SIMEAS Software

SIMEAS Q
Connecting SIMEAS Q to SIMATIC S7-300/400

Application Description

Release: 03.03.00

E50417-H1176-C122-A1

Notes on Safety

This manual does not constitute a complete catalog of all safety measures required for operating the respective equipment (module, device), since special operating conditions may require additional measures. However, it does contain notes which must be adhered to for your own personal safety and for avoiding property damage. These notes are highlighted with a warning triangle and different keywords indicating different degrees of danger:

Warning

means that death, severe injury or substantial property damage may occur if the appropriate safety measures are not taken.

Caution

means that minor injury or property damage may occur if the appropriate safety measures are not taken.

Qualified Personnel

Commissioning and operation of the equipment (module, device) described in this manual must be performed by qualified personnel only. In the sense of the safety notes contained in this manual, qualified personnel are those persons who are authorized to commission, release, ground and tag devices, systems and electrical circuits in accordance with safety standards.

Use for the Intended Purpose

The equipment (device, module) must not be used for any other purposes than those described in the Catalog and the technical description. If it is used together with third-party devices and components, these must be recommended or approved by Siemens.

Correct and safe operation of the product requires adequate transportation, storage, installation and mounting as well as appropriate use and maintenance.

During operation of electrical equipment, it is inevitable that certain parts of this equipment will be carrying dangerous current. Severe injury or property damage may occur if the appropriate measures are not taken:

- Before making any connections at all, ground the equipment at the PE terminal.
- Hazardous voltages may be present on all switching components connected to the power supply.
- Even after the supply voltage has been disconnected, hazardous voltages may still be present in the equipment (capacitor storage).
- Equipment with current transformer circuits may not be operated while open.

The limit values indicated in the manual or the operating instructions must not be exceeded; this also applies to testing and commissioning.

Foreword

Purpose of this manual

This manual describes device-specific information for connection of **SIMEAS Q** to a **PROFIBUS DP/CP communications system.**

Target group

This manual is aimed at users of SIMEAS Q.

Basic knowledge of the operating systems Microsoft Windows 95/98 or Microsoft Windows NT 4.0 is required.

Scope of this manual

This manual is valid for **SIMEAS Q** and **SIMEAS Q Parameterization**, version V1.0 and higher, as well as SIMATIC STEP 7, version V5. Operation is also possible with version V4 of SIMATIC STEP 7.

This version operates with SIMEAS Q devices of the current model /BB with the firmware version 1.03 and higher.

CE

Declaration of Conformity

The product is herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Laws of the Member States relating to Electromagnetic Compatibility (EMC Directive 89/336/EWG)

This conformity is the result of a test carried out by SIEMENS AG in accordance with article 10 of the directive which complies with the basic specifications of EN 50081-2 and EN 50082-2.

The device has been developed and manufactured for industrial use to EMC standards.

The evaluation has been carried out in accordance with the international standards of IEC series 255 and the national standard DIN 57 435/Part 303 (corresponding to VDE 0435/Part 303).

Standards

Development of **SIMEAS Q** was carried out according to directives of ISO 9000.

Further support

If you have any queries regarding connection of **SIMEAS Q** to PROFIBUS DP/CP, please contact:

- ❑ Your nearest Siemens partner
- ❑ The Siemens hotline (workdays from 7.30 to 17.00): +49 (0)180- 5247000
- ❑ Fax: +49 (0)180-5242471

or

- ❑ e-mail: EVS-Serviceline@nbg6.Siemens.de

Table of contents

SIMEAS Q - PROFIBUS integration

1

This manual provides device-specific information on how to integrate SIMEAS Q into an existing PROFIBUS system.

SIMEAS Q can be integrated in a PROFIBUS DP system in recording mode. PROFIBUS is a fast bus whose variably definable telegram lengths enable application-orientated speed optimization. This ensures that the data volume which is gathered in SIMEAS Q in a very short time reference can continuously be read out.

Contents

1.1 Capabilities

Connection of the network quality recorder SIMEAS Q to PROFIBUS provides the following capabilities.

- You can **parameterize** SIMEAS Q via PROFIBUS.

  As a rule, SIMEAS Q is parameterized directly via a PC. Connection to a PROFIBUS supports the additional option of remote parameterization of the SIMEAS Q device. This procedure is described in the application description for the ***SIMEAS Q network quality recorder,*** *Chapter 5,* ***File transfer via PROFIBUS.*** You will find the required software included in delivery of the SIMEAS Q network quality recorder.

- You can **read out** SIMEAS Q via PROFIBUS.

  This manual covers all the steps required for connection of a SIMEAS Q device to a PROFIBUS system with a SIMATIC S7 as PROFIBUS master.

  It also describes the possible measurement settings of SIMEAS Q when reading out through a SIMATIC S7-300/400.

1.2 The PROFIBUS DP system setup

A PROFIBUS DP system comprises at least one master which can be assigned up to 125 slaves. If more than one master is integrated in a system, this is called "multi-master operation". In multi-master operation, each slave is also uniquely assigned to one master.

PCs with an integrated PROFIBUS interface or **P**rogrammable **L**ogic **C**ontrollers (PLC) can be used as PROFIBUS master. This manual tells you how to parameterize a SIMATIC S7-300/400 as PROFIBUS master.

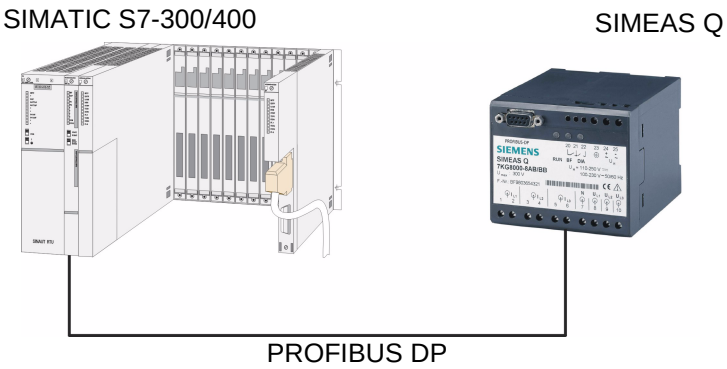

Fig. 1-1 PROFIBUS DP system setup

The devices (e.g. SIMEAS Q) connected to the PROFIBUS are called slaves. Each slave must be assigned a unique address within a PROFIBUS system, via which it is activated directly.

1.3 Communications procedure with SIMEAS Q

Communication in the PROFIBUS system is controlled via telegrams, whereby the master assumes the active role. It sends request telegrams to which SIMEAS Q responds.

SIMEAS Q is always passive, i.e. it only communicates with the master when it receives a **request telegram**. The arrival of a so-called **response telegram** serves the master as an acknowledgment of a successful communication.

The data volume is not read out selectively, i.e. the data memory is read out in blocks and not according to individual data types. The maximum length of the user data fields defined by SIMEAS Q depends on the PROFIBUS **configuration telegram**, the creation of which is application-orientated, depending on the performance characteristics of the master.

Polling is carried out cyclically in ascending order of the PROFIBUS addresses, in accordance with the standard EN 50170. It may consist of several runs if the content of the data memory is greater than the permitted user data field length. This means that the master begins polling at the device with the lowest PROFIBUS address. Once it has reached the highest address, it starts all over again from the beginning until the data memory is completely read out.

In the master, the user data fields of the SIMEAS Q are collected and not released for further processing until the end of the polling cycle. The read-out measured values can be assigned by means of their unique **identification**.

Parameterizing SIMEAS Q for PROFIBUS DP 2

Overview

The following chapter describes presettings that you need to carry out on the **SIMEAS Q** measuring device in order to start controlling with the PLC SIMATIC S7-300/400.

The settings need to be carried out with the parameterization package **SIMEAS Q Parameterization**. You will find instructions on how to install the software, and which hardware and software requirements need to be met, in the application description for the ***SIMEAS Q network quality recorder,*** *Chapter 2,* ***Getting started***. It contains a detailed description of the software.

Contents

2.1 Starting the parameterization software

Program call

Once you have successfully installed the **SIMEAS Q Parameterization** application, start the program.

- Double-click the program icon on your Windows desktop.

  The main window appears on the screen.

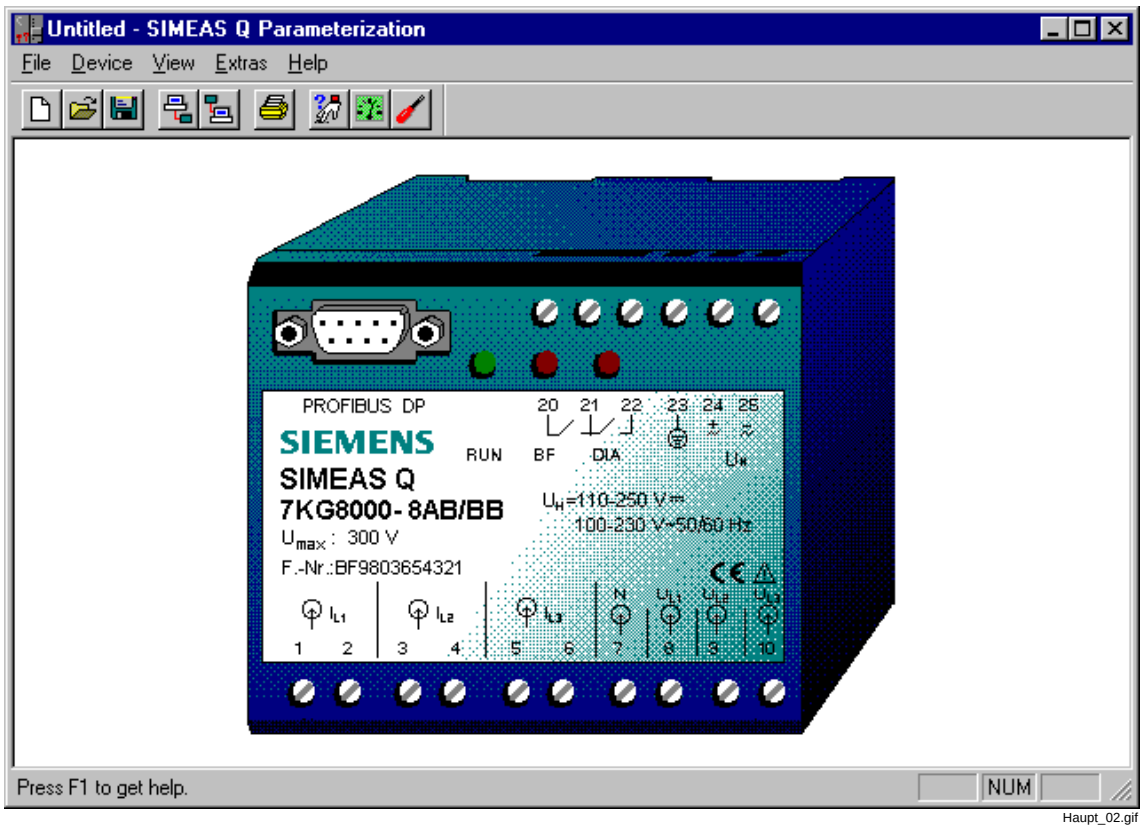

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Bild 2-1 Main window of the SIMEAS Q parameterization software

2.2 Linking the SIMEAS Q device with a PC

The following section describes how to link the SIMEAS Q device with a PC via an RS232/RS485 connecting cable. You need to take the following steps:

PC interface

On the PC side, one of the two serial interfaces COM1 or COM2 must be selected as the connection in the parameterization software.

- Select **Options** → **Select PC Interface** from the menu.

  This opens the **Set PC Interface** dialog box.

- Click either **COM1** or **COM2** to select as the interface to which the connecting cable is to be connected and confirm with **Close**.

Connecting cable

Connect the connecting cable supplied as shown in see Fig. 2-2.

