SIEMENS

SIMATIC NET

GPRS/GSM-Modem SINAUT MD720-3

System manual

C79000-G8976-C211

Release 06/2006

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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Disclaimer of Liability

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

General

The product SINAUT MD720-3 complies with European standard EN60950, 05.2003, Safety of Information Technology Equipment.
Read the installation instructions carefully before using the device.
Keep the device away from children, especially small children.
The device must not be installed or operated outdoors or at damp locations.
Do not operate the device if the connecting leads or the device itself are damaged.

External power supply

Use only an external power supply which also complies with EN60950. The output voltage of the external power supply must not exceed 30VDC. The output of the external power supply must be short-circuit proof.

⚠ **Warning**

The SINAUT MD720-3 may be powered only by power supply units according to IEC/EN60950 section 2.5 "Limited power sources".

The power supply unit to supply the SINAUT MD720-3 must comply with NEC Class 2 circuits as outlined in the National Electrical Code (ANSI/NFPA 70) only.

When connecting to a battery or accumulator, make sure that an all-pole circuit-breaker (main battery switch) with sufficient selectivity and a fuse with sufficient selectivity (e.g. Pudenz FKS Fuse 32V, 3A, Order-No. 162.6185.430) are provided between the device and the battery or accumulator.

Please pay regard to section *7 Technical Data* of the system manual, as well as the installation and utilization regulations of the respective manufacturers of the power supply, the battery or the accumulator.

SIM card

To install the SIM card the device must be opened. Before opening the device, disconnect it from the supply voltage. Static charges can damage the device when it is open. Discharge the electric static of your body before opening the device. To do so, touch an earthed surface, e.g. the metal casing of the switch cabinet. Please pay regard to section 2 *Inserting the SIM card* of this system manual.

Handling cables

Never pull a cable connector out of a socket by its cable, but pull on the connector itself. Cable connectors with screw fasteners (D-Sub) must always be screwed on tightly. Do not lay the cable over sharp corners and edges without edge protection. If necessary, provide sufficient strain relief for the cables.

For safety reasons, make sure that the bending radius of the cables is observed.

Failure to observe the bending radius of the antenna cable results in the deterioration of the system's transmission and reception properties. The minimum bending radius static must not fall below 5 times the cable diameter and dynamic below 15 times the cable diameter.

Radio device

Warning

Never use the device in places where the operation of radio devices is prohibited. The device contains a radio transmitter which could in certain circumstances impair the functionality of electronic medical devices such as hearing aids or pacemakers. You can obtain advice from your physician or the manufacturer of such devices. To prevent data carriers from being demagnetized, do not keep disks, credit cards or other magnetic data carriers near the device.

Installing antennas

Warning

The emission limits as recommended by the Commission on Radiological Protection (13/14 September 2001) must be observed.

Installing an external antenna

Caution

When installing an antenna outdoors it is essential that the antenna is fitted correctly by a qualified person. Lightning Protection Standard VDE V 0185 Sections 1 to 4, in its current version, and further standards must be observed.

Lightning protection category for buildings

Caution

For outdoor installation, the antenna may be fitted only within the lightning protection zones O/E or 1. These lightning protection zones are prescribed by the lightning protection spherical radius.

The EMV lightning protection zone concept

Caution

The EMV lightning protection zone concept is to be observed. To avoid large induction loops a lightning protection equipotential bonding is to be used. If the antenna or antenna cable is installed near to the lightning protection system, the minimum distances to the lightning protection system must be observed. If this is not possible, insulated installation as described in VDE V 0185 Sections 1 to 4, in its current version, is essential.

FCC Part 15

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer / installer or an experienced radio/TV technician for help.

FCC Part 15.19

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. this device may not cause harmful interference, and

2. this device must accept any interference received, including interference that may cause undesired operation.

FCC Part 15.21

Modifications not expressly approved by this company could void the user's authority to operate the equipment.

Installation by qualified personnel only

You may only use the SINAUT MD720-3 with an antenna of the SINAUT MD720-3 accessory program.

The installation of the SINAUT MD720-3 and the antenna as well as servicing is to be performed by qualified technical personnel only. When servicing the antenna, or working at distances closer than those listed below, ensure the transmitter has been disabled.

RF Exposure mobile

Caution

Typically, the antenna connected to the transmitter is an omni-directional antenna with 0dB gain. Using this antenna the total composite power in PCS mode is smaller than 1 watt ERP.
The internal / external antennas used for this mobile transmitter must provide a separation **distance of at least 20 cm from all persons** and must not be co-located or operating in conjunction with any other antenna or transmitter."

Caution

This is a class A equipment. This equipment can disturb other electric equipment in living areas; in this case the operator can be demanded to carry out appropriate measures.

Caution

Please note that data packets exchanged for setting up connections, reconnecting, connect attempts (e.g. Server switched off, wrong destination address, etc.) as well as keeping the connection alive are also subject to charge.

Preface

Purpose of this documentation

This documentation will support you on your way to successful application of SINAUT MD720-3. It will introduce you to the topic in clear and straightforward steps and provide you with an overview of the hardware of the SINAUT MD720-3 GSM/GPRS modem. This documentation will help you during installation and commissioning of SINAUT GSM/GPRS modem and explains the diagnostics and service options available.

Validity of the documentation

This manual relates to the following product versions

- GPRS/GSM modem MD720-3 hardware release 3.x

SIMATIC Technical Support

You can contact Technical Support for all A&D products

- Phone: +49 (0) 180 5050 222
- Fax: +49 (0) 180 5050 223

You will find further information on our Technical Support on the Web at

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Here, you will find:

- Up-to-date product information (Updates), FAQs (Frequently Asked Questions), Downloads, Tips and Tricks.
- 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.
- You can find your local contact for Automation & Drives in our contacts database.
- You will find information on local service, repairs, spares and much more under the rubric "Service".

You will find the latest version of this documentation under the entry ID 22549543.

Do you still have questions relating to the use of the products described in the manual? If so, then please talk to your local Siemens contact.

You will find the addresses in the following sources:

- On the Internet at: http://www.siemens.com/automation/partner

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

- In the catalog CA 01

- In the catalog IK PI specifically for SIMATIC NET products

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Introduction

<div style="text-align: right; font-size: xx-large; font-weight: bold;">1</div>

The SINAUT MD720-3 has two different operation modes:

- Terminal Mode

- OPC Mode

The functional range and the functionality of the device are different in both modes. The change between OPC Mode and Terminal Mode (refer to page 23 or page 58) forces a restart of the device.

Terminal mode

The SINAUT MD720-3 establishes radio data connections via a GSM network (Global System for Mobile Communication).

- using modem connections via CSD (**C**ircuit **S**witched **D**ata),

- by sending SMS (**S**hort **M**essage **S**ervice).

Notice

You will find further information about the Terminal Mode and its use in combination with TIM devices of the SINAUT ST7 system in the system manual of the SINAUT ST7.

OPC-Modus

The SINAUT MD720-3 transmits data over via a GSM radio network (Global System for Mobile Communication).

- using GPRS (**G**eneral **P**acket **R**adio **S**ervice) between S7-200 devices and an OPC server SINAUT MICRO SC,

- using SMS from a S7-200-device to any remote station, which can receive SMS.

Therefore the SINAUT MD720-3 will be configured by program building blocks of the connected PLC. The SINAUT MD720-3 establishes autonomous the radio data connection via GPRS between a S7-200 device and the OPC server SINAUT MICRO SC.

Notice

You will find information about the OPC Mode in the system manual of the SINAUT MICRO SC.

Inserting the SIM card

2

Notice

- The device must be switched off when you insert or change the SIM card.
- A plug-in SIM card (3 V) is used.

Changing the SIM card

If you change the SIM card, please do not forget to update also the PIN number in your application.

If you use a lot of SIM cards it can be helpful to set all PINs to the same PIN number. You can do this i.e. by using a mobile phone. Please observe the security requirements of your organization.

To insert the SIM card proceed as follows:

1. Make sure that the device is disconnected from the supply voltage.

2. The SINAUT MD720-3 must be opened to insert the SIM card.

The housing is fastened by two clamps, one on top of the housing and one on the bottom side (see figure 2-1).

1 - Clamp
2 - Clamp

figure 2-1

3. With a suitable object press one of the clamps cautiously (see figure 2-2) so that the catch opens.
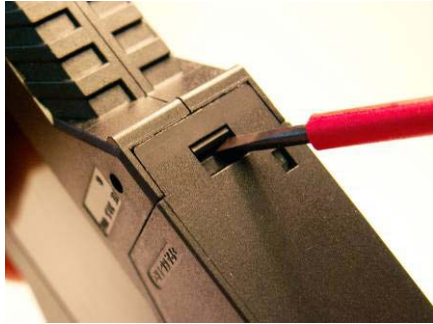
figure 2-2

4. Remove the rear section of the housing (see figure 2-3).

figure 2-3

5. The SIM card holder is visible on the motherboard. (see figure 2-4).
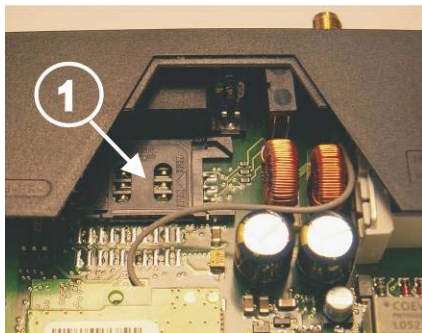
1 - SIM card holder

figure 2-4

6. With a suitable object open the flap of the SIM card holder by moving it cautiously about 2 mm to the left - in the direction of the arrow (see red arrow in figure 2-5) so that it can be raised.
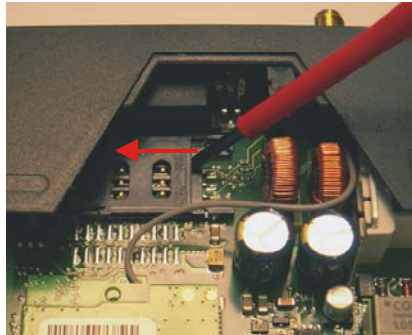
figure 2-5

