TAINY GMOD-S3

User Manual

Dr. Neuhaus

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Product no.:	3198
Doc. no.:	3198AD001 Version 1.5 / January 2015
Compatible with:	Firmware Version 1.227

Classification of safety instructions

This manual contains instructions which you must follow for your own personal safety and to prevent property damage. A warning triangle is provided to draw your attention to instructions for your personal safety; no warning triangle is provided for instructions for general property damage. Warning notices are provided in the following sequence according to the decreasing severity of the hazard.

Danger

means that death or severe bodily injury **will** occur if the appropriate precautionary measures are not taken.

Warning

means that death or severe bodily injury **can** occur if the appropriate precautionary measures are not taken.

Caution

with a warning triangle means that minor bodily injury can occur if the appropriate precautionary measures are not taken.

Caution

without a warning triangle means that property damage can occur if the appropriate precautionary measures are not taken.

Attention

means that an undesired result or status can arise if the corresponding instructions are not followed.

In the event of multiple hazard levels simultaneously, the warning notice of the highest respective level always applies. If a warning of personal injury is provided in a warning notice with a warning triangle, a warning of property damage can also be added.

Safety instructions

General

Warning

The product TAINY GMOD-S3 conforms to the European standard EN60950-1), Information technology - safety. Carefully read the installation manual before using the device. Keep the device away from children, especially small children. The device may not be installed and operated outdoors or in humid rooms. Do not commission the device if there is damage to the connection cables or the device itself.

Qualified personnel

Warning

The corresponding device/system may only be set up and operated in connection with this documentation. Commissioning and operation of a device and system may only be performed by **qualified personnel.** Qualified personnel in the sense of the safety-related instructions of this documentation are persons who are authorised to commission, earth and identify devices, systems and electric circuits.

Intended use

Warning

The device may only be used for intended application in the data sheets and in this document. Proper transport, storage, set-up and assembly, as well as careful operation and service are prerequisite for fault-free and safe operation of the product.

External power supply

Observe the following:

Warning

Only use an external power supply that likewise conforms to EN60950. The output voltage of the external power supply may not exceed 30V DC. The output of the external power supply must be short-circuit-proof.

The TAINY GMOD-S3 may only be supplied from power supplies in accordance with IEC/EN60950 section 2.5 "Power source with limited power". The external power supply for the TAINY GMOD-S3 must correspond to the provisions for NEC Class 2 power circuits, as defined in the National Electrical Code ® (ANSI/NFPA 70).

With connection to a battery, make sure a disconnecting device for all poles (battery main switch) with sufficient a sufficient disconnection rating as well as a fuse with sufficient disconnection rating (32 V, 3 A) is provided between the device and the battery.

Observe the section Technical data of this documentation (chapter 13), as well as the specifications for installation and use of the respective manufacturer of the power supply or battery.

Handling cables

Warning

Never pull on the cable to remove a cable plug from its socket; pull on the plug instead. Do not route cables over sharp corners and edges without an edge guard. If applicable, ensure that the cable has sufficient strain relief.

Antenna assembly

Attention

When routeing the antenna cable, pay attention to the bending radii. Non-observance of the bending radii of the antenna cable will diminish the transmission and reception properties for the device. The minimum bending radius may not statically exceed 5 times the cable diameter and may not dynamically exceed 15 times the cable diameter.

HF exposure

Warning

Never use the device in areas in which the operation of radio equipment is prohibited. The device contains a radio transmitter which can impair the function of medical electronic devices like hearing aids or pacemakers. Your doctor or the manufacturer of such devices can advise you. In order to ensure that no data carriers are demagnetised, please do not store any diskettes, credit cards or other magnetic data carriers in the vicinity of the device..

Caution

Normally, work the antenna connected to the transmitter of this device operates in all directions with 0 dB amplification. The composite power in PCS mode is less than 1 watt ERP with the use of this antenna.

Using directional antennas, the council recommendation 199/519/EG dated July, 12, 1999 on limiting the general public's exposure to electromagnetic fields (0 hertz to 300 gigahertz) shall be observed.

The internal/external antennas used with this mobile device must be at least 20 cm away from people. And they may not be placed or operated in a manner such that they work together with other antennas or transmitters.

Caution: Costs

Caution

Please observe that even with (re-) establishment of a connection, data packages subject to a charge are exchange for connection attempts to the remote station (e.g. server switched off, incorrect destination address, etc.), as well as for maintaining a connection. For example, additional costs can arise with unsuccessful attempts to establish a connection with a remote station that cannot be reached.

Table of Contents

1 Introduction

The TAINY GMOD-S3 fulfil the following purpose:

GPRS data communication for machines which are not TCP/IP capable.

The TAINY GMOD-S3 establishes a bidirectional data connection via the GRPS (**G**eneral **P**acket **R**adio **S**ervice) of a GSM network (**G**lobal **S**ystem for **M**obile Communication = mobile radio network).

The communication required for this purpose is delivered by means of TCP/IP protocol by the TAINY GMOD-S3. It thereby transfers data from devices, machines, computers, etc. which are not TCP/IP capable.

GSM data communication

The TAINY GMOD-S3 can also be operated like a conventional GSM modem in order to transfer data over the GSM network to any other arbitrary modem in the GSM or fixed network. In this GSM mode, the TAINY GMOD-S3 can actively establish connections and even accept calls.

Remote configuration via GPRS data connection

The TAINY GMOD-S3 remote configuration is also possible via GPRS data connection (see chapter 9.1).

Practical examples

The TAINY GMOD-S3 is ideally suited for communication with al M2M (machine to machine) or PLC applications (programmable logic control).

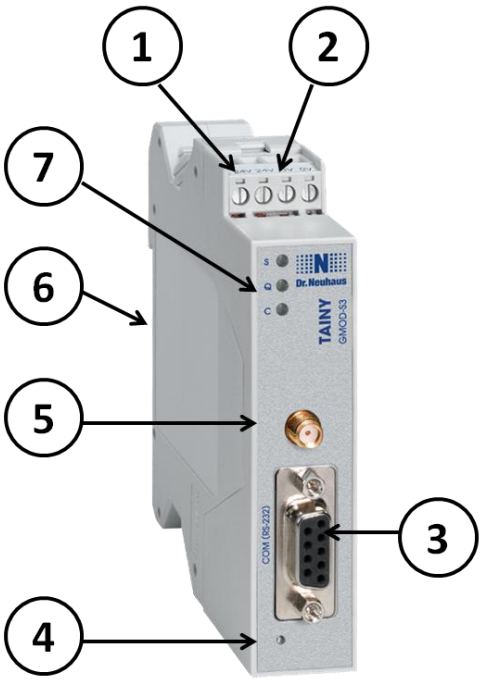
- Data recorded from power, water or gas consumption, from vending machines or fill levels
- Remote maintenance
- Transmission of alarm messages
- Fast data transmission for electronic payments
- Control of machines
- Control of vending machines
- Transmission of weather data

Attention

For time-critical applications, there may be limitations with GPRS transmissions. Although transmission in the GPRS network normally only takes about 100 milliseconds, individual data packages can take longer due to the package-transmitting infrastructure of the GPRS network – in other words it may take up several seconds.
Even with the use of time-critical control software, this can lead to problems if it awaits responses to sent commands within a certain time.

2 Installation

2.1 Controls



1 – Supply +24V

2 – Supply 0V

3 – Local serial interface

4 – Service button

5 – Antenna socket

6 – SIM card holder*)

7 – Signal lamps

*) The SIM card holder is located on the rear side of the device

2.2 Connections

Connection for power supply

The 4 screw terminals at the top are for connection of the power supply source:

Input voltage range:	10 - 30 VDC (24 VDC nominal)
Power consumption:	P_{MAX}= 3.25 W;
	See Technical data

The two screw terminals to the left (24 V) are connected to each other.

The two screw terminals to the right (0 V) are connected to each other.

Caution:

The TAINY GMOD-S3 can be used as a substitute for a TAINY GMOD-T1. Note the different wiring at the connection of the power supply (+24V; 0V):

Remove the bridge between the two inner screw terminals, or do not connect the signal input SW as for the TAINY GMOD-T1 at TAINY GMOD-S3, because it causes a short circuit of the power supply.

Warning:

The mains adaptor of the TAINY xMOD is not isolated. Please observe the safety instructions at the beginning of this manual.

Note:

Please ensure sufficient dimensioning of the supply source. If the supply is too weak, unstable operation can arise.

Local serial interface

You connect the COM interface of the TAINY GMOD-S3 to the application, e.g. sensor, vending machine, computer. For this purpose, use a V.24 cable. The interface is a V.24 interface with V.28 level, also known as RS-232; see also chapter 9.12.

If your application has a different interface, such as CAN, Ethernet or another industrial bus, a conventional interface converter can be used.

Antenna socket

The TAINY GMOD-S3 has a type SMA antenna socket for connecting an antenna. Make sure that an antenna is always connected during operation.

The antenna which is used should have an impedance of approx. 50 Ohm. It must be synchronised for GSM 900 MHz and DCS 1800MHz or GSM 850 MHz and PCS 1900 MHz, depending on which frequency bands you GSM mobile radio operator uses. In Europe and China, GSM 900 MHz, DCS, 1800 MHz are used, in the USA GSM 850 MHz and PCS 1900 MHz are used. Please contact your network operator for information.

The adjustment (VSWR) of the antenna must be 1:2.5 or better.

Attention:

Please only use antennas from the accessory programme for the TAINY xMOD. These antennas have been tested by us and guarantee the described product features.

A sufficiently good signal quality must be ensured with the installation of the antenna. Use the signal lamps of the TAINY GMOD-S3, which show you the signal quality.

Please observe the manual for assembly and use of the antenna which is used.

2.3 Signal lamps

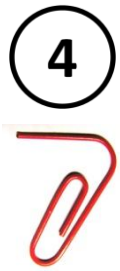
The TAINY GMOD-S3 has three signal lamps **S**, **Q** and **C** for display of the operating statuses.

LED	Status	Meaning
S, Q, C together	Light up in sequence quickly	Booting
	Light up in sequence slowly	Update
	Flashing quickly in unison	Error
S (Status)	Flashing slowly	Waiting for PIN entry
	Flashing quickly	PIN error / SIM error
	Always OFF	No IP address available
	Always ON	IP address available
Q (Quality)	Flashing slowly	Logging into the GSM network
	Flash 1 time with interval	Field strength not sufficient
	Flash 2 time with interval	Field strength sufficient
	Flash 3 time with interval	Field strength good
	Always ON	Field strength very good
	OFF	Waiting for PIN
C (Connect)	OFF	No connection
	Flashing slowly	Connection establishment
	Always ON	GPRS data connection established (IPT, RSV, RCL)

Slow flashing: 1 time per second; Fast flashing: 4 times per second.

