

SIMATIC NET

SINAUT MICRO SC

System manual

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Safety Guidelines

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



Danger

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



Warning

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



Caution

with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken..

Caution

without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

Notice

indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

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

Qualified Personnel

The device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Prescribed Usage

Note the following:



Warning

This device 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. Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance

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General notices about the system

Before using the software SINAUT MICRO SC and the PLC library please read carefully this system manual. Observe also the system manual of the GPRS/GSM modem SINAUT MD720-3.

Preface

Purpose of this documentation

This documentation will support you on your way to successful application of the SINAUT MICRO SC. It will introduce you to the topic in clear and straightforward steps and provide you with an overview of the hardware and software components of the SINAUT MICRO SC and SINAUT MD720-3 station control system. You will be supported during the planning of network structures and topologies and will see how to install and configure individual components based on the installation guidelines. This documentation will help you during installation and commissioning of SINAUT modules and explains the diagnostics and service options available.

Validity of the documentation

This manual relates to the following product versions

- SINAUT MICRO SC Server (Version 1.1 and higher)
- GPRS-Modem MD720-3 (Version 1.1 and higher)

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- The Newsletter keeps you constantly up to date with the latest information on the products you use.
- The Knowledge Manager will find the documents you need.
- In the Forum, users and specialists exchange information and experience.
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You will find the latest version of this documentation under the entry ID 22547968.

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- On the Internet at <http://www.siemens.com/simatic-net> specifically for SIMATIC NET products
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Introduction

1

The software SINAUT MICRO SC and the GPRS-Modem SINAUT MD-720-3 meet the following purpose:

Communication of S7-200 controls via GPRS

The SINAUT MICRO SC software is a OPC routing software with special communication functions. These communication functions enables the SINAUT MICRO SC to have data connections to remote S7-200 controls. For the connections the GPRS (**G**eneral **P**acket **R**adio **S**ervice) of GSM networks (**G**lobal **S**ystem for **M**obile **C**ommunication) is used.

Via these GPRS connections, the remote S7-200 controls can communicate with the OPC routing software or with other S7-200 controls being connected to the SINAUT MICRO SC.

The S7-200 controls are connected by the GSM/GPRS modem SINAUT MD720-3 to the GPRS/GSM network.

This manual

Inside this manual, you will find all required information

- about the installation and the operation of the SINAUT MICRO SC software and
- about the GSM/GPRS-Modem SINAUT MD720-3 in OPC mode.

A guide about the installation and the hardware of the SINAUT MD720-3 can be found in the SINAUT MD720-3 manual.

Connections

2

The following diagrams shows connections, which can be realised using the SINAUT MICRO SC and the SINAUT MD720-3. Additional explanations can be found in the succeeding chapters.

2.1 Communication via GPRS/GSM

Connection S7-200 ⇔ MICRO SC OPC routing software

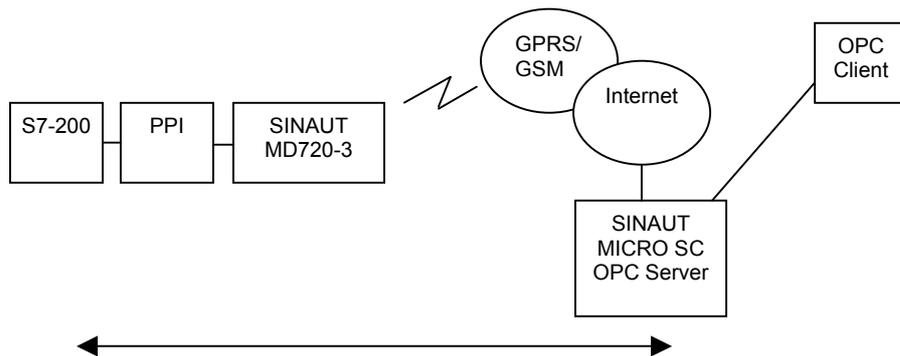


Figure 2-1

GPRS communication S7-200 to SINAUT MICRO SC routing software

The central SINAUT MICRO SC OPC Routing Software can connect up to 256 remote controls S7-200 via GSM/GPRS.

The GSM/GPRS modems SINAUT MD720-3 connect the S7-200 controls to the GSM/GPRS network.

The computer with the OPC Routing Software SINAUT MICRO SC is connected to the GSM/GPRS network via the Internet.

So an OPC client has access to the OPC Server of the OPC Routing Software SINAUT MICRO SC and can send / receive data to / from the remote controls.

Connection S7-200 ⇔ S7-200

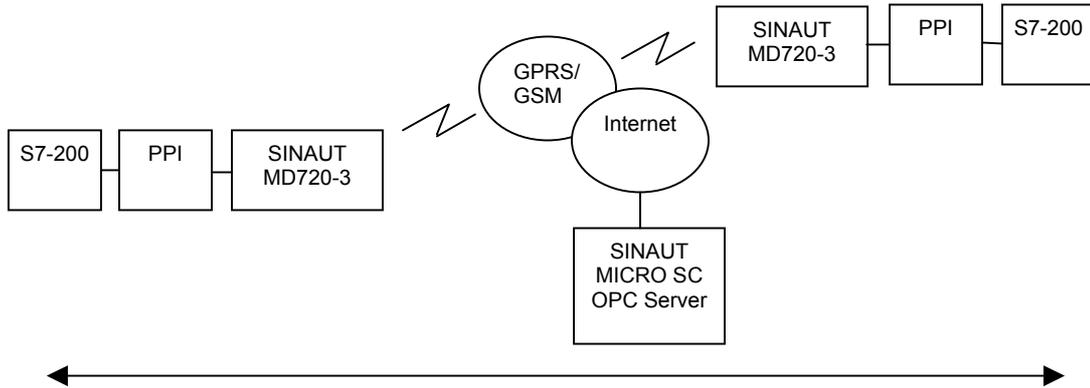


Figure 2-2

GPRS communication S7-200 to S7-200 via SINAUT MICRO SC routing software

Also the remote controls S7-200 can exchange data via the SINAUT MICRO SC Routing Software. To do this the control sends the data to the SINAUT MICRO SC Routing Software which forwards the data to the addressed control.

2.2 Communication by SMS

Text messages (SMS) S7-200 ⇔ SMS receiver

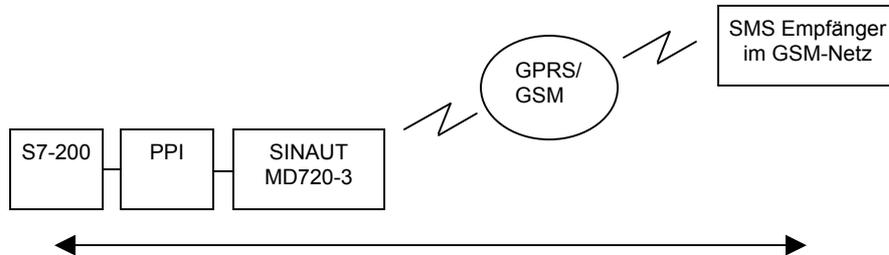


Figure 2-3

SMS transmission by using the SINAUT MD720-3

With the SINAUT MD720-3 GSM/GPRS modems the controls S7-200 can send SMS to any station that is able to receive SMS.

During a SMS transmission an existing GPRS connection to the SINAUT MICRO SC is interrupted.

2.3 Remote configurations by GSM data call

Using a modem (analog, ISDN, GSM) a PC, functioning as configuration computer, can establish a data connection to a SINAUT MD720-3. The SINAUT MD720-3 only accepts calls that identify themselves with the right telephone number registered before in the SINAUT MD720-3 (CLIP).

According to the transmitted CLIP the incoming call will be connected to the internal Service Interface of the SINAUT MD720-3 or to the control which is connected.

GSM data call S7-200 ⇔ Configuration computer

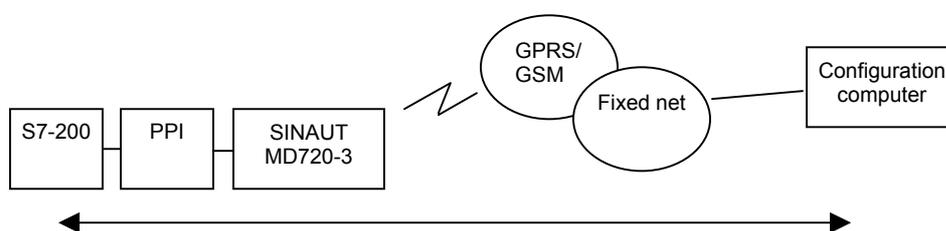


Figure 2-4

Remote configurations of the S7-200 by CSD data call

When a call goes to the connected control this control switches to the PPI mode. Then a software update is possible.