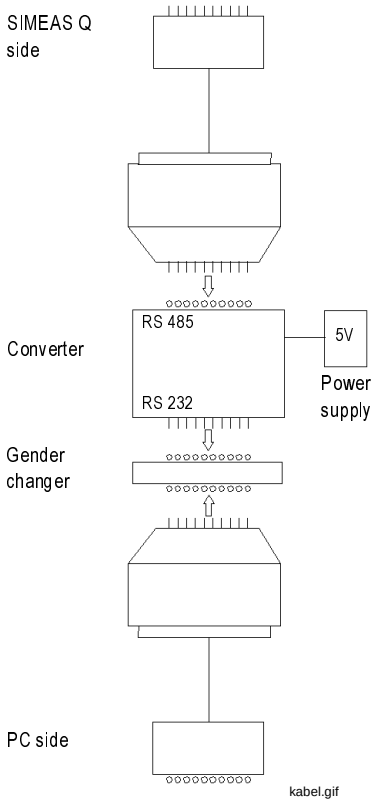

Fig. 2-2 Connecting cable setup

Link the PC and SIMEAS Q measuring device with the RS232/RS485 connecting cable.

- When connecting, please heed the information on the connecting cable.

Caution:

The 9-pin Sub D plug must not be changed! The RS485 end must be connected to the SIMEAS Q and the RS232 end to the PC!

- Check that the cable is correctly connected. If the connecting cable is incorrectly connected, no parameterization data will be transmitted.
- Connect the 5 V power supply unit with a 230 V voltage source

2.3 Selecting the parameterization mode

For two minutes after the voltage supply is switched on, SIMEAS Q is in parameterization mode. It then switches automatically and permanently into recording mode.

The following applies:

- If there is **an** incoming parameterization telegram in this two minutes, SIMEAS Q stays permanently in parameterization mode.
- If there is **no** incoming parameterization telegram, then SIMEAS Q switches permanently to recording mode. To return to parameterization mode, SIMEAS Q needs to be switched off and back on again. It is then in parameterization mode for 2 minutes again.

  The easiest way to go into parameterization mode is to use the function **Device** → **Read Identification**. A parameterization telegram is sent to the SIMEAS Q device. Provided that the 2 minutes have not yet expired, the following information window appears:

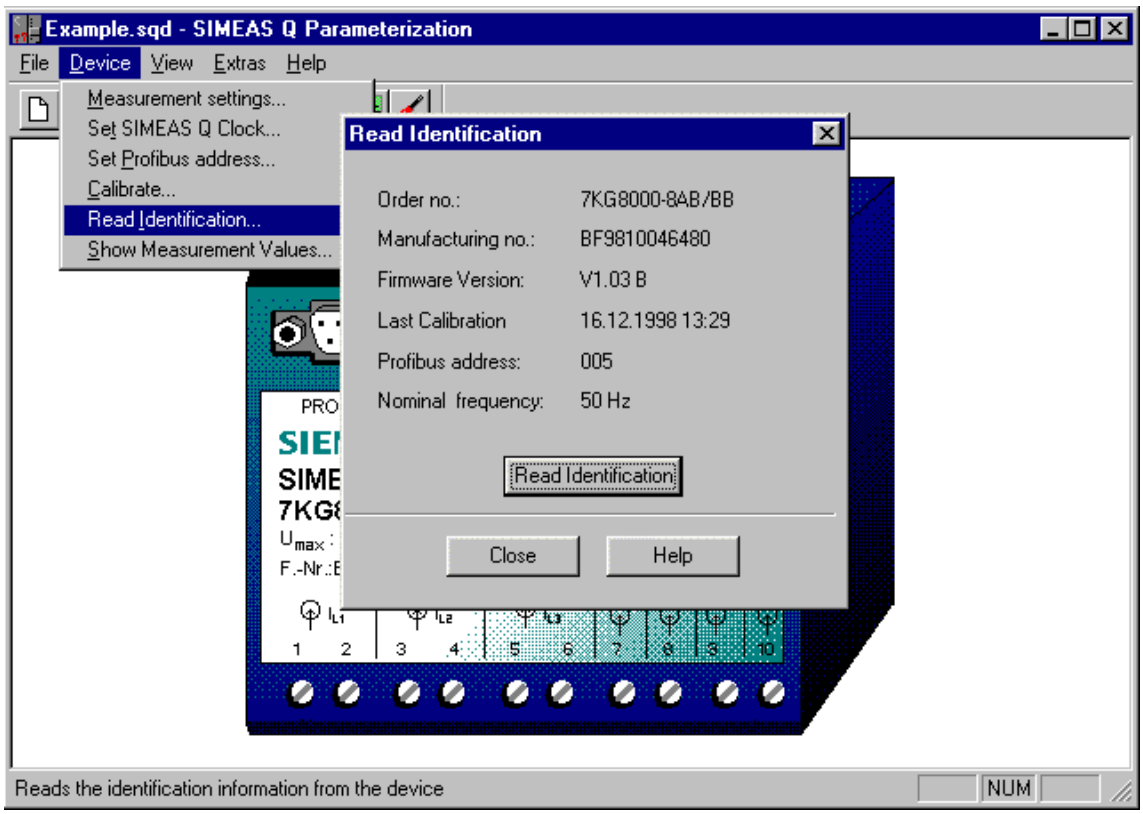

Bild 2-3 **Read Identification** information window

As well as information on the device itself, this window contains the PROFIBUS address set in the device. Close this information window.

2.4 Setting/changing the PROFIBUS address

So that the device can be uniquely identified within the PROFIBUS DP system, it must be assigned a PROFIBUS address.

To apply the address to the device, proceed as follows:

- Select the menu item **Device** → **Set PROFIBUS Address**. This opens the **Set PC Interface** dialog box.
- Enter the desired address and click the **Send address** button.

  If the function was correctly executed, this is confirmed by an information message.
- Click the **Close** button.

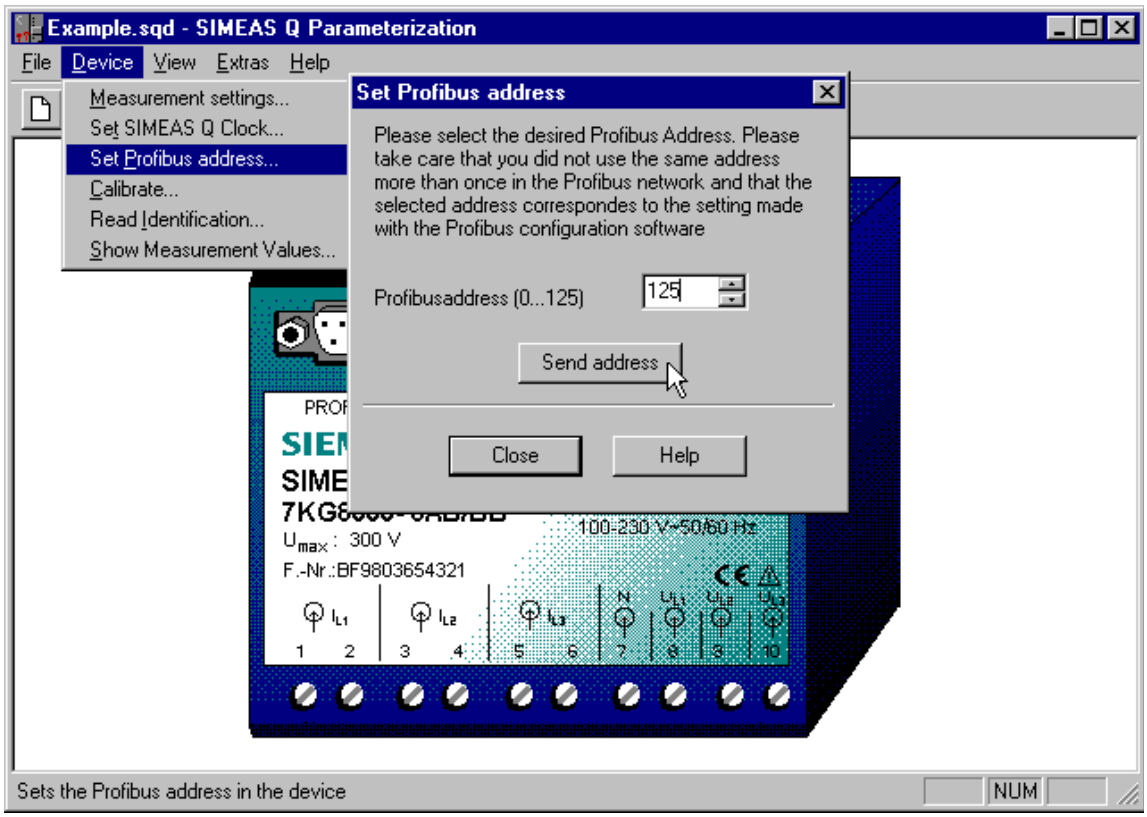

Bild 2-4 Set PROFIBUS Address

2.5 Parameterizing measurement settings

The following section shows you how to specify the measurement settings for the SIMEAS Q. To do this, you need to specify the following details:

- ❑ Which measured values do you want to record?
- ❑ How, and how often do you want to record these measured values?
- ❑ When do you want to begin recording the measurement data in SIMEAS Q?

Function test

The function test described below deals with a very small measuring task. In this example, the following measurement settings are to be defined for the SIMEAS Q:

- ❑ The voltage UL1 is to be continuously measured over an averaging time of 1 s.
- ❑ Recording is to begin directly.

- Select the menu item **Device** → **Measurement Settings**. This opens the **Parameterize Measurement Settings** dialog box. The left pane with the folder structure is called the navigation window. The measurement settings are entered in data sheets which can be called in the navigation window.
- In the navigation window, open the folder **SIMEAS Q** → **Basic Settings** → **Other Settings**.
- Select **Other Settings** to show the settings on the right side.

  The data sheet with the measurement settings is displayed on the right side.

Parameterizing the basic settings

The basic settings include the general read-out options.

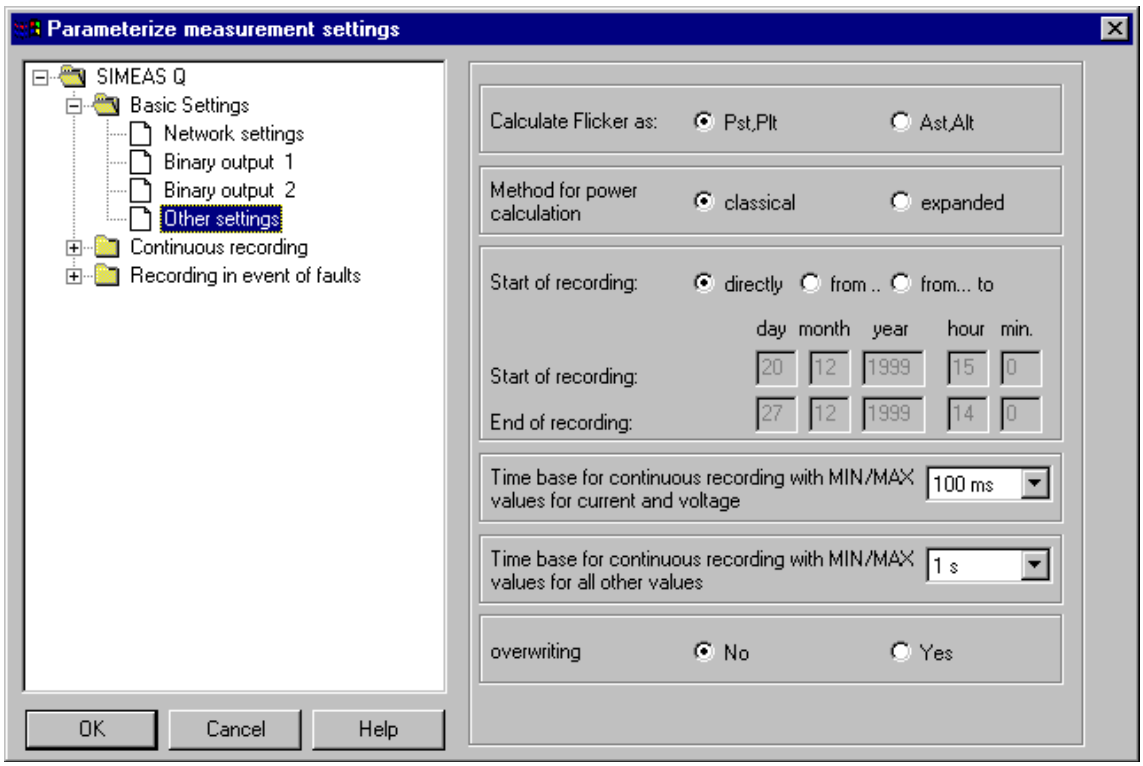

Bild 2-5 Navigation and data window for entering the measurement settings

- Under **Start recording**, select the option **Directly**.
- Under **Overwrite**, select the option **No.**

Parameterizing continuous measurement

For continuous recording, you need to define specific measuring periods (averaging times) for each selected measured value (except flicker). The averaging time provides an average value for the recorded current and voltage values. This is continuously filed in the memory with time stamp.

