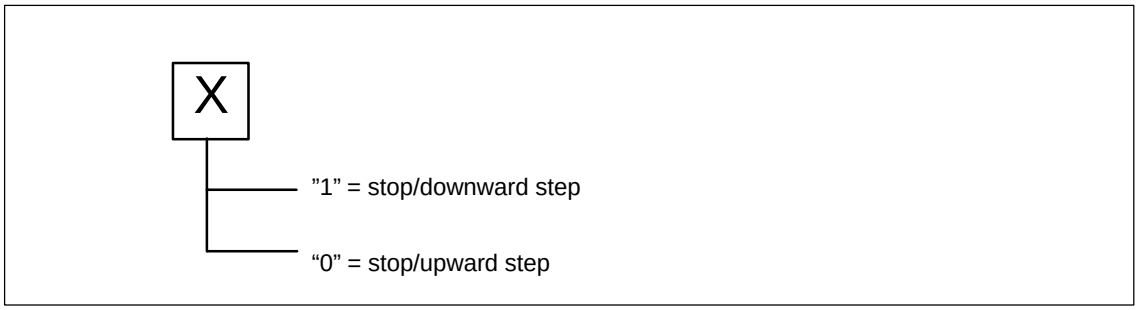


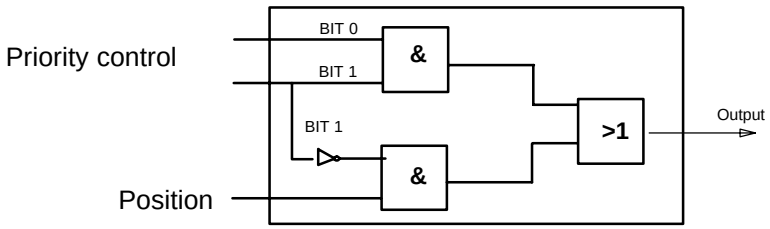
Figure A-2

A.8 EIB Function EIS 8: priority

Description

This function is used to output a switching instruction (position) dependent on a switching condition (priority).

Under “Definition”, the EIS Specification contains further information about the coding.



- EIB subfunction ”EIS_Priority_Position”

  This specifies a desired switch setting that is output controlled by the EIB subfunction ”Priority Control”.

  - Value Format

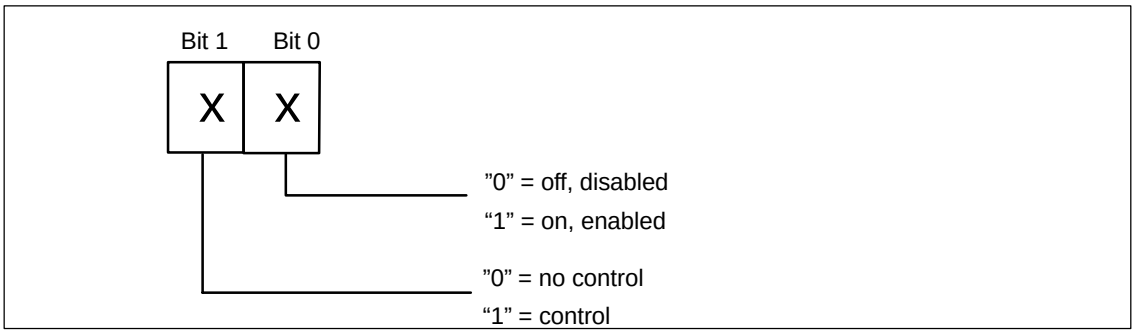
    See EIS 1: on/off

- EIB subfunction ”EIS priority control”

  Controls the output; as an alternative, the “Position” signal (when ”Control” is selected) or Bit 0 (when ”No Control” is selected) is applied to the output.