GSM data call SINAUT MD720-3 (Service mode) ⇔ Configuration computer

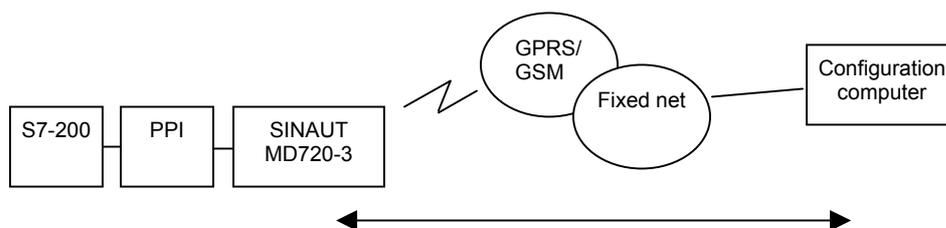


Figure 2-5

Remote configurations of the SINAUT MD720-3 by CSD data call

A call to the Service Interface of the SINAUT MD720-3 must be established as PPP-connection. Then it is possible to update the software of the device via FTP protocol (refer to chapter 9.4 *Service calls in OPC mode*).

3.1 Reachability of SINAUT MICRO SC

The computer running the OPC routing software SINAUT MICRO SC needs to be reachable from the GPRS network permanently. Therefore this computer needs to be connected directly to the GPRS or must permanently be reachable in the internet by DSL for example.

Caution

If the OPC routing software SINAUT MICRO SC is not reachable, the GPRS/GSM modems SINAUT MD720-3 try again and again to connect to the SINAUT MICRO SC. This generates data volume through GPRS with costs.

Avoid any times, when the SINAUT MICRO SC is turned-off or not reachable.

3.2 Firewall

Like any other computer being connected to the internet or another public IP network, you must protect the OPC server by a firewall against attacks coming through the connected network.

Please ensure that the configured Server Port (Default 26862; refer to 7.1 *Configuration tool*) is not blocked by the firewall. Otherwise the trials of the GPRS/GSM modems to connect via GPRS will generate data volume with costs.

3.3 Defined Address of the OPC Routing Software SINAUT MICRO SC

In order that a SINAUT MD720-3 can actively establish a GPRS connection to the OPC Server SINAUT MICRO SC, the OPC Server SINAUT MICRO SC must have a fixed IP address. There are three ways of obtaining a fixed IP address:

Fix IP address

The server is connected to the GPRS network via a dedicated line. In this case it has normally been assigned a fixed IP address by the network operator. (An IP address consists of 4 numbers, separated by full stops, which can each have up to three digits, e.g. 184.17.20.30).

OR

The server can be accessed via the Internet and has been assigned a fixed IP address by the Internet service provider (the address can be applied for from some Internet service providers).

Fixed IP address via DynamicDNS provider

The server can be accessed via the Internet and is assigned dynamic IP addresses but he is registered with a DynamicDNS provider (DNS = Domain Name Server) - see Glossary. Thus, he has a fixed name (URL = Uniform Resource Locator) in URL format.

3.4 GPRS subscriber contract

To use the SINAUT MICRO SC and the GPRS modem SINAUT MD720-3

Requirements for using the SINAUT MICRO SC and the SINAUT MD720-3:

- subscriber contract with a GSM network operator (e.g. T-Mobile, Vodafone, E-Plus, O2) that supports GPRS
- release of the GPRS for the user in question by the network operator.

3.5 Necessary information

Please have the following information available before you start to configure the SINAUT MICRO SC and the SPS program modules:

Information about GSM / GPRS

You will get this information from your GSM/GPRS network provider, e.g. on his Web pages, from his account manager or from his customer service.

APN (Access Point Name) :
Name of the gateway to the Internet, Intranet.

User name :
(Optional, depends on the network provider)

Password :
(Optional, depends on the network provider)

DNS1 :
(Optional, only required for Hostname addressing)

DNS2 :
(Optional, only required for Hostname addressing as backup for DNS1)

Information about the Internet / GPRS access

You will get this information from your network administrator, your internet provider or, if you have a direct connection to the GPRS net from your GSM/GPRS provider.

Host name :
or

IP address :

of the computer running the OPC Routing Software SINAUT MICRO SC.

To establish the system

4

Approach

1. Get the necessary information about the your internet and GPRS access, see *Necessary information*, chapter 3.5.
2. Install the OPC Routing Software SINAUT MICRO SC, see *Installation SINAUT MICRO SC*, chapter 5.
3. Open the configuration tool Sie and configure the stations, see SINAUT MICRO SC configuration, chapter 7.
4. Define the entries for the SPS program modules WDC_INIT, see *PLC Program modules*, chapter 8.1. Please observe, that the definition die need to correspond to the entries made in the configuration tool.
5. Compile the SPS program and transfer it to the SPS.
6. Insert the SIM-Karte in the GPRS modem MD 720-3 and install it, see system manual SINAUT MD720-3.
7. Connect the GPRS modem SINAUT MD720-3 with the SPS via the PPI adapter, see *Connect / Setup the PPI adapter*, chapter 9.1.
8. Connect the modem SINAUT MD720-3 to the power supply and switch on the SPS.
9. When the modem SINAUT MD720-3 and the OPC routing software has establish the connection, the connection status will be indicated as „yellow“.
10. When the SPS has connected to the OPC routing software, the connection status will be indicated as „green“.

Installation SINAUT MICRO SC

5

5.1 System requirements

Hardware

- PC compatible Server (INTEL or AMD); clock speed: > 1GHz recommended,
- main memory: > 500Mbyte recommended; hard disk: > 1GByte free memory space recommended,
- CD-ROM drive to run the installation,
- Network adapter and network access to the internet or the GPRS.

Operating system

Die OPC Routing Software SINAUT MICRO SC is suitable for the following operating system

- Microsoft Windows XP Professional ServicePack2
- Microsoft Windows 2003 Server ServicePack1
- Windows 2000 Professional/Server Service Pack4

Internet access

Internet access, being always accessible from „outside“ (for the GPRS modems), i.e. having a fix IP address or a Host name (using DNS).

5.2 Installation

Administrator

To install the SINAUT MICRO SC software you need administrator rights for the computer.

Number of connections

Depending on the license which you have acquired, the SINAUT MICRO SC supports

- 8 connections to 8 stations
- 64 connections to 64 stations
- 256 connections to 256 stations

In addition there is a demo version available, which allows the connection to one only station (for a limited period).

Installation

Insert the CD-ROM SINAUT MICRO SC in the CD-ROM drive of the computer and start *Setup.exe*. Select the language you wish. The wizard will guide you through the installation.