7. Raise the flap of the SIM card holder so that you can insert the SIM card. (see figure 2-6).
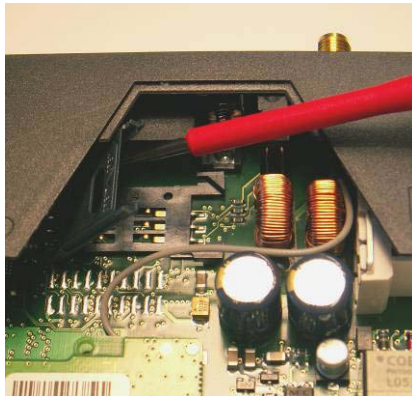
figure 2-6

8. In figure 2-7, the compartment into which you can insert the SIM card is emphasized in white.
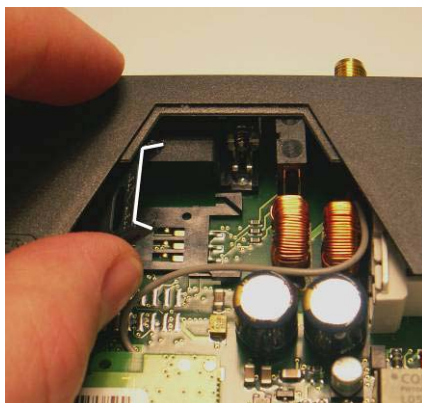
figure 2-7

9. Slide the SIM card into the flap of the SIM card holder, with the gold-coloured microchip pointing down. The flap has a groove for this purpose. The notched corner of the SIM card has to point towards the front of the device (see figure 2-8).

figure 2-8

10. Slide the SIM card down into the flap as far as possible (see figure 2-9).

figure 2-9

11. Lower the flap paying attention to the notched corner of the SIM card (see figure 2-10).
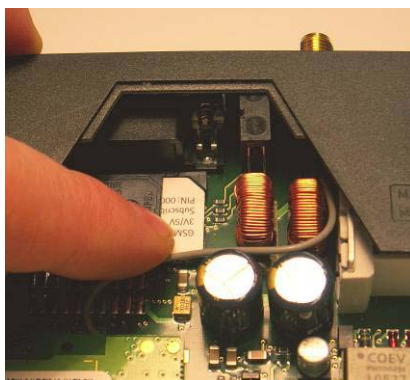
figure 2-10

12. With your fingernail or a suitable object move the flap about 2 mm to the right (in the direction of the arrow, see figure 2-11) until you can feel it click into place.
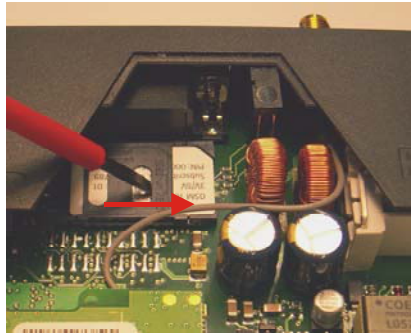
figure 2-11

13. Now the SIM card holder is locked into position (see figure 2-12).

figure 2-12

14. Finally re-attach both housing parts:
    Slide the motherboard into the rails on top and bottom inside the rear section of the housing. Close the housing by slightly pressing both housing parts together so that the clamps on the upper and lower part of the housing engage (see figure 2-13).
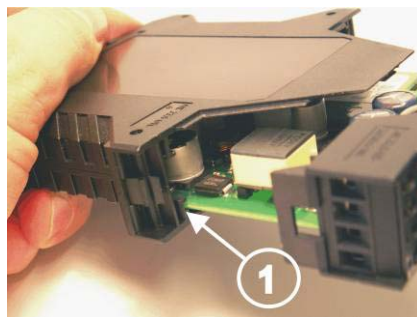
figure 2-13

1 - SIM card holder

15. The housing is locked when both clamps have clicked shut (see figure 2-14).
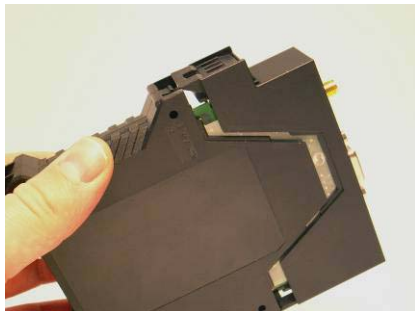
figure 2-14

Connecting the device and switching on the device

3

Connectors and LEDs
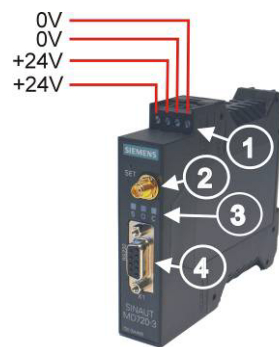
1	-	Connectors for supply voltage 24 V DC voltage (nominal)
2	-	Antenna
3	-	LEDs: S (Status) Q (Quality) C (Connect)
4	-	X1 (RS232) For connection of the application OR or the service PC

figure 3-1

Antenna

The antenna connector – SMA socket - is situated on the upper part of the front.

Impedance: approx. 50 Ohm

Caution

Please use only antennas of the SINAUT MD720-3 accessory program. Other antennas may disturb the product characteristics and may even cause defects.

Connectors for current supply

The screw terminals on the top of the device are for connecting the current supply: 24 V DC voltage (nominal), $I_{typ.}$ 165mA at 24V. (Please also refer to chapter 7 *Technical Data*.)

Both screw terminals on the left (24V) are internally connected, see figure 3-1. Both screw terminals on the right (0V) are internally connected.

Switching on

The devices switch on as soon as the operating voltage is supplied.

Functions of the LEDs

The SINAUT MD720-3 has three LEDs, which are used to indicate the device status. The function of the LEDs is different in terminal and OPC Mode. You will find the explanation of the function

- in Terminal Mode in chapter 4.3 *Functions of the LEDs in Terminal Mode* and

- in OPC Mode in chapter 5.3 *Functions of the LEDs in OPC Mode*.

Serial interface X1

For data transmission:

Connect the application (e.g. machine, vending machine, sensor, computer) with the interface **X1** of the SINAUT MD720-3. To connect, use a RS-232 cable.

If the application has a different interface, e.g. CAN, PPI cable or a different industry bus, a commercially available interface converter can be connected between it and the SINAUT MD720-3.

OR

For configuration and service:

Connect the service PC via its serial interface (COM port). To connect, use a RS-232 cable.

The SET button

By pushing the SET button for a certain period of time, you can configure the device or activate different service modes.

Pushing the SET button		LED Status	Function
while connecting the supply voltage	→	The LEDs start to light up in sequence signalling the boot sequence	Switch between the operating modes Terminal Mode ⇔ OPC Mode
during operation for less than 2 seconds	→	The LED „S" (Status) begins to light	Dump of current settings and values issued via the RS232 interface
during operation for 2-4 seconds	→	The LED „Q" (Quality) begins to light	Service mode to download a new firmware
during operation for more than 4 seconds	→	Die LED „C" (Connect) begins to light	Load factory settings

Top-hat rail mounting

The SINAUT MD720-3 is suitable for top-hat rail mounting on DIN EN 50022 rails. A corresponding bracket can be found at the rear of the device.

SINAUT MD720-3 in Terminal Mode

4

In the Terminal Mode the SINAUT MD720-3 operates like a GSM modem, which is controlled by AT commands.

Supported are

- incoming and outgoing GSM data connections with 9600 bps with modems being connected to the GSM network, the ISDN or the analogue telephone network,

- sending of SMS (**S**hort **M**essage **S**ervice).

4.1   Terminal mode activation

Terminal mode is the factory default setting

The SINAUT MD720-3 supports two fundamental operation modes:

- Terminal Mode,

- OPC Mode.

The SINAUT MD720-3 is delivered by the factory with activated Terminal Mode.

Switching from OPC Mode into the Terminal Mode

If it is necessary to switch a manually the SINAUT MD720-3 from OPC Mode into the Terminal Mode, you will find the instructions for this in the chapter *Switching between Terminal mode and OPC Mode*.

4.2 Operating requirements in Terminal Mode: GPRS subscriber contract

To use the SINAUT MD720-3 in Terminal Mode it is required:

- SIM card of a GSM network operator including CSD data service 9600 Bit/s and an extra telephone number for data calls,

- Availability of a GSM network.

4.3 Functions of the LEDs in Terminal Mode

The device has 3 LEDs, which indicates the current operation status:

S (Status)   **Q** (Quality)   **C** (Connect)

LED	Status	Meaning
S, Q, C combined	Fast lighting in sequence	Boot procedure
	Synchronous slow blinking	Service mode
	Slow lighting in sequence	Update
	Synchronous fast blinking	Error
S (Status)	Blinks slowly	Device waiting for PIN input
	Blinks fast	PIN error / SIM error
Q (Quality)	Blinks slowly	Booking into GSM network
	1x intermittent blinking	Field strength not sufficient
	2x intermittent blinking	Field strength sufficient
	3x intermittent blinking	Field strength medium
	ON permanently	Field strength high
	OFF	Waiting for PIN input
C (Connect)	Blinks	Terminal mode active

Blinks slowly: 1 time each second

Blinks fast: 4 times each second

4.4 Terminal mode operation

To operate the device the PIN (PIN = **P**ersonnel **I**dentification **N**umber) of the inserted SIM card must be known. In the Terminal Mode the PIN is <u>not</u> stored in the SINAUT MD720-3. The PIN must be set again every time the device is turned-on.

● The PIN is set by AT commands.