  - Value Format

    2 bits



A.9 EIB Function EIS 9: float value

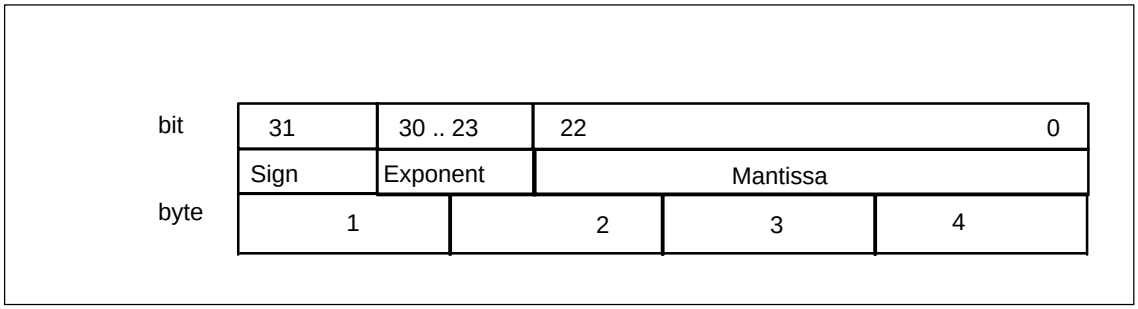
Description

This function defines a 32 bit floating point value complying with IEEE 754 for transferring values of various physical units.

Under “Units of measurement”, the EIS Specification contains further information on coding and physical values.

Value Format

4 bytes



A.10 EIB Function EIS 10: 16-bit counter value

Description

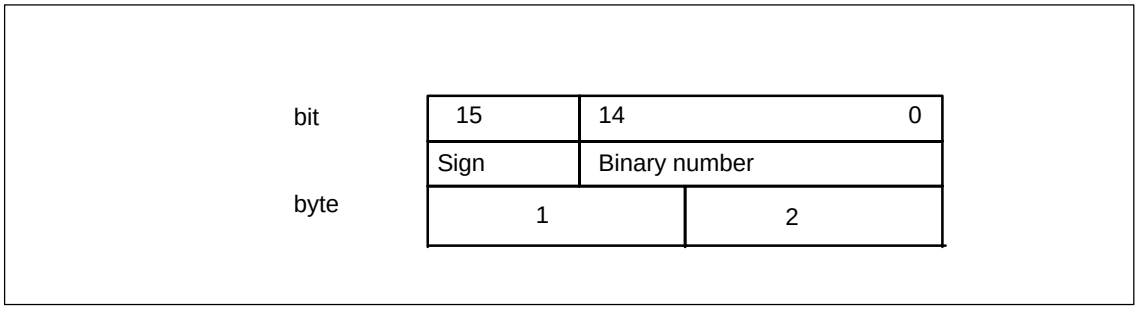
This function defines a 16-bit integer (optionally with or without sign) for transferring values.

Under “Value size”, the EIS Specification has further information on coding.

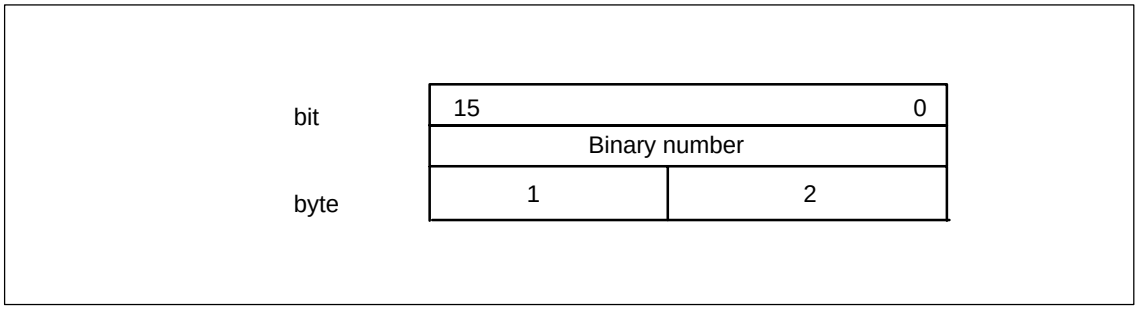
Definition

Negative values are coded in two’s complement.