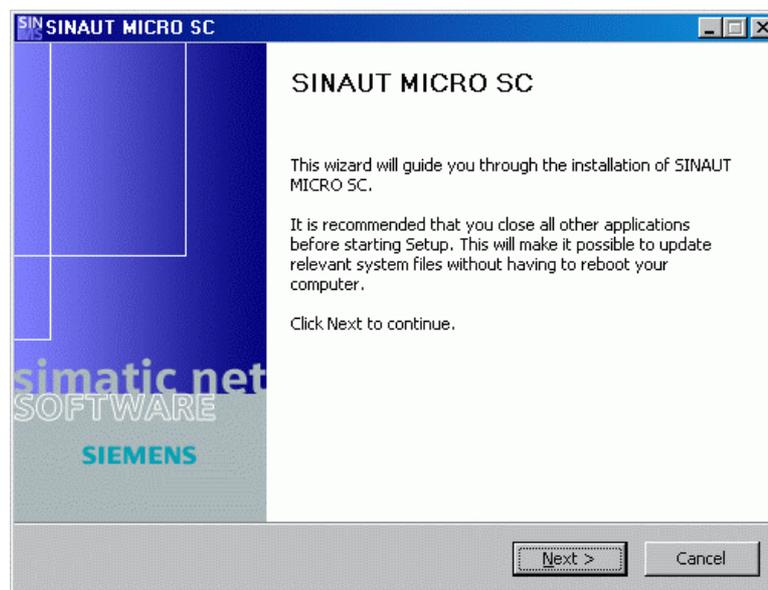


Figure 5-1

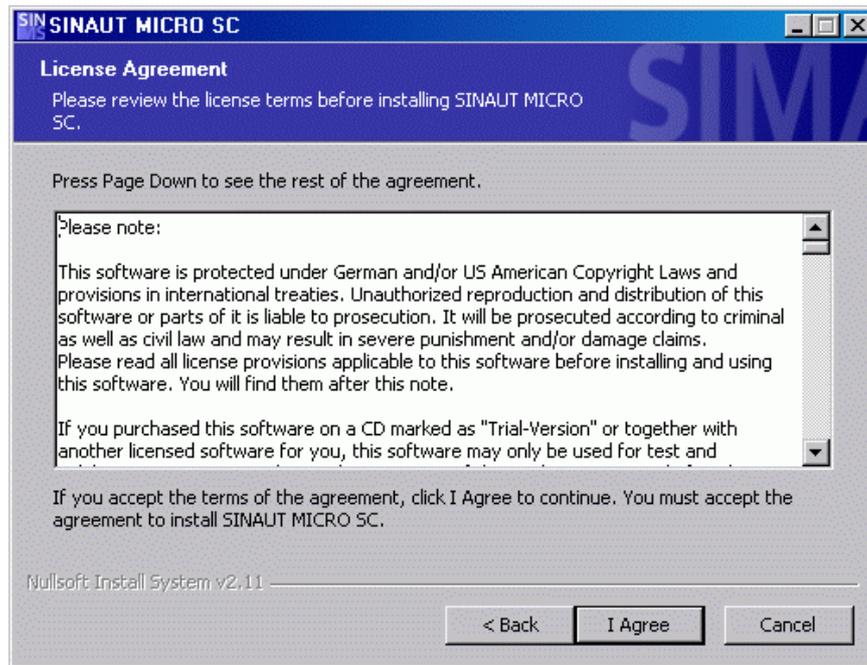


Figure 5-2

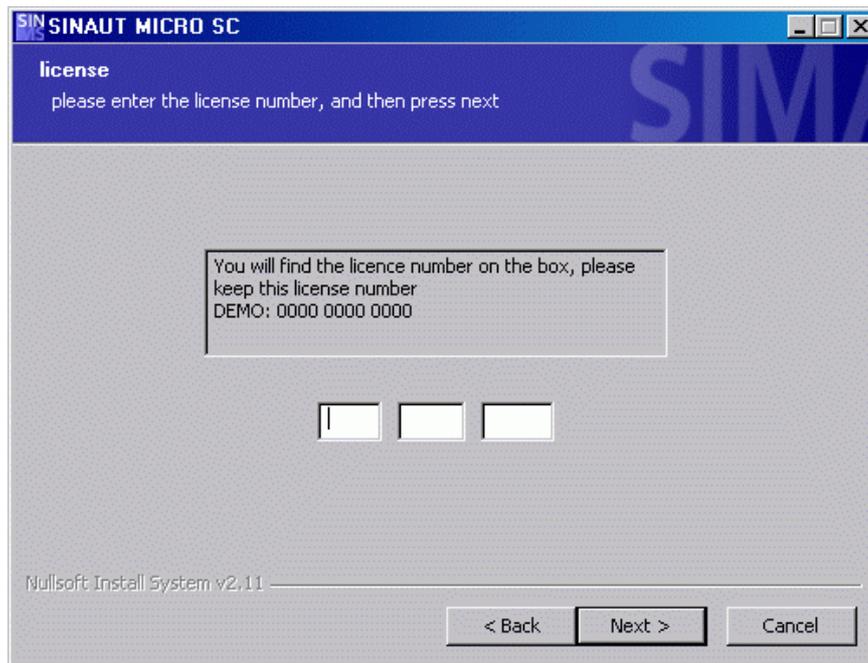


Figure 5-3

Enter the license number. The license number is written on the licence certificate of the packaging.

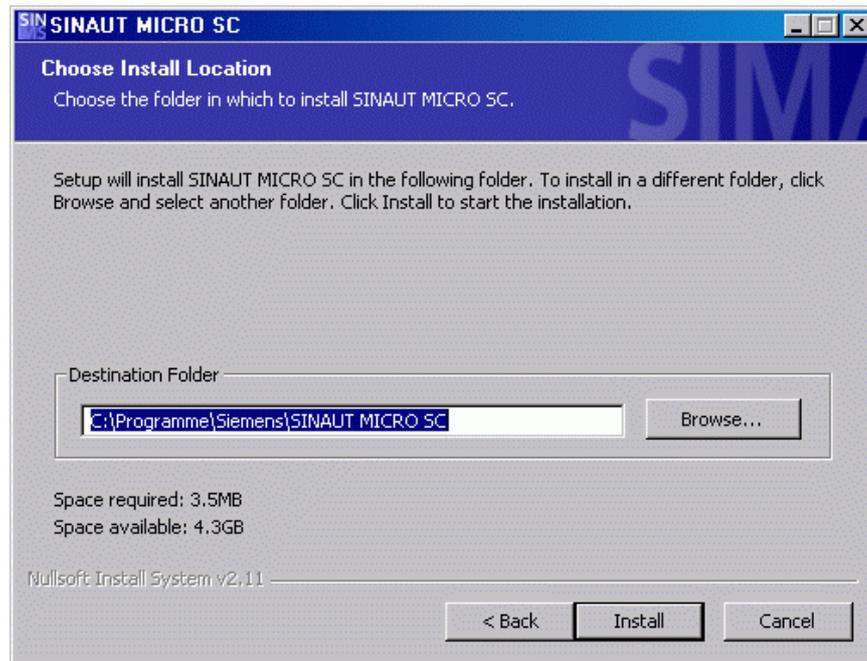


Figure 5-4

Select the directory the SINAUT MICRO SC software shall be installed into.

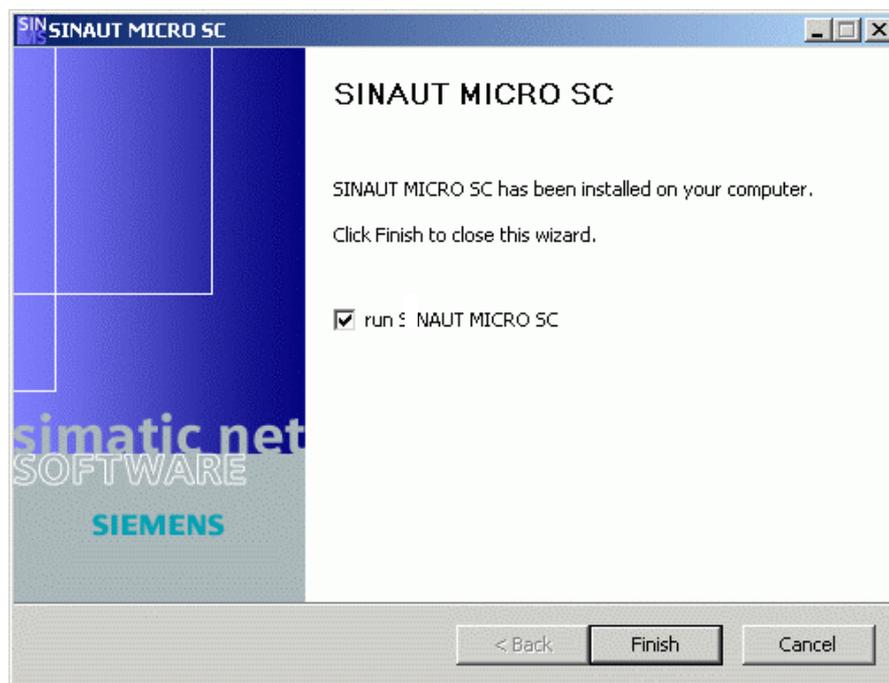


Figure 5-5

After you have start the SINAUT MICRO SC software, you will find an icon for this software in the task bar of Windows.

OPC Routing Software SINAUT MICRO SC

6

Any OPC client gains access to the actual data in the connected controls by means of the OPC Routing Software SINAUT MICRO. With the software you can also display the status information of each of the GPRS connections to the controls.

6.1 OPC Server

The SINAUT MICRO SC OPC Server has the name „M2MOPC.OPC.1“. If the OPC client offers a list of all OPC servers you have to choose the corresponding entry. Or write the name in the field.