- In the navigation window, select **SIMEAS Q** → **Continuous Measurement**.
- Double-click to open the folder.

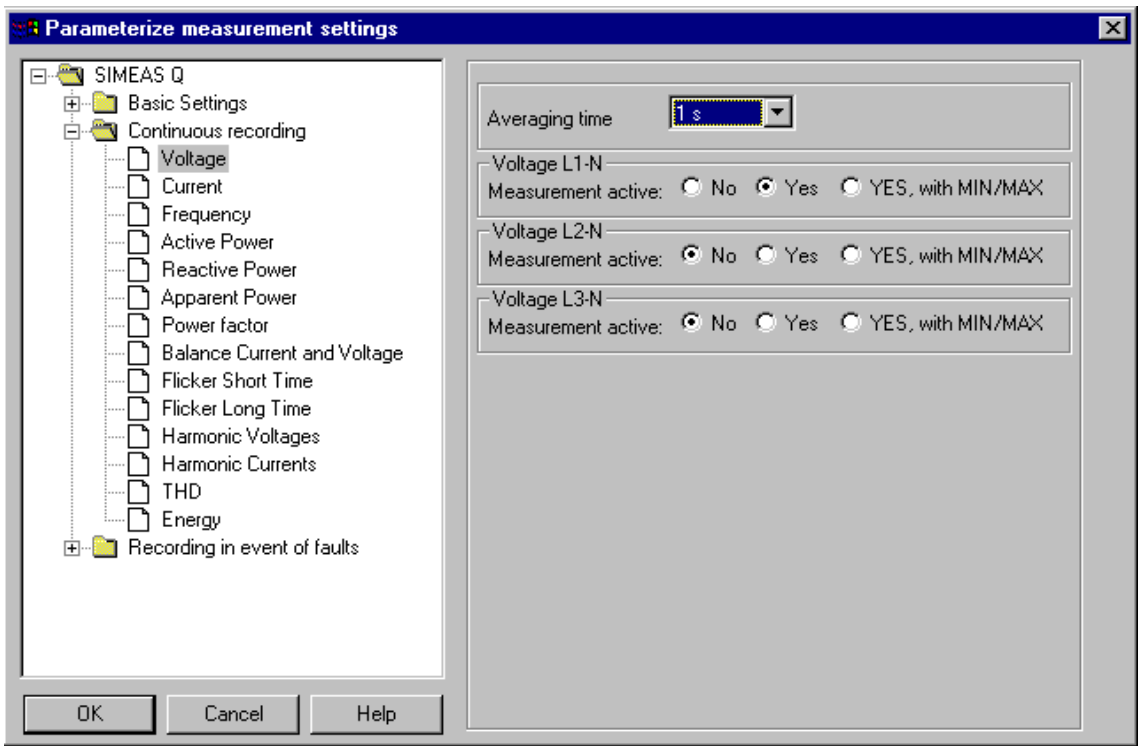

Bild 2-6 Selection of measured values for continuous measurement

The folder structure contains all measured values that can be recorded using continuous measurement.

- Select the measured value **Voltage**.
- For the **Averaging time**, select **1 s**.
- Under **Voltage L1-N** → **Measurement active**, select the option **Yes**.
- Under **Voltage L2-N** → **Measurement active**, select the option **No**.
- Under **Voltage L3-N** → **Measurement active**, select the option **No**.

Parameterizing fault measurement

In order to select measured values for the fault measurement and define the settings, proceed as follows:

- In the navigation window, select **SIMEAS Q** → **Recording in event of Fault.**
- Double-click on the **Recording in event of Fault** folder.

  The folder structure contains all measured values that can be recorded using fault measurement.
- Open the data sheets for **all** measured values and **disable** all settings.

  Parameterization of the measurement settings is completed.
- Confirm your input in the **Parameterize Measurement Settings** dialog by pressing **OK**.

  This returns you to the main window **SIMEAS Q Parameterization** (see Fig. 2-1).

2.6 Sending parameterization data to the SIMEAS Q device

The measurement settings set in the previous chapter can now be sent to the SIMEAS Q device.

- To do this, select **File** → **Send Parameters**.

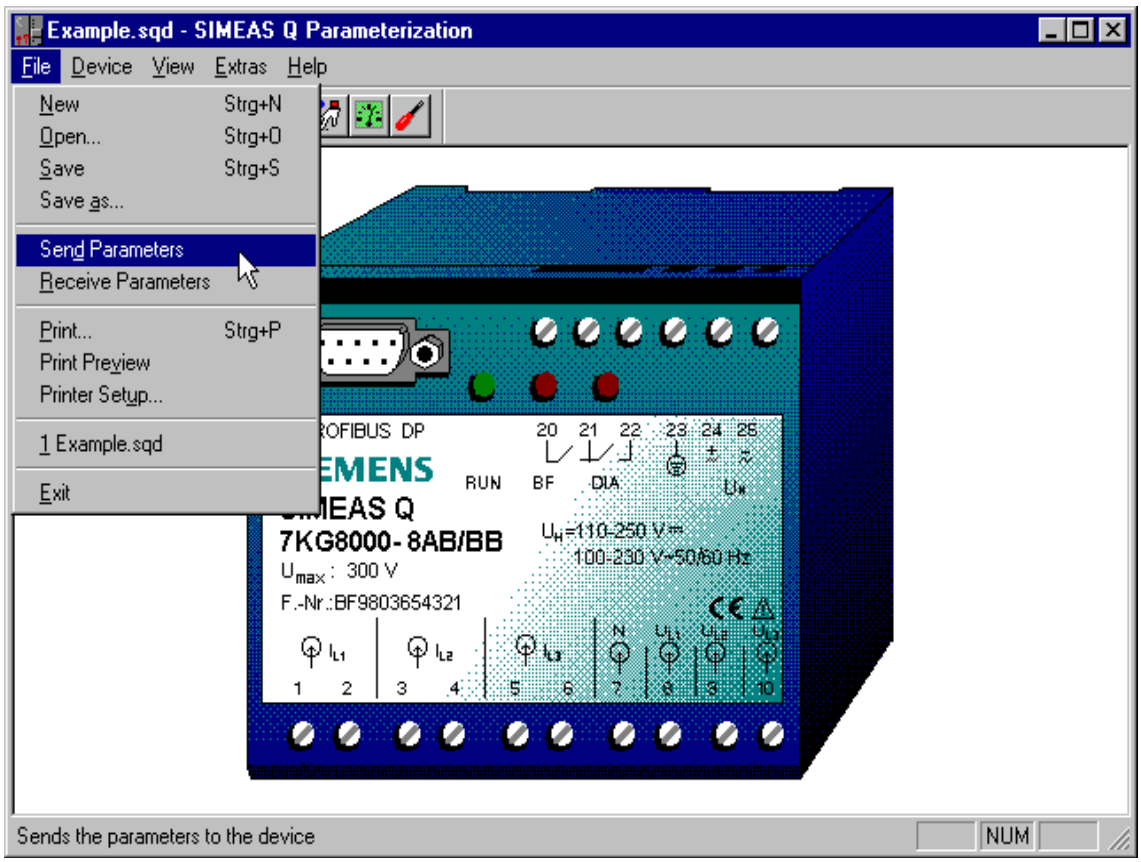

Bild 2-7 Sending parameters

The specified parameters are now sent to the SIMEAS Q device.

The SIMEAS Q confirms receipt of the parameters with the message **The parameters were successfully sent to the device**.

2.7 Setting measuring / PROFIBUS mode

To operate the SIMEAS Q device on PROFIBUS, set it back to **measuring or PROFIBUS** mode.

- To do this, switch the device off for approx. three seconds.
- Remove the parameterization cable (RS232/RS485 connecting cable).
- Connect SIMEAS Q to the PROFIBUS network.

Once it is switched back on, SIMEAS Q is initially back in parameterization mode for 2 minutes, during which it waits for a communications telegram from the parameterization software.

While these settings are being carried out, watch the LEDs on the front of the SIMEAS Q.

- ❑ The red LED display **BF** (bus failure) on the SIMEAS Q lights up for **two minutes**. This LED display should go out after two minutes.
- ❑ The second red LED display **DIA** does not light up. It is in the OFF state, indicating that SIMEAS Q is recording measurement data.

The device is now in **recording mode** and ready for the transmission of measurement data to the master station.

Description of the preset settings

SIMEAS Q is now set for the small measuring task. As soon as SIMEAS Q goes into measuring or Profibus mode, it begins to measure and save voltage values of the **Phase voltage UL1**.

A value complete with time stamp is stored every second. The setting **Overwrite** → **No** means that the individual second values are stored one after the other in the SIMEAS Q data memory. They remain in this data memory until they are called during data transmission. If the maximum memory capacity of 10,000 measured values is exceeded, SIMEAS Q reports a storage overflow.

The setting **Overwrite** → **Yes** means that each value is always overwritten by the next measured value. In this case, there is no storing of a series of values and there can therefore be no storage overflow when using this setting.

You will find detailed information on the measuring options and parameterization of SIMEAS Q in the application description for the **SIMEAS Q network quality recorder**.

Configuration with SIMATIC STEP 7

3

Overview

The SIMEAS Q device is connected to the PROFIBUS DP system.
It operates as a slave in a group with a maximum of 125 slaves and one master.
Amongst others, programmable logic controllers (PLC) are implemented as PROFIBUS masters. In this case, a SIMATIC S7-300/400 is implemented as a PLC.

In the following section, the SIMATIC S7 is configured as PROFIBUS master using the configuration tool **SIMATIC STEP7**.

Contents

3.1 Starting the SIMATIC STEP 7

SIMATIC STEP 7 is started from the Windows 95/Win NT user interface:

- Double-click the **SIMATIC Manager** icon on your desktop.

  or

- Select **SIMATIC** → **SIMATIC Manager** from the Start menu.

  This opens the **SIMATIC STEP 7** application **SIMATIC Manager**.

3.2 Creating a new project

Creating a project

In the first step to configuring your SIMATIC S7-300/400, create your own SIMATIC project. To create a new project, proceed as follows:

- Select **File** → **New** → **Project**.

  This opens the **New** dialog box for a new project. It contains a list of all projects already created.

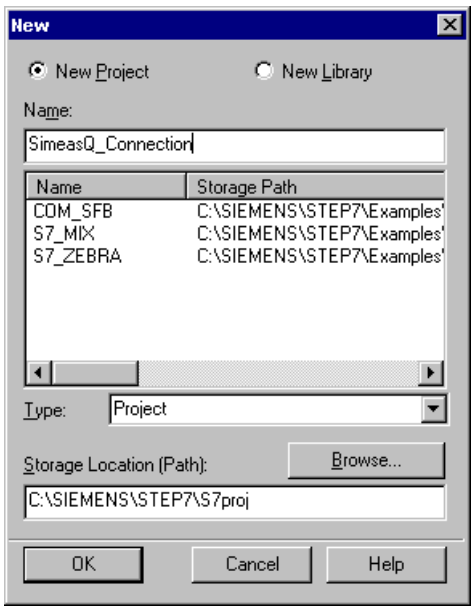

Fig. 3-1 Creating a new project

- Select the option **New Project**.
- Enter a unique project name in the (Project) **Name** box.

Note:

Folder names must not exceed a maximum of 8 characters. Otherwise, this may cause problems when you want to archive folders.

- Select **Project** in the **Type** box.
- For the **Storage location (Path)**, select the current project folder.
- If necessary, switch to another project folder by clicking the **Browse** button.
- Confirm your input with **OK**.