In TAM mode the LED Connect is not used (OFF).

2.4 Service button



There is a small hole on the front side of the TAINY GMOD-S3 where a button is located. Use a thin object, such as a straightened paper clip, to press the button.

- When you press the button during operation for less than 2 seconds until the LED "S" (Status) begins to illuminate, the device delivers the current settings for the device and the value and local serial interface.
- When you press the button during operation for longer than 2 seconds until the "C" (Connect) LED begins to illuminate, the TAINY GMOD-S3 begins a local firmware update (see chapter 11).
- When you press the button during operation for longer than 4 seconds until the "C" (Connect) LED begins to illuminate, the factory configuration is loaded.

2.5 SIM card holder

Before you insert or remove the SIMN card holder, please completely disconnect the TAINY GMOD-S3 from the supply voltage.

Note!

Never insert or remove the SIM card during operation. The SIM card and the TAINY GMOD-S3 could be damaged.

The tray for the SIM card is located on the rear side of the device. There is a small button immediately next to the tray for the SIM card in the housing opening. Press this button with a pointed object, e.g. a pencil.

When you press the button the SIM card tray comes out of the housing.

Insert the SIM card in the tray so that its gold contacts remain visible.

Then slide the tray with SIM card completely into the housing.

2.6 Mounting

The TAINY GMOD-S3 is suitable for mounting on cap rails in accordance with DIN EN 50022. The corresponding mount is located on the rear side of the device.

3 Operating modes

Overview

The TAINY GMOD-S3 can be operated in various modes in order to cover a variety of applications.

The following operating modes can be selected:

- IPT (IP-Telemetry Client)
- TSC (TSC-Protocol Client)
- RSV (Raw TCP Server)
- RCL (Raw TCP Client)
- TAM (Terminal Adapter Mode)

Selecting the operating mode

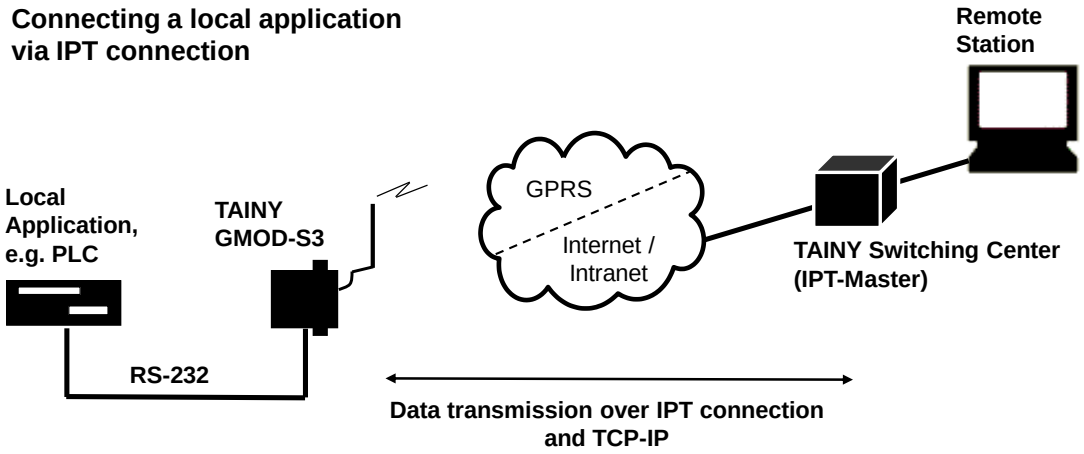
Switching between operating modes takes place with the AT command for the parameterisation (see chapter 9.3).

AT command	Description	Op. mode / Interface
AT^Pb00=<value> *Example:* *AT^Pb00=IPT*	**Selecting the operating mode** The parameter determines which operating mode is used. IPT = IP Telemetry Client TSC = TSC-Protocol-Client RSV = TCP/IP Server RCL = TCP/IP Client TAM = Terminal Adapter (Default) Possible responses: OK, ERROR	IPT, RSV, RCL, TAM / Local

4 IPT operating mode (IP-Telemetry)

Operating method

The TAINY GMOD-S3 automatically logs into the GSM network, logs onto the GPRS and establishes an IP telemetry connection to an IPT master, e.g. the TAINY Switching Center, in IPT operating mode.



Together with the TAINY Switching Center, both dedicated connections (LL = Leased Line) and switched connections (CS = Circuit Switched) are supported by IP telemetry.

The local application and the remote IPT station can exchange transparent data over the established IPT connection and the local serial interface.

Note: The TAINY GMOD-S3 supports besides the IPT-Protocol also the TSC-Protocol of the previous product. Refer to chapter 5.

Parameterisation

Proceed according to the following steps to parameterise the TAINY GMOD-S3 for operation on the TAINY Switching Center (IPT master):

☞ **Chapter 4**

1. Choose the operating mode IPT with the command **AT^Pb00**.

☞ **Chapter 9.4**

2. Enter the PIN number with **AT^Pi01**.

☞ **Chapter 9.6**

3. Define whether the GPRS access parameter should be selected automatically based on the inserted SIM card or statically with **AT^Pe01**.

☞ **Chapter 9.6**

4. Enter the GPRS access parameters:

   - Network ID
   - Free text for identification of the network operator
   - Access Point Name (APN)
   - GPRS login name
   - GPRS login password
   - Primary Domain Name Server (DNS1)
   - Secondary Domain Name Server (DNS1)

☞ **Chapter 9.7**

5. Enter the address and port of the primary and, if applicable, secondary IPT master:

   - Address of the primary destination server
   - Port on the primary destination server

   - Address of the secondary destination server
   - Port on the secondary destination server

☞ **Chapter 9.8**

6. Enter the login data for the IPT master:

   - Login name for primary IPT master
   - Login password on the primary IPT master

   - Login name for secondary IPT master
   - Login password on the secondary IPT master

☞ **Chapter 9.10**

7. Define whether the TAINY GMOD-S3 should work in dedicated or dial-up mode:

   - Dedicated / dial-up connection selection

☞ **Chapter 9.11**

8. Define whether the TAINY GMOD-S3 should automatically accept an incoming IPT connection:

   - Automatic call acceptance

☞ **Chapter 9.12**

9. Define the bit rate, the character format and the function of the interface signals on the local serial interface:

   - Bit rate on the local serial interface
   - Data format on the local serial interface
   - DTR control
   - RTS control

☞ **Chapter 9.13**

10. Define whether the TAINY GMOD-S3 should issue responses at the local interface (Connect; No Carrier, etc.):

    - Responses

☞ **Chapter 9.14**

11. Define how the data packaging should take place at the local interface:

    - TCP/IP package size
    - Wait time
    - Null character

☞ **Chapter 9.15**

12. Define the interval in which the TAINY GMOD-S3 is automatically restarted or switch off the automatic periodic restart:

    - Interval of the periodic reboot

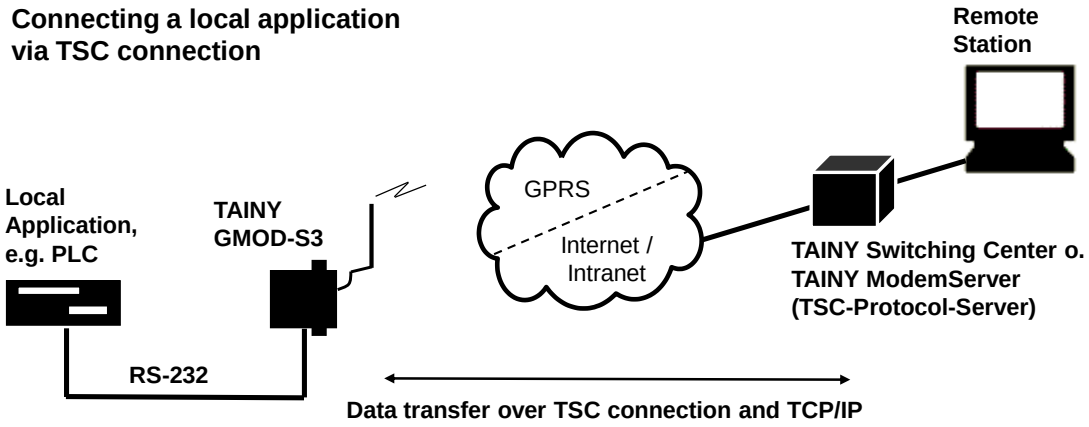
Operation

The TAINY GMOD-S3 can be controlled in IPT operating mode with the AT commands listed in chapter 9.17. AT commands that are accepted in this operating mode are identified with IPT.

5 TSC operating mode (TSC-Protocol)

Operating method

The TAINY GMOD-S3 in TSC operating mode automatically logs into the GSM network, logs onto the GPRS and establishes a TSC protocol connection to a TAINY Switching Center or a TAINY ModemServer.



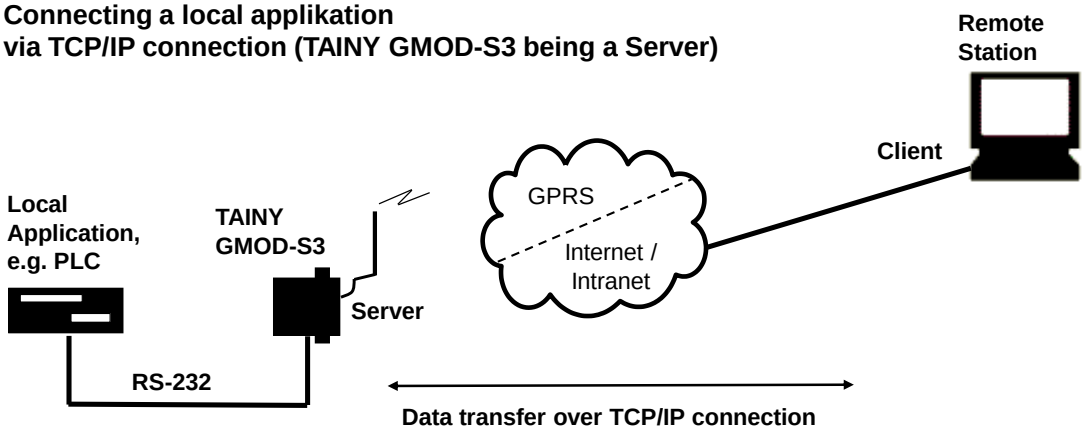
Together with the TAINY ModemServer or the TAINY Switching Center, both dedicated connections (LL = Leased Line) and switched connections (CS = Circuit Switched) are supported by IP telemetry.

Note: The functions of the TAINY GMOD-S3 in the TSC operating mode correlates to the functions of the TAINY GMOD-S3 in IPT operating mode. This manual distinguishes only between IPT and TSC operating mode, if the device acts different in both modes. Otherwise the expression IPT used in this manual stands for both IPT and TSC operating mode.