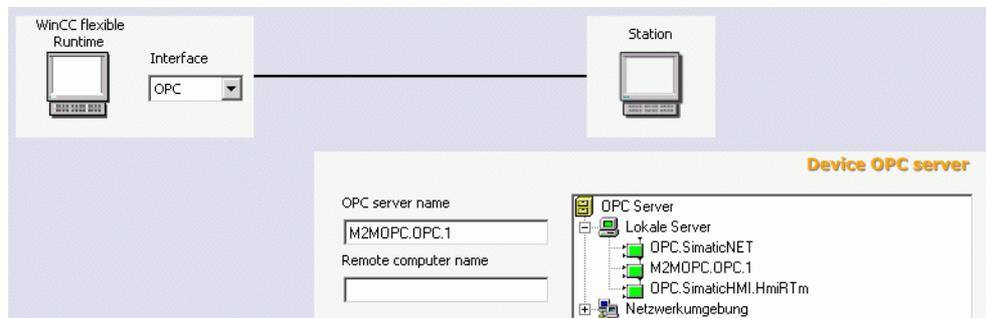


Figure 6-1: A server entry in WinCC flexible (example)

6.2 OPC Items

The OPC server provides for each configured station the following OPC items:

- MSC: [<stationname>]DB1, {<type>}<address>{,<count>}**
 Access to the PLC's memory
 Read / Write
- MSC: [<stationname>]GPRSConnected**
 GPRS connection is currently established
 Datatype: Bool, Read only
- MSC: [<stationname>]SignalQuality**
 GSM signal quality (0..31)
 Datatype: Byte, Read only
- MSC: [<stationname>]BytesReceived**
 Counter for received bytes (counted by the modem)
 Datatype: DWord, Read only
- MSC: [<stationname>]BytesTransmitted**
 Counter for transmitted bytes (counted by the modem)
 Datatype: DWord, Read only
- MSC: [<stationname>]BytesTotal**
 Counter for total transmitted and sent bytes (counted by the modem)
 Datatype: DWord, Read only
- MSC: [<stationname>]Firmware**
 The GPRS modem's firmware version
 Datatype: String, Read only
- MSC: [<stationname>]DeviceID**
 The GPRS modem's device type ID
 Datatype: String, Read only
- MSC: [<stationname>]PLCConnected**
 Communication with the PLC program (i.e. with the GPRS library) works error free.
 FALSE: Communication fault
 TRUE: Communication ok
 Datatype: Bool, Read only
- MSC: [<stationname>]RefreshValues**
 Command to update all values of the PLC variable's by the OPC client.
 Datatype: Bool, Write only, reading results to 0
- MSC: [<stationname>]RefreshStatus**
 Command to test the connection to the PLC by the OPC client.
 With this command the user is able to test the connection to the PLC from inside the OPC client independently to the periodic functional calls. (After this command the *PLCConnected* field holds the current status.)
 Datatype: Bool, Write only, reading results to 0

Stationname:

The station's name to access. This name is part of the station's configuration.

Type:

Term	Description	OLE datatype	S7-200 datatype
B	Byte (unsigned)	VT_UI1	BYTE
W	Word (unsigned)	VT_UI2	WORD
D	Doubleword (unsigned)	VT_UI4	DWORD
CHAR	Byte (signed)	VT_I1	BYTE
INT	Word (signed)	VT_I2	INT
DINT	Doubleword (signed)	VT_I4	DINT
REAL	Floating point number	VT_R4	REAL
STRING	String with fixed length	VT_BSTR	STRING
DT	Date and time, 8 Byte BCD format	VT_DATE	

The conversion of the different byte order between the PC and the PLC is performed by the OPC server.

Address:

Byte-offset of the variable in the PLC. With strings additionally there has to be given the length , separated by a point, e.g. <Byte-offset>.<stringlength>.

Example:

The integer value of variable **VW100** in the S7-200 with the station name „S1“ e.g. is addressed as:

MSC: [S1]DB1, INT100

The string with the length 12 at address 1500 of the S7-200 with the station name „S1“ are addressed e.g. as:

MSC: [S1]DB1, STRING1500.12

Count:

(optional)

Number of array elements that have to be accessed starting with the offset given in *address*. If no number is determined, a single variable will be accessed.

A data block in the remote station is always mapped to DB1.

Example:

8 Bytes starting at address 500 of the S7-200 with the *stationname* „S1“ are addressed e.g. as:

TSC: [S1]DB1 ,B500 , 8

Notice

The signal quality as well as the data volume counters are not updated every time because costs for higher data volume are generated. The information are updated in periodic time intervals (about every hour). This interval is appropriate for monitoring the station's running behaviour. Updating these values by synchronous reading commands from the OPC client is possible at any time.

Refresh_Values

After the start of the OPC clients it is necessary to set the bit „Refresh Values“ to 1. Only then the SPS will transmit the actual values.

6.3 OPC access path

In case the OPC client allows to define an access path, the *stationname* can be used as access path and the address as item ID.

Example:

Access path: **MSC:[S1]**

Item ID: **DB1,INT100**

Alternatively the complete address can be given as OPC item ID (with an empty access path).

Example:

Access path: -

Item ID: **MSC:[S1]DB1,INT100**

6.4 Address Space Browsing

The OPC server supports hierarchically Address Space Browsing.

When browsing the data on the PLC there's an asterisk „*“ given in the Item ID instead of the *address*. That one has to be replaced by the requested byte-offset.

6.5 Example: Variable entries at WinCC flexible

The screenshot shows the 'TAGS' window in WinCC flexible. It contains a table with the following data:

Name	Connection	Data type	Symbol	Address	Array count
Variable_1	Verbindung_1	String	MSC:[t004]Firmware	MSC:[t004]Firmware	1
Variable_10	Verbindung_1	Byte	<Undefined>	MSC:[S2]DB1,b1510	1
Variable_11	Verbindung_1	Byte	<Undefined>	MSC:[S2]DB1,b1505	1
Variable_12	Verbindung_1	DWord	<Undefined>	MSC:[S2]DB1,d1500	1
Variable_13	Verbindung_1	String	<Undefined>	MSC:[S2]DeviceID	1
Variable_14	Verbindung_1	Byte	<Undefined>	MSC:[S2]SignalQuality	1
Variable_2	Verbindung_1	Byte	<Undefined>	MSC:[t004]DB1,b2400	1
Variable_3	Verbindung_1	DWord	<Undefined>	MSC:[t004]DB1,d1500	1
Variable_4	Verbindung_1	Byte	<Undefined>	MSC:[t004]DB1,b1505	1
Variable_5	Verbindung_1	Byte	<Undefined>	MSC:[t004]DB1,b1505	1
Variable_7	Verbindung_1	String	<Undefined>	MSC:[t004]DeviceID	1

Figure 6-2: Example variable entries at WinCC flexible

SINAUT MICRO SC configuration

7

7.1 Configuration tool

SINAUT MICRO SC provides process remote control via GPRS (General Packet Radio Service). The system provides communication for the connected stations with each other and access to all stations over an OPC server. This "SINAUT MICRO SC" configuration tool is used to configure and monitor all stations connected to the system. A station consists of a Siemens S7-200 PLC and a GPRS modem SINAUT MD720-3.

Main window

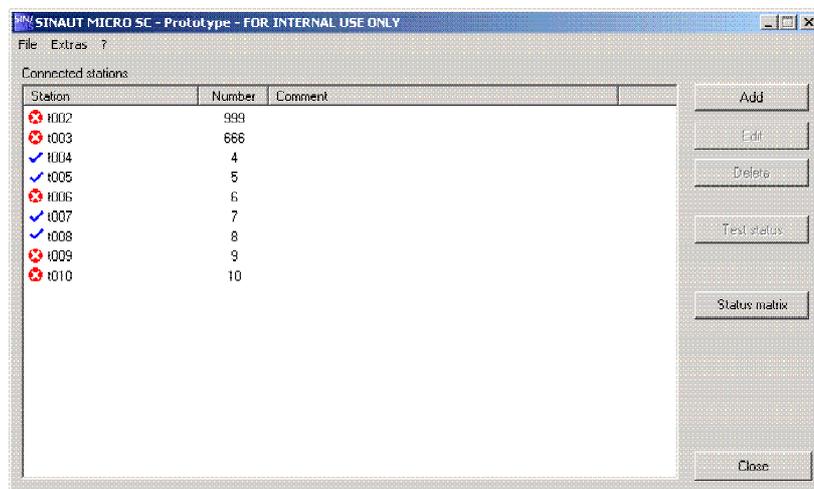


Figure 7-1 Main window

The main dialog shows a list of all configured stations. For each station the current state is indicated:

-  The station is disconnected
-  The GPRS modem is connected to the server but the communication with the PLC isn't possible (e.g. because the PLC isn't in RUN mode or the wire between the PLC and the modem is broken)
-  The station is connected

The menu bar provides the following options:

- **File**
 - **Exit**
Closes the configuration tool (the server keeps on running).
- **Extras**
 - **Settings**
System-wide settings
- **?**
 - **Help**
Opens this help
 - **Info**
Shows license information

The buttons on the right side are for processing the connected stations.

Add

Adds a new station to the system. A dialog is opened, to edit the properties of the new station.