Coding with sign:



Coding without sign:



A.11 EIB Function EIS 11: 32-bit counter value

Description

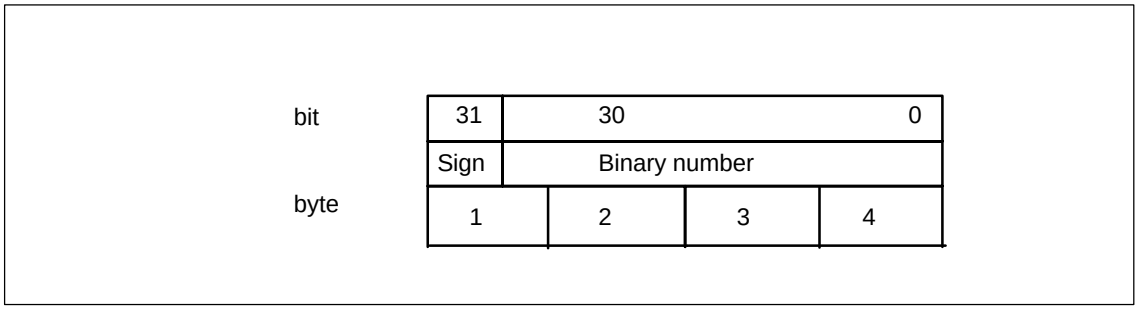
This function defines a 32-bit integer (optionally with or without sign) for value transfer.

Under “Value size”, the EIS Specification has further information on coding.

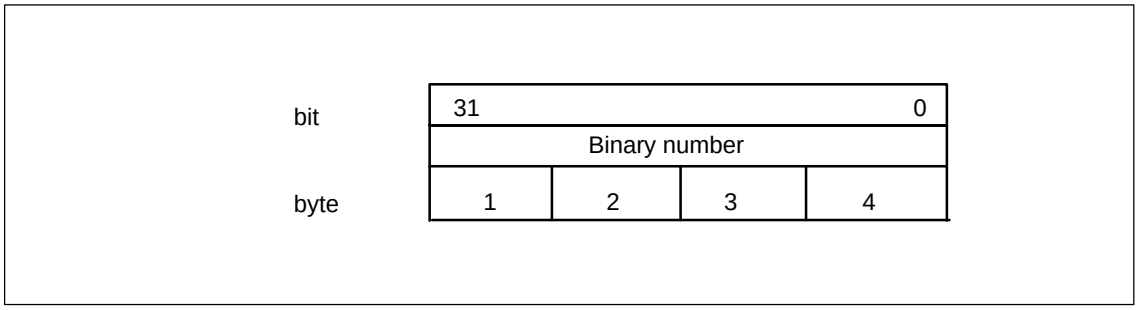
Definition

Negative values are coded in two’s complement.

Coding with sign:



Coding without sign:



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Structure of the PROFIBUS DP Parameter Assignment and Configuration Frame

B

When is this Information Necessary?

This section describes the structure of the parameter assignment frame and the configuration frame for DP/*EIB* Link. This information is necessary when you use configuration tools that cannot interpret the type or GSD file of the DP/EIB Link supplied on diskette with this manual.

Note

If you configure the DP/EIB Link with configuration tools such as STEP 7 or COM PROFIBUS, you do **not** require this information. The options for configuring/assigning parameters to the DP/EIB Link are then available directly in menus.

Structure of the Configuration Frame

Byte 0	10_H	1 cyclic input byte

Structure of the Parameter Assignment Frame

The parameter assignment frame of the DP/EIB Link is 17 bytes long. It consists of a 7-byte long standard section complying with EN 50170 and a further 10-byte long field with additional parameters for the DP/EIB Link.

- **Standardized section**

Byte 0		Station status, see /9/
Byte 1		WD factor 1, see /9/
Byte 2		WD factor 2, see /9/
Byte 3		Min. T_{SDR}, see /9/
Byte 4	80_H	Vendor ID, high byte, see /9/
Byte 5	99_H	Vendor ID, low byte, see /9/
Byte 6		Group ID, see /9/

- **User-specific parameters**

Byte 7	80_H or 84_H	
Byte 8	00_H	fixed value
Byte 9	00_H	fixed value
Byte 10	07_H	fixed value
Byte 11	81_H	fixed value
Byte 12	00_H	fixed value
Byte 13	00_H	fixed value
Byte 14	$1C_H$	fixed value
Byte 15	00_H	fixed value
Byte 16	00_H	fixed value

1) Range of values for Byte 7:
Value 80_H : Watchdog base = 10 ms;
value 84_H : Watchdog base = 1 ms.

Notice

In the configuration tool, the user-specific parameters can also be represented beginning with the identifier ”Byte 0”. Refer to the instructions in the documentation or in the help texts of the configuration tool.

References

C

/1/

EIB Developers Handbook.