If you use a PIN-less SIM card the PIN request is skipped.

Control by the application

Usually the application or the application software, which you execute on a connected computer, will control the SINAUT MD720-3. So wits, the commands to establish or to disconnect a data connection via the GSM network, are given by the application to the device. For this purpose the application and the device communicates using AT commands, like other types of modems. The sending of SMS is handled in the same way.

Direct control using AT commands

You can also enter manually AT commands to control the SINAUT MD720-3. In this case use any terminal program (Refer to *Working with a terminal* program.)

Or you write your own communication program which is adapted especially to your purposes.

Enter the PIN first

Please enter the PIN first before any other AT commands. The PIN need to be entered using the AT command AT+CPIN. Until a PIN has been entered most AT commands will be answered with ERROR.

4.5   Entering AT commands

The SINAUT MD720-3 is controlled by AT commands, which are entered either by the connected application or manually by terminal program.

Working with a terminal program

To be able to control the device directly via AT commands, use a terminal program, e.g. HyperTerminal.

Note the following settings:

Make the connection:	COM port to which the device is connected
Speed:	19200 Bit/s
Data bits:	8
Parity:	**N**o
Stop bits:	1
Duplex:	**F**ull

PIN in Terminal-Mode

Enter the PIN

If the LED S blinks slowly (1 time each second), the SINAUT MD720-3 waits for a PIN entry.

In Terminal-Mode the PIN need to be entered using the AT command AT+CPIN.

Example:

Command: **at+cpin="0000"   // Input incl. " "**

Response: **OK**

The number of permitted trial to enter the PIN is limited by the SIM card.

Normally three attempts are allowed, i.e. you may enter two times back-to-back a wrong PIN, at the third attempt the right PIN must be entered, otherwise the SIM will be blocked. In this case the SIM card can only be unblocked by entering the PUK.

The LED S (status) blinks fast

If the modem blinks fast (4 times each second), either the SIM card was not detected correctly or the SIM card is PUK-blocked, because a wrong PIN has been entered too often.

Please check, if the SIM card is inserted correctly (see chapter 2 *Inserting the SIM card*).

Please check, if the SIM card is PUK-blocked. Insert the SIM card into a common mobile phone. The mobile phone will display, if the SIM card is PUK-blocked. If the SIM card is PUK-blocked, please enter the PUK and then a PIN. You can use a common mobile phone to do this.

Before you enter again the SIM card into the SINAUT MD720-3, please investigate why the SIM card has been PUK-blocked: Which PIN have you entered or which PIN has your application sent to the SINAUT MD720-3?

Changing the SIM card

If you change the SIM card, please do not forget to update also the PIN number in your application.

If you use a lot of SIM cards it can be helpful to set all PINs to the same PIN number. You can do this i.e. by using a mobile phone. Please observe the security requirements of your organization.

PIN-less SIM cards

The device operates also with SIM cards, which PIN check is deactivated. In this case the PIN check is skipped and the device will immediately try to attach the GSM network.

4.6 Use AT commands

Syntax

The AT command language is a standard for controlling modems. It is line-orientated. Each command line begins with AT (for ATtention), followed by the actual command, and ends with (Enter key).

Example: **ATD444444¬**

means: dial (D for Dial) 444444

There are only two exceptions to this rule:

The command **+++** to switch to Command Phase (see below) and the command **A/** with which the last command line is repeated.

Command phase, Transparent phase

The device accepts AT commands only when it is in Command Phase.

It is in *Command Phase*,

- when there is <u>no</u> active connection,

- when the sequence Pause **+++** has been entered during a connection.

The device does not accept AT commands when it is in Transparent Phase.

It is in *Transparent Phase*,

- when there is an active connection,

- when the device has been switched to Command Mode during an active connection with +++ and then switched back to Transparent Mode with **ATO**.

Enabling/disabling local echo

To see your entries on the screen, you may have to enable the local data echo. To do so, enter the following command: **ATE1**

To disable the local data echo, enter the following command: **ATE0**

Enter the PIN

Command: **at+cpin="0000"**

Response: **OK**

Network-Status request

Command: **at+creg?**

Response: **+CREG: 0,1**

Firmware Version request

Command: **ati3**

Response: **SIE3171 SINAUT MD720-3 V.1.7.00 19.05.2006**

CSD call outgoing:

Command: **atd0123456789**

Response: **CONNECT**

CSD call incoming:

Response: **RING**

Command: **ata**

Response: **CONNECT**

Sending SMS:

Command: **at+cmgf=1**

Response: **OK**

Command: **at+cmgs="phonenumber",145**

Command: **>Text of the SMS max. 160 characters; End and sending with Strg-Z**

Response: **+CMGS: 251   // value is an example**

OK

4.7   Supported AT commands in Terminal Mode

All AT commands being not listed below will be answered with OK by the device, but the command will <u>not</u> be executed.

+++	Switch from data mode to command mode
Execute command	
Command:	**+++**
Response:	This command is only available during data calls. The +++ characters sequence causes to cancel de data flow over the AT interface and switch to command mode. This allows to enter AT commands while maintaining the data connection to the remote device.
Parameter:	-
Notice:	To return to data mode, use the ATO command Line does not need to end with terminating character, i.e. <CR><LF>

A/	Repeat previous command line
Executive command	
Command:	**A/**
Response:	Depend on the previous command
Parameter:	-
Notice:	Line does not need to end with terminating character, i.e. <CR><LF>

ATA	Answer a call
Executive command	
Command:	**ATA**
Response:	CONNECT[<text>] Data connection established OK Voice connection established or if cancellation of the command NO CARRIER Response if no connection
Parameter:	-
Notice:	See ATX for setup of the CONNECT message.

ATD	Mobile originated Call to dial a number
Executive command	
Command:	**ATD[<n>]**
Response:	The connection cannot be established:
	NO DIALTONE
	BUSY
	NO CARRIER
	NO ANSWER
	Data connection successfully connected:
	CONNECT[<text>]
Parameter:	<n>:
	String of dialing digits and optionally V.25ter modifiers (dialing digits): 0-9, * , #, +, A, B, C
Notice:	-

ATE	Local Echo On/Off
Executive command	
Command:	**ATE[<value>]**
Response:	OK
Parameter:	<value>:
	0 Local Echo off
	1 Local Echo on <Default>
Notice:	This setting determines whether or not the device echoes characters received from application during command state

ATH	Disconnect existing connection
Executive command	
Command:	**ATH**
Response:	OK
Parameter:	-
Notice:	On this command, all calls in progress are ended.
	If a call is in progress, it is necessary to switch into the command phase by +++ before entering commands.

ATI	Request identification information
Read command	
Command:	**ATI[<value>]**
Response:	<text> (depends on <value>)
	OK
Parameter:	<value>:
	none: Product name and Firmware Version
	0: Product name and Firmware Version
	1: Product name, Interface, Mode
	3: Product name and Firmware Version
Notice:	<text> may take more than one line

ATO	Switch from command mode to data mode
Executive command	
Command:	**ATO[n]**
Response:	Device returns to data mode from command mode:
	CONNECT <text>
	If connection is not successfully resumed
	NO CARRIER
Parameter:	<n>:
	0 switch from command mode to data mode
Notice:	ATO corresponds to the +++ escape sequence.

ATQ	Set result code presentation mode
Executive command	
Command:	**ATQ[<n>]**
Response:	OK (if <n> = 0)
	Nothing (if <n> = 1)
Parameter:	<n>:
	0: result codes transmitted by the device <Default>
	1: no result code transmitted by the device
Notice:	Specifies whether or not the device transmits any result code to the application. Information text transmitted in response is not affected by this setting.

ATS0?	Shows Automatic answering settings
Read command	
Command:	**ATS0?**
Response:	<n>
	OK
Parameter:	See ATS0=<n>
Notice:	-

ATS0	Configures Automatic answering
Executive command	
Command:	**ATS0=<n>**
Response:	OK
Parameter:	<n>: 0: automatic answering deactivated <Default> 1-255: number of rings before automatically answering
Notice:	GSM networks usually generate only 8-12 RING. If S0 is set to a higher value, calls are eventually not being answered.

ATV	Set result code format mode		
Executive command			
Command:	**ATV[<value>]**		
Response:	0 When numeric code is activated OK When verbose code is activated		
Parameter:	<value>:		
	0 Information	<text><CR><LF>	
	Result Code (short format):	<numeric code><CR>	
	1 Information	<CR><LF><text><CR><LF>	
	Result Code (long format): <Default>	<CR><LF><verbose code><CR>	
Notice:	This parameter setting determines the contents of the header and trailer transmitted with result codes and information responses.		
	Result codes numeric or verbose:		
	OK	0	Command executed, no error, Restart executed
	CONNECT	1	Connection established
	RING	2	Ring detected
	NO CARRIER	3	Connection not established or interrupted
	ERROR	4	Command not valid
	NO DIALTONE	6	No dialtone, dialing not possible, wrong mode
	BUSY	7	Remote station busy
	CONNECT 2400/RLP	1	Connect at 2400 bps and Radio Link Protocol
	CONNECT 4800/RLP	1	Connect at 4800 bps and Radio Link Protocol
	CONNECT 9600/RLP	1	Connect at 9600 bps and Radio Link Protocol

AT\Q	Hardware Flow Control on/off
Executive command	
Command:	**AT\Q<n>**
Response	OK
Parameter:	<n>:
	0: Hardware Flow Control (RTS/CTS) off
	3: Hardware Flow Control (RTS/CTS) on
Notice:	-

ATX	Set CONNECT result code Format und Call monitoring
Executive command	
Command:	**ATX[<value>]**
Response:	OK
Parameter:	<value>:
	0 : CONNECT result code only returned, dial tone and busy detection are both disabled <Default>
	1 : CONNECT<text> result code only returned, dial tone and busy detection are both disabled
	2 : same as 1
	3 : same as 1
	4 : same as 1
Notice:	The term "tone" is used in analogue telephone networks. The status "No dialtone" will usually not appear, as soon as the device is booked into a GSM network. A Busy message will be transmitted.