Edit

Opens a dialog to edit the properties of the selected station.

Delete

Removes the selected station from the system.

Test status

Tests the current connection status of the selected station and opens a dialog to show it.

The station status can also be tested by double clicking on a station in the list.

Status matrix

Shows the status of all configured stations in form of an open matrix.

Close

Terminates the configuration tool.

Station properties

Properties - <New station>

Stationname: t004

Stationnumber: 4

GPRS modem

Name: modem4

Password: secret4

PLC status monitoring

Status monitoring deactivated

Status monitoring by value updates

Status monitoring by RealTimeClock synchronization

Interval: 15 Minutes

Comment

OK

Cancel

Figure 7-2 Station properties

Station name

The specific station's name. This name must be unique over all stations. This name must be provided in the OPC client for addressing the variables.

Station number

The station's unique number. This number must match the parameter STATION_NUMBER when calling WDC_INIT. This number is used as destination address with communication between PLCs. Possible values are between 1 and 65535, 0 is reserved for the server.

GPRS modem name

The name used by the GPRS modem for login at the server. This name must match the parameter MODEM_NAME when calling WDC_INIT in the PLC program. This name can't be edited.

GPRS modem password

The password used by the GPRS modem for login at the server. This password must match MODEM_PASSWORD when calling WDC_INIT in the PLC program. This password is proposed depending on the station number but can be changed at any time.

SPS status monitoring

Indicates if and how the connection to the PLC is monitored in periodic intervals.

- *Status monitoring deactivated*
The connection to the PLC is not monitored. No additional costs are created.
- *Status monitoring by value updates*
The connection to the PLC is monitored by updating all values from the PLC in the configured time interval. With this option it might not be necessary to update analogue values and counters by the PLC program in periodic intervals.
- *Status monitoring by RealTimeClock synchronization*
The connection to the PLC is monitored by synchronizing the PLC real time clock in the configured interval.
Even if this option is not selected, the PLC real time clock is synchronized once a day.

The Interval determines the frequency for status monitoring.

Notice

The status monitoring has the function to test and to indicate, if the configured connection is still available. Often the status monitoring function is also necessary to keep the connection alive. A lot of network operators disconnect connections automatically if no data has been transmitted for a period of time. This can be avoided, when frequently status requests are transmitted.

If you do not have already experiences with your GPRS service, you should select an interval of 15 minutes and you should use *Status monitoring by RealTimeClock synchronization*.

Try if the connections are stable also, if you use intervals greater than 15 minutes and accordingly select smaller intervals if your connections are often interrupted.

Warning

With frequent status test calls higher costs may be caused, because of higher data volume.

Comment

Any comment regarding this station.

Station status

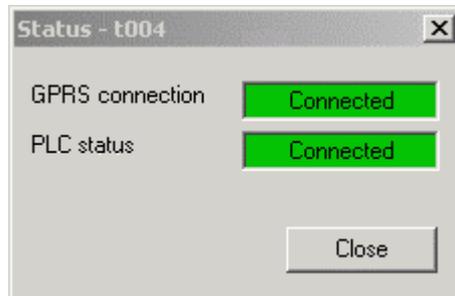


Figure 7-3 Station status

Shows the current connection status of the selected station. The status is checked by an active call to the PLC when opening this dialog.

GPRS connection

Shows if the GPRS modem is connected to the server.

PLC status

Shows if there's a communication between the server and the PLC.

There's only communication possible between the OPC server and the stations or between the stations with each other, if both fields show *connected*.

If the GPRS modem is connected but the PLC isn't, then a possible reason could be that the PLC isn't in RUN mode or the serial connection between the PLC (port 0) and the modem is broken.

Status matrix



Figure 7-4

Shows the current connection status of all configured stations. The stations are identified by their station number.

The color coding shows the current state:

-  The station is disconnected.

-  The GPRS modem is connected to the server but communication with the PLC isn't possible.

-  The station is connected

With **Test status of all stations** the status of all stations is updated. Depending on the number of configured stations this action might last for up to 30 seconds.

Caution

With frequent status test calls higher costs may be caused, because of higher data volume.

Settings



Figure 7-5

Language selection

Here the language used for the user interface can be selected. If you select an other language it is active after a restart of the program.

Server Port

Here the TCP/IP port the GPRS modems use to connect to the server can be configured. Possible values are between 1025 and 32767, the default is 26862.

Notice:

The port as configured here must match the setting in all PLC programs. Otherwise there won't be any connection between the station and the server!

After setting another server port you must restart the OPC server. Only then the new setting becomes effective.

For wireless GPRS communication a GSM/GPRS-Modem SINAUT MD720-3 is connected to the PLC S7-200. The GSM/GPRS modem is configured and controlled by program modules of the S7-200.

The PLC library SINAUT MICRO SC offers the possibility to communicate with the OPC routing software SINAUT MICRO SC“ as well as with other control systems via GPRS.

The PLC program modules are executable on the S7-200 CPUs 224, 224XP and 226.

8.1 PLC Program modules

The PLC library provides the following modules for developing a GPRS communication.

- WDC_INIT
Parameter setting of modem
- WDC_SEND
Execution of transmission tasks
- WDC_RECEIVE
Processing of received data
- WDC_CONTROL
Controlling of communication mode (PPI resp. Freeport)

The library always uses port 0 of the PLC.

8.2 Program module WDC_INIT

The module initialises the GRPS library, the PLC serial interface as well as the GPRS modem.

Remark:

This module is to be called from the user program once per cycle.

WDC_INIT	
STATION_NUMBER	BUSY
IP_ADDRESS_CS	DONE
DESTPORT_CS	ABORTED
MODEM_NAME	ERROR
MODEM_PASSWORD	
PIN	
APN	
AP_USER	
AP_PASSWORD	
DNS	
CLIP	

Entering configuration parameters as string

A lot of the configuration parameters need to be entered as strings. These strings need to be defined in the „data module“ of MicroWIN. The first Byte of the strings contains the number of characters, the following Bytes contains the several characters. The disposal of the parameter to the *WDC_INIT* module is made by giving the reference to the corresponding string (&-operator) („Memory address of the strings“).

Example:

Name of the modem at address VB1830.

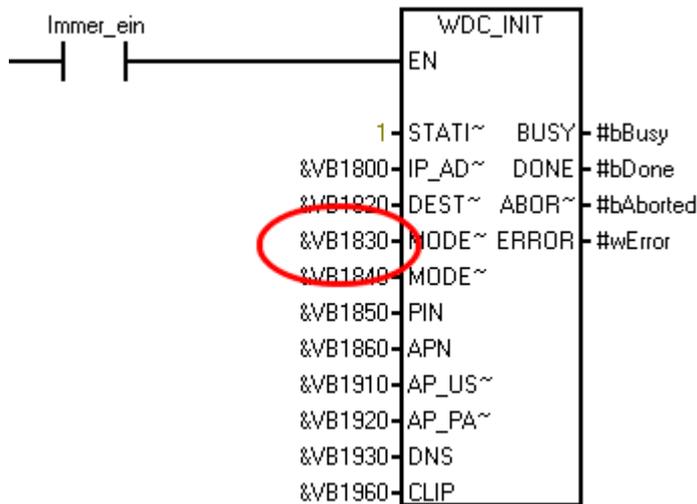
Data module:

```

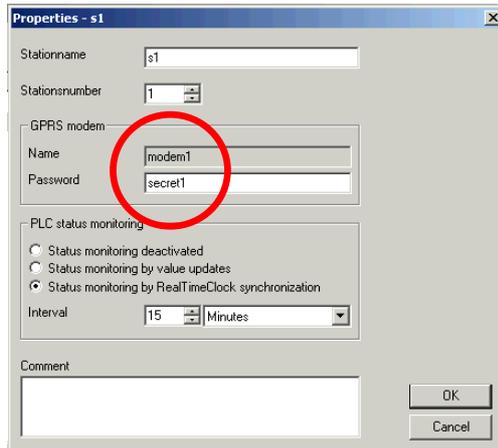
VB1830      6
VB1831      'modem1'

```

Call of WDC_INIT:



Corresponding entries MICRO SC ⇔ SPS program modules



```
//
//Data module comments
//
//Press F1 to start Help and a
program example.
//

VB1800 11
VB1801 '68.225.63.9'
VB1820 5
VB1821 '26862'
VB1830 6
VB1831 'modem1'
VB1840 7
VB1841 'secret1'
VB1850 4
VB1851 '0000'
VB1860 16
VB1861 'internet.t-d1.de'
VB1910 5
VB1911 'guest'
VB1920 5
VB1921 'guest'
VB1930 26
VB1931 '194.25.2.131;193.254.160.1'
VB1960 6
VB1961 '*:*****'
```

STATION_NUMBER

(WORD)

Logical address of local station.