  The following project window opens:

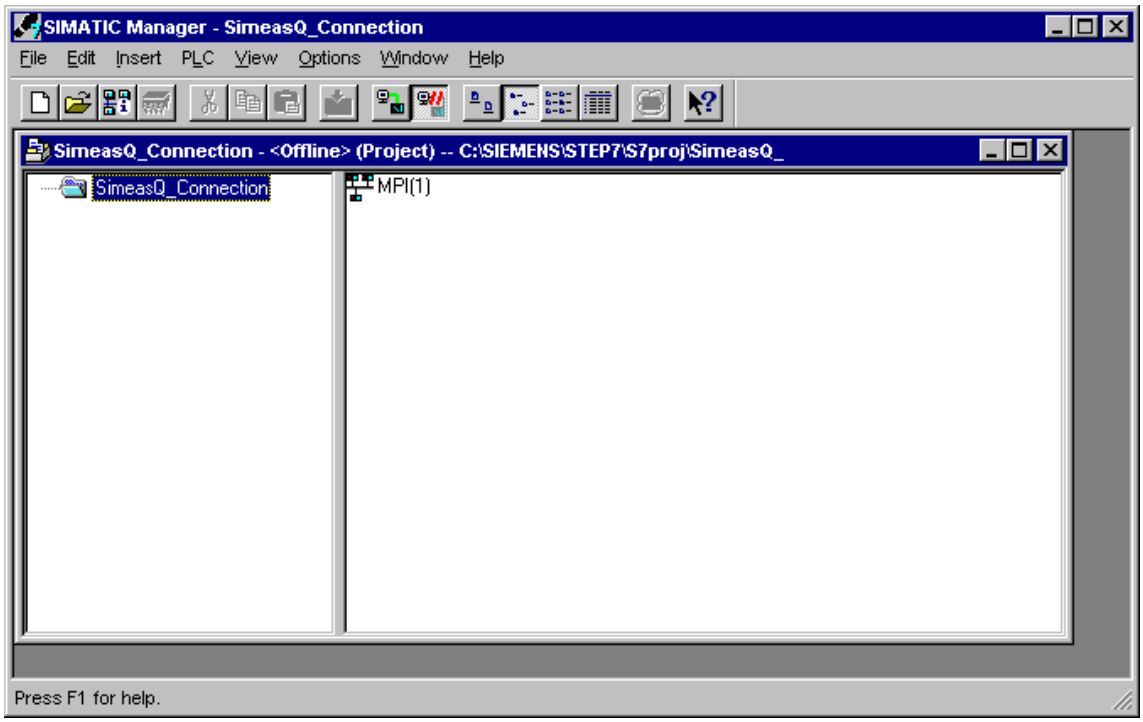

Bild 3-2 SIMATIC project window

The left pane of the project window contains an icon for the project **SIMEAS Q Connection**.

In the right pane, the current project only contains the automatically created object **MPI(1)**. MPI designates a predefined interface between your PC and the SIMATIC S7 as target system.

Note:

You only need the MPI interface when you want to communicate between the programming device (PC) and the target system (SIMATIC S7) under STEP 7.

3.3 Defining SIMATIC S7 as a new station

The next step shows you how to define a **SIMATIC S7-300/400** as a new station within the PROFIBUS system.

- Select the current project in the left pane of the project window.
- Select **Insert** → **Station** → **SIMATIC S7-300/400**.

  The **SIMATIC S7-300/400** is inserted into the project as a new station in the right pane.
- Select the new entry and give it a self-explanatory name, such as **SIMEAS Q Master.**

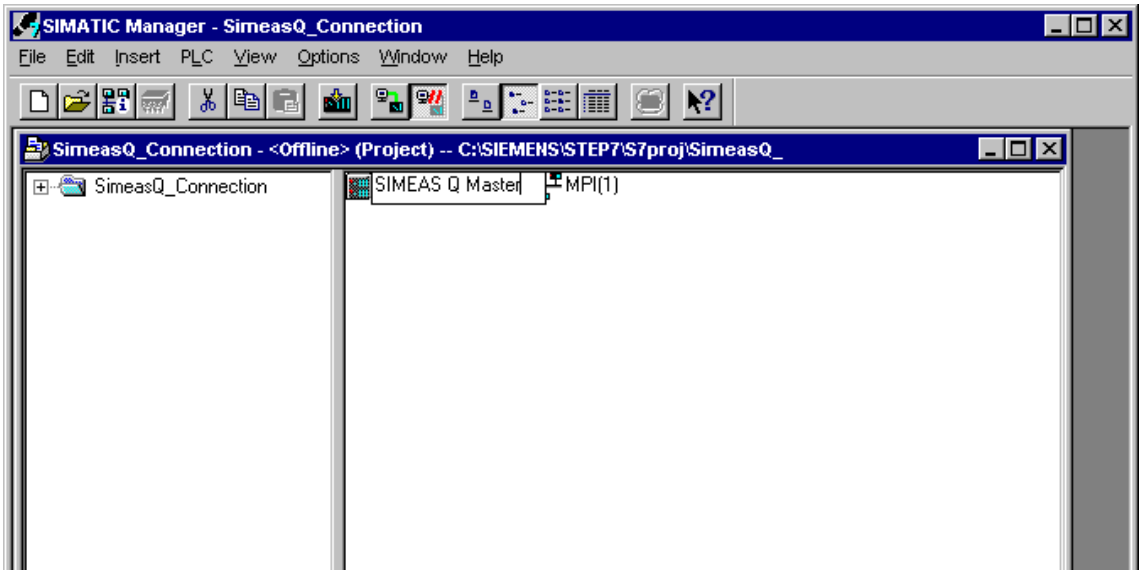

Bild 3-3 SIMATIC S7 as new station in PROFIBUS

Station structure

The **Hardware** container is automatically created when a station is created. It appears in the right pane as part of the station.

The next step shows you how to enter the hardware configuration of your SIMATIC S7-300/400 in SIMATIC Manager.

Configuring the hardware

4

Overview

During **hardware configuration**, you inform the SIMATIC Manager parameterization software which hardware components your **SIMATIC S7** consists of. The hardware configuration forms the basis of the subsequent selection of associated PROFIBUS slaves and corresponding software blocks.

Contents

4.1 Start hardware configuration

To configure the hardware, proceed as follows:

- Double-click the **Hardware** container.

  This starts the hardware configuration and the **HW Config** window opens.

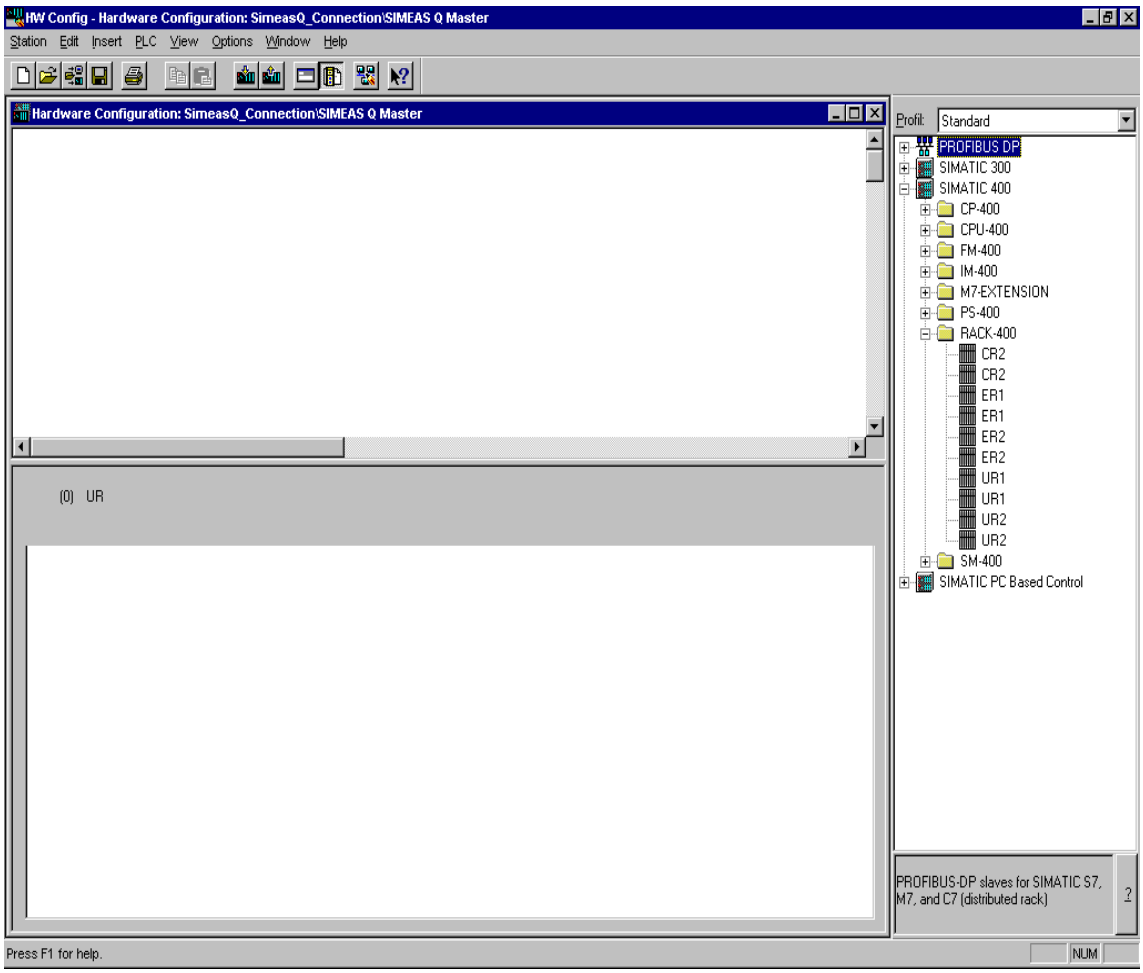

Bild 4-1 HW Config with open hardware catalog

The hardware configuration in SIMATIC Manager contains a catalog with all the hardware components that your SIMATIC S7 can contain.

- Open the Hardware Catalog by selecting **Insert** → **Hardware Components** or **View** → **Catalog**.

  This opens the **Hardware Catalog** window.

4.2 Integrating the GSD file

The GSD (device database) file contains all the properties of a DP slave. By integrating the GSD file for SIMEAS Q, you expand the Hardware Catalog in SIMATIC Manager by the PROFIBUS slave SIMEAS Q.

The disk with the GSD files for SIMEAS Q are included in delivery with the measured value data block.

Installing the GSD file

There are three files on the GSD disk:

- SimQ1653.GSD

This contains the device-specific data of the SIMEAS Q device.

- 7KG 8000n.BMP
- 7KG 8000s.BMP

These two files are used for the graphical representation of the SIMEAS Q slaves on the PROFIBUS system.

To install the files in your Hardware Catalog, proceed as follows:

- Select **Options** → **Install New GSE** (in some releases named **Install New DDB**) in the **HW Config** window.

  This opens the **Install New GSE** dialog.
- Switch to the sample disk which contains the GSD files.
- Select the **SimQ1653.GSD** file and click the **Open** button.

  The GSE file is installed in SIMATIC Manager.
- Select **Options** → **Update Catalog**.

  The Hardware Catalog is updated with the new hardware components. It now contains the folder **SIMEAS Q** located under **PROFIBUS DP** → **Additional Field Devices** → **Other**.

  You can now use this folder to assign the hardware component SIMEAS Q to the PROFIBUS as slave.

Note:

You will find further details on how to configure the PROFIBUS connection in the operating instructions for your PROFIBUS configuration software.

4.3 Configuring the hardware

The **HW Config** window is initially empty. First select a **rack** from the Hardware Catalog:

- In the Hardware Catalog, open the folder **SIMATIC 400** → **RACK-400.**

  The rack symbolizes your SIMATIC S7. Assign all hardware components contained in your SIMATIC S7 to the rack.

- To insert a rack, e.g. **UR1,** drag & drop it onto the **SIMEAS Q (configuration)** window.

  The central rack automatically contains the designation **UR1(0)**.

Display modes

The **HW Config** window has two display modes for the PROFIBUS system:

- Graphical display mode
- Tabular display mode of the selected components

4.4 Equipping the basic modules

In the next step, you equip the racks with all the hardware components actually in your SIMATIC S7.

You have two options:

- Open the folder in the Hardware Catalog and browse until you reach the corresponding module.
- Select the module and drag and drop it onto the planned slot in the rack.

Or:

- First select the planned slot in the rack.
- Double-click the required module in the Hardware Catalog. The selected module is inserted in the rack.

Now insert all required modules in the rack in the same manner.

Select Power Supply

First insert a **P**ower **S**upply in the rack.