AT&C	AT&C Set circuit Data Carrier Detect (DCD) function mode
Executive command	
Command:	**AT&C[<value>]**
Response:	OK
Parameter:	<value>:
	0 : DCD line is always ON
	1 : DCD line is ON in the presence of data carrier only. <Default>
Notice:	-

AT&D	Set circuit Data Terminal Ready (DTR) function mode
Executive command	
Command:	**AT&D[<value>]**
Response:	OK
Parameter:	<value>:
	0: Device ignores status on DTR. <Default>
	2: ON->OFF on DTR: Disconnect call, change to command mode. During state DTR = OFF is auto-answer off.
Notice:	-

AT&F	Restore manufactory configuration
Executive command	
Command:	**AT&F**
Response:	OK
Parameter:	<value>:
	0: Restore parameters to manufactory values
Notice:	Restores the configuration of manufacturer of the following commands: ATE, ATQ, ATV, ATX, AT&C, AT&D, AT\Q and ATS0.

AT&W	Save stored profile
Executive command	
Command:	**AT&W<n>**
Response:	OK
Parameter:	<n>:
	None Saving in Profile 0
	0 Saving in Profile 0
Notice:	This command saves the current configuration in a non volatile memory of the commands ATE, ATQ, ATV, ATX, AT&C, AT&D, AT\Q and ATS0. The configuration can be reloaded with ATZ. Before the first saving the profile is the same as the default configuration.
	See also AT&V.

AT&V	Display current configuration
Executive command	
Command:	**AT&V[<value>]**
Response:	ACTIVE PROFILE:
	<current configuration>
	OK
Parameter:	<value>:
	0: only active profile
Notice:	The configuration is a text string on multiple lines as shown in the example below. As it is dependant on the manufactory and user set-up, it is impossible to list the exact number of information given.

AT+CCLK	Clock		
Test			
Command:	**+CCLK=?**		
Response:	OK		
Read command			
Command:	**+CCLK?**		
Response:	+CCLK: <time>		
Executive command			
Command:	**AT+CCLK=<time>**		
Response:	OK +CME ERROR: <err>		
Parameter:	<time>: String variable; the format is "yy/MM/dd,hh:mm:ss±zz", with		
	yy:	Year	
	MM:	Month	
	dd:	Day	
	hh:	Hour	
	mm:	Minute	
	ss:	Second	
	zz:	Time zone, gives the difference between the local time and GMT, given in quarters of an hour; the range of values is -47…+48. Example: 6th of may, 1994, 22:10:00 GMT+2 hours corresponds to "94/05/06,22:10:00+08"	
Notice:	-		

AT+CRLP	Radio link protocol	
Test		
Command:	**+CRLP=?**	
Response:	+CRLP: (list of supported <iws>s),(list of supported <mws>s), (list of supported <T1>s),(list of supported <N2>s),<ver1> ,(list of supported <T4>s)	
Read command		
Command:	**+CRLP?**	
Response:	+CRLP: <iws>,<mws>,<T1>,<N2>,<ver1>,<T4>	
Executive command		
Command:	**AT+CRLP=<iws>[,<mws>[,<T1>[,<N2>[,<ver>[,<T4>]]]]]**	
Response:	OK	
Parameter:	<ver>:	RLP version number as Integer variable; Version number 0 indicates "RLP version indication not available"
	<iws>:	Window size IWF to MS
	<mws>:	Window size MS to IWF
	<T1>:	Acknowledge timer T1
	<N2>:	Retransmission attempts N2
	<T4>:	Re-sequencing period T4 as Integer variable
Notice:	Default values and value ranges depend on RLP Version; refer GSM 04.22 [18]. T1 and T4 are in units of 10 ms.	

AT+CPIN	Enter PIN
Test	
Command:	**AT+CPIN=?**
Response:	OK
Read command	
Command:	**AT+CPIN?**
Response:	+CPIN: <code>
Executive command	
Command:	**AT+CPIN=<pin> [,<newpin>]**
Response:	OK
Parameter:	<code>: Values reserved by this device: READY — Device is not pending for any password SIM PIN — Device is waiting SIM PIN to be given SIM PUK — Device is waiting SIM PUK to be given. Also, a second pin, <newpin>, is used to replace the old pin in the SIM and should thus be supplied SIM PIN2 — Device is waiting SIM PIN2 to be given (this <code> is recommended to be returned only when the last executed command resulted in PIN2 authentication failure (i.e. +CME ERROR: 17); if PIN2 is not entered right after the failure, it is recommended that ME does not block its operation) SIM PUK2 — Device is waiting SIM PUK2 to be given (this <code> is recommended to be returned only when the last executed command resulted in PUK2 authentication failure (i.e. +CME ERROR: 18); if PUK2 and new PIN2 are not entered right after the failure, it is recommended that ME does not block its operation). Also, a second pin, <newpin>, is used to replace the old pin in the SIM and should thus be supplied PH-NET PIN — ME is waiting personalization password to be given <pin>, <newpin>: String type value (8 characters max.)
Notice:	-

AT+CSQ	Check Signal Quality
Test	
Command:	**AT+CSQ=?**
Response:	+CSQ: (list of supported \<rssi\>s),(list of supported \<ber\>s) OK
Response:	
Command:	**AT+CSQ**
Response:	+CSQ: \<rssi\>,\<ber\> OK
Parameter:	\<rssi\>: 0 -113 dBm or less 1 -111 dBm 2...30 -109... -53 dBm 31 -51 dBm or greater 99 not known or not detectable \<ber\>: 0...7 as RXQUAL values in the table in GSM 05.08 [20] subclause 8.2.4 99 not known or not detectable
Notice:	The read command (**AT+CSQ?**) returns an error.

AT+CGSN	Request product serial number identification (IMEI) identical to GSN
Test	
Command:	**AT+CGSN=?**
Response:	OK
Read command	
Command:	**AT+CGSN**
Response:	\<sn\> (identification text for determination of the individual device) OK
Parameter:	-
Notice:	-

AT+CGDCONT Define PDP context	
Test	
Command:	**AT+CGDCONT=?**
Response:	+CGDCONT: (range of supported <cid>s), <PDP_type>,,,(list of supported <d_comp>s), (list of supported <h_comp>s)[,(list of supported <pd1>s)[,…[,(list of supported <pdN>s)]]]][...]]
	[+CGDCONT: (range of supported <cid>s), <PDP_type>,,,(list of supported <d_comp>s), (list of supported <h_comp>s)[,(list of supported <pd1>s)[,…[,(list of supported <pdN>s)]]]][...]]] OK
Read command	
Command:	**AT+CGDCONT?**
Response:	If +CGDCONT is set:
	+CGDCONT: <cid>, <PDP_type>, <APN>,<PDP_addr>, <d_comp>, <h_comp>[,<pd1>[,…[,pdN]]]
	[+CGDCONT: <cid>, <PDP_type>, <APN>,<PDP_addr>, <data_comp>, <head_comp>[,<pd1>[,…[,pdN]]] OK
	If +CGDCONT is not set:
	OK
Executive command	
Command:	**+CGDCONT=<cid> ,<PDP_type> ,<APN> ,<PDP_addr> ,<d_comp> ,<h_comp>**
Response:	OK
Parameter:	<cid>:　　　　　(Local) context identification parameter
	<PDP_type>:　　Packet Data Protocol type
	A string parameter which specifies the type of packet data protocol. Only IP Internet Protocol - IETF STD 5) is supported.
	<APN>:　　　　Access Point Name
	A string parameter which is a logical name that is used to select the GGSN or the external packet data network.
	<PDP_address>:
	A string parameter that identifies the MT in the address space applicable to the PDP. As only IP is currently supported, it shall be an IP address.
	If the value is null ("0.0.0.0" or 0), then a value may be provided by the TE during the PDP startup procedure or, failing that, a dynamic address will be requested.
	The read form of the command will continue to return the null string even if an address has been allocated during the PDP startup procedure. The allocated address may be read using the +CGPADDR command.
	<d_comp>:
	A numeric parameter that controls PDP data compression.
	0:　　　off (default and only value supported)
	<h_comp>:
	A numeric parameter that controls PDP header compression
	0:　　　off (default and only value supported)
	<pd1>, … <pdN>:
	Zero to N string parameters whose meanings are specific to the <PDP_type>

Notice:	The execute command specifies PDP context parameter values for a PDP context identified by the (local) context identification parameter, <cid>. The number of PDP contexts that may be in a defined state at the same time is given by the range returned by the test command. A special form of the set command, +CGDCONT= <cid> causes the values for context number <cid> to become undefined.