IP_ADDRESS_CS

(DWORD (Saving address of string))

IP-address or DNS of server (Central Station).

DESTPORT_CS

(DWORD (Speicheradresse des Strings))

TCP/IP Port des Servers.

MODEM_NAME

(DWORD (Saving address of string))

Name for GPRS modem registration to the server.

MODEM_PASSWORD

(DWORD (Saving address of string))

Password for GPRS modem registration to the server.

PIN

(DWORD (Saving address of string))

PIN for activation of SIM card.

APN

(DWORD (Saving address of string))

GPRS access point at provider (Access Point Name).

AP_USER

(DWORD (Saving address of string))

Name for registration to GPRS access point.

AP_PASSWORD

(DWORD (Saving address of string))

Password for registration at GPRS access point.

DNS

(DWORD (Saving address of string))

IP addresses of DomainNameServer of GSM provider.

If two DNS servers are to be specified, these can be divided by semicolon (;)
(DNS1;DNS2), e.g. „194.25.2.131;193.254.160.1“.

CLIP

(DWORD (Saving address of string))

List of all valid dial-in numbers at the station. Several listing entries are divided by semicolon (;). The sequence is specified, in each case three numbers for the dial-in to the application (COM) and for the dial-in to the modem service-operation (SERVICE).

<COM_CLIP_0>;<COM_CLIP_1>;<COM_CLIP_2>;<SERVICE_CLIP_0>;<SERVICE_CLIP_1>;<SERVICE_CLIP_2>

Only calls are accepted of valid phone numbers.

The entered numbers for SERVICE_CLIP and COM_CLIP must be different. If same numbers has been entered the SERVICE_CLIP priority.

Wildcard characters (*) can be used for the definition of phone number groups.

Example:

+49123123* all numbers are accepted starting with +49123123.

Caution

Enter as CLIP a phone number, which you can use to call the PLC or the SINAUT MD720-3, to download a new software.

If you do not enter a CLIP, you cannot use this teleservice function.

BUSY

(BOOL)

0 Inactive

1 The initialization sequence is in process at the moment.

DONE

(BOOL)

1 The initialization has been successfully accomplished.

ABORTED

(BOOL)

1 The initialization has been aborted due to an error.

ERROR

(WORD)

Error number, describing the result of the processing.

A list of all error numbers and their meaning is to be found in chapter 0

8.3 Program module WDC_SEND

This module processes all transmission tasks, initiated by the user program (transmission impulse via START). Thereby a new transmission task is accepted only then when no other task is active (BUSY must be 0). In the context of a transmission task, it is possible to send a user data block with specification of starting index and the length to the remote station.

While BUSY is set parameters of the module must not be edited.

Remark:

This module is to be called from the user program once per cycle.

WDC_SEND	
START	BUSY
REMOTESTATIONADDRESS	DONE
DATA_START	ABORTED
DATA_LENGTH	ERROR
COMMAND	
CURRENTTIME	

START

(BOOL)

A positive edge starts a new transmission task.

REMOTESTATIONADDRESS

(WORD)

Logical address of remote station, to which data should be sent and/or of which data should be read.

DATA_START

(WORD)

Index of first data byte, to be sent and/or read.

E.g.: „1500“ for VB1500

DATA_LENGTH

(BYTE)

Amount of bytes, to be sent and/or read.

COMMAND

(WORD)

- 1 Send data to another station
- 2 Request data from another station

CURRENTTIME

(DWORD)

Starting address of 8-Byte buffer with the current time in Siemens S7-200 BCD format (see *READ_RTC* standard module).

If no real-time clock is available, 0 can be specified here.

BUSY

(BOOL)

- 0 No transmission task is running
- 1 Transmission task is not terminated yet

DONE

(BOOL)

- 1 Transmission task has been successfully completed.

ABORTED

(BOOL)

- 1 Transmission task has been aborted due to an error.

ERROR

(WORD)

Error number, describing the result of the processing.

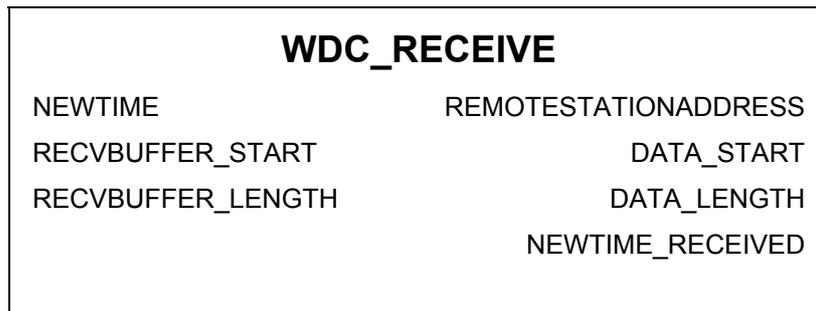
A list of all error numbers and their meaning is to be found in chapter 8.6 *Error numbers*.

8.4 Program module WDC_RECEIVE

This module monitors the receipt buffer. When a new telegram has arrived it will be evaluated. Received data will directly be copied to the mentioned address. To the application the receipt of data will be signalled via the outputs *DATA_START* and *DATA_LENGTH*.

Remark:

This module is to be called from the user program once per cycle.



NEWTIME

(DWORD)

Starting address of 8-Bytes buffer, to which the received system time should be copied (Siemens S7-200 BCD format (see *READ_RTC* standard module)).

If 0 is specified, received time stamps will be rejected.

RECVBUFFER_START

(WORD)

Start index of the part of memory that is released.

RECVBUFFER_LENGTH

(WORD)

Length of the space for data that is released to store the received data in it (in Bytes).

REMOTESTATIONADDRESS

(WORD)

Logical address of remote station (PLC or OPC server), that has transmitted the message.

DATA_START

(WORD)

Starting index of received data.

DATA_LENGTH

(BYTE)

If data has been received, amount of received bytes.

If no data has been received, 0.

NEWTIME_RECEIVED

(BOOL)

Flag, which signals the receipt of a new system time. This bit and the value of NEWTIME should be used as parameter of SET_RTC in the user program, to synchronise the real-time clock.

This bit can be ignored if no real-time clock is available.

8.5 Program module WDC_CONTROL

The WDC-This module indicates the current operation mode of the GPRS modem and the library.

This module enables the modem switching in the AT command mode, to become access directly to the modem via AT commands from the user program (call via positive flank ACT_AT_MODE).

This module enables the change to the „normal operation“ after a remote programming session via CSD call to the GPRS modem (call via rising edge at ACT_GPRS_SERVICE).

With separation of the CSD connection, the GPRS modem changes automatically back into the GPRS mode. The controller is not able to recognise the end of the phone connection. To return in any way to the GPRS communication, a time delayed switch has to be activated in the freeport mode before connection end via module WDC_CONTROL from the variable table of MicroWin. Therefore in DELAY_TIME_GRPS the delay time must be specified and the switch to ACT_GPRS_SERVICE must be activated.

For security a maximum time interval for the „not GPRS operation“ (this means INT_MODE <> 1) can be specified (MAX_TIME_AT). After this time the modem is switched back in any case to the GPRS operation mode, if the PLC is set to RUN.

Remark

This module is to be called from the user program once per cycle.

WDC_CONTROL

ACT_GPRS_SERVICE	INT_MODE
ACT_AT_MODE	BUSY
DELAY_TIME_GPRS	DONE
MAX_TIME_AT	ABORTED
	ERROR

ACT_GPRS_SERVICE

(BOOL)

With consideration of the delay time *DELAY_TIME_GPRS* a rising edge activates the freeport mode of the interface 0 and puts the modem into the GPRS mode.

ACT_AT_MODE

(BOOL)

A rising edge activates the AT command mode to the modem.

DELAY_TIME_GPRS

(WORD)

Delay time in seconds between rising edge of *ACT_GPRS_SERVICE* and the switching in the freeport mode.

MAX_TIME_AT

(WORD)

Standard time in seconds, after which the modem should be switched back in any case to GPRS mode (e.g. 1800 seconds, i.e. 30 minutes).

INT_MODE

(WORD)

0 Operation mode changing:

Interface is being switched / not yet initialised (Start status after activation)

1 Normal operation:

Interface is in freeport mode, modem is in GPRS mode.

2 Initialisation:

Interface is in freeport mode, modem is in configuration mode (see *WDC_INIT*, chapter 1.2.1)

3 AT-Mode:

Interface is in freeport mode, modem is in AT command mode.