6 RSV (Raw TCP Server)

The TAINY GMOD-S3 automatically logs into the GSM network, logs onto the GPRS and acts as a TCP/IP server. TCP/IP clients can establish a TCP/IP connection to the TAINY GMOD-S3. For this purpose, the IP address of the TAINY GMOD-S3 must be known, e.g. with assignment of a permanent IP address by the GPRS network.

Connecting a local applikation via TCP/IP connection (TAINY GMOD-S3 being a Server)



The local application and the remote TCP/IP station can exchange transparent data over the established TCP/IP connection and the local serial interface.

Parameterisation

Proceed according to the following steps to parameterise the TAINY GMOD-S3 for operation as a TCP/IP server:

☞ **Chapter 4**
- Choose the operating mode RSV with the command AT^Pb00.

☞ **Chapter 9.4**
- Enter the PIN number with **AT^Pi01**.

☞ **Chapter 9.6**
- Define whether the GPRS access parameter should be selected automatically based on the inserted SIM card or statically with **AT^Pe01**.

☞ **Chapter 9.6**
- Enter the GPRS access parameters:

  - Network ID
  - Free text for identification of the network operator
  - Access Point Name (APN)
  - GPRS login name
  - GPRS login password
  - Primary Domain Name Server (DNS1)
  - Secondary Domain Name Server (DNS1)

☞ **Chapter 9.11**

- Define whether the TAINY GMOD-S3 should automatically accept an incoming TCP/IP connection:

  - Automatic call acceptance

☞ **Chapter 9.12**

- Define the bit rate, the character format and the function of the interface signals on the local serial interface:

  - Bit rate on the local serial interface
  - Data format on the local serial interface
  - DTR control
  - RTS control

☞ **Chapter 9.13**

- Define whether the TAINY GMOD-S3 should issue responses at the local interface (Connect; No Carrier, etc.):

  - Responses

☞ **Chapter 9.14**

- Define how the data packaging should take place at the local interface:

  - TCP/IP package size
  - Wait time
  - Null character

☞ **Chapter 9.15**

- Define the interval in which the TAINY GMOD-S3 is automatically restarted or switch off the automatic periodic restart:

  - Interval of the periodic reboot

☞ **Chapter 9.17**

- Define the port number and the IP filter for the Raw-TCP-Server mode:

  - Port of the TAINY GMOD-S3 in RSV operation mode
  - IP filter 1…3 for RSV data connections

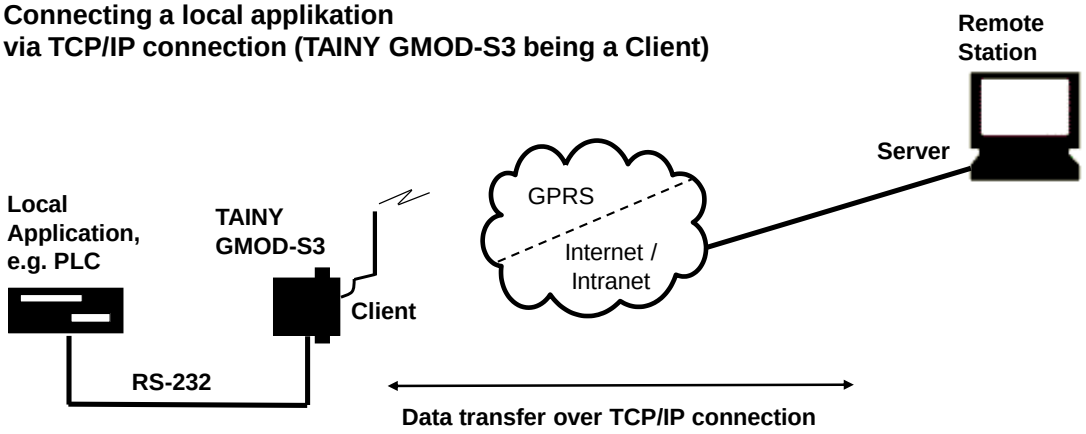
Operation

The TAINY GMOD-S3 can be controlled in RSV operating mode with the AT commands listed in chapter 9.17. AT commands that are accepted in this operating mode are identified with RSV.

7 RCL (Raw TCP Client)

The TAINY GMOD-S3 automatically logs into the GSM network, logs onto the GPRS and, as a TCP/IP client, establishes a TCP/IP connection to a TCP/IP server, address of which was configured in the TAINY GMOD-S3 ahead of time. For this purpose, the IP address must be known to the TCP/IP server.

Connecting a local applikation via TCP/IP connection (TAINY GMOD-S3 being a Client)



The local application and the remote TCP/IP server can exchange transparent data over the established TCP/IP connection and the local serial interface.

Parameterisation

Proceed according to the following steps to parameterise the TAINY GMOD-S3 for operation as a TCP/IP client:

☞ **Chapter 4**

1. Choose the operating mode RCL with the command **AT^Pb00**.

☞ **Chapter 9.4**

2. Enter the PIN number with **AT^Pi01**.

☞ **Chapter 9.6**

3. Define whether the GPRS access parameter should be selected automatically based on the inserted SIM card or statically with **AT^Pe01**.

☞ **Chapter 9.6**

4. Enter the GPRS access parameters:

   - Network ID
   - Free text for identification of the network operator
   - Access Point Name (APN)
   - GPRS login name
   - GPRS login password
   - Primary Domain Name Server (DNS1)
   - Secondary Domain Name Server (DNS1)

☞ **Chapter 9.7**

5. Enter the address and port of the primary and, if applicable, secondary TCP/IP server:

   - Address of the primary destination server
   - Port on the primary destination server

   - Address of the secondary destination server
   - Port on the secondary destination server

☞ **Chapter 9.10**

6. Define whether the TAINY GMOD-S3 should work in dedicated or dial-up mode:

   - Dedicated / dial-up connection selection

☞ **Chapter 9.12**

7. Define the bit rate, the character format and the function of the interface signals on the local serial interface:

   - Bit rate on the local serial interface
   - Data format on the local serial interface
   - DTR control
   - RTS control

☞ **Chapter 9.13**

8. Define whether the TAINY GMOD-S3 should issue responses at the local interface (Connect; No Carrier, etc.):

   - Responses

☞ **Chapter 9.14**

9. Define how the data packaging should take place at the local interface:

   - TCP/IP package size
   - Wait time
   - Null character

☞ **Chapter 9.15**

10. Define the interval in which the TAINY GMOD-S3 is automatically restarted or switch off the automatic periodic restart:

    - Interval of the periodic reboot

Operation

The TAINY GMOD-S3 can be controlled in RCL operating mode with the AT commands listed in chapter 9.17. AT commands that are accepted in this operating mode are identified with RCL.

8 TAM (Terminal Adapter Mode)

In terminal adapter mode the TAINY GMOD-S3 behaves like a GSM data modem. It is directly controllable by AT commands.

CSD connections can be initiated and accepted.

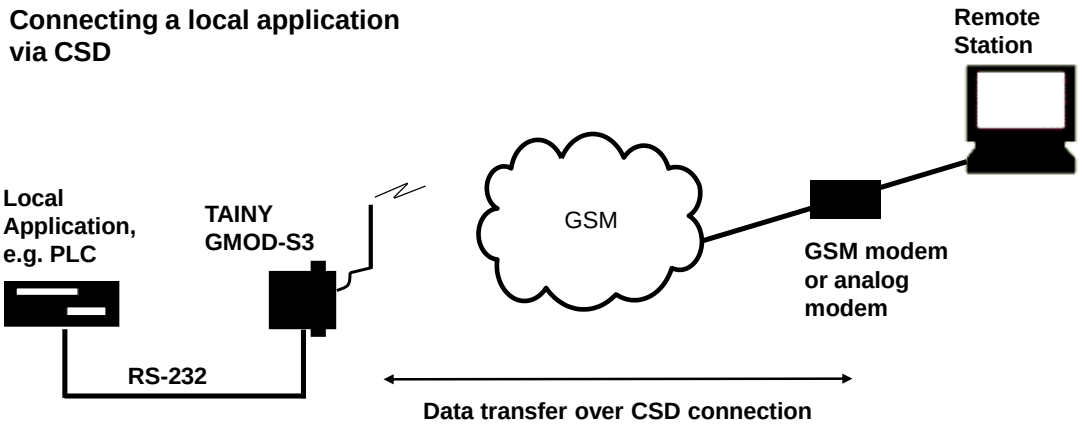
The TAINY GMOD-S3 can be used as a substitute for a TAINY GMOD-T1.

Caution:

Note the different wiring at the connection of the power supply (+24V; 0V):

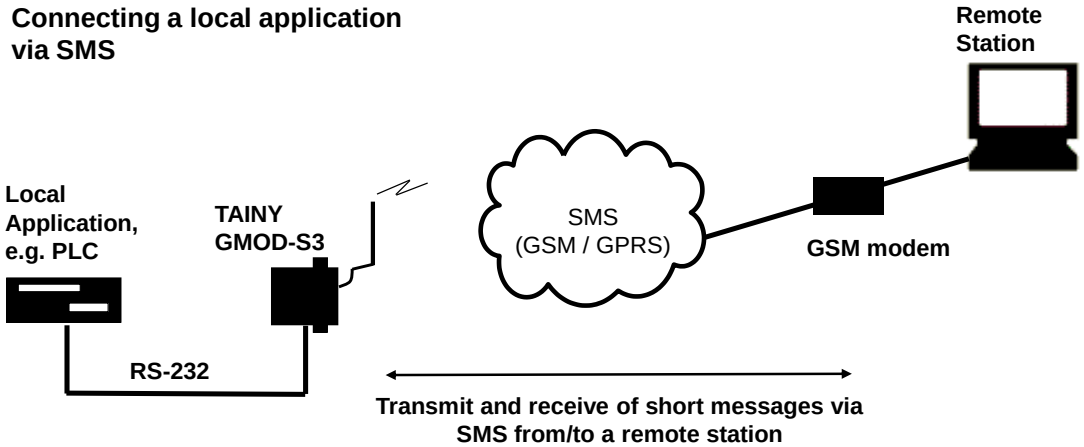
Remove the bridge between the two inner screw terminals, or do not connect the signal input SW as for the TAINY GMOD-T1 at TAINY GMOD-S3, because it causes a short circuit of the power supply.

Connecting a local application via CSD



SMSs can be sent or received.

Connecting a local application via SMS



Parameterisation

Proceed according to the following steps to parameterise the TAINY GMOD-S3 for operation as a GSM terminal adapter

☞ **Chapter 4**

13. Choose the operating mode TAM with the command **AT^Pb00**.

☞ **Chapter 10.1**

1. Define whether the TAINY GMOD-S3 should automatically accept an incoming CSD call connection with the AT command ATS0.