AT+CGATT GPRS Attach or Detach	
Test	
Command:	**AT+CGATT=?**
Response:	+CGATT: (list of supported <state>s)
Read command	
Command:	**AT+CGATT?**
Response:	+CGATT: <state>
Executive command	
Command:	**+CGATT=<state>**
Response:	OK
Parameter:	<state>: Indicates the state of GPRS attachment 0: detached 1: attached
Notice:	-

AT+CIMI	Request international subscriber identity
Test	
Command:	**AT+CIMI=?**
Response:	OK
Read command	
Command:	**AT+CIMI**
Response:	<IMSI> (International Mobile Subscriber Identify) OK
Parameter:	-
Notice:	-

AT+CPAS	Phone activity status
Test	
Command:	**AT+CPAS=?**
Response:	+CPAS: (list of supported <pas>s)
	OK
Read command	
Command:	**AT+CPAS**
Response:	+CPAS: <pas>
	OK
Parameter:	<pas>:
	0 ready (device allows commands from application)
	1 unavailable (device does not allow commands from application)
	2 unknown (device is not guaranteed to respond to instructions)
	3 ringing (device is ready for commands from application, but the ringer is active)
	4 call in progress (device is ready for commands from application, but a call is in progress)
Notice:	-

AT+CPMS	Preferred Message Storage
Test	
Command:	**AT+CPMS=?**
Response:	+CPMS: (list of supported \<mem1>s),(list of supported \<mem2>s),(list of supported \<mem3>s), OK
Read command	
Command:	**AT+CPMS?**
Response:	+CPMS: \<mem1>,\<used1>,\<total1>,\<mem2>,\<used2>,\<total2>,\<mem3>, \<used3>,\<total3> OK
Executive command	
Command:	**AT+CPMS=** \<mem1>,\<mem2>,\<mem3>
Response:	+CPMS: \<used1>,\<total1>,\<used2>,\<total2>,\<used3>,\<total3> OK
Parameter:	The executive command selects the SMS storage \<mem\<x>>, being used to read, write, etc. \<mem1> Memory to be used for listing, reading and deleting of messages: "SM" Message storage on SIM card "ME" Message storage on device "MT" Sum of message storage on SIM card and device \<mem2> Memory to be used for writing and sending of messages: "SM" Message storage on SIM card "ME" Message storage on device "MT" Sum of message storage on SIM card and device \<mem3> Memory to be used for storage of received messages, if the routing to the connected application is not possible. Refer to command AT+CNMI with parameter \<mt>=2 "SM" Message storage on SIM card "MT" Sum of message storage on SIM card and device \<usedx> Number of messages currently stored in \<memx>. \<totalx> Number of messages currently which can be stored in\<memx>.

Notice:	<u>Example:</u>
	AT+CPMS=? +CPMS: ("ME","SM","MT")
	        OK
	AT+CPMS? +CPMS: "ME",0,100
	        OK
	AT+CPMS="ME" +CPMS: 0,100
	        OK
	Until firmware version 1.6 inclusive, only the message storage "MT could be selected for

	<mem3>.	
AT+CNUM	**Subscriber number**	
Test		
Command:	**AT+CNUM=?**	
Response:	OK	
Executive command		
Command:	**AT+CNUM**	
Response:	+CNUM: [<alpha1>],<number1>,<type1>[,<speed>,<service>[,<itc>]] [<CR><LF>+CNUM: [<alpha2>],<number2>,<type2>[,<speed>,<service> [,<itc>]] [...]] OK	

Parameter:	<alpha>:
	optional alphanumeric string associated with <number>; used character set should be the one selected with command Select TE Character Set +CSCS
	umber>:
	string type phone number of format specified by <type>
	type>:
	type of address octet in integer format (refer GSM 04.08 [8] subclause 10.5.4.7)
	
	speed>:
	service>:
	service related to the phone number
	        0: asynchronous modem
	        1: synchronous modem
	        2: PAD Access (asynchronous)
	        3: Packet Access (synchronous)
	        4: voice
	        5: fax
	also all other values below 128 are reserved by the present document
	
	itc>:
	information transfer capability
	        0: 3.1kHz
	        1: UDI	

Notice:	Action command returns the MSISDNs related to the subscriber (this information can be stored in the SIM or in the ME)
	The Read Command (AT+CNUM?) returns an error
	<u>Example:</u>
	AT+CNUM +CNUM: "TEL","0612345678",129
	                    +CNUM: "","",255
	                    +CNUM: "","",255
	                    +CNUM: "","",255
	                    OK	

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AT+CBST	Select bearer service type
Read command	
Command:	**AT+CBST=?**
Response:	+CBST: (list of supported <speed>s),(list of supported <name>s),(list of supported <ce>s) OK
Executive command	
Command:	**AT+CBST=[<speed> [,<name>[,<ce>]]]**
Response:	OK
Parameter:	<speed>: 4 2400 bps (V.22bis) 6 4800 bps (V.32) 7 9600 bps (V.32) 68 2400 bps (V.110 or X.31 flag stuffing) 70 4800 bps (V.110 or X.31 flag stuffing) 71 9600 bps (V.110 or X.31 flag stuffing) <name>: 0 data circuit asynchronous (UDI or 3.1 kHz modem) 1 Not supported <ce>: 0 transparent 1 non-transparent
Notice:	Set command selects the bearer service <name> with data rate <speed>, and the connection element <ce> to be used when data calls are originated.

AT+CMGD	Delete a SMS
Test	
Command:	**AT+CMGD=?**
Response:	+CMS ERROR: <err>
Read command	
Command:	**AT+CMGD?**
Response:	+CMS ERROR: <err>
Executive command	
Command:	**+CMGD=<index>**
Response:	OK or +CMS ERROR: <err>
Parameter:	<index> 1 – n Memory location on the SIM card; n depends on the memory capacity of the SIM card <err> Error code
Notice:	-

AT+CMGF	Select SMS message format
Test	
Command:	**AT+CMGF=?**
Response:	+CMGF: (list of supported <mode>s)
	OK
Read command	
Command:	**AT+CMGF?**
Response:	+CMGF: <mode>
	OK
Executive command	
Command:	**AT+CMGF=[<mode>]**
Response:	OK
Parameter:	<mode>:
	0 PDU mode
	1 Text mode
Notice:	-

AT+ CMGL	List SMS messages from preferred storage
Test	
Command:	**AT+CMGL=?**
Response:	+CMGL: (list of supported <stat>s)
	OK
Executive command	
Command:	**AT+CMGL[=<stat>]**
Response:	**In text mode (+CMGF=1) and successfully executed command and SMS-SUBMITs and/or SMS-DELIVERs:**
	If <stat> = "REC READ" or "REC UNREAD"
	+CMGL: <index>,<stat>,<oa/da>,<scts>,<length>
	<CR><LF><data><CR><LF>
	[+CMGL: <index>,<stat>,<oa/da>,<scts>,<length><CR><LF><data>
	<CR><LF>[...]]
	If <stat> = "STO UNSENT" or "STO SENT"
	+CMGL: <index>,<stat>,<oa/da>,<length>
	<CR><LF><data><CR><LF>
	[+CMGL: <index>,<stat>,<oa/da>,<length><CR><LF><data>
	<CR><LF>[...]]
	In other cases:
	+CMS ERROR: <err>
	In PDU mode (+CMGF=0) and successfully executed command:
	[+CMGL: <index>,<stat>,[<alpha>],<length><CR><LF><pdu>
	[<CR><LF>+CMGL:<index>,<stat>,[<alpha>],<length><CR><LF><pdu>
	[...]]]
	OK

Parameter:	<index>
	integer type; value in the range of location numbers supported by the associated memory
	<stat>
	integer type (default 0: "REC UNREAD"); indicates the status of message in memory; defined values:
	0 "REC UNREAD" received unread message (i.e. new message)
	1 "REC READ" received read message
	2 "STO UNSENT" stored unsent message (only applicable to SMS)
	3 "STO SENT" stored sent message (only applicable to SMS)
	4 "ALL" all messages (only applicable to +CMGL command)
	<oa/da>
	GSM 03.40 TP-Originating-Address / TP-Destination-Address Address-Value field in string format
	<scts>
	GSM 03.40 TP-Service-Centre-Time-Stamp in time-string format
	<length>
	integer type value indicating the length in characters of the message body <data>
	<data>
	GSM 03.40 TP-User-Data in text mode responses
Notice:	The execute command indicates the state <stat> of the preferred SMS storage <mem1>.

AT+CMGR	Read SMS message
Test	
Command:	**AT+CMGR=?**
Response:	OK
Executive command	
Command:	**AT+CMGR=\<index\>**
Response:	**In text mode (+CMGF=1)**
	If command is executed successfully and SMS-DELIVER:
	+CMGR: \<stat\>,\<oa\>,\<scts\>,\<length\>
	\<CR\>\<LF\>\<data\>\<CR\>\<LF\>
	If command is executed successfully and SMS-SUBMIT:
	+CMGR: \<stat\>,\<da\>,\<length\>
	\<CR\>\<LF\>\<data\>\<CR\>\<LF\>
	In other cases:
	+CMS ERROR: \<err\>
	In PDU mode (+CMGF=0) and successfully performed command:
	+CMGR: \<stat\>,[\<alpha\>],\<length\>\<CR\>\<LF\>\<pdu\>
	OK
Parameter:	Refer to +CMGL
Notice:	Execution command returns message with location value \<index\> from preferred message storage \<mem1\>. Status of the message and entire message data unit \<pdu\> is returned. If status of the message is 'received unread', status in the storage changes to 'received read'.