Can be ordered by E-mail from eiba@eiba.com or from http://www.eiba.be

/2/

Product Information DP/*EIB* LINK

Supplied with every device

Siemens AG

/3/

Building Automation with *instabus EIB*

Engineering 1998

Siemens AG

/4/

SIMATIC NET Industrial Communications Networks

Catalog IK PI

The catalog can be obtained from any SIEMENS branch or national subsidiary.

/5/

SIMATIC STEP 7 Configuring Hardware and Connections with STEP 7
Part of the standard STEP 7 Documentation Package
Part of the online documentation in STEP 7
Siemens AG

/6/

Programming with STEP 7
Part of the standard STEP 7 documentation package
Part of the online documentation in STEP 7
Siemens AG

/7/

SIMATIC STEP 7 Reference Manuals including
- Ladder Logic / Function Block Diagram / Statement list
- System and Standard functions for S7-300 and S7-400

Part of the online documentation in STEP 7
Siemens AG

/8/

SIMATIC NET
Industrial Communications Networks PROFIBUS Networks
Manual from
Siemens AG

/9/

PROFIBUS Standard EN 50170

Order Numbers

The order numbers of the SIEMENS documentation listed above can be found in the catalogs ”SIMATIC NET Industrial Communication, Catalog IK10” and ”SIMATIC Automation Systems SIMATIC S7 / M7 / C7 - Components for Fully Integrated Automation, Catalog ST70”.

You can obtain these catalogs and any additional information you require from your local SIEMENS branch or national subsidiary.

Notes on the CE Mark

D

Product name: DP/*EIB* Link Order no.: 6GK1415-0AA0

The above SIMATIC NET product meets the requirements of the following EU directives:

EMC Directive Directive 89/336/EEC “Electromagnetic Compatibility”

Area of Application The product is designed for use in the following areas:

Area of Application	Requirements	
	Emitted Noise	Noise Immunity
Industrial environment	EN 50081-2 : 1993	EN 50082-2 : 1995

Adherence to Installation Instructions This product meets the requirements if you follow the installation instructions and instructions relating to safety described in this document and in /2/.

Declaration of Conformity The EU declaration of conformity is available for the responsible authorities according to the above-mentioned EU directive at the following address:

Siemens Aktiengesellschaft
Bereich A&D
Industrielle Kommunikation SIMATIC NET
Postfach 4848
D-90327 Nuremberg
Germany

Directive on Machines The product remains a component according to Article 4(2) of the EU directive on machines 89/392/EEC.

According to the directive on machines, we are obliged to point out that the above product is intended exclusively for installation in a machine when used in the sense of the directive on machines. Before the final product is put into operation, it must be tested to ensure conformity with the 89/392/EEC directive.

DP/*EIB* Link
Release 9/2003
C79000-G8976-C133-02

Glossary

E

E.1 Topics Relating to *EIB*

EIB (**E**uropean **I**nstallation **B**us)
The name of a common, European concept for a bus technology used in building automation.

***EIB* communication object**
EIB communication objects transfer data via the EIB instabus. They are identified by a data type and a group address.

Event bit
Indicates to the user program in the DP master that data have been received for the assigned *EIB* communication object.

ETS (**E**IB **T**ool **S**oftware)
Configuration and commissioning software for *EIB* devices.

Group address
Defines logical and functional connections between the *EIB* communication objects.

Repetition bit
Using the repetition bit, the user program on the DP master signals that an EIB send frame must be generated for the assigned *EIB* communication object regardless of whether data values have changed.

E.2 Topics Relating to PROFIBUS

Bus parameter

Bus parameters control the data transmission on the bus. Each -> node on -> PROFIBUS must use bus parameters that match those of other stations.

CLEAR mode

Mode of the DP master. Inputs are read cyclically, outputs remain set to 0.

CP

Communications Processor: Module for communications tasks for installation in a computer or programmable controller.

Device database

The device database (GSD file) contains DP slave descriptions complying with EN 50170, Vol 2. The use of GSD files simplifies configuration of the -> DP master and -> DP slaves.

Distributed I/Os (DP)

Inputs and output modules used at a distance (distributed) from the CPU (central processing unit of the controller). The connection between the programmable controller and the distributed I/Os is established on the -> PROFIBUS system. For the programmable controller, the distributed I/Os are no different from local process inputs/outputs.

DP master

Active node on -> PROFIBUS that can send frames on its own initiative when it is in possession of the token.