☞ **Chapter 9.4**

11. Enter the PIN number with **AT+CPIN** after **every restart**.

    Note: If the AT command AT&W is entered after AT+CPIN="xxxx", the TAINY GMOD-S3 saves the PIN. Then it is not necessary to enter the PIN again.

Operation

The TAINY GMOD-S3 can be controlled in TAM operating mode with the AT commands listed in chapter 9.17. AT commands that are accepted in this operating mode are identified with TAM.

9 Parameterisation and control

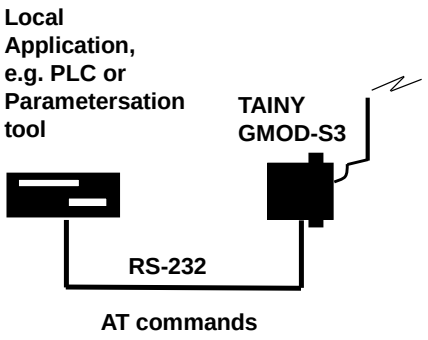
9.1 Methods

Local parameterisation

The local parameterisation of the TAINY GMOD-S3 takes place by means of AT commands over the serial RS-232 interface.

Operating modes: IPT, RSV, RCL, TAM

Local parameterisation, control of TAINY GMOD-S3 by AT commands



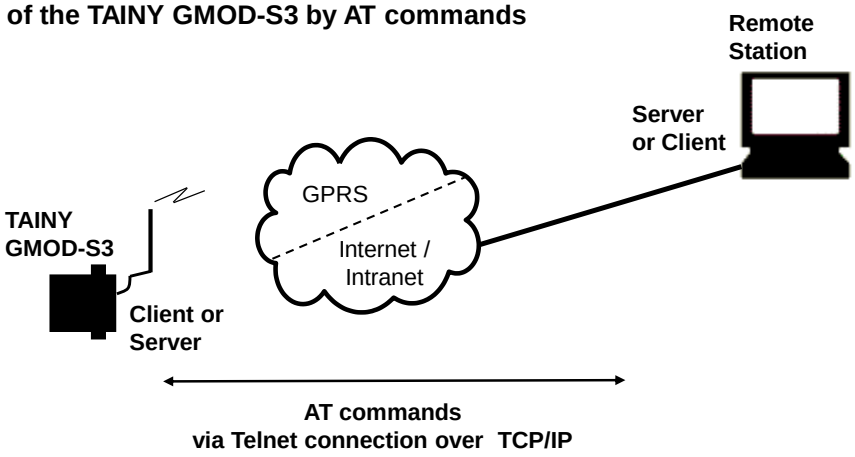
Remote parameterisation

The remote parameterisation of the TAINY GMOD-S3 takes place by means of AT commands over a simple TCP/IP connection.

The remote parameterisation need to be configured before, see chap. 9.18.

Operating modes: IPT, RSV, RCL

Parameterisation of the TAINY GMOD-S3 by AT commands via Telnet/TCP/IP



9.2 Entry of AT commands

The TAINY GMOD-S3 is controlled via AT commands which are either transmitted to it from the connected application or by means of manual entry over a terminal program.

Working with a terminal program

To control the device directly with AT commands, use a terminal program, such as HyperTerminal which is included in Windows Accessories up to Windows XP or ZOC.

Pay attention to the following settings:

Establish connection via:	COM port to which the device is connected
Speed:	19200 bit/s
Data bits:	8
Parity:	no
Stop bits:	1
Duplex:	full

Syntax

The AT command language is a standard for the control of modems. It is line-oriented. Each command line begins with AT (for ATtention) following by the actual command and ends with (enter key).

Example: **ATD444444¬**

means: select (D for dial) 444444

There are only 2 exceptions to this rule:

The command **+++** to change to the command phase (see below) and the command **A/**, with which the last entered command line is repeated.

Command phase, transparent phase

The device is only activated by AT commands if it is in **command phase**.

It is in command phase,

- if no connection has been established,
- if the sequence pause **+++** has been entered during a connection.

The device does not accept any AT commands if it is in **transparent phase**.

It is in transparent phase,

- if a connection to the remote station has been established,
- if a switch to the command phase took place with **+++** during an existing connection and then a switch back to transparent phase has taken place with **ATO**.

Switching local echo on and off

In order to see your entries on the screen, switch on the local data echo, if necessary. For this purpose, give the following command to the device:
ATE1

You can switch the local data echo off again with the command: **ATE0**

9.3 Parameterisation with AT commands

Start of the parameterisation (AT^PARSTART)

To be able to parameterise the TAINY GMOD-S3 by means of AT commands, it must be in command mode.

With entry of the AT command **AT^PARSTART**, parameterisation mode is switched on.

Then the individual parameterisation commands can be entered.

The TAINY GMOD-S3 can be configured between **AT^PARSTART** and **AT^PAREND** using parameterisation commands listed below.

End of the parameterisation (AT^PAREND)

To finish the parameterisation, enter the AT command **AT^PAREND**.

Query of the parameterisation (AT^PARGETALL)

To finish the parameterisation, enter the AT command **AT^PARGETALL**.

```
at^pargetall  // Command
^PA00: "0"    // address of the primary destination server
^PA01: "0"    // address of the secondary destination receiver
^PA02: 26863  // port of the primary destination server
^PA03: 26863  // port of the secondary destination receiver
^PA06: 3      // number of attempts to establish connection
^PA08: 3,5,15,30,60,60,60,60,60,60
              // wait time to establish connection
^PB00: TAM    // operating mode
^PB01: CS     // dedicated / dial-up connection selection
^PB03: NONE   // login name for primary IPT master
^PB04: "PW0"  // login password on the primary IPT master
^PB05: NONE   // login name for secondary IPT master
^PB06: "PW0"  // login password on the secondary IPT master
^PB07: NONE   // IPT call number of the remote station with
               // DTR selection
^PE01: NONE   // process for selection of access data
^PE07: 8082   // port in RSV operating mode
^PE08: NONE   // port for remote parameterisation
```

```
^PH00: NONE          // Access Point Name (APN)
^PH01: "guest"       // GPRS login name
^PH02: "guest"       // GPRS login password
^PH03: NONE          // primary Domain Name Server (DNS1)
^PH04: NONE          // secondary Domain Name Server (DNS2)
^PI00: OFF           // STK handling off / on
^PI01: NONE          // PIN of the SIM card
^PI02: NONE          // new PIN
^PI05: 0             // Enable / Disable Roaming
^PJ00: OFF           // DTR control
^PJ01: 0             // Auto. call acceptance (TAM; IPT, RSV)
^PJ02: OFF           // ignore RTS
^PJ03: 19200         // baud rate at local interface
^PJ04: 8N1           // character format at local interface
^PJ06: 1             // Delay for half duplex mode
^PL00: "DNT3198"     // product identifier
^PL02: 24            // interval for periodic reboot (h)
^PN00: NONE          // (Reserved; do not change)
^PN01: NONE          // (Reserved; do not change)
^PN02: NONE          // (Reserved; do not change)
^PO00: NONE          // (Reserved; do not change)
^PO01: NONE          // (Reserved; do not change)
^PO02: NONE          // (Reserved; do not change)
^PQ00: 1             // TCP/IP package size
^PQ01: 500           // wait time before sending data packages
^PQ02: NONE          // null character
^PQ08: 0             // CSD-Idle-Timeout
^PQ09: 0             // CSD-Connection-Timeout
^PR03: ON            // reply off
^PS00: NONE          // IP filter 1 for RSV connection
^PS01: NONE          // IP filter 2 for RSV connection
^PS02: NONE          // IP filter 3 for RSV connection
^PT00: NONE          // IP filter 1 for remote parameterisation
^PT01: NONE          // IP filter 2 for remote parameterisation
^PT02: NONE          // IP filter 3 for remote parameterisation
^PZ0000: "T-Mobile Deutschland"  // net. operator 1 free text
^PZ0001: 26201       // network operator 1 identifier (MNC/MCC)
^PZ0002: "internet.t-d1.de"  // network operator 1 APN
^PZ0003: "guest"     // GPRS login name (net. operator 1)
^PZ0004: "guest"     // GPRS login password (net. operator 1)
^PZ0006: NONE        // DNS 1 (network operator 1)
^PZ0007: NONE        // DNS 2 (network operator 1)
^PZ0100: "Vodafone Deutschland"  // net. operator 2 free text
^PZ0101: 26202       // network operator 2 identifier (MNC/MCC)
^PZ0102: "web.vodafone.de"  // network operator 2 APN
^PZ0103: "guest"     // GPRS login name (net. operator 2)
^PZ0104: "guest"     // GPRS login password (net. operator 2)
^PZ0106: NONE        // DNS 1 (network operator 2)
^PZ0107: NONE        // DNS 2 (network operator 2)

OK
```

9.4 Enter the PIN, Change the PIN, Reset the SIMSTATE

Entry of the PIN

The previously set PIN number (see AT^Pi01) is automatically transferred to the SIM card after a restart in all operating modes. In the event of an error, such as when the number is incorrect, the "Network status" LED blinks.

The TAINY GMOD-S3 also supports pin-free SIM cards. Then the value parameterised with AT^Pi01 is ignored.

In TAM operating mode the PIN can also be set manually with AT+CPIN after each restart.

AT command	Description	Op. mode / Interface
AT^Pi01=<value> *Example:* *AT^Pi01=1234*	**PIN number (IPT, RSV, RCL, TAM operating mode)** PIN number of the inserted SIM card. Only numbers between 0 and 9 are permitted. Max. 8 numbers. Default: NONE Possible responses: OK, ERROR	IPT, RSV, RCL, TAM / Local

Entry of the PIN (TAM operating mode)

In TAM operating mode the PIN must be re-entered with the AT command AT+CPIN, insofar as it is not saved with AT&W3 after entry.

AT command	Description	Op. mode / Interface
AT+CPIN= "<value>" *Example:* *AT+CPIN=1234* *or* *AT+CPIN="1234"*	**PIN number (TAM operating mode)** PIN number of the inserted SIM card. Only numbers between 0 and 9 are permitted. Max. 8 numbers. No PIN has to be entered for PIN-free SIM cards. Possible responses: OK, ERROR	TAM / Local

Change the PIN

The change the PIN of the SIM card, please enter the new PIN with the command AT^Pi02. It is important, that the PIN valid so far is entered with AT^Pi01. After storage with AT^PAREND the TAINY GMOD-S3 performs a restart and adopts the new PIN.

AT command	Description	Op. mode / Interface
AT^Pi02=<value> *Example:* *AT^Pi02=1234*	**New PIN (IPT, RSV, RCL, TAM operating mode)** New PIN number of the inserted SIM card. Only numbers between 0 and 9 are permitted. Max. 8 numbers. Default: NONE Possible responses: OK, ERROR	IPT, RSV, RCL, TAM / Local

Retrieve and reset the SIMSTATE parameter

To prohibit a blocking of the SIM card by entering too often a wrong PIN, the TAINY GMOD-S3 enters the state SIMSTATE=SIM_ERROR and SIMSTATE=SIM_PROBLEM respectively. In this state, the PIN is not longer sent to the SIM card.