AT+CMGS	Sending SMS
Test	
Command:	**AT+CMGS=?**
Response:	OK
Executive command	
Command:	**In text modus (+CMGF=1):** +CMGS=<da>,<toda><CR> **> text is entered**<ctrl-Z/ESC> **In PDU mode (+CMGF=0):** AT+CMGS=<length><CR> enter PDU <ctrl-Z/ESC>
Response:	**In text mode (+CMGF=1) and successful sending:** +CMGS: 0 **If sending fails:** +CMS ERROR: <err> **In PDU mode (+CMGF=0) and successful sending:** +CMGS: <mr>[,<ackpdu>] OK

Parameter:	<da>:
	Enter phonenumber with " "
	`<toda>`:
	145: Enter phone number incl. country code, e.g. +49xxxxx for Germany
	129: Enter phone number without country code
	`<mr>`:
	TP-Message-Reference in integer format
	`<ackpdu>`
	RP-User-Data element of RP-ACK PDU; format is same as for <pdu> in case of SMS, but without 3G TS 24.011 [6] SC address field and parameter shall be bounded by double quote characters like a normal string type parameter
	`<length>`
	Integer type value indicating in the text mode (+CMGF=1) the length of the message body <data> > (or <cdata>) in characters; or in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)

Notice:	• The device shall send a four character sequence <CR><LF><greater_than><space> (IRA 13, 10, 62, 32) after command line is terminated with <CR>; after that PDU can be given from application to the device • the DCD signal shall be in ON state while PDU is given • the echoing of given characters back from the device is controlled by ATE echo command • the PDU shall be hexadecimal format (similarly as specified for <pdu>) and given in one line; the device converts this coding into the actual octets of PDU • when the length octet of the SMSC address (given in the PDU) equals zero, the SMSC address set with command Service Centre Address +CSCA is used; in this case the SMSC Type-of-Address octet shall not be present in the PDU, i.e. TPDU starts right after SMSC length octet • sending can be cancelled by giving <ESC> character (IRA 27) • <ctrl-Z> (IRA 26) must be used to indicate the ending of PDU

AT+CNMI	New SMS message indication
Test	
Command:	**AT+CNMI=?**
Response:	+CNMI: (list of supported <mode>s), (list of supported <mt>s), (list of supported <bm>s), (list of supported <ds>s), (list of supported <bfr>s) 2.
Read command	
Command:	**AT+CNMI?**
Response:	+CNMI: <mode>,<mt>,<bm>,<ds>,<bfr>,OK
Executive command	
Command:	**AT+CNMI=[<mode>][,<mt>][,<bm>][,<ds>][,<bfr>]**
Response:	OK
Parameter:	<mode>:
	0: Buffer unsolicited result codes in the device. If device result code buffer is full, indications can be buffered in some other place or the oldest indications may be discarded and replaced with the new received indications.
	1: Discard indication and reject new received message unsolicited result codes when the link between the device and the connected application is reserved. Otherwise forward them directly to the connected application.
	2: Buffer unsolicited result codes in the device when the link between the device and the connected application is reserved (e.g. in on-line data mode) and flush them to the connected application after reservation. Otherwise forward them directly to the connected application.
	3: Not supported
	<mt>:
	0: No SMS-DELIVER indications are routed to the connected application.
	1: If SMS-DELIVER is stored into device, indication of the memory location is routed to the connected application using unsolicited result code +CMTI: <mem>,<index>
	<bm>:
	0: No CBM indications are routed to the connected application.
	<ds>:
	0: No SMS-STATUS-REPORTs are routed to the connected application.
	<bfr>:
	0: The buffered notifications are sent.
Notice	-

AT+CREG	Network registration
Test	
Command:	**AT+CREG=?**
Response:	+CREG: (list of supported <n>s) OK
Read command	
Command:	**AT+CREG?**
Response:	+CREG: <n>,<stat>[,<lac>,<ci>] OK
Executive command	
Command:	**AT+CREG=<n>,<stat>**
Response:	OK
Parameter:	**<n>:** 0: disable network registration unsolicited result code 1: enable network registration unsolicited result code +CREG: <stat> 2: enable network registration and location information unsolicited result code +CREG: <stat>[,<lac>,<ci>] **<stat>:** 0: not registered, ME is not currently searching a new operator to register to 1: registered, home network 2: not registered, but ME is currently searching a new operator to register to 3: registration denied 4: unknown 5: registered, roaming **<lac>:** string type; two byte location area code in hexadecimal format (e.g. "00C3" equals 195 in decimal) **<ci>:** string type; two byte cell ID in hexadecimal format
Notice:	Executive command controls the presentation of an unsolicited result code **+CREG: <stat>** when <n>=1 and there is a change in the device network registration status, or code **+CREG: <stat>[,<lac>,<ci>]** when <n>=2 and there is a change of the network cell.

AT+CSCA	SMS service center address
Test	
Command:	**AT+CSCA=?**
Response:	OK
Read command	
Command:	**AT+CSCA?**
Response:	+CSCA: <sca>,<tosca>
	OK
Executive command	
Command:	**AT+CSCA=<sca>[,<tosca>]**
Response:	OK
Parameter:	<sca>
	"Phone number SMS-ServiceCenters"
	<tosca>
	129, 145
Notice:	Executive command updates the SMSC address, through which mobile originated SMS are transmitted. In text mode, settings are used by send and write commands. In PDU mode, setting is used by the same commands, but only when the length of the SMSC address coded into <pdu> parameter equals zero.

AT+CSMP	Set SMS text mode parameters
Test	
Command:	**AT+CSMP=?**
Response:	+CSMP: (list of <fo>),(list of <vp>),(list of <pid>),(list of <dcs>)
	OK
Read command	
Command:	AT+CSMP?
Response:	+CSMP: <fo>,<vp>,<pid>,<dcs>
	OK
Executive command	
Command:	AT+CSMP=[<fo>[,<vp>[,<pid>[,<dcs>]]]]
Response:	OK
Parameter:	<fo>
	17
	<vp>
	Determines the period of time the SMS will be stored in the SMS Service Center:
	0 to 143: (<vp> + 1) * 5 minutes (e.g. 5 minutes interval up to 12 hours)
	144 to 167 12 hours + (<vp> - 143) x 30 minutes
	168 to 196 (<vp> - 166) x 1 day
	197 to 255 (<vp> - 192) x 1 week
	<pid>
	0
	<dcs>
	0
Notice:	Until firmware version 1.6 inclusive, only the <vp> values 71, 167, 173 and 255 have been supported.
	In the composite AT command AT+CMGF=1+CSMP=17,0,0,0+CSCA=" +AAAAAAAAAA" the value 0 for <vp> will be accepted, but 0 will be replaced by the value 71.

AT+CRC	Set Cellular Result Codes for incoming call indication
Test	
Command:	**AT+CRC=?**
Response:	+CRC: (list of supported <mode>)
	OK
Read command	
Command:	**AT+CRC?**
Response:	+CRC:<mode>
	OK
Executive command	
Command:	**AT+CRC=[<mode>]**
Response:	OK
Parameter:	<mode>:
	0: disable extended format
	1: enable extended format
Notice:	When enabled, an incoming call is indicated with
	+CRING: <type> with, **<type>** : FAX or VOICE

AT+IPR	Set fixed local rate
Test	
Command:	**AT+IPR=?**
Response:	+IPR: (list of supported auto-detectable <rate>s), (list of supported fixed-only <rate>s)
Read command	
Command:	**AT+IPR?**
Response:	+IPR: <rate> OK
Executive command	
Command:	**AT+IPR=<rate>**
Response:	OK
Parameter:	**<rate>** bit rate per second
	1200
	2400
	4800
	9600
	19200
	38400
	57600
Notice:	-

AT+KHNDVR	Selecting mobile / stationary operation
Read command	
Command:	**+ KHNDVR?**
Response:	+ KHNDVR <stat>
Executive command	
Command:	**+ KHNDVR=<stat>**
Response:	OK
Parameter:	<stat>:
	0: Setting for data calls (CSD 9600 Bit/s) in mobile operation
	1: Setting for data calls (CSD 9600 Bit/s) in stationary operation
Notice:	The command has no impact to GPRS connections or the sending of SMS. In mobile operation <stat> must be set to zero.

Composed AT commands

The initialization strings below are accepted by the SINAUT MD720-3. The reaction to the separate commands correspondingly.

TIM device

ATE0S0=1&D2+CBST=71,0,1;+CRC=1;&W+IPR=19200

S7-2xx-device

ATE0S0=0+IPR=9600

Other initialization strings

AT+CMGF=1+CSMP=17,0,0,0+CSCA="+AAAAAAAAAA"

AT+CMGS="+*BBBBBBBBBB*",145

SINAUT MD720-3 in OPC Mode

5

GPRS modem

In the OPC Mode the SINAUT MD720-3 is configured by program building blocks of the connected S7-200 PLC. The SINAUT MD720-3 establishes autonomous the radio data connection via GPRS between the connected S7-200 device and the OPC server SINAUT MICRO SC.

SMS-Adapter

In addition also in OPC Mode the connected S7-200 device can send messages by SMS:

● directly to other subscribers of the SMS service, or

● through gateways to fax machines.

To send a SMS, the GPRS connection to the OPC server SINAUT MICRO SC will be interrupted.

GSM-Modem

Also the SINAUT MD720-3 in OPC Mode can answer service data calls from analog modems, ISDN modems or GSM modems.

Notice

You can find details about these functions in the system manual of the OPC server SINAUT MICRO SC.

5.1　OPC Mode activation

Terminal mode is factory default setting

The SINAUT MD720-3 supports two fundamental operating modes:

- Terminal mode

- OPC Mode.

The SINAUT MD720-3 will be delivered by the factory with activated Terminal Mode.

Automatic activation by the PLC

Operating the SINAUT MD720-3 in OPC Mode combined with S7-200 devices, the OPC Mode will be activated by the program building blocks automatically during the initialization.

Manual activation

If in exceptional cases a manual activation of the OPC Mode is necessary, you will find instructions in chapter 6.1 *Switching between Terminal mode and OPC Mode*.

5.2　Operating requirements in OPC Mode: GPRS subscriber contract

To use the SINAUT MD720-3 in OPC Mode it is required:

- SIM card of a GSM network operator with activated GPRS,

- SIM card of a GSM network operator including CSD data service 9600 Bit/s and an extra telephone number for data calls (to make Teleservice),

Availability of a GSM network

5.3   Functions of the LEDs in OPC Mode

The device is equipped with 3 LEDs which indicate the status:

S (Status)   **Q** (Quality)   **C** (Connect)

LED	Status	Meaning
S, Q, C combined	Fast lighting in sequence	Boot procedure
	Synchronous slow blinking	Service mode
	Slow lighting in sequence	Update
	Synchronous fast blinking	Error
S (Status)	Blinks slowly	Device waiting for PIN input
	Blinks fast	PIN error / SIM error
	OFF	No GPRS attach
	ON	GPRS attach
Q (Quality)	Blinks slowly	Booking into GSM network
	1x intermittent blinking	Field strength not sufficient
	2x intermittent blinking	Field strength sufficient
	3x intermittent blinking	Field strength medium
	ON permanently	Field strength high
	OFF	Waiting for PIN input
C (Connect)	OFF	No connection to MICRO SC
	Blinks slowly	Trying to connect MICRO SC
	ON	Connected to MICRO SC
	Blinks synchronously to data stream	Data transfer

Blinks slowly: 1 time each second

Blinks fast :   4 times each second

5.4   PIN in OPC-Mode

Enter the PIN

If the LED "S" blinks slowly (1 time per second), the SINAUT MD720-3 waits for a PIN entry.