- In the Hardware Catalog, open the folder **SIMATIC 400** → **PS-400**.
- Drag and drop a power supply, e.g. **PS 405 20 A**, onto the free slot **1**.

The power supply requires three slots.

Select a CPU

The selection of the CPU depends on the SIMATIC S7 series and the data volume to be transmitted.

- Open the folder for your SIMATIC series, e.g. **SIMATIC-400** → **CPU-400**.
- Insert one of the **CPUs 412** to **416** or the **CPU 417** in slot **4**.

Note:

The CPU in your SIMATIC S7 influences the maximum number of measured values in the response telegram. See section 4.6 Integrating SIMEAS Q as PROFIBUS slave.

Drag the selected CPU to the first free slot **4**. The CPU serves as DP master within the PROFIBUS system.

4.5 Creating a PROFIBUS system

Defining the PROFIBUS master

The **Properties - PROFIBUS Interface DP Master** dialog appears.

- For the PROFIBUS **address** of the DP master SIMATIC S7**,** use the recommended value **2**.

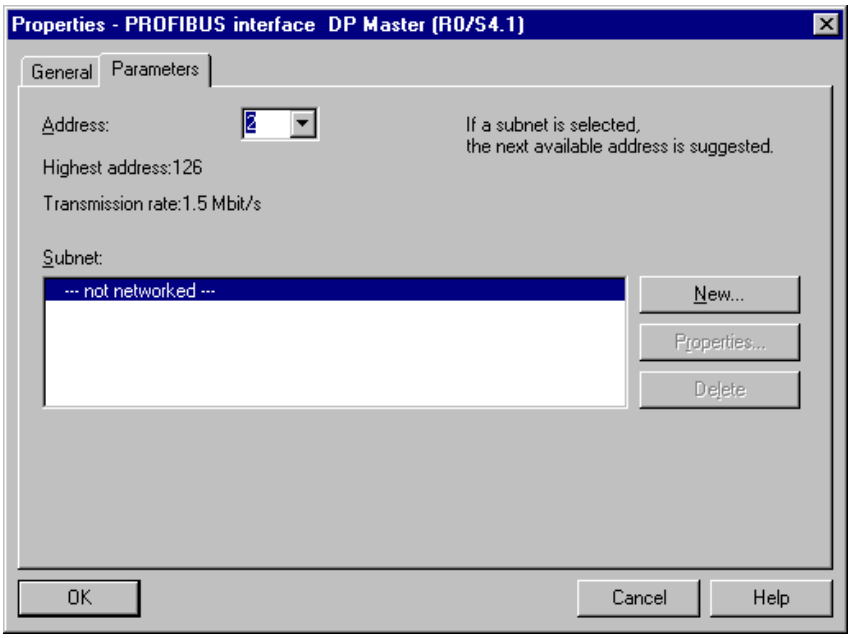

Fig 4-2 Defining the PROFIBUS DP master

The DP master has not yet been assigned a PROFIBUS. It currently only contains the entry **--- not networked ---**. You therefore need to define a new PROFIBUS network first.

- Click the **New** button.

  The **Properties - New PROFIBUS Subnetwork** dialog appears.

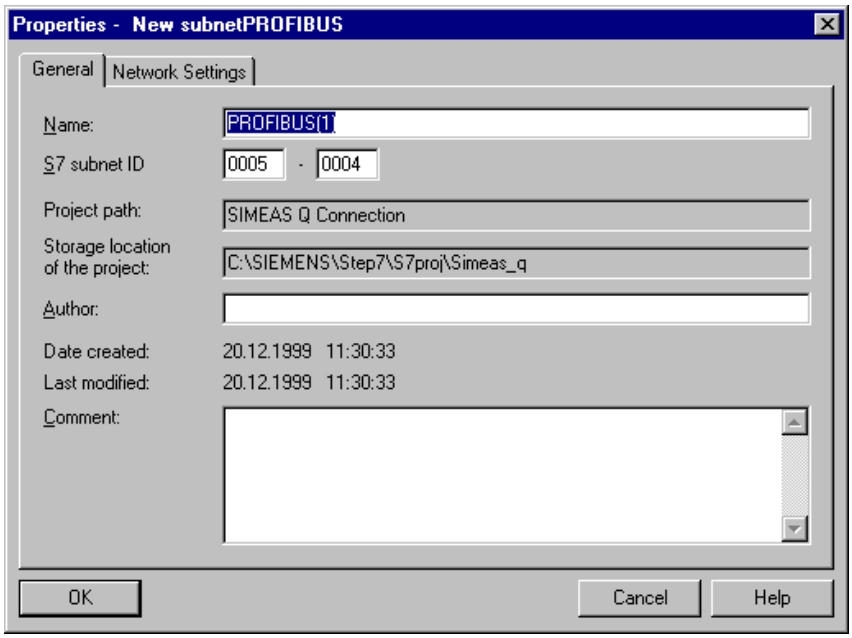

Fig 4-3 Creating a PROFIBUS subnetwork

If necessary, rename the subnetwork **PROFIBUS(1)** in the **Name** box.

- Switch to the **Network Settings tab**

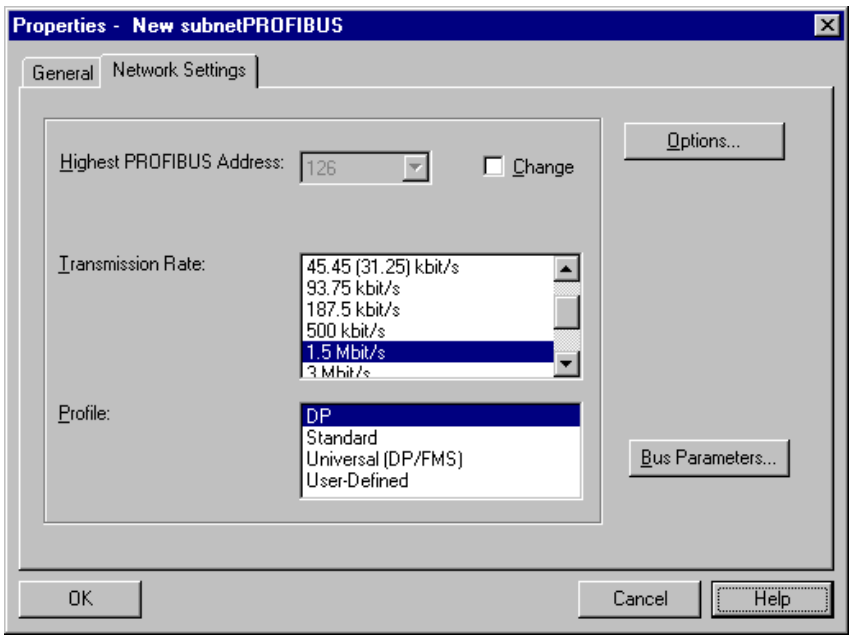

Fig 4-4 Network Settings tab

- Check the option **Turn on Cyclic Distribution of the Bus Parameters**.

If this option is checked, the bus parameters in operation are cyclically sent from the DP master interfaces. This, for example, allows problem-free connection of the SIMATIC S7 to the PROFIBUS during runtime.

- For the **Transmission rate,** use either the default setting of **1.5 Mbit/s**, or select another value.

  The setting of the transmission rate depends on the properties of the PROFIBUS station. The transmission rate must not be greater than that of the slowest station.

- Select **DP** from the **Profile** list.

  The setting of the bus parameter is then optimized to the devices of the SIMATIC S7 series. This is defined in the standard EN 50170 Volume 2/ 3, Part 8-2 PROFIBUS.

- Confirm your input with **OK**.

  This returns you to the **Properties - PROFIBUS interface DP Master dialog.**

- Confirm your input for the DP master with **OK**.

  The graphical representation in HW Config now contains the **DP Master CPU 417-4** with connected PROFIBUS. This forms the ”rack” for the **DP slaves** of the master system.

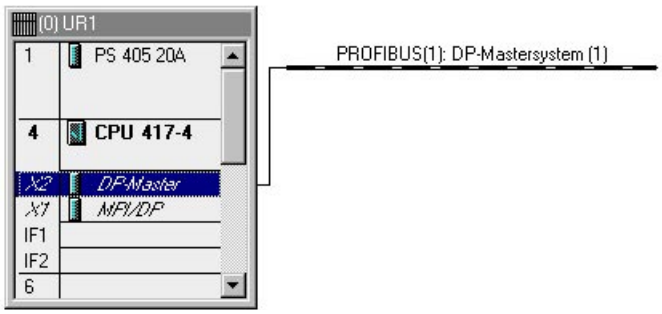

Fig 4-5 DP master with PROFIBUS

4.6 Integrating SIMEAS Q as PROFIBUS slave

The PROFIBUS master and the PROFIBUS DP system are now defined. The next step shows you how to integrate the measuring device SIMEAS Q as a PROFIBUS slave.

- Enable the **PROFIBUS** in the graphical overview.

  The PROFIBUS is now highlighted.

- In the **Hardware Catalog** folder structure, double-click the following entries: **PROFIBUS-DP** → **Additional Field Devices** → **General** and select the folder **SIMEAS Q**.

  The **Select Setpoint Configuration** dialog appears.

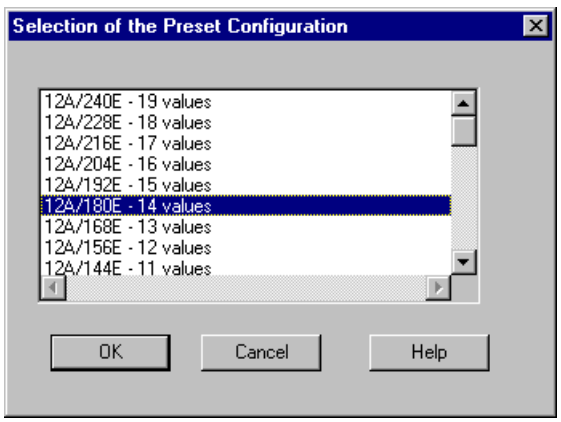

Fig 4-6 Select Setpoint Configuration

The **Select Setpoint Configuration** dialog contains the available combinations for the **O**utput and **I**nput areas of the DP slave. These also define the length of the request and response telegrams.

O: Length of the request telegram

I: Length of the response telegram

Values: Maximum number of measured values in the response telegram

These values cannot be selected independently of each other.

Select a combination from the displayed list.

Note:

Please note that the combinations offered in the list must not be changed.

Table 4-1 compares the maximum number of measured values for various CPUs.

Table 4-1 Performance characteristics of different SIMATIC masters

SIMATIC	Master	RAM capacity in Kbytes	Maximum number of measured values	Maximum number of slaves
S5	IM 308 B	2	1	32
	IM 308 C	16	19	125
	CP 5412 A2	64[1)]	19	125
S7	CPU 315 DP	64[1)]	9	64
	CPU 412-416		9	64
	CPU 417		19	125

[1)]The RAM is available for all data (incl. configuration data). Please note device manual

- Confirm your input with **OK**.

  This opens the **Properties - PROFIBUS Interface SIMEAS Q** dialog.

Assigning PROFIBUS addresses

Enter the PROFIBUS address for the slave SIMEAS Q as follows.

- Select the **Parameters** tab.
- In the **Address** box, select the address that you assigned to this SIMEAS Q device.
- Confirm your input with **OK**.

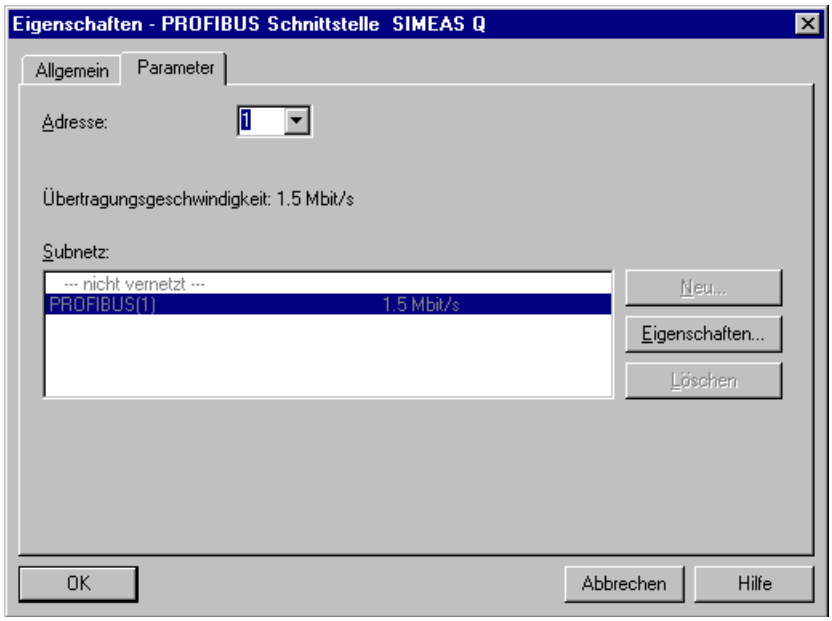

Fig 4-7 PROFIBUS address of the DP slave

In the **HW Config** dialog, the graphical representation of the PROFIBUS system now contains the new slave SIMEAS Q.