DP master system

A -> DP master and all -> DP slaves with which the DP master exchanges data.

DP mode

The following operating modes are possible for communication between the DP master and DP slaves:

- OFFLINE
- STOP
- CLEAR
- RUN

Each of these modes is characterized by defined actions between the DP master and DP slave.

DP slave

A -> node with slave functions on -> PROFIBUS DP.

Firmware

Here, the software running on the DP/*EIB* Link module.

FREEZE mode

The FREEZE mode is a DP mode in which process data are acquired from one, from several (group) or from all DP slaves at the same time. The time at which the data are required is indicated in the FREEZE command (a synchronization control frame).

Maximum station delay

A -> bus parameter for -> PROFIBUS. The Maximum Station Delay (max. TSDR) specifies the longest interval required by a -> node on the -> subnet between receiving the last bit of an unconfirmed -> frame to sending the first bit of the next frame. After sending an unconfirmed frame, a sender must wait for the maximum TSDR to expire before sending a further frame.

Minimum station delay

A -> bus parameter for -> PROFIBUS. The Minimum Station Delay (min. TSDR) specifies the minimum time that the receiver of a -> frame must wait before sending the confirmation or before sending a new frame. The minimum TSDR takes into account the longest interval required by a node in the subsystem for receiving a confirmation after sending a frame.

MPI

The multipoint interface (MPI) is the programming device interface of SIMATIC S7.

PROFIBUS

A fieldbus system complying with EN 50170 Vol. 2, (previously SINEC L2).

PROFIBUS address

The PROFIBUS address is a unique identifier for a -> station/node connected to -> PROFIBUS. The PROFIBUS address is transferred in the -> frame to address a node.

PROFIBUS-DP

DP mode complying with EN 50170, Vol 2.

SIMATIC NET

Siemens SIMATIC Network and Communication. Product name for -> networks and network components from Siemens (previously SINEC).

SIMATIC NET PROFIBUS

SIMATIC NET bus system for industrial applications based on PROFIBUS. (Previously SINEC L2).

SINEC

Previous product name for networks and network components from Siemens. Now: SIMATIC NET.

SYNC mode

The SYNC mode is a DP mode in which one, several (group) or all -> DP slaves transfer data to their process outputs at a certain time. The time at which the data is transferred is indicated in the SYNC command (a control command for synchronization).

Target rotation time

A -> bus parameter for -> PROFIBUS. The token represents the right to transmit for a -> node on PROFIBUS. A node compares the actual token rotation time it has measured with the target rotation time and, depending on the result, can then send high or low priority frames.

Token bus

Network access technique used to assign bus access with several active nodes (used on PROFIBUS). The token is passed on from active node to active node. A complete token rotation takes place between a station sending the token and receiving it again.

UNFREEZE

Job for resetting the -> FREEZE mode.

UNSYNC

Job for resetting the -> SYNC mode.

A&D Technical Support

Worldwide, available 24 hours a day:

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Europe / Africa (Nuernberg) **Authorization** Local time: Mon.-Fri. 8:00 to 17:00 Phone: +49 (0) 180 5050-222 Fax: +49 (0) 180 5050-223 E-Mail: adsupport@ siemens.com GMT: +1:00	**United States** (Johnson City) **Technical Support and Authorization** Local time: Mon.-Fri. 8:00 to 17:00 Phone: +1 (0) 423 262 2522 Fax: +1 (0) 423 262 2289 E-Mail: simatic.hotline@ sea.siemens.com GMT: -5:00	**Asia / Australia** (Beijing) **Technical Support and Authorization** Local time: Mon.-Fri. 8:00 to 17:00 Phone: +86 10 64 75 75 75 Fax: +86 10 64 74 74 74 E-Mail: adsupport.asia@ siemens.com GMT: +8:00
The languages of the SIMATIC Hotlines and the authorization hotline are generally German and English.		

Service & Support on the Internet

In addition to our documentation, we offer our Know-how online on the internet at:

http://www.siemens.com/automation/service&support

where you will find the following:

- The newsletter, which constantly provides you with up-to-date information on your products.
- The right documents via our Search function in Service & Support.
- A forum, where users and experts from all over the world exchange their experiences.
- Your local representative for Automation & Drives via our representatives database.
- Information on field service, repairs, spare parts and more under "Services".