The SIMSTATE can be terminated by entering the command AT^PARCSE.

AT command	Description	Op. mode / Interface
AT^PARSIM *Example:* *AT^PARSIM*	**Retrieve SIMSTATE** Entered without parameter Possible responses: SIMSTATE=SIM_OK — Ready for operation SIMSTATE=SIM_ERROR — SIMSTATE SIMSTATE=SIM_PROBLEM — SIMSTATE	IPT, RSV, RCL, TAM / Local

AT-Befehl	Beschreibung	Betriebsart / Schnittstelle
AT^PARCSE *Example:* *AT^PARCSE*	**Reset SIMSTATE** Entered without parameter Possible responses: OK, ERROR	IPT, RSV, RCL, TAM / Local

9.5 Roaming

Using the parameter Pi05 the Roaming can be enabled or disabled..

AT command	Description	Op. mode / Interface
AT^Pi05=<value> *Example* *AT^Pi05=0*	**Roaming enabled / disabled** 0: The TAINY GMOD-S3 enters an available network, if this is released at the SIM card, irrespective of being the home network or not. 1: The TAINY GMOD-S3 only tries to enter the home network. Other available networks are ignored. The home network is selected by means of the network idendifier of the inserted SIM card (part of the IMSI) 4: The TAINY GMOD-S3 first tries to enter the home network. The home network is selected by means of the network idendifier of the inserted SIM card (part of the IMSI). If this fails, the TAINY GMOD-S3 automatically searches for other networks and enters one of them, if this network is released at the SIM card and the SIM card allows roaming. Default: 0 Possible responses: OK, ERROR	IPT, RSV, RCL / Local

9.6 Entering GPRS access data

The TAINY GMOD-S3 uses GPRS in the following operating modes:

IPT = IP telemetry client

RSV = TCP/IP server

RCL = TCP/IP client

For the login on the GRPS, access data must be entered in the TAINY GMOD-S3. Then the access data is automatically used when establishing a connection.

Process for selection of access data

The TAINY GPRS-S3 can select the access data for GPRS access either independently of the inserted SIM card from the entry from the parameter set (see CLASS_USER) or on the basis of the network ID of the SIM card from two corresponding data sets.

Selection process overview:

	AT^Pe1=CLASS_USER	AT^Pe1=NONE	
	The values of the following parameters are used for the GPRS login independently of the inserted SIM card:	The values of the following parameters for the GPRS login are used depending on the MCC/MNC of the inserted SIM card:	
		If MCC/MNC (SIM)= value (Pz0001)	If MCC/MNC (SIM)= value(Pz0101)
Name of the GPRS provider	n/a	AT^Pz0000	AT^Pz0100
Network identifier (MCC/MNC)	n/a	AT^Pz0001	AT^Pz0101
Access Point Name (APN)	AT^Ph00	AT^Pz0002	AT^Pz0102
GPRS login name	AT^Ph01	AT^Pz0003	AT^Pz0103
GPRS password	AT^Ph02	AT^Pz0004	AT^Pz0104
Domain Name Server 1 (DNS 1)	AT^Ph03	AT^Pz0006	AT^Pz0106
Domain Name Server 2 (DNS 2)	AT^Ph04	AT^Pz0007	AT^Pz0107

AT command	Description	Op. mode / Interface
AT^Pe01=<value> *Example:* *AT^Pe01= NONE*	**Process for selection of access data** The parameter defines how the access data of the GPRS provider is selected. NONE = automatic selection of access data on the basis of the network identifier (MCC/MNC) on the inserted SIM card (default) CLASS_USER = use of the access data entered with AT^Phxx Possible responses: OK, ERROR	IPT, RSV, RCL / Local

GPRS access data / fixed setting (AT^Pe01=CLASS_USER)

AT command	Description	Op. mode / Interface
AT^Ph00=<value> *Example:* *AT^Ph00= "internet.t-mobile"*	**Access Point Name (APN)** Enter the Access Point Name (APN) as a value between the quotation marks ("..."). Default: NONE Your network operator provides the correct Access Point Name. Possible responses: OK, ERROR	IPT, RSV, RCL / Local
AT^Ph01=<value> *Example:* *AT^Ph01=guest*	**GPRS login name** Enter the login name to log onto the GPRS. Your network operator provides the correct login name. Default: "guest" Possible responses: OK, ERROR	IPT, RSV, RCL / Local

AT command	Description	Op. mode / Interface
AT^Ph02=<value> *Example:* *AT^Ph02=guest*	**GPRS login password** Enter the login password to log onto the GPRS. Your network operator provides the correct login password. Default: “guest” Possible responses: OK, ERROR	IPT, RSV, RCL / Local
AT^Ph03=<value> *Example:* *AT^Ph03= 194.25.0.125*	**Primary Domain Name Server (DNS1)** Enter the IP address of the primary Domain Name Server. Your network operator indicates the correct IP address of the primary Domain Name Server. Default: NONE The specified Domain Name Server is only used if the TAINY GMOD-S3 is not assigned a Domain Name Server address on login. Normally this takes place automatically. Possible responses: OK, ERROR	IPT, RSV, RCL / Local
AT^Ph04=<value> *Example:* *AT^Ph04= 194.25.0.126*	**Secondary Domain Name Server (DNS2)** Enter the IP address of the primary Domain Name Server. Your network operator indicates the correct IP address of the primary Domain Name Server. Default: NONE The specified Domain Name Server is only used if the TAINY GMOD-S3 is not assigned a Domain Name Server address on login. Normally this takes place automatically. Possible responses: OK, ERROR	IPT, RSV, RCL / Local

GRPS access data / automatic selection according to SIM card (AT^Pe01=NONE) / network operator 1

AT command	Description	Op. mode / Interface
AT^Pz0001=<value> *Example:* *AT^Pz0001= 26201*	**Network ID (network operator 1)** The network ID of the network operator is to be specified as a value. This is comprised of the three-digit Mobile Country Code (MCC and the two-digit Mobile Network Code (MNC). *Examples (MCC/MNC):* *26201 = T-Mobile Germany* *26202 = Vodafone Germany* Select the specifications according to the SIM card you would like to use. You receive the network identification (MCC/MNC) from your network operator. Default: 26201 Possible responses: OK, ERROR	IPT, RSV, RCL / Local
AT^Pz0000=<value> *Example:* *AT^Pz0000= T-D1*	**Free text for identification of network operator 1** Default: "T-Mobile Deutschland" Possible responses: OK, ERROR	IPT, RSV, RCL / Local
AT^Pz0002=<value> *Example:* *AT^Pz0002=* *"internet.t-mobile"*	**Access Point Name (APN) (network operator 1)** Enter the Access Point Name (APN) as a value between quotation marks ("..."). Your network operator provides the correct Access Point Name. The entry of AT^Pz0002 or AT^Pz0102 is used depending on the SIM card (see AT^Pz0001, AT^Pz0101). Default: "internet.t-d1.de" Possible responses: OK, ERROR	IPT, RSV, RCL / Local
AT^Pz0003=<value> *Example:* *AT^Pz0003=guest*	**GPRS login name (network operator 1)** Enter the login name to log onto the GPRS. Your network operator provides the correct login name. The entry of AT^Pz0003 or AT^Pz0103 is used depending on the SIM card (see AT^Pz0001, AT^Pz0101). Default: "gast" Possible responses: OK, ERROR	IPT, RSV, RCL / Local
AT^Pz0004=<value> *Example:* *AT^Pz0004=guest*	**GPRS login password (network operator 1)** Enter the login password to log onto the GPRS. Your network operator provides the correct login password. The entry of AT^Pz0004 or AT^Pz0104 is used depending on the SIM card (see AT^Pz0001, AT^Pz0101). Default: "gast" Possible responses: OK, ERROR	IPT, RSV, RCL / Local

AT command	Description	Op. mode / Interface
AT^Pz0006=<value> *Example:* *AT^Pz0006= 194.25.0.125*	**Primary Domain Name Server (DNS1) (network operator 1)** Enter the IP address of the primary Domain Name Server. Your network operator indicates the correct IP address of the primary Domain Name Server. The entry of AT^Pz0007 or AT^Pz0107 is used depending on the SIM card (see AT^Pz0001, AT^Pz0101). The specified Domain Name Server is only used if the TAINY GMOD-S3 is not assigned a Domain Name Server address on login. Normally this takes place automatically. Default: NONE Possible responses: OK, ERROR	IPT, RSV, RCL / Local
AT^Pz0007=<value> *Example:* *AT^Pz0007= 194.25.0.126*	**Secondary Domain Name Server (DNS2) (network operator 1)** Enter the IP address of the primary Domain Name Server. Your network operator indicates the correct IP address of the primary Domain Name Server. The entry of AT^Pz0007 or AT^Pz0107 is used depending on the SIM card (see AT^Pz0001, AT^Pz0101). The specified Domain Name Server is only used if the TAINY GMOD-S3 is not assigned a Domain Name Server address on login. Normally this takes place automatically. Default: NONE Possible resposes: OK, ERROR	IPT, RSV, RCL / Local

GRPS access data / automatic selection according to SIM card (AT^Pe01=NONE) / network operator 2

AT command	Description	Op. mode / Interface
AT^Pz0101=<value> *Example:* *AT^Pz0101= 26202*	**Network ID (network operator 2)** See **AT^Pz0001** Default: 26202	IPT, RSV, RCL / Local
AT^Pz0100=<value> *Example:* *AT^Pz0100= Vodafone*	**Free text for identification of network operator 2** Default: "Vodafone Deutschland" Possible responses: OK, ERROR	IPT, RSV, RCL / Local
AT^Pz0102=<value> *Example:* *AT^Pz0102= "web.vodafone.de"*	**Access Point Name (APN) (network operator 2)** See **AT^Pz0002** Default: "web.vodafone.de"	IPT, RSV, RCL / Local
AT^Pz0103=<value> *Example:* *AT^Pz0103=guest*	**GPRS login name (network operator 2)** See **AT^Pz0003** Default: “gast”	IPT, RSV, RCL / Local

AT command	Description	Op. mode / Interface
AT^Pz0104=<value> *Example:* *AT^Pz0104=guest*	**GPRS login password (network operator 2)** See **AT^Pz0004** Default: “gast”	IPT, RSV, RCL / Local
AT^Pz0106=<value> *Example:* *AT^Pz0106=* *194.25.0.125*	**Primary Domain Name Server (DNS1) (network operator 2)** See **AT^Pz0006** Default: NONE	IPT, RSV, RCL / Local
AT^Pz0107=<value> *Example:* *AT^Pz0107=* *194.25.0.126*	**Secondary Domain Name Server (DNS1) (network operator 2)** See **AT^Pz0007** Default: NONE	IPT, RSV, RCL / Local

9.7 Enter the address and port for the destination server (IPT or RCL)

In both IPT operating mode (IP telemetry) and in RCL operating mode (Raw TCP/IP client) the TAINY GMOD-S3 connects to a TCP/IP server as a remote station.