With the aid of appropriate AT commands, it is possible f.i. to call up transaction services from SMS messages.

4 Remote programming:

Interface is in PPI mode, modem is in CSD operation mode BUSY

BUSY

(BOOL)

DONE

(BOOL)

- 1 A mode change is carried out

ABORTED

(BOOL)

- 1 Mode change has been successfully completed.

ERROR

(WORD)

Error list with cause of missed mode change.

A list of all error numbers and their meaning is to be found in chapter 8.6 *Error numbers*.

8.6 Error numbers

The WDC program modules return error numbers if errors have occurred, in order to describe the error situation in detail.

The following table contains all supported error numbers and their meaning.

Error number		Meaning
dec	hex	
0	0000	No error
1	0001	General error Error, not specified
2	0002	Timeout During function process a timeout occurred
10	000A	Unknown Communication Participator The specified station in „DestinationAddress“ is not known to the system
11	000B	Invalid Starting Address The specified starting address of the user data is not valid
12	000C	Invalid Length Specification The specified number of user data is not acceptable (this means too long)
13	000D	Function not supported The requested task is not supported („FunctionCode“)
257	0101	Invalid parameter „IP_ADDRESS_CS“ in „WDC_INIT“
258	0102	Invalid parameter „DESTPORT_CS“ in „WDC_INIT“
259	0103	Invalid parameter „MODEM_USER“ in „WDC_INIT“
260	0104	Invalid parameter „MODEM_PASSWORD“ in „WDC_INIT“
261	0105	Invalid parameter „PIN“ in „WDC_INIT“
262	0106	Invalid parameter „APN“ in „WDC_INIT“
263	0107	Invalid parameter „AP_USER“ in „WDC_INIT“
264	0108	Invalid parameter „AP_PASSWORD“ in „WDC_INIT“
265	0109	Invalid parameter „DNS“ in „WDC_INIT“
266	010A	Invalid parameter „CLIP“ in „WDC_INIT“

MD720-3 in OPC Mode

9

9.1 Connect / Setup the PPI adapter

The S7-200 PLC and the GSM/GPRS modem MD720-3 are connected by the Siemens PPI adapter order number 6ES7 901-3CB30-0XA0.

Connection

Connect the port PPI-RS485 with the PLC and the port PC-RS232 with the SINAUT MD720-3. Use a gender changer to adapt the PPI cable and the modem.

Setup PPI-Adapter

Character format: 8 N 1

Bit count : 10 bit

Bit rate: 57600 bps

DIP switch:

DIP switch no.:	1	2	3	4	5	6	7	8
Position:	1	1	1	0	0	1	1	0

Caution

Only a half duplex connection is established by the PPI-cable. If (<5-10 Sec.)-data packages are transmitted too often, data loss may happen.

9.2 Prepare the SINAUT MD720-3 for the OPC mode

The GSM/GPRS-Modem SINAUT MD720-3 will be configured by the PLC S7-200 and the program modules. An additional configuration is not necessary.

9.3 SMS transmission in OPC mode

Information about the SMS transmission in OPC mode you can find in the Internet in the SET21 examples, Beitrags-ID 22537809

9.4 Service calls in OPC mode

To download a new firmware setup a service connection to the GSM/GPRS modem MD720-3.

You need a computer with a modem (Analogue, ISDN or GSM) and a corresponding network access. You have installed a modem driver for the used modem on your PC.

As `SERVICE_CLIP` (see chapter 8.2 *Program module WDC_INIT*) need to be entered the telephone number, which you use to call the SINAUT MD720-3.

To set up a network connection

A network connection is used to communicate with the SINAUT MD720-3 in Service mode.

1. Click *Start, Control Panel*.
2. In the *Category View* select *Network and Internet Connections*.
3. Select *Set up a connection with the network at the office* and follow the wizard for new connections that will start.
4. Select *Remote Data Transmission* and click *Next*.
5. Select the *Modem* you have installed before and click *Next*.
6. Give a name to the new connection, e.g. *Service-MD720*. Then click *Next*.
7. Enter the telephone number the SINAUT MD720-3 uses for data calls and then click *Next*.
8. Click *Finish* to terminate the wizard.

9. In the *Start*-menu select *Connect to* and choose the connection you just have set up, e.g. *Service-MD720*.
10. Click two times *OK* to finish the *Modem Configuration* and the *Properties* windows

To establish a service connection

As soon as the network connection is set up you can establish the service connection.

1. Click *Start*.
2. In the *Start*-menu select *Connect to* and choose the connection to the SINAUT MD720-3.
3. Type in the user name (Default: *service*) and the password (Default: *service*) and the click *Dial*.
4. When the connection is established in the Windows task bar a connection icon is displayed.
5. Click *Start, All Programs, Accessories, Command Prompt*.
6. Enter: `C:\WINDOWS>ftp 192.168.0.8`
Then press *Enter*.
7. You are asked for the user name (Default: *service*) and for the password (Default: *service*). Enter both in the right case sensitive spelling.
8. As soon as the connection is established successfully you get the message „230 User logged in“. The prompt changes to „Ftp>“.

To update the firmware of the SINAUT MD720-3

As soon as the service connection is established you can start to upload the firmware.

1. With Notepad (belongs to Windows) create a file with the name **!cmdfile**. The file name must not have any extension (e.g.: *.txt*). The first line in this file is: `STORE FirmwareName.BIN`
Instead of „FirmwareName.BIN“ write the name of the new firmware file.
2. At the `Ftp>`-prompt enter: **put** `FirmwareName.BIN`
Press *Enter*. Instead of „FirmwareName.BIN“ write the name of the new firmware file.

3. Then at the Ftp>-prompt enter: **put !cmdfile**
Press Enter.
After the firmware file and the !cmdfile file are successfully uploaded the SINAUT MD720-3 will start to install the new firmware. This process can last up to 10 minutes. After this the SINAUT MD720-3 restarts. Then the SINAUT MD720-3 is ready again.

To tear-down the service connection

Tear-down the local service connection when you do not use it any more.

1. At the Ftp>-prompt enter: **quit**
Then press Enter.
2. Then also tear-down the network connection to the device. To do so right-click the icon in the Windows task bar.

SINAUT MD720-3 and SINAUT MICRO SC do not connect

The status indication  of the SINAUT MICRO SC shows that the connection to the SINAUT MD720-3 is not established and the LED "C" (Connect) of the SINAUT MD720-3 is off or blinks slowly.

The SINAUT MD720-3 is not ready for Operation

Please check the LED indication of the SINAUT MD720 (refer to System manual SINAUT MD720-3, chapter *Functions of LEDs in OPC-Mode*), if the SIM card is inserted correctly and the if the PIN is accepted. If a problem is indicated, please follow the related instructions about the PIN of the SINAUT MD720-3 System manual.

The Signal quality at the SINAUT MD720-3 is not sufficient

Please check with the LEDs of the SINAUT MD720-3 (refer to System manual SINAUT MD720-3, chapter *Functions of LEDs in OPC-Mode*), if the signal quality is sufficient or better. Change the antennas position, until you have a sufficient or good signal quality.

The SINAUT MD720-3 does not attach the GPRS

Please check with the LEDs of the SINAUT MD720-3 (refer to System manual SINAUT MD720-3, chapter *Functions of LEDs in OPC-Mode*), if the device is attached to the GPRS. If not, please double-check the entries for APN, AP_USER and AP_PASSWORD in your PLC program module WDC_INIT. Pushing the SET button of the SINAUT MD720-3, the device will send a list of the current configuration to a connected PC running a terminal software (refer to System manual SINAUT MD720-3, chapter *Getting the current values and settings*). If the displayed APN value does not correspond to the value of your PLC program, please double-check the connection between PLC and SINAUT MD720-3.

Please check also, if your PLC is in RUN mode.

Using a common mobile phone with GPRS function, please check if a GPRS Service is available in the location of your SINAUT MD720-3.

The SINAUT MD720-3 does not reach the SINAUT MICRO SC

The SINAUT MD720-3 is attached to the GPRS, but the LED “C” is off or blinks slowly.

If the SINAUT MD720-3 is ready for operation and the signal quality is sufficient and the device is attached to the GPRS, please check the values for IP_ADDRESSCS, DESTPORT_CS, DNS, MODEM_NAME und MODEM_PASSWORD which are referred to in the PLC program module WDC_INIT. The following values are displayed at a connected PC, when you push the SET button (refer to System manual SINAUT MD720-3, chapter *Getting the current values and settings*):

Remote-Host	corresponds to	IPADDRESS_CS
Destination-Port	corresponds to	DESTPORT_CS
Server-Username	corresponds to	MODEM_NAME

If the displayed values correspond to the entries of the PLC, the PLC transmits its values to the SINAUT MD720-3 correctly. Otherwise please check the connection between the PLC and the SINAUT MD720-3. Please compare also all values with the corresponding parameters of the SINAUT MICRO SC.