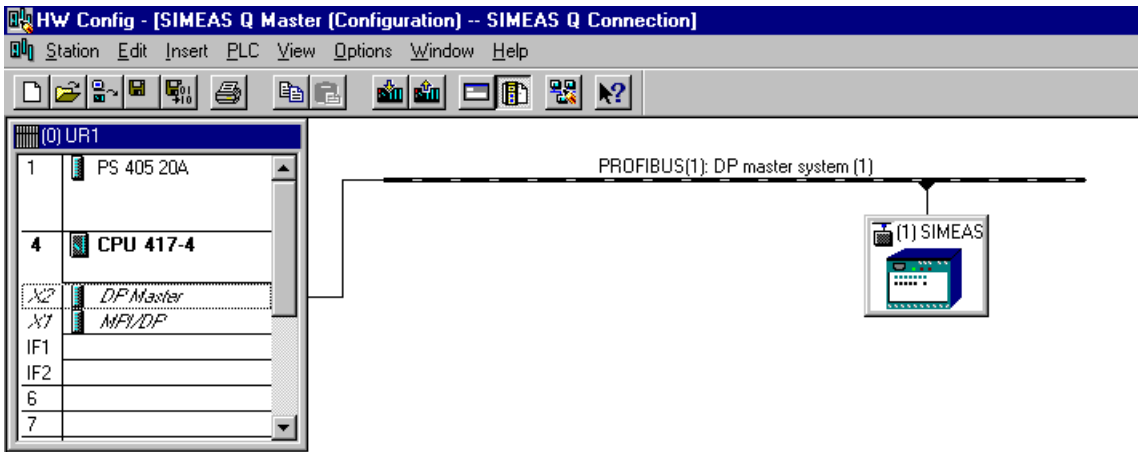

Bild 4-8 PROFIBUS DP master system with SIMEAS Q

- Save the current configuration by selecting the menu command **Station** → **Save and Compile**.

  Saving this configuration stores the **S7 Program, Sources** and **Blocks** containers in your SIMATIC project for the subsequent software configuration.

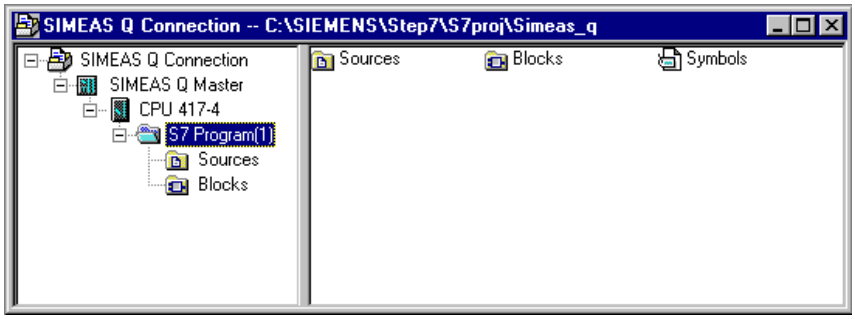

Fig 4-9 SIMATIC project with containers for software blocks

The following section shows you how to assign the required software blocks of your SIMATIC S7 to the **Blocks** container.

Configuring the software

5

Overview

The following section describes the selection of the software block for SIMATIC S7. The required software blocks vary depending on the connection:

- Via the integrated PROFIBUS DP interface
- To the PROFIBUS CP with communications processor

Contents

5.1 Overview of software blocks used

SIMATIC STEP 7 works with a range of software blocks. The software blocks for connections described in the following section are all in the sample project **S7_FB_V120.exe** on the disk included in delivery.

Code blocks

Table 5-1 Code blocks for SIMEAS Q connection

Block	Description
OB1	Standard organizational block for program call
OB100	Organizational block for unique program call during initialization
FB30, FB31	Function blocks for querying SIMEAS Q
FC1, FC2	System functions of the standard library STDLIB 30

These blocks contain the program code in the programming language STL (statement list).

The system functions SFC1 and SFC15 are permanently integrated in the CPU.

Data blocks

Table 5-2 Data blocks for SIMEAS Q connection

Block	Description
DB41	Measured value data block
DB30, DB31	Instance data blocks

5.2 Functional overview

The following overview explains how to call the software blocks when more than one SIMEAS Q slave is connected.

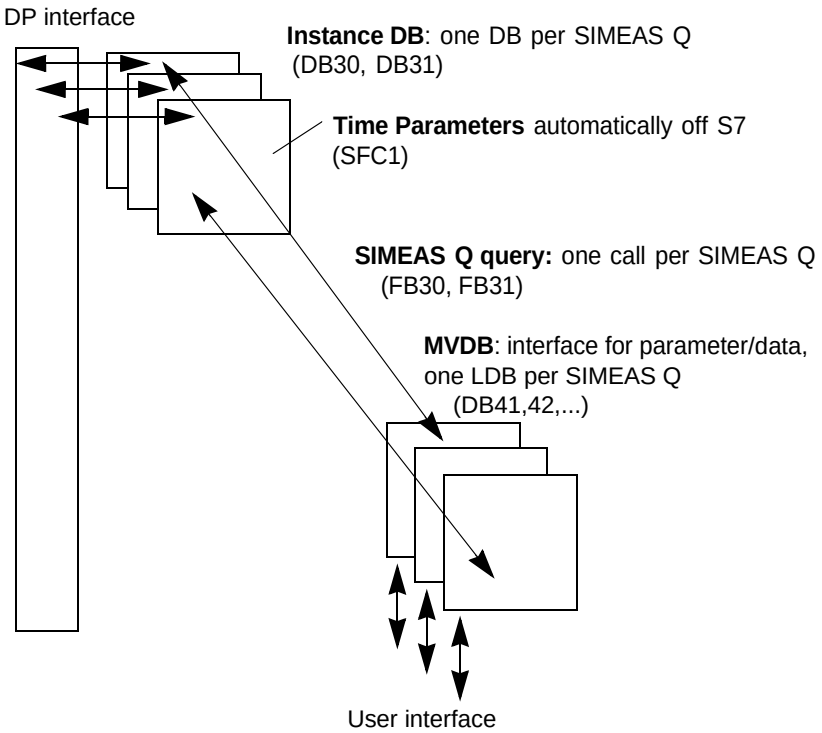

Fig. 5-1 Calling function blocks for SIMEAS Q connection

The following section describes the blocks required for PROFIBUS DP and PROFIBUS CP. In order to save disk space, always load only the blocks necessary for your variant in SIMATIC S7.

5.3 Blocks for PROFIBUS DP

You need these blocks for connection to SIMATIC S7-400 and S7-300 with integrated interface.

For connection to PROFIBUS DP, copy the following blocks to your SIMATIC project:

- Open the sample project **S7_FB_V120.exe** on the sample disk.
- Open the folder
  SIMEAS Q → **S7 Program (SimeasQ)** → **Blocks**.
- Press and hold the **CTRL** key and select the following blocks:

  FB30, DB41, DB30

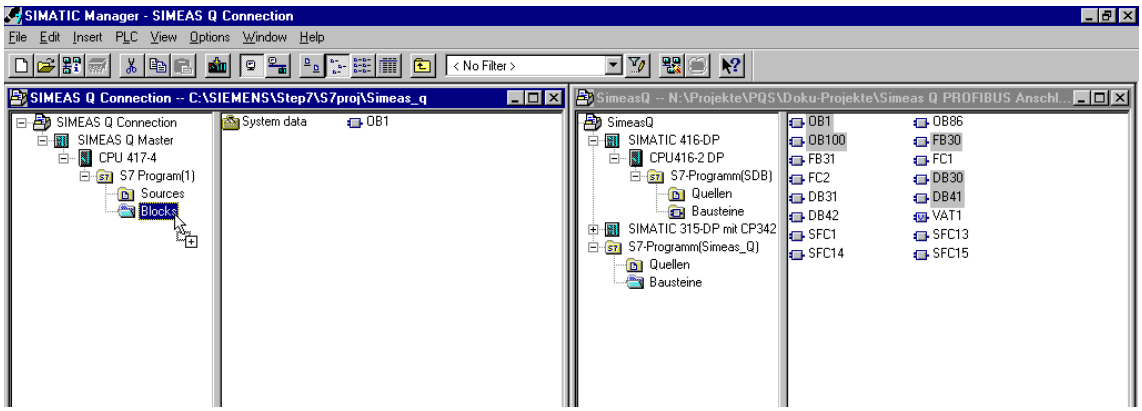

Bild 5-2 Software blocks for PROFIBUS DP

- Drag the selected blocks to the **Blocks** folder in your SIMATIC project.

  The selected blocks are copied to your project.

  Die system functions **SFC1** and **SFC15** are already permanently integrated in the CPU. Data transmission under PROFIBUS DP is effected via these standard blocks.

5.4 Blocks for PROFIBUS DP with CP

You need these blocks for connection to SIMATIC S7-300.

For connection to PROFIBUS DP, copy the following blocks to your SIMATIC project:

- Open the sample project **S7_FB_V120.exe** on the sample disk.
- Open the folder
  SIMEAS Q → **S7 Program (SimeasQ)** → **Blocks**.
- Press and hold the **CTRL** key and select the following blocks:

  FB31, DB41, DB31, FC1, FC2

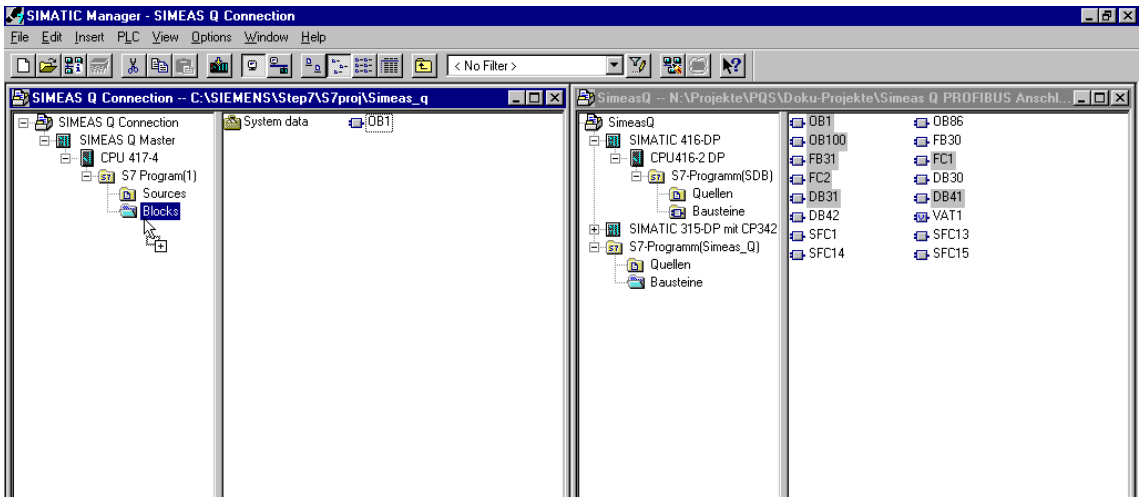

Bild 5-3 Software blocks for PROFIBUS CP

- Drag the selected blocks to the **Blocks** folder in your SIMATIC project.

  The selected blocks are copied to your project.

  The system functions **FC1** and **FC2** are taken from the standard library **STDLIB 30**. Data transmission under PROFIBUS CP is executed via these standard blocks.

Reading out SIMEAS Q

6

Overview

The following section describes the options available for reading out SIMEAS Q via PROFIBUS. For this purpose, various parameters must be set in the programming environment of SIMATIC Manager.