In OPC-Mode the PIN is sent by the connected PLC to the SINAUT MD720-3. Therefore you need to enter the PIN in the data module of your SPS program with reference to the program module WDC_INIT (See System manual SINAUT MICRO SC). Please check if the PLC and the SINAUT MD720-3 are connected together.

The LED S (Status) blinks fast

If the LED S blinks fast (4 times per second), either the SIM card was not detected or he SIM card is PUK-blocked, because a wrong PIN has been entered too often.

1. Please check, if the SIM card has been inserted correctly into the device (refer to chapter 2 *Inserting the SIM card*).

2. Please check, if the SIM card is PUK-blocked. Insert the SIM card into a common mobile phone. The mobile phone will display, if the SIM card is PUK-blocked. If the SIM card is PUK-blocked, please enter the PUK and then a PIN. You can use a common mobile phone to do this.

3. Before you enter again the SIM card into the SINAUT MD720-3, please investigate why the SIM card has been PUK-blocked: Which PIN have you entered into your PLC program?

4. Please check and eventually reset the parameter SIMSTATE of the SINAUT MD720-3.

Check and reset the parameter SIMSTATE

The parameter SIMSTATE will be displayed when you press the SET button (refer to 6.2 *Getting the current settings and values*):

SIMSTATE=SIM_OK	Ready for operation
SIMSTATE=SIM_ERROR	Wrong PIN; one wrong PIN entry
SIMSTATE=SIM_PROBLEM	Wrong PIN; two wrong PIN entries or no SIM detected

In case of SIMSTATE=SIM_ERROR or SIMSTATE=SIM_PROBLEM please proceed as follows:

1. Please make sure, that the correct PIN is entered into the PLC program module.

2. Push the SET button until the factory default settings has been loaded (Attention, all settings will be reset)

   or

   Enter the following AT commands:

   AT^PARSTART
   AT^PARCSE
   AT^PAREND

3. Afterwards the device will perform a restart and is ready of operation again.

Changing the SIM card

If you change the SIM card, please do not forget to update also the PIN number in your application.

If you use a lot of SIM cards it can be helpful to set all PINs to the same PIN number. You can do this i.e. by using a mobile phone. Please observe the security requirements of your organization.

PIN-less SIM cards

The device operates also with SIM cards, which PIN check is deactivated. In this case the PIN check is skipped and the device will immediately try to attach the GSM network.

5.5   Log in to SINAUT MICRO SC

After the SINAUT MG720-3 is switched on and configured by the control or after a connection is broken off the SINAUT MD720-3 starts at once to connect itself with the OPC Server SIANAUT MICRO SC, if the SINAUT MD720-3 is in OPC mode.

If the trial of the SINAUT MD720-3 to connect with the OPC Server SIANAUT MICRO SC does not succeed it will start another trial according to the following scheme:

After switching on:	3 trials in succession
After about 2 minutes of waiting:	3 trials in succession
After about 4 minutes of waiting:	3 trials in succession
After about 6 minutes of waiting:	3 trials in succession
After about 10 minutes of waiting:	3 trials in succession
After about 15 minutes of waiting:	3 trials in succession
Always after each 15 minutes:	3 trials in succession

Service functions

6

6.1 Switching between Terminal mode and OPC Mode

The SINAUT MD720-3 is delivered by the factory with activated Terminal Mode.

Operated in combination with a S7-200 the OPC Mode of the SINAUT MD720-3 will be activated by program building blocks of the connected S7-200 PLC during the initialization.

Manual switching

There are the following two methods to switch the SINAUT MD720-3 manually from the Terminal Mode into the OPC Mode and vice versa.
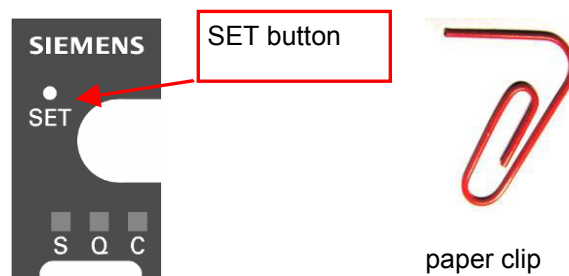
Method 1:

figure 6-1

Push the SET button while you are connecting SINAUT MD720-3 to the supply voltage, until the LEDs shows a fast lighting in sequence. The SINAUT MD720-3 changes the operating mode and keeps this new mode permanently until you change it again.

Method 2:

Change the operating mode by AT commands. Enter therefore the following commands:

+++

Activates the AT command interface and interrupts the data transfer.

AT^PARSTART<CR>

Activates the AT configuration

AT^PARSET="TERMINAL","MODE","SUPERVISED" <CR>

Selects the Terminal Mode, or

AT^PARSET="TERMINAL","MODE," DISABLE "<CR>

Selects the OPC Mode.

AT^PAREND<CR>

Deactivates the AT configuration and forces a restart of the SINAUT MD720-3.

The device restarts in the selected new operating mode.

6.2   Getting the current settings and values

Connect your PC to the interface X1 and start a terminal software, e.g. HyperTerminal. Select the used COM interface of the PC and configure the character format and the baudrate to the same settings as the X1 interface of the SINAUT MD720-3.

By factory default the SINAUT MD720-3 has the following settings:

Baudrate	9600 Bit/s (in OPC Mode) or 19200 Bit/s (in Terminal Mode)
Character format	8N1

When you push the SET button (less than 2 seconds) the correct IP configuration of the SINAUT MD720-3 is shown by the terminal software.

Assigned-IP:	Assigned IP address (OPC Mode)
Remote-Host:217.6.61.22	IP address of the OPC servers (OPC Mode)
Destination-Port:20030	Port address of the OPC server (OPC Mode)
Source-Port:26863	Own port address (OPC Mode)
Remote-Host2:	Reserved
Destination-Port2:26862	Reserved
Source-Port2:RANDOM	Reserved
Server-Mode:TSC	Reserved
Server-Line:LL	Reserved
Server-Username:st	User name at the OPC server (OPC Mode)
Server-Username2:G21	Reserved
Dial-Up:GPRS	Reserved
System-Time:1894	System time since last restart
Terminal-Mode:DISABLE	Active mode: Terminal mode or OPC Mode
Firmware-Version:V.1.2.0	Firmware-Version
SIM-STATUS:SIM-OK	SIM/PIN-Status
Provider:	GSM-Operator
NetID:	ID of the GSM-Operator
APN:	APN of the GPRS network
Quality:99	Receive quality (CSQ- value)
COM-Control:DTR	Reserved
COM-Baudrate:9600	Baudrate on X1 interface
COM-Format:8E1	Character format on X1 interface

6.3　Service mode to upload a new firmware

When the service mode is active you can update the firmware of SINAUT MD720-3.

The firmware contains the fundamental programming of the SINAUT MD720-3. If the manufacturer has produced new firmware, for example to equip the device with new functions, then this can be loaded into the SINAUT MD720-3.

You can find the latest firmware in the internet on the pages of des Siemens Service & Support (see Foreword).

To update the firmware please proceed as follows.

Switch on the service mode and connect the device to a PC

1. Push the SET button for 2 up to 4 seconds until the LED "Q" in ON, while the SINAUT MD720-3 is in operation. The device switches into the service mode.

2. Connect a PC to the interface X1 of the SINAUT MD720-3.

Installation of the modem driver

For the communication with the SINAUT MD720-3 in service mode you need to install a modem driver.

1. Open the *Control Panel* in the Start Menu.

2. Using Windows XP opens the category *Printers and Other Hardware* or switch to the Classic View.

3. Open the *Phone and Modem Options*.

4. Select *Add* in the register *Modems*.

5. Please follow the *Hardware-Wizard*.

6. Select *Don't detect my modem; I will select it from a list a*nd click *Next.*

7. Select from the manufacturer list *Standard Modem Types* the *Standard 19200 bps Modem* and click *Next.*

8. Select the COM-Port of your computer, the SINAUT MD720-3 is connected to and clicks *Next.*

9. Wait until the modem installation has been finished and click *Finish*.

10. In the *Phone and Modem Options* menu the *Standard 19200 bps* Modem is listed now.

11. Open the tab *Modems*, select the Standard 19200 bps modem and click *Properties*.

12. Select the tab *Modems* again and set the maximum speed to 57600. Then click *OK* twice.

13. Click *Start*, *Control Panel*. In the *Control Panel* window (classic view) double-click *System*, then select the tab *Hardware*.

14. Click the *Device Manager* button. In the *Device Manager* window beneath the item *Modems* double-click the Standard Modem 19200.

15. In the Properties window of this modem select the *Modem* tab. Set the speed to 57600. Close the window.

Installation of a Network Connection

The communication with the SINAUT MD720-3 in service mode is made via a network connection.