Please check, if the SINAUT MICRO SC is reachable.

SINAUT MICRO SC is not reachable

When you have double-checked and eventually corrected all connection Parameters of the PLC and the SINAUT MD720-3 and the connection is still not established, eventually the SINAUT MICRO SC is not reachable.

If the SINAUT MICRO SC has already established connections to other SINAUT MD720-3, the SINAUT MICRO SC is reachable.

If the SINAUT MICRO SC has no connection to any SINAUT MD720-3, please check:

- that the Computer running the SINAUT MICRO SC is connected to the Internet,
- that the server port being entered into the SINAUT MICRO SC is the same like the value for DESTPORT_CS in the PLC program module,
- that this server port is not blocked in any hardware or software firewall,

- that the internet address of your server (IP address or hostname) is correctly entered in your PLC program module (IP_ADDRESS_CS Parameter),
- that the DynDNS server is frequently updated, if you are using a DynDNS Service to get a fixed address for your SINAUT MICRO SC.

SINAUT MICRO SC and SPS do not connect

The Status indication  of the SINAUT MICRO SC shows, that the connection between SINAUT MICRO SC and SINAUT MD720-3 is established, but that the PLC is not reachable.

Please check, if the value for Station number corresponds to the values being entered into the PLC program module.

Please check, if the PPI cable is configured as shown in the System manual.

Data loss between SINAUT MICRO SC and PLC

A loss of data between SINAUT MICRO SC and PLC may occur, because the used PPI cable is only capable of half-duplex connections.

Please make sure that you wait at least 5 to 10 seconds between two requests from SINAUT MICRO SC to the PLC.

The LED “S” blinks fast (4 times per second)

If the SIM card is inserted correctly and the SIM card is not PUK-blocked, the LED “S” blinks fast and indicates a SIM Problem. Please check and eventually reset the SIMSTATE, refer to System manual SINAUT MD720-3, chapter *PIN in OPC-Mode*.

Glossary

DynamicDNS providers

offer the capability of being accessible via a fixed Internet address

Each computer which is connected to the Internet has an IP address (IP = Internet Protocol). An IP address consists of 4 numbers, separated by full stops, which each have up to three digits. If the computer is online via the telephone line per modem, per ISDN or per ADSL it is assigned a dynamic IP address by the Internet service provider, i.e. the address changes from session to session. Even if the computer is online for 24 hours without interruptions (e.g. with a flat rate) the IP address is changed from time to time.

If a local computer is to be accessible via the Internet it must have an address which is known to the remote communication partner. Only in this way can the communication partner establish a connection to the local computer. However, if the address of the local computer continually changes this is not possible, except where the operator of the local computer has an account with a DynamicDNS provider (DNS = Domain Name Server).

He can then define a name in URL format (URL = Uniform Resource Locator) with this provider under which the computer shall be accessible in the future, e.g. `www.xyz.abc.de`. In addition the DynamicDNS provider provides a small program which has to be installed and executed in the computer in question. In each Internet session of the local computer this tool informs the DynamicDNS provider of the computer's current IP address. Its domain name server registers the current assignment of URL □ IP address and advises this to other domain name servers in the Internet.

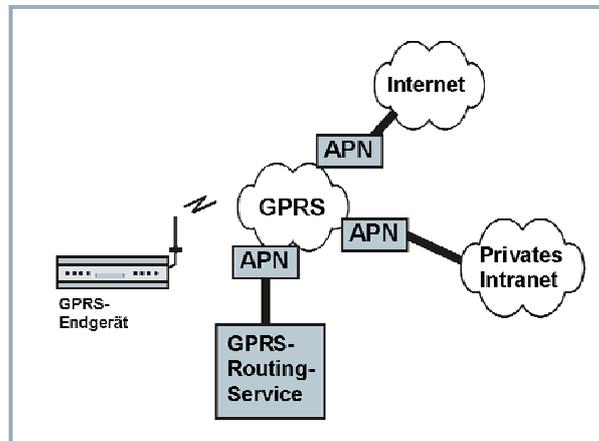
If a remote computer now wishes to establish a connection to the local computer which is registered with the DynamicDNS provider the following takes place: The remote computer uses the URL (= host name) of the local computer as the address. This results in a connection being established to the responsible DNS (Domain Name Server) to determine the IP address currently assigned to this URL. The IP address is transferred back to the remote computer which now uses it as the destination address. This now leads to exactly the desired local computer.

This procedure is the basis for all Internet addresses in URL format: First a connection is established to the DNS to determine the IP address assigned to this URL. Once that has happened this "looked-up" IP address is used to establish the connection to the desired communication partner, i.e. to any Internet site.

You can find DynamicDNS providers on the Internet under the following address: <http://netzadmin.org/ddns-provider.php>

APN (Access Point Name)

(Access Point Name). Cross-network connections, e.g. from the GPRS network into the Internet are established in the GPRS network via so-called APNs



During the dialling into the GPRS network the calling terminal specifies via the APN with which network it wishes to be connected:

- the Internet,
- a private company network connected via a dedicated line.

RAS (Remote Access Services)

The designation for the Windows programming interface and its functions which the dial-up networking makes available to the application programs. RAS enables application programs which expect a network, e.g. a TCP/IP network, to establish a connection via the TAPI and a modem. The application does not notice at all that the data are not forwarded via a network board but via the telephone network using a modem or another transmission device. In the Windows dial-up networking so-called connections are created. The connection data for each of these connections is stored, for example a definition is made as to which modem is used to establish the connection and which network protocol is available to the application following establishment of the connection.

TCP/IP

Two network protocols which are used for the connection of two computers in the Internet.

IP provides the basic mechanisms for the transmission of data packets.

UDP is based upon IP and transmits individual data packets. They can reach the receiver in another sequence as the sequence they have been sent. They also can get lost.

TCP serves to protect the connection and, for example, ensures that the data packets are forwarded in the correct order to the application.

UDP and TCP also bring port numbers between 1 and 65535, in addition to the IP addresses. These port numbers distinguish the different services.

There are some more protocols that are based upon UDP and TCP, e.g.: HTTP (Hyper Text Transfer Protokoll), HTTPS (Secure Hyper Text Transfer Protokoll), SMTP (Simple Mail Transfer Protokoll), POP3 (Post Office Protokoll, Version 3), DNS (Domain Name System).

	<p>ICMP is based upon IP and transmits control messages.</p> <p>SMTP is based upon IP and is an E-mail protocol.</p> <p>IKE is based upon UDP and is an IPsec protocol.</p> <p>ESP is based upon IP and is an IPsec protocol.</p> <p>On a Windows PC the WINSOCK.DLL (or WSOCK32.DLL) takes over the handling of both these protocols.</p>
PPP (Point to Point Protocol)	<p>Designates a transmission procedure via serial point-to-point connections for data packets, specially for Internet access via a modem.</p> <p>As an Internet standard for serial data communication PPP defines the way data packets are exchanged with other Internet based systems via modem connections.</p> <p>In Windows PPP connections are defined in the Dial-up Network.</p>
Service Provider	<p>A company or institution which provides users with access to the Internet or an online service.</p>
Protokoll, Übertragungsprotokoll	<p>Devices which communicate with one another must use the same rules for this communication. They must "speak the same language". Such rules and standards are collectively referred to as a protocol or transmission protocol. Often used protocols are, for example, IP, TCP, PPP, HTTP and SMTP. TCP/IP is the major term for all protocols based upon IP.</p>
COM-Port, virtual COM-Port	<p>The term "COM port" (communications port) is used to describe a serial interface (RS232) on a Windows PC. Application programs use COM ports for data transmission to various devices such as modems, PCs, terminals etc. A COM port can have a connector (a physical COM port) or be a software interface in the PC (a virtual COM port). Virtual COM ports behave in the same way for application programs as physical COM ports but the data can be rerouted onto other interfaces.</p>
Client / Server	<p>In a client/server environment a server is a program or computer which receives and answers queries from the client program or client computer.</p> <p>In the case of data communication one also uses the term client for the computer which establishes a connection to a server (or host), i.e. the client is the calling computer and the server (or host) is the called computer.</p>
OPC	<p>OPC means Openess, Productivity, Collaboration and contains specifications for the exchange of data between controls, signal generators and control systems of the automation technology.</p>