6.1 Program call

Overview

The program call is executed in the standard organizational block OB 1 and in OB 100 for initialization during the first system startup. Adapt the code in OB1 and OB100 in the sample project as follows.

Note:

The following program call in OB1 must be carried out once in the PROFIBUS for each SIMEAS Q.

This call must be similarly adapted in block **OB100**.

- Double-click block **OB1** in the blocks container.

  The Editor opens block OB1 for processing. Integrate the following call:

PROFIBUS DP S7-400 and S7-300 with integrated interface

```
CALL  "FB30" , "DB30"
      INIT          :=FALSE     // :=TRUE for initialization in OB 100
      I_ADDRESS     :=512
      I_SIZE        :=96        // n*12, n = 8 (values)
      O_ADDRESS     :=512
      O_SIZE        :=12
      MV_DB         :=41        // := 42, 43,..., for each SiMEAS Q slave
      Mon_Timer     :=T30
```

PROFIBUS DP with CP S7-300

```
CALL  "FB31" , "DB31"
      INIT          :=FALSE     // :=TRUE for initialization in OB 100
      I_ADDRESS     :=512
      I_SIZE        :=96
      O_ADDRESS     :=512
      O_SIZE        :=12
      MV_DB         :=41        // := 42, 43,..., for each SiMEAS Q slave
      Mon_Timer     :=T31
```

Set input and output addresses

Apply the values **I_ADDRESS, O_ADDRESS**, and **I_SIZE** from the hardware configuration of the respective SIMEAS Q slave. Proceed as follows:

- Switch to the application **HW Config.**
- Select the corresponding SIMEAS Q slave in the PROFIBUS network.

The following list with the I/O addresses of the SIMEAS Q slave is displayed:

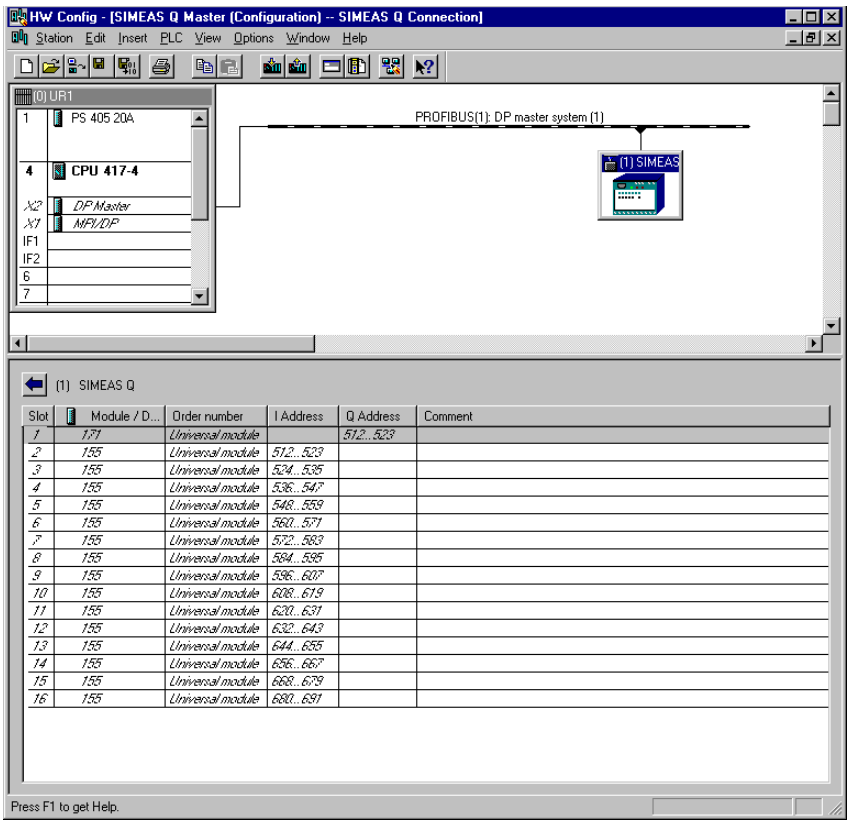

Fig. 6-1 Input and output addresses of the PROFIBUS slave.

- Apply the I address **512** for I_ADDRESS.
- Apply the O address **512** for O_ADDRESS.
- Apply values*12 = **96** for I_SIZE. The **values** parameter is found in the **Setpoint Configuration** dialog in HW Config.

One MVDB per SIMEAS Q slave

Each additional SIMEAS Q slave is called in the same way. In each case, change the allocated measured value data block (MVDB) and the input and output addresses of the slave.

- Copy a program call for each SIMEAS Q slave.
- Change the Instance_db as required.
- Change the allocation of the MVDB, for example to:
  MV_DB := **42**
- Match the **I_ADDRESS**, **O_ADDRESS** and **I_SIZE** parameters with the hardware configuration of the second slave.
- Change the Timer_db as required.
- Now parameterize the individual measured values in DB42 as described in section 6.2.

The following table contains all the parameters for calling the application program.

Table 6-1 Program call parameters

Parameters	Value	Meaning
INIT	FALSE TRUE	for calling in OB 1 for initialization in OB 100:
I_ADDRESS	I address	Input address (from HW Config)
I_SIZE	values*12	Number of values multiplied by 12 bytes per measured value (from setpoint configuration of HW Config)
O_ADDRESS	O address	Output address (from HW Config)
O_SIZE	12	12 bytes per measured value
MV_DB	DBx	Parameter and measured value data block
Mon_Timer	Ty	Monitoring timer

Example

The call for connecting **two** SIMEAS Q slaves to **PROFIBUS DP** might look as follows:

```
CALL  "FB30" , "DB30"
      INIT          :=FALSE
      I_ADDRESS     :=512
      I_SIZE        :=96
      O_ADDRESS     :=512
      O_SIZE        :=12
      MV_DB         :=41
      Mon_Timer     :=T30
CALL  "FB30" , "DB31"
      INIT          :=FALSE
      I_ADDRESS     :=524     // 512 + 12
      I_SIZE        :=36      // values from setpoint configuration: 3*12
      O_ADDRESS     :=752     // recommended by SIMATIC Manager
      O_SIZE        :=12
      MV_DB         :=42
      Mon_Timer     :=T31
```

6.2 Parameterizing measured values

The parameters for setting the individual measured values are modified in the measured value data block (MVDB).

Note:

Each SIMEAS Q slave requires exactly one MVDB in the SIMATIC S7. The following changes must therefore be carried out for each PROFIBUS slave.

for this purpose, copy one MVDB 41 for each SIMEAS Q from the sample project and store it under a new name, such as **DB42.** Then set the measured values for each SIMEAS Q as follows.

- Double-click the respective MVDB, e.g. DB41.

  The application for programming **LAD/STL/SFC** blocks opens block DB41 for processing.

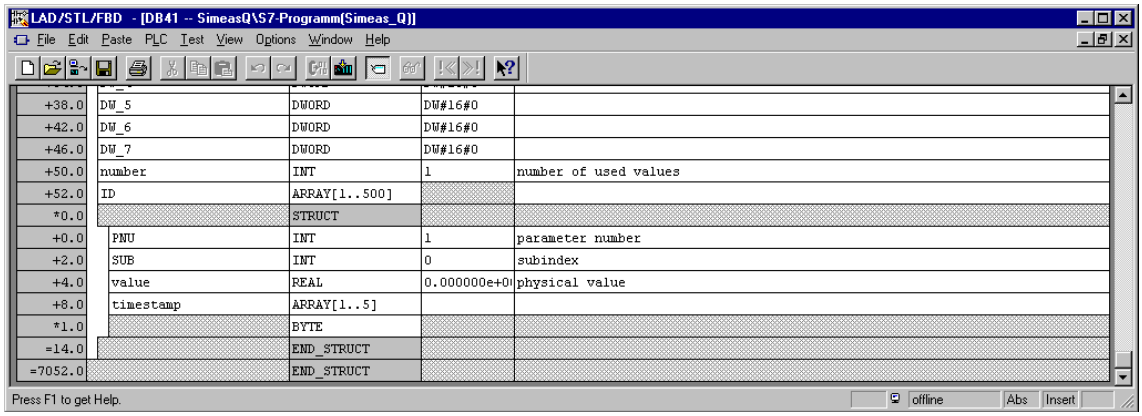

Fig. 6-2 Parameterizing measured values

- Click **View**→ **Data Display** to switch to the data display of block DB41.

Set the number of measured values

You can define the number of measured values to be read out via PROFIBUS in the **Number** parameter.

- For example, change **Number** from its default value of **1** to the value **10**

.

Note:

The CPU in your SIMATIC S7 influences the maximum number of measured values transmitted per response telegram.

- ❑ The CPUs 412 - 416 have an address area of 122 bytes.
- ❑ The CPU 417 has an address area of maximum 244 bytes.

Setting the measured value ID for each measured value

SIMEAS Q enters the actual physical measured value in the **Value** cell. The **Time** cell contains the corresponding time stamp.

To enable allocation of specific measured values to the read out measured values, each is assigned a unique measured value ID. The measured value ID comprises:

- ❑ Parameter numbers
- ❑ Subindex

- Click **View**→ **Data Display** to switch to the data display of block DB41.

  The data view shows a list of the data storage area of the entire measured value array.

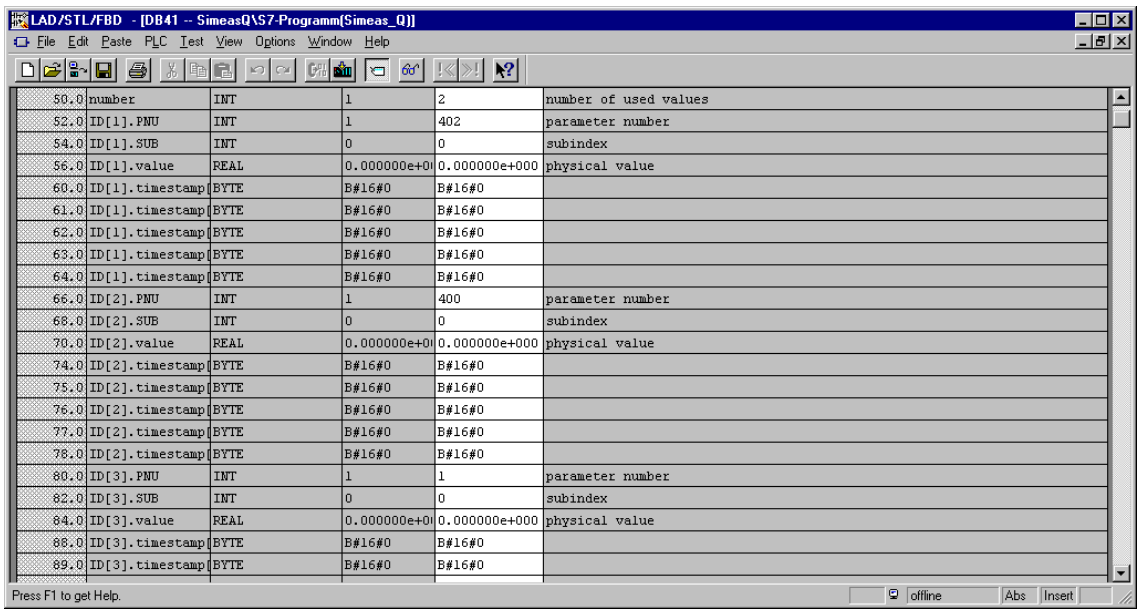

Bild 6-3 Measured value addresses in the data display

- Enter a parameter number **PNU** between 400 and 1512 for each measured value.
- Enter a subindex **SUB** between 0 and 120 .
- You will find a list of all measured value IDs in the application description for the **SIMEAS Q network quality recorder**, Appendix E, **Function IDs and parameter numbers.**

Note:

Any measured values that are not paramerized are rejected by SIMEAS Q.

Shortening the MVDB

In order to save disk space, you can shorten each measured value data block to the length of the measured values actually used. To do this, set the upper limit of the measured value array from the default setting 500 to the actual **Number** value.

- Click **View**→ **Declaration View** to switch to the declaration view of the MVDB.
- Change the declaration of the measured values in the **ID** parameter from Array[1..500] to Array[1..**10**].