1. Open the *Control Panel* in the *Start* menu.

2. Using Windows XP open the category *Network and Internet Connections*.

3. Select *Create a connection to the network at your workplace* and follow the *New Connection Wizard*.

4. Select *Dial-up connection* and click *Next*.

5. From the shown list select the *Modem – Standard 19200 bps Modem* being installed before and click *Next*.

6. Enter a name for the new connection, e.g. *Service-MD720* and click *Next*.

7. Enter the phone number ***98#** and click *Next*.

8. Finish the installation wizard by clicking *Finish*.

9. Open the *Start* Menu and select the new connection (e.g. *Service-MD720)* in the menu *Connect to.*

10. Open *Properties,* select the *Modem – Standard 19200 bps Modem* and click *Configure*.

11. Choose the Maximum speed 9600 bps. Enable the hardware flow control and disable the other options.

12. Click two times *OK* to close the *Modem Configuration* and *Properties*.

Setup the Local Service Connection

When the modem driver and the network connection are installed and the SINAUT MD720-3 is connected to the COM-Port of the PC, the service connection can be established. Activate the service mode and continue as follows:

1. Open the *Start* Menu.

2. Select the new connection (e.g. *Service-MD720)* in the menu *Connect to.*

3. Enter the user name (default: service) and the password (default: service) and click *Dial.*

4. The connection will be established. After the connection is established an Icon appears in the Windows taskbar.

5. In the *Start* Menu click *All Programs*, *Accessories*, *Command Prompt*.

6. Enter the following command line: C:\WINDOWS>ftp 192.168.0.8
   Press Enter.

7. You will be asked for a User name (default: service) and a password (default: service). Enter both and observe capital or small characters.

8. If the connection is established successfully the message „230 User logged in" appears and the prompt changes to Ftp>.

Upload a new firmware into the SINAUT MD720-3

When the service connection is established, you can start to upload the new 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 „FirmewareName.BIN" write the name of the new firmware file.

2. At the Ftp>-prompt enter: **put** FirmwareName.BIN
   Press Enter. Instead of „FirmewareName.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.

The firmware update is ready, if:

- the LED "Q" is ON and the LED "C" blinks (MD720-3 with SIM card)

or

- the LED "S" blinks and the LED "C" is ON (MD720-3 without SIM card).

Release the local service connection

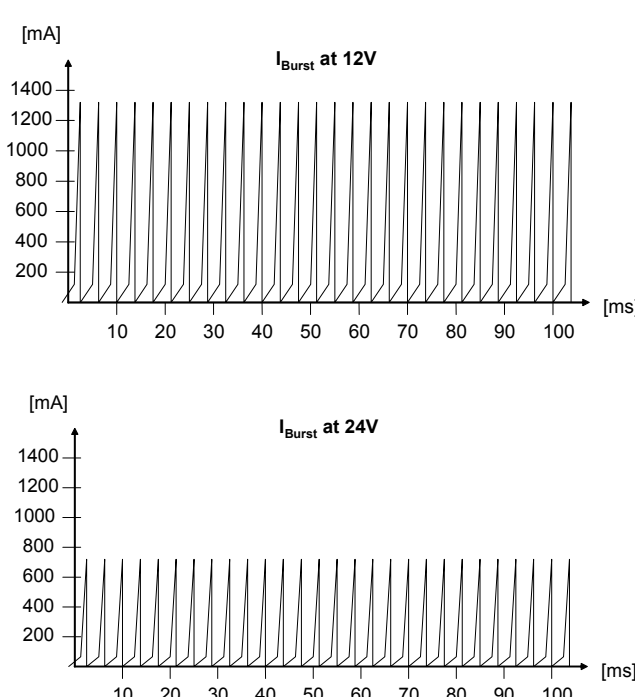Release the local service connection, if you do not need it anymore.

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.

6.4   Load factory defaults

By pushing the SET button for more than 4 seconds till the LED "C" begins to light up, the configuration of the SINAUT MD720-3 will be reset to factory default settings.

Technical Data

<div style="text-align: right; font-size: 2em;">7</div>

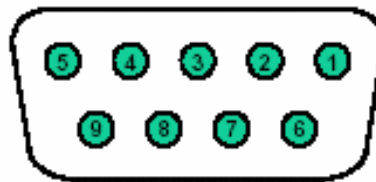| Interface X1	Function	GPRS connections to SINAUT MICRO SC GSM data calls (CSD 9.600 bps) MTC SMS sending
	Standard	RS232 (V.24 / V.28), socket: D-SUB 9 pins
	Default speed	9600 bps
	Control	AT commands
Air interface	GSM module	GPRS / CSD / Quad band
	GPRS	Up to 2 uplinks / up to 4 downlinks (max. 5 Slots)
	Transmit power	GSM 850 MHz (max. 2W), GSM 900 MHz (max. 2W), DCS 1800 MHz (max. 1W), PCS 1900 MHz (max. 1W)
	Antenna connector	SMA / 50 Ohm
Power supply	power consumption	typ. 5.5W
	Supply voltage	12 - 30 VDC (24 VDC nominal)
	Supply current / Established GPRS connection with data exchange	I_{Burst} at 12V graph and I_{Burst} at 24V graph I_n 430mA at 12V (I_{Burst} 1,3A), I_n 165mA at 24V (I_{Burst} 0,8A), 4,62ms Burst repetition rate

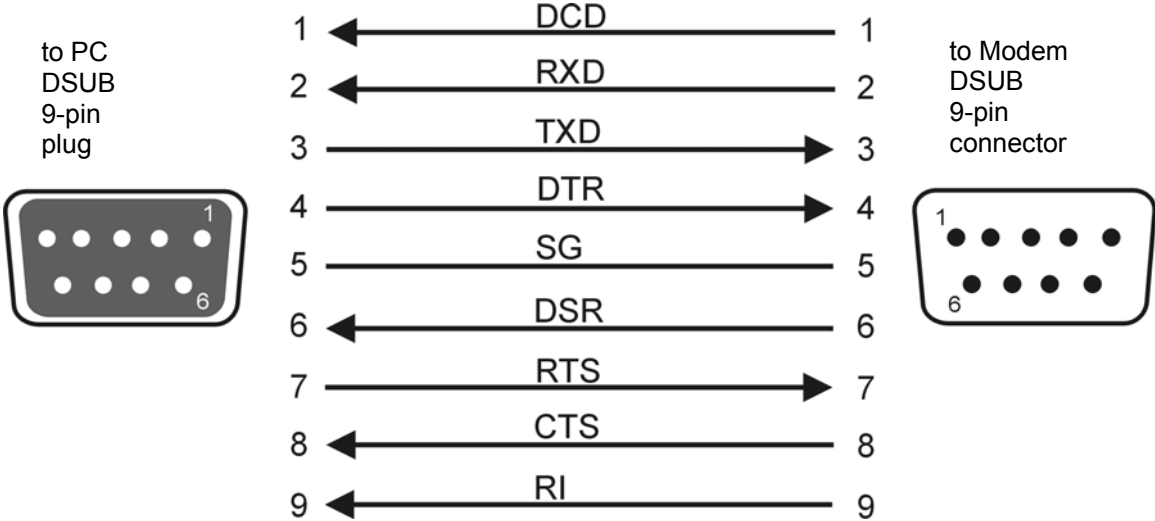|		
	Supply current / no connection or connection to SINAUT MICRO SC without data exchange	In 90mA at 12V In 50mA at 24V In 40mA at 30V
Ambient conditions	Temperature range	Operation: –20°C up to +60°C Storage: –25°C up to +85°C
	Humidity	0-95 %, not condensing
Mechanics	Construction	Top-hat rail housing
	Material	Synthetic material
	Protection category	IP40
	Dimensions	114 mm x 22,5 mm x 99 mm (L x W x H)
	Weight	Approx. 150g
Approvals	CE	Yes
	R&TTE	Yes
	EMV / ESD	EN 55024, EN 55022 Class A, EN 61000-6-2
	ATEX	III 3 G EEx nA II T4 Ta=-20°C-60°C KEMA 03 ATEX 1229 X
	FM	CLI, DIV2, GP. A,B,C,D T4 Ta=-20°C-60°C CLI, Zone 2 IIC, T4 Ta=-20°C-60°C
	UL	E301826

Interface X1

Signals
(Signal direction DTE)

Pin1 DCD Output
Pin2 RXD Output
Pin3 TXD Input
Pin4 DTR Input
Pin5 GND Signal ground
Pin6 DSR Output
Pin7 RTS Input
Pin8 CTS Output
Pin9 RI Output

SUB-D9 socket, Pin assignment RS232

SINAUT MD720-3
C79000-G8976-C211

Modem cable for Service Interface

to PC
DSUB
9-pin
plug

1	←	DCD		1	to Modem
2	←	RXD		2	DSUB
3	→	TXD		3	9-pin
4	→	DTR		4	connector
5	—	SG		5	
6	←	DSR		6	
7	→	RTS		7	
8	←	CTS		8	
9	←	RI		9	

The line RI is an option.

Glossary

GSM

Global **S**ystem for **M**obile Communication

Global standard for wireless telephony, data and fax transmission and transmission of text messages (SMS). GSM based networks are available in a lot of countries world-wide, with high coverage in Europe, China, Latin America as well as in regions of the USA, Africa and Russia. Depending on the used frequencies you distinguish PCS 850MHz, GSM 900MHz, DCS 1800MHz und PCS 1900MHz networks.

CSD

Circuit **S**witched **D**ata

GSM Service for wireless data transmission at 9600 bps full duplex. Connections can be established to other GSM devices, to analogue modems or to ISDN modems in wired networks. The connections can be initialized at both sides. Only dial-up connections are supported.

GPRS

General **P**acket **R**adio **S**ervice

GSM service for IP-based data transmission. Over GPRS network connections are established, either to the internet or to private networks.. Data are transmitted using the internet protocols TCP/IP or UDP/IP.

OPC

OPC covers a series of specification for data exchange in automation technologies between control devices, sensors etc. and control systems (see www.opcfoundation.org).

Protocol, transmission protocol

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, TCP/IP and PPP.

COM-Port

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.

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