With IPT this is the IPT master (e.g. TAINY Switching Center); with RCL this is a computer with installed TCP/IP server.

In both cases the addressing of the server takes place over its host name or IP address and a port number.

A primary and secondary server can be set up in TAINY GMOD-S3. TAINY GMOD-S3 attempts alternating between the primary and the secondary server until the connection to one of the servers is established (see chapter 9.9).

Address and port of the primary destination server

AT command	Description	Op. mode / Interface
AT^Pa00=<value> *Example 1:* *AT^Pa00=* *194.25.0.126* *Example 2:* *AT^Pa00=* *myServer1.com*	**Address of the primary destination server** IP address or host name of the primary destination server with IPT (IPT master) or RCL (Raw client). Default: 0 Possible responses: OK, ERROR	IPT, RCL / Local
AT^Pa02=<value> *Example:* *AT^Pa00=26862*	**Port at the primary destination server** Number of the port to be reached at the primary destination server. Default: 26863 Possible responses: OK, ERROR	IPT, RCL / Local

Address and port of the secondary destination server

AT command	Description	Op. mode / Interface
AT^Pa01=<value> *Example 1:* *AT^Pa01=* *194.25.0.125* *Example 2:* *AT^Pa01=* *myServer2.com*	**Address of the secondary destination server** IP address or host name of the secondary destination server with IPT (IPT master) or RCL (Raw client). Default: 0 Possible responses: OK, ERROR	IPT, RCL / Local
AT^Pa03=<value> *Example:* *AT^Pa00=20025*	**Port at the secondary destination server** Number of the port to be reached at the secondary destination server. Default: 26863 Possible responses: OK, ERROR	IPT, RCL / Local

9.8 Enter the parameters for logging in on the IPT master

With the login on an IPT master (e.g. TAINY Switching Center), the IPT client must be authenticated with its login name and login password.

The login name and login password can be defined separately for the primary and secondary IPT master.

Login on the primary IPT master

AT command	Description	Op. mode / Interface
AT^ Pb03=<value> *Example 1:* *AT^Pa03=myTAINY1* *Example 2:* *AT^Pa03=*	**Login name for primary IPT master** Enter the login name of the TAINY GMOD-S3 like on the IPT master. Default: NONE The following characters are permitted: []0-9a-zäöüA-ZÄÖÜ:!_§=-/?.*$()|{} The length is limited to 62 characters. If no login name is entered, the IMEI number of the TAINY GMOD-S3 is entered automatically and used for the login on the server. Possible responses: OK, ERROR	IPT / Local
AT^ Pb04=<value> *Example:* *AT^Pb04=PW0*	**Login password on the primary IPT master** Enter the login password of the TAINY GMOD-S3 like on the IPT master. Default: PW0 The following characters are permitted: []0-9a-zäöüA-ZÄÖÜ:!_§=-/?.*$()|{} The length is limited to 30 characters. Possible responses: OK, ERROR	IPT / Local

Login on the secondary IPT master

AT command	Description	Op. mode / Interface
AT^ Pb05="<value>" *Example 1: AT^Pa05= "myTAINY2"* *Example 2: AT^Pa05=*	**Login name for secondary IPT master** Enter the login name of the TAINY GMOD-S3 like on the IPT master. Default: NONE The following characters are permitted: []0-9a-zäöüA-ZÄÖÜ:!_§=-/?.*$()|{} The length is limited to 62 characters. If no login name is entered, the IMEI number of the TAINY GMOD-S3 is entered automatically and used for the login on the server. Possible responses: OK, ERROR	IPT / Local
AT^ Pb06="<value>" *Example: AT^Pb06="fdr45tg6"*	**Login password on the secondary IPT master** Enter the login password of the TAINY GMOD-S3 like on the IPT master. Default: PW0 The following characters are permitted: []0-9a-zäöüA-ZÄÖÜ:!_§=-/?.*$()|{} The length is limited to 30 characters. Possible responses: OK, ERROR	IPT / Local

9.9 Configuring the GSM/GPRS connection establishment

In IPT, RSV and RCL operating modes the TAINY GMOD-S3 automatically logs in after a restart or after a breakdown of the connection in the GSM network and logs in on the GPRS.

In IPT and RCL operating modes the connection to the set server is established automatically.

For various reasons it is possible that the attempt to establish connection fails at first. In such cases the TAINY GMOD-S3 independently carries out repeated attempts until the connection has been established. The number of attempts and pauses between the attempts are adjustable.

AT command	Description	Op. mode / Interface
AT^ Pa06=<value> *Example: AT^Pa06=3*	**Number of attempts to establish GSM/GPRS connection** Value = number between 1 and 999; default: 3 The parameter defines the number of attempts to establish a connection between the TAINY GMOD-S3 and the server. If no server is reached, a connection attempt is repeated the number of times corresponding to the set value (1-999). After the laps of the current pause (see AT^ Pa07), a wait before a renewed connection attempt is initiated takes place. Possible responses: OK, ERROR	IPT / Local

AT^ Pa08= <Delay1,Delay2, Delay3,Delay4, Delay5,Delay6, Delay7,Delay8, Delay9,Delay10> *Example:* *AT^Pa08= 3,5,15,30,60*	**Wait times for establishing GSM/GPRS connection** DelayX = Max. 10 values, separated by comma. Each individual value may be between 1 and 999999 and corresponds to minutes. Default: 3,5,15,30,60,60,60,60,60,60 N attempts to establish connection are carried out (see AT^Pa06), then the set wait time (Delay 1 after the initial attempt, Delay2 after the 2nd attempt, etc.) is waited and the next attempt is started. At the end of the chain a restart is performed and the sequence begins anew Possible responses: OK, ERROR	IPT / Local

9.10 Dedicated or dial-up connection mode (IPT; RCL)

Dial-up connection mode

In IPT operating mode a connection to the IPT master (e.g. TAINY Switching Center) is automatically established in dial-up connection mode. The establishment of the connection to the remote station that is also connected to the IPT master takes place after entry of the call command ATD<call number> on the TAINY GMOD-S3 or with acceptance of a connection initiated by the remote station.

In RCL operating mode the connection to the server is established after entry of the call command ATD<server address>.

Dedicated connection mode

In IPT operating mode a connection to the IPT master (e.g. TAINY Switching Center) is automatically established in dedicated connection mode. The establishment of the connection to the remote station, which is likewise connected to the IPT master, likewise takes place immediately without the need for entering an additional command, assuming the IPT master and remote station are set up appropriately.

In RCL operating mode the connection to the server is established immediately. It is not necessary to enter commands.

AT command	Description	Op. mode / Interface
AT^ Pb01=<value> *Example:* *AT^Pb01=CS*	**Dedicated / dial-up connection selection** CS = dial-up connection mode (Default) LL = dedicated connection mode Possible responses: OK, ERROR	IPT, RCL / Local

9.11 Automatic "call acceptance" (IPT)

The TAINY GMOD-S3 can automatically accept incoming IPT connections from the remote station in IPT operating mode.

The function can be activated or deactivated.

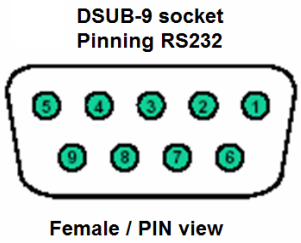
AT command	Description	Op. mode / Interface
AT^ Pj01=<value> *Example:* *AT^Pj01=3*	**Automatic call acceptance** 0 = The IPT connection must be accepted manually with the ATA command 1...20 = The TAINY GMOD-S3 automatically accepts the IPT connection Default: 0 Possible responses: OK, ERROR	IPT, RCL / Local

9.12 Configuring the local serial interface

The local serial interface of the TAINY GMOD-S3 is used for connection of the local application and for configuration by means of AT commands.

Signals and behaviour of the local serial interface take place according to the standards ITU-T V.24 and V.28 or EIA RS-232.

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



Signal	Direction	Function
DCD	FromTAINY	Monitor signal. Active with existing connection
RXD	FromTAINY	Data to the connected application
TXD	To TAINY	Data from the connected application
DTR	To TAINY	Control signal. Can be used for initiation of connection establishment
DSR	From TAINY	Monitor signal. Always active
RTS	To TAINY	Flow control signal. Active if the application is ready to receive
CTS	From TAINY	FlusskontFlow control signal. Active if the TAINY is ready to receive
RI	From TAINY	RING indicator. Active when remote station is calling

The bit rate and the character format on the interface as well as the behaviour in the event of changes of the control signals RTS and DTR are configurable.

Bit rate and character format on the local serial interface

AT command	Description	Op. mode / Interface
AT^Pj03=<value> *Example:* *AT^Pj03=9600*	**Bit rate on the local serial interface** The following bit rates can be selected: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 bit/s Default: 19200 Possible responses: OK, ERROR	IPT, RCL, RSV, TAM / Local
AT^Pj04=<value> *Example:* *AT^Pj04=8N1*	**Data format on the local serial interface** The following character formats can be set: 7N1, 8E1, 7E1, 8O1, 7O1, 8N2, 7N2, 8E2, 7E2, 8O2, 7O2, 8N1 Default: 8N1 *Example:* 8 N 1 → Number of Stopbits, selectable 1 or 2 → Parity bit, selectable N (= None), E (=Even), O (=Odd) → Number of Data bits, selectable 7 or 8 Possible responses: OK, ERROR	IPT, RCL, RSV, TAM / Local

DTR control

AT command	Description	Op. mode / Interface
AT^Pj00=<value> *Example:* *AT^Pj00=DTR*	**DTR control** ON The TAINY GMOD-S3 establishes the user data connection to the remote station identified by the call number stored with AT^Pb07 if the DTR signal is active at the local serial interface OFF The TAINY GMOD-S3 establishes the user data connection to the remote station independently of the DTR signal when a ATD command has been entered. Default: OFF Possible responses: OK, ERROR	IPT, RCL / Local

AT^Pb07=<value> *Example:* *AT^Pb07="12345"*	**DTR call number** Call number of remote station dialed by DTR control. The call number may be a IPT call number (IPT mode) or an IP address (RCL mode) Default: NONE Possible responses: OK, ERROR	IPT, RCL / Local

RTS control

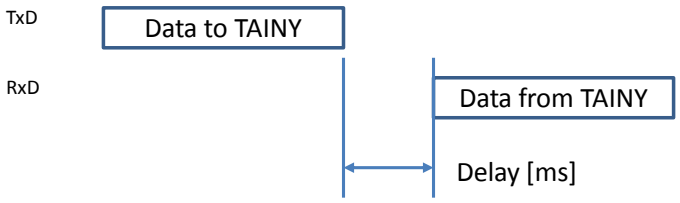
AT command	Description	Op. mode / Interface
AT^Pj02=<value> *Example:* *AT^Pj02=OFF*	**Ignore RTS signal** OFF The TAINY GMOD-S3 only sends data to the connected application if the RTS signal is active. ON The TAINY GMOD-S3 always sends the present data to the connected data, independently of the RTS signal. Default: OFF Possible responses: OK, ERROR	IPT, RCL, RSV / Local

Delay of half duplex operation

The TAINY GMOD-S3 itself supports only full duplex operation at its serial interface.