Optimizing runtime

The runtime of the block is strongly influenced by the number of parameterized measured values. For this reason, the number of measured values from the receive telegram actually entered in the MVDB for each block processing can be specified in the **Optimize Runtime** parameter.

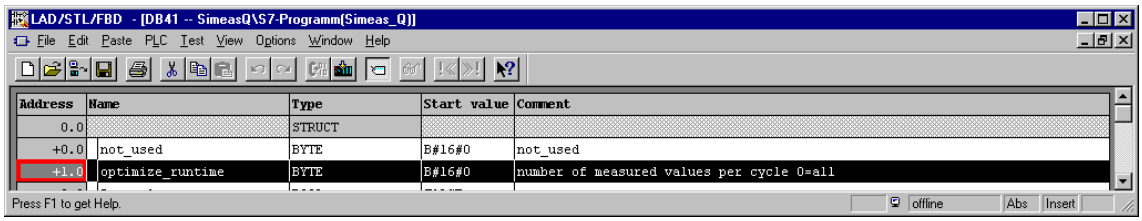

Bild 6-4 Optimize runtime

- The default setting B#16#**0** automatically enters **all** the measured values of a telegram in the MVDB immediately.

  This is the least favorable for the runtime behavior.
- Select a value between **0** and **Number** in order to enter only this number of measured values in the MVDB.

  All measured values above and beyond this set value are not entered in the MVDB and are rejected.

  If the value entered in the **Optimize Runtime** parameter is too high, the program runtime will not improve.

6.3 Setting recording options

All commands to control the recording at SIMEAS Q are triggered by setting a bit in the measured value data block (MVDB).

- Double-click the respective data block, e.g. DB41.

  The Editor opens block DB41 for processing.

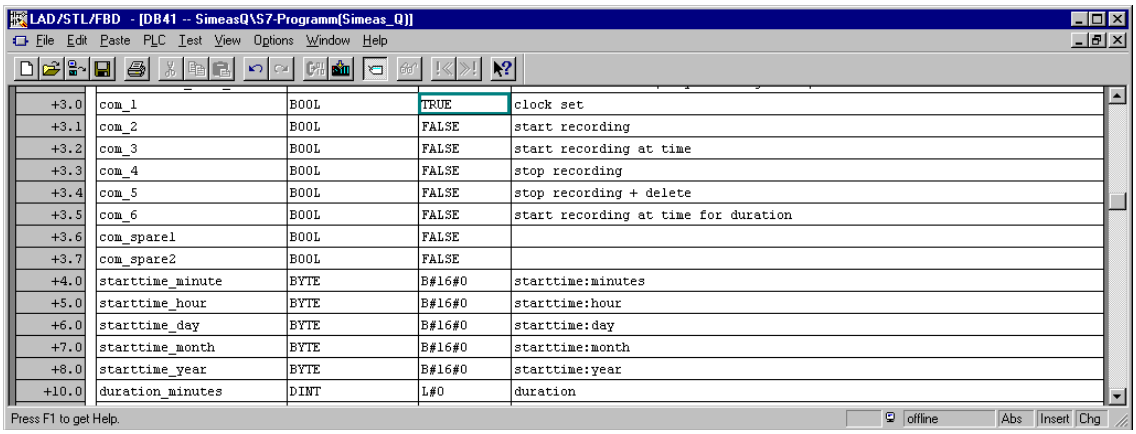

Bild 6-5 Command assignment

Setting the date and time

Set the date and time on SIMEAS Q by setting **Com_1** to **TRUE**. The time and the date are automatically retrieved from SIMATIC S7 and transferred to SIMEAS Q.

Start recording

Start the recording on SIMEAS Q immediately by setting **Com_2** to **TRUE**.

Stop recording

Stop the recording on SIMEAS Q immediately by setting **Com_4** to **TRUE**.

Stop and delete recording

Stop the recording on SIMEAS Q and delete all current measured values simultaneously by setting **Com_5** to **TRUE**.

Start recording at a specific time

To start recording on SIMEAS Q at a specific time, set **Com_3** to **TRUE**. Enter the desired time in the **Start_Time** parameters. The following table

Table 6-2 Value ranges of time and date information

Time information	Value range
Minute (mm)	0 to 59
Hour (hh)	0 to 23
Day (dd)	Depending on the month: – 1 to 30 – 1 to 31 For February: – 1 to 28 (non-leap year) – 1 to 29 (leap year)
Month (mm)	1 to 12
Year (yy)	The last two digits of the year are stored modulo 100. Thus, all values **< 80** are interpreted as **> 2000**.

The following example starts the recording on 18.11.1999 at 02:27.

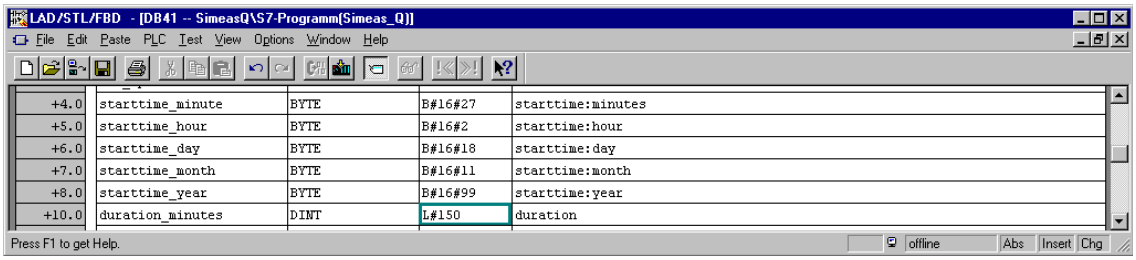

Bild 6-6 Setting the start time and period for recording

Start recording: time and period

To start the recording on SIMEAS Q at a specific time and for a specific duration, set **Com_6** to **TRUE**. As well as the time, enter the recording duration in the **Number_Minutes** parameter.

The above example starts the recording at 02:27 on 18.11.1999 for a period of 150 minutes:

Error messages

7

Overview

The following section describes possible error messages of the SIMEAS Q device and those occurring during data transmission. All error messages are stored in the respective measured value data block (e.g. DB41).

You can read this data storage area with SIMATIC Manager using the command **Monitor and Control Variables**.

Contents

7.1 Error messages of the SIMEAS Q device

Command acknowledgment

SIMEAS Q can only execute a command under certain conditions. If these are not fulfilled, SIMEAS Q outputs a negative acknowledgment of the command execution. Correct execution of the respective commands com_1 to com_6 can be seen in the **Command_Acknowledgment** parameter.

Table 7-1 Command acknowledgment in DBB15

Command_ Acknowledgment	Explanation
0	Executing command
1	Command executed correctly
2	An error has occurred

SIMEAS Q errors

If an error occurs, the exact cause of the error is entered in the **Fault_Identification_Telegram** parameter of the respective measured value data block (e.g. DB41).

Table 7-2 Error identification of SIMEAS Q device in DBB16

Command not executed	Error	Error code							
– Start recording – Start recording from specified time – Start recording from specified time over specified period – Set time – File transfer	– Recording running – Measured data are stored in the memory of SIMEAS Q						1	0	0
– Stop recording	– Recording not running					1	0	0	0
– Start recording from specified time – Start recording from specified time over specified period	– Already over the received time. – The received time format is invalid.				1	0	0	0	0
– Set time	– The received time format is invalid.								
– File transfer	– Invalid file ID			1	0	0	0	0	0

SIMEAS Q status

Information on the operating status of SIMEAS Q is transmitted to the DP Master via PROFIBUS and stored in the **Status** parameter of the respective measured value data block.

The information contained in the status parameter is in **binary code.** Only bits 1 to 6 are currently used. Bit0 and bit8 are reserved for future expansions.

Table 7-3 Status of SIMEAS Q, binary-coded in DBW22

	SIMEAS Q status							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Measurement settings available							1	
Recording running						1		
Measurement data available					1			
Storage overflow				1				
Measuring range-exceeded			1					
Wrong or faulty connection		1						

Example

The SIMEAS Q status “Measurement settings available”, “Measurement data available” and “Storage overflow” are binary-coded as **00011010**.

The status parameter contains the value $1 \times 2^1 + 1 \times 2^3 + 1 \times 2^4$ = 26: B#16#**26**.

7.2 General communications errors

A general communications error is stored in the respective measured value data block in the **Error_Communication** parameter. The following general communications errors may occur:

Table 7-4 General communications error in DBW18

Error	Explanation
0	No error
1	Timeout during communication (No response to measured value query)
2	Not in use
3	Function ID in the receive telegram is invalid

7.3 Errors during data transmission

Data transmission

Errors during data transmission between SIMATIC S7 and Simeas Q are stored in the respective measured value data block in the **RET_VAL_SFC14** and **RET_VAL_SFC15** parameters.

Table 7-5 Error code for RET_VAL_SFC14/15 in DBW24 or 26

Error code	Explanation
0000	No error
8090	You have not configured a module for the specified logical base address, or you have disregarded the restrictions on the length of the consistent data.
8092	The ANY reference contains a type specification with uneven BYTES
80A1	The selected module is defective
only SFC 14: 80B1	The length of the specified destination area does not match the length of the user data configured with STEP 7
only SFC 15: 80B1	The length of the specified source area does not match the length of the user data configured with STEP 7

Bibliography

/1/ SIMEAS Q, Operating Instructions
C53000-B874-C204-1

/2/ SIMEAS Q Parameterization, Operating Instructions
E50417-H1176-C072-A1

Glossary

A_{st}, A_{lt}	Measurement for disturbance sensitivity (short term; long term)
Averaging time	The averaging time is a multiple of the → base time. During the period of the averaging time, extreme values are formed.
Base time	Time span in which an average value is formed from the sampling values. These average values are used for the period of the → averaging time to form extreme values.
Binary outputs	Output of binary signals (high and low) for switching relays.
Byte	→ Octett. a unit of information unit consisting of 8 bits.
Classic method	Algorithm for calculating the output capacity in a → symmetrical network without taking into account the harmonics
Continuous recording	Continuous recording of the measured values in an application-orientated, user-definable time reference.
Control boxes	Serve to enable or disable functions. More than one box can be active at the same time.
Converter	Adapter for linking different standardized interfaces
cos φ	Power factor
Data window	Dialog box for the input of data
Desktop	On-screen work area
DSF file	→ DeviceSpecific File
Expansion method	Algorithm for calculating the output capacity in an → unsymmetrical network taking into account the harmonics

Fault recording	Only measured values that exceed specified application-orientated → threshold values are stored with time stamp.
Flicker	Measurement for voltage fluctuations in the low-voltage distribution.
FT	Abbreviation for FileTransfer
Gender Changer	Coupling for linking two connectors of the same type.
Master	Higher-level device, which monitors and controls subordinate devices (→ slaves)
Navigation window	Displays the program structure of the measurement settings. Clicking or double-clicking the structure symbols lets you "navigate" between the various parameter groups and dialog boxes.
Negative-phase-sequence system	Polyphase system, in which phases L1, L2 and L3 are each phase-shifted through 120° in an anticlockwise direction.
Parameter numbers	→ PNU. Part of the unique identification of the measured values. The identification is made up of the PNU and → subindex.
Positive phase-sequence system	Polyphase system, in which phases L1, L2 and L3 are each phase-shifted through 120° in an clockwise direction.
P_{st}, P_{lt}	Measurement for disturbance effect (short term; long term)
Radio buttons	Serve to enable or disable functions. These are latched as default (only one radio button can be active).
SIMEAS Q	**SI**emens **MEAS**uring **Q**uality Network quality recorder
SIMEAS Q Parameterization	Parameterization software for SIMEAS Q
Slave	Subordinate device, which is monitored and controlled by a higher-level device (→ Master).
sql file	Extension of parameter files

Standard parameter set	Factory-set parameter data record in SIMEAS Q und in SIMEAS Q Parameterization.
SW	Summer/winter time switchover
Symmetrical system	Polyphase network in which all phases are uniformly loaded with consumers.
THD	Total Harmonic Distortion
Threshold value	Limit value which triggers an action, e.g. status indication, warning, disconnection, etc. Several threshold values which trigger defined actions can be specified for a single measured value.
Time information	Date and time of an event
Time stamp	→ Time information
Unsymmetrical system	Polyphase network in which not all phases are uniformly loaded with consumers.
Validity	Validity bit. Displays the status **Valid** or **Invalid**.

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