In some customer applications the TAINY GMOD-S3 are used with an external converter, eg. from RS-232 (full duplex) to RS-485 (half duplex).

For this purpose the TAINY GMOD-S3 provides the option to delay the output of data via the serial interface compared to incoming data. The delay can be adjusted by the command AT^Pj06.



AT command	Description	Op. mode / Interface
AT^Pj06=<Value> *Example:* *AT^Pj06=0*	**Delay for Half duplex Operation** 0 No delay 1...999 Output delay at the serial interface of 10….1000 ms. The configured value will be rounded to the next 10 ms, 20 ms, 30 ms etc. Default: 1 Possible responses: OK, ERROR	IPT, RCL, RSV / Local

9.13 Responses on the local serial interface

The TAINY GMOD-S3 answers AT commands with responses (OK, ERROR, CONNECT, NO CARRIER, etc.)

The TAINY GMOD-S3 also sends spontaneous messages to the local application (e.g. RING, CONNECT).

The output of these responses can be switched off in IPT, RCL and RSV operating modes.

AT command	Description	Op. mode / Interface
AT^Pr03=<value> *Example:* *AT^Pr03=ON*	**Responses off** NO Responses are not output YES Responses are output (Default) Possible responses: OK, ERROR	IPT, RCL, RSV / Local

9.14 Data packaging

With a data connection to a remote station, the TAINY GMOD-S3 receives user data over the serial local interface from the local application, packages it into TCP/IP packages and sends the TCP/IP packages to the remote station. A TCP/IP package can accommodate a specific amount of user data. If the maximum amount of user data is reached, the TCP/IP data package is sent. If the maximum amount of user data is not reached, the TAINY GMOD-S3 either sends the TCP/IP package

- after the lapse of a wait time or
- after a specific character in the user data was recognised.

AT command	Description	Op. mode / Interface
AT^Pq00=<value> *Example:* *AT^Pq00=1024*	**TCP/IP package size** 1…1024 (Byte); Default: 1 Possible responses: OK, ERROR	IPT, RCL, RSV / Local
AT^Pq01=<value> *Example:* *AT^Pq01=10*	**Waiting period** 1….9999 (ms) ; Default: 500 Possible responses: OK, ERROR	IPT, RCL, RSV / Local
AT^Pq02=<value> *Example:* *AT^Pq02=27*	**Null character** ASCII character (numeric); Default:NONE Possible responses: OK, ERROR	IPT, RCL, RSV / Local

9.15 Periodic reboot

Despite all effort in the development and checking of all functions of the TAINY GMOD-S3, it cannot be entirely ruled out that the device cannot be reached remotely on occasion. In order to prevent such disruptions, the TAINY GMOD-S3 has an automatic reboot function which periodically restarts the device.

AT command	Description	Op. mode / Interface
AT^PL02=<value> *Example:* *AT^PL02=1*	**Interval of the periodic reboot** 0 No periodic reboot takes place 1.. 99999 A reboot of the TAINY GMOD-S3 is performed automatically approximately every 24 hours (Default: 24). Possible responses: OK, ERROR	IPT, RCL, RSV, TAM / Local

9.16 Automatic disconnection of the CSD connections

AT command	Description	Op. mode / Interface
AT^Pq08=<value> *Example:* *AT^Pq08=120*	**CSD-Idle-Timeout** 0 (off), 1 …99999 sec; Default: 0 An existing CSD connection is automatically disconnected if no user data is transferred within the set time span. Possible responses: OK, ERROR	IPT, RCL, RSV, TAM / Local
AT^Pq09=<value> *Example:* *AT^Pq09=240*	**CSD-Connection-Timeout** 0 (off), 1 …99999 sec; Default: 0 An existing CSD connection is automatically disconnected after the set time span, depending on whether user data is transferred or not. Possible responses: OK, ERROR	IPT, RCL, RSV, TAM / Local

9.17 Settings for RSV mode

AT command	Description	Op. mode / Interface
AT^Pe07=<value> *Example:* *AT^Pe07=8082*	**Port of the TAINY GMOD-S3 in RSV operating mode** Number of the port where access for the RSV data connection is provided. Default: 8082	RSV Local

AT command	Description	Op. mode / Interface
	Possible responses: OK, ERROR	
AT^Ps00=<value> *Example:* *AT^Ps00=* *"2.204.12.187"*	**IP filter 1 for RSV connection** IP address of the remote station which may establish an RSV data connection. Default settings: NO IP entered; access with every IP possible. Possible responses: OK, ERROR	RSV Local
AT^Ps01=<value> *Example:* *AT^Ps01=* *"2.204.12.188"*	**IP filter 2 for RSV connection** IP address of the remote station which may establish an RSV data connection. Default settings: NO IP entered; access with every IP possible. Possible responses: OK, ERROR	RSV Local
AT^Ps02=<value> *Example:* *AT^Ps02=* *"2.204.12.189"*	**IP filter 3 for RSV connection** IP address of the remote station that may connect for the purpose of remote parameterisation Default settings: NO IP entered; access with every IP possible. Possible responses: OK, ERROR	RSV Local

9.18 Remote parameterisation

AT command	Description	Op. mode / Interface
AT^Pe08=<value> *Example:* *AT^Pe08=8081*	**Port for remote parameterisation** Number of the port at which access for the remote parameterisation is delivered, consisting of up to 5 digits. Default settings: NONE Possible responses: OK, ERROR	IPT, RCL, RSV, TAM / Local
AT^Pt00=<value> *Example:* *AT^Pt00=* *"2.204.12.187"*	**IP filter 1 for remote parameterisation** IP address of the remote station that may connect for the purpose of remote parameterisation Default settings: NO IP entered; access with every IP possible. Possible responses: OK, ERROR	IPT, RCL, RSV, TAM / Local
AT^Pt01=<value> *Example:* *AT^Pt01=* *"2.204.12.188"*	**IP filter 2 for remote parameterisation** IP address of the remote station that may connect for the purpose of remote parameterisation Default settings: NO IP entered; access with every IP possible. Possible responses: OK, ERROR	IPT, RCL, RSV, TAM // Local

AT command	Description	Op. mode / Interface
AT^Pt02=<value> *Example:* *AT^Pt02=* *"2.204.12.189"*	**IP filter 3 for remote parameterisation** IP address of the remote station that may connect for the purpose of remote parameterisation Default settings: NO IP entered; access with every IP possible. Possible responses: OK, ERROR	IPT, RCL, RSV, TAM // Local

9.19 Further settings

AT command	Description	Op. mode / Interface
AT^Pi00=<value> *Example:* *AT^Pi00=* *"OFF"*	**STK Handling on/off** Default: OFF: The SIM tool kit function of the SIM card is independently operated by the integrated GSM module. **Do not change it.** Possible responses: OK, ERROR	IPT, RCL, RSV, TAM / Local

10 AT command set

10.1 AT commands according to V.25

AT command	Description	Op. mode / Interface
A/	**Repeat the last command** Function The last-entered AT command is repeated	IPT, RCL, RSV, TAM / Local
+++	**Switch command from transparent mode => command mode** Function With the entry of +++ in transparent mode, in other words with an active connection to the remote station, the TAINY GMOD-S3 switches to command mode. The data flow over the connection to the remote station is stopped, but the connection is not terminated. With the entry of +++ a specific timing must be observed: <wait at least 1 sec> +++ < wait at least 1 sec> In command mode AT commands can be sent to the TAINY GMOD-S3. With ATO the TAINY GMOD-S3 switches back to transparent mode and the data flow over the connection to the remote station is continued.	IPT, RCL, RSV, TAM / Local
ATA	**Accept incoming connection** Function An incoming connection to the remote station is accepted. Responses: CONNECT[<text>] Data connection established NO CARRIER Connection not established See ATX for the CONNECT messages.	IPT, RSV, TAM / Local
ATB	**Define data rates** Function None. See AT+IPR Responses: OK	IPT, RCL, RSV, TAM / Local

AT command	Description	Op. mode / Interface
ATD<n> ATDP<n> ATDT<n>	**Initiate outgoing connection** Function Establishes a IPT, CSD or TCP/IP connection to the addressed remote station depending on the operating mode Parameter <n> With IPT: IPT call number of the remote station With RCL: IP address of the remote station With TAM: Call number of the remote station Responses: If the connection is not established: NO DIALTONE BUSY NO CARRIER NO ANSWER On successful establishment of a data connection: CONNECT[<text>] Note: The commands ATPS (pulse selection) and ATDT (tone selection) behave like ATD.	IPT, RCL, RSV, TAM / Local
ATE<value>	**Switching local echo on/off** Function The setting determines whether the device echoes the characters from the locally connected device in the command phase. Parameter <value> 0: Local echo off 1: Local echo on <default setting> Responses: OK	IPT, RCL, RSV, TAM / Local
ATH	**Terminate active connection** Function After entry of ATH, an existing connection to the remote station is terminated. In order to be able to enter the ATH command, you must first switch to command mode with +++. Responses: OK	IPT, RCL, RSV, TAM / Local

AT command	Description	Op. mode / Interface
ATI<value>	**Query of device identification** Function Delivers product number, firmware version of the device, firmware version of the installed radio module and the IP address at which the device can currently be reached. Parameter <value> ATI: DNT3198 (product number) ATI0: DNT3198 (product number) ATI3: Firmware version: 1.005b1 ATI4: GSM module firmware: Hi2N,A.004.02 ATI9: Own IP: 2,204,157,251 Responses: Output of the queried identification.	IPT, RCL, RSV, TAM / Local; remote
ATO	**Switch command from command mode => transparent mode** Function With entry of ATO, the device, which had an existing connection to the remote station with +++ and was switched to command mode beforehand, switches back to transparent mode. The active connection to the remote station remains intact. Responses: None	IPT, RCL, RSV, TAM / Local
ATQ<n>	**Display of result codes on/off** Function The command defines whether the device outputs result codes or not. The output of information text is not influenced by the command. Parameter <n>: ATQ0: Result codes are output <default setting> ATQ1: Result codes are not output <default setting> Responses: OK (if <n> = 0) none (if <n> = 1)	IPT, RCL, RSV, TAM / Local; remote

<table>
<tr><th>AT command</th><th>Description</th><th>Op. mode / Interface</th></tr>
<tr><td>ATV<n></td><td>
Set result code format
<u>Function</u>
This parameter defines the contents of the header and trailer which are transferred with the result codes and the answers.
<u>Parameter:</u>
ATV0: Information <text><CR><LF>
Result code (short): <numeric code><CR>
ATV1: Information <CR><LF><text><CR><LF>
Result code (long): <CR><LF><verbose code><CR>
<default setting>

<u>Text messages and numeric message</u>
<table>
<tr><td>OK</td><td>0</td><td>command executed, no errors, restart performed</td></tr>
<tr><td>CONNECT</td><td>1</td><td>connection established</td></tr>
<tr><td>RING</td><td>2</td><td>ring recognised</td></tr>
<tr><td>NO CARRIER</td><td>3</td><td>connection not established or interrupted</td></tr>
<tr><td>ERROR</td><td>4</td><td>invalid command</td></tr>
<tr><td>NO DIALTONE</td><td>6</td><td>no dial tone, selection not possible, incorrect mode</td></tr>
<tr><td>BUSY</td><td>7</td><td>remote station occupied</td></tr>
<tr><td>CONNECT 2400/RLP</td><td>1</td><td>connection with 2400 bps and Radio Link Protocol</td></tr>
<tr><td>CONNECT 4800/RLP</td><td>1</td><td>connection with 4800 bps and Radio Link Protocol</td></tr>
<tr><td>CONNECT 9600/RLP</td><td>1</td><td>connection with 9600 bps and Radio Link Protocol</td></tr>
</table>
</td><td>IPT, RCL, RSV, TAM / Local</td></tr>
<tr><td>ATX<n></td><td>
Setting of CONNECT Result Code Format and Call Monitoring
<u>Function</u>
None

<u>Parameter</u>:
<n> = 0, 1, 2, 3, 4
<u>Responses:</u>
Always OK
</td><td>IPT, RCL, RSV, TAM / Local</td></tr>
<tr><td>ATZ</td><td>
Restart and resetting of user settings
<u>Function</u>
Loading of the user settings saved with AT&W for ATE, ATQ, ATV, ATX, AT&C, AT&D, AT\Q and ATS0.
Execution of a restart
<u>Responses:</u>
OK
</td><td>IPT, RCL, RSV, TAM / Local</td></tr>
</table>

AT command	Description	Op. mode / Interface
AT&C<n>	**Setting of the DCD function** Function Defines the behaviour of the DCD interface signal Parameter: AT&C0: DCD signal is always on. AT&C1: DCD signal is on while a connection is established <default setting> Responses: OK	IPT, RCL, RSV, TAM / Local
AT&D<n>	**Setting of the DTR function** Function Defines the behaviour of the DTR interface signal Parameter: AT&D0: Device ignores the DTR signal of the connected device. <default setting> AT&D2: ON->OFF of the DTR signal: Termination of the connection and switch to command phase. As long as DTR = OFF, the automatic call acceptance is deactivated. Responses: OK	IPT, RCL, RSV, TAM / Local
AT&F AT&F<n>	**Load default configuration** Function Re-establishes the default settings of the commands ATE, ATQ, ATV, ATX, AT&C, AT&D, AT\Q and ATS0. Parameter: AT&F: Function is executed AT&F0: Function is executed Responses: OK	IPT, RCL, RSV, TAM / Local
AT&K AT&K<n>	**Configure local flow control** Function Defines the behaviour of RTS/CTS interface signals Parameter: AT&K: Local flow control (RTS/CTS) off AT&K0: Local flow control (RTS/CTS) off AT&K3: Local flow control (RTS/CTS) on Responses: OK	IPT, RCL, RSV, TAM / Local

AT command	Description	Op. mode / Interface
AT&W AT&W<0>	**Save current profile** Function This command saves the current user profile of the commands ATE, ATQ, ATV, ATX, AT&C, AT&D, AT\Q and ATS0. It can be reloaded with ATZ. Before the initial save with AT&W the save user profile corresponds to the default configuration. Parameter: AT&W: Save in profile 0 AT&W0: Save in profile 0 Responses: OK	IPT, RCL, RSV, TAM / Local
AT&W3	**Store PIN** Function This command stores the PIN entered with AT+CPIN=xxxx in the parameter ^PI01. If a PIN is stored, the TAINY GMOD-S3 uses the stored PIN. It is not necessary to re-enter the PIN even in TAM mode Parameter: AT&W3: Stores the PIN Responses: OK	TAM / Lokal
AT&V	**Display of the current configuration** Function Output of the current configuration, which can be changed by means of AT commands. Parameter: AT&V Responses: at&v E:1 Q:0 V:1 &C:1 &D:2 \Q:0 S0:0 S3:13 S5:8 +CMGF:1 +CNMI:2,1,0,0,1 OK	IPT, RCL, RSV, TAM / Local

AT command	Description	Op. mode / Interface
AT+IPR	**Set local interface speed** Function With the write command AT+IPR=<rate> the interface speed at the local serial interface is set. The read command AT+IPR=? outputs the currently set interface speed. Responses With read command +IPR: <rate> OK OK With write command: OK Parameter <rate> bit rate per second 1200 2400 4800 9600 19200 (Default) 38400 57600	IPT, RCL, RSV, TAM / Local

10.2 GSM-specific AT commands

AT command	Description	Op. mode / Interface
AT+CBST	**Selection of bearer service type** Function: The command selects the bearer service <name>, the data rate <speed> and the connection element <ce> for outgoing connections. Parameter: AT+CBST=[<speed> [,<name>[,<ce>]]] <speed>: 4: 2400 bps (V.22to) 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: Asynchronous data connection (UDI or 3.1 kHz Modem) 1: Not supported <ce>: 0: transparent 1: non-transparent Responses: OK	IPT, RCL, RSV, TAM / Local

AT command	Description	Op. mode / Interface
AT+CCLK	**Set time** Function: Sets the time in the TAINY GMOD-S3. The time must be reset after each power failure. Parameter: AT+CCLK=<time> <time>: String variable; the format is "yy/MM/dd,hh:mm:ss±tz", with yy: Year MM: Month dd: Day mm: Minutes ss: Seconds tz: Time zone, indicates the difference between the local time and GMT, specified in 15 minute intervals; the value range lies between -47 and +48. Example: 06 May 1994, 22:10:00 GMT+2 hours corresponds to "94/05/06,22:10:00+08" Responses: OK +CME ERROR: <err>	IPT, RCL, RSV, TAM / Local
AT+CGMI	**Query of the manufacturer of the radio module** Function: Provides the manufacturer identification of the radio module Responses: SAGEMCOM OK	IPT, RCL, RSV, TAM / Local
AT+CGMM	**Query of the type designation of the radio module** Function: Provides the type designation of the radio module Responses: HILO GPRS OK	IPT, RCL, RSV, TAM / Local
AT+CGMR	**Query of the version of the radio module** Function: Provides the version of the radio module Responses: Hi2N,A.004.02 OK	IPT, RCL, RSV, TAM / Local

AT command	Description	Op. mode / Interface
AT+CGSN	**Query of IMEI** Function: Provides the IMEI of the device Responses: 355839041530116 OK	IPT, RCL, RSV, TAM / Local
AT+CIMI	**Query of IMSI** Function: Provides the IMSI of the SIM card Responses: 262022034041440 OK	IPT, RCL, RSV, TAM / Local

AT command	Description	Op. mode / Interface
AT+CNUM	**Output of participant call numbers** Function The command delivers the MSISDNs of the participant (this information can be saved in the device or on the SIM card). Note: Not all SIM cards support this functions. AT+CNUM Responses +CNUM: [<alpha1>],<number1>,<type1>[,<speed>,<service>[,<itc>]] [<CR><LF>+CNUM: [<alpha2>],<number2>,<type2>[,<speed>,<service> [,<itc>]] [...]] OK Parameter: <alpha>: Optional alphanumeric character chain, base on <number>. <number>: Telephone number as a character chain in the format specified by <type> <type>: Type of the address octet as an integer variable (cf. GSM 04.08 [8], 10.5.4.7) <speed>, <service>: Service based on the participant call number 0: Asynchronous modem 1: Synchronous modem 2: PAD access (asynchronous) 3: Packet access (synchronous) 4: voice 5: fax <itc>: Methods used for information transfer 0: 3.1kHz 1: UDI	IPT, RCL, RSV, TAM / Local

AT command	Description	Op. mode / Interface
AT+CPAS	**Activity status** Function The command delivers status information for GSM mode. AT+CPAS Responses +CPAS: <pas> OK Parameter <pas>: 0: ready — entry of commands possible 1: unavailable — entry of commands not possible 2: unknown — status unknown 3: ringing — entry of commands possible, incoming call 4: call in progress — entry of commands possible, active connection	IPT, RCL, RSV, TAM / Local
AT+CPIN	**PIN number (TAM operating mode)** Function See chapter 9.4	IPT, RCL, RSV, TAM / Local

AT command	Description	Op. mode / Interface
AT+CPOL	**List of preferred network operators** Function AT+CPOL delivers the list of GSM network operators in whose networks the TAINY GMOD-S3 is logged in as a read command, AT+CPOL delivers the list of GSM network operators in whose networks the TAINY GMOD-S3 is logged in as a write command Read command: AT+CPOL? Write command: AT+CPOL: <index>, <format>, <operator> Responses After read command: +CPOL: <index>, <format>, <operator> +CPOL: ... OK ERROR +CME ERROR: <err> After write command: OK ERROR +CME ERROR: <err> Parameter <index> The number of the network operator in the list <format> Format of the output (always 2 = numeric) <operator> Numeric identification of the network operator (MCC/MNC) <err> Error code	IPT, RCL, RSV, TAM / Local

AT command	Description	Op. mode / Interface
AT+COPS	**Network operator selection** Function The read command AT+COPS? delivers the current settings for the network operator selection With the write command the criteria for the selection of network operator for the login can be defined. AT+COPS=[<mode>[,<format>[,<oper>[,< AcT>]]]] Responses After read command: +COPS: <mode>[,<format>,<oper>[,< AcT>]] OK After write command: OK Parameter <mode>: 0 automatic (<oper> field is ignored) 1 manual (<oper> field shall be present, and <AcT> optionally) 2 unsupported 3 set the read format; use with <format> 4 manual/automatic (<oper> field shall be present); if manual selection fails, automatic mode (<mode>=0) is entered <format>: 0 long format alphanumeric <oper> 1 short format alphanumeric <oper> 2 numeric <oper> <oper>: string type <format> indicates if the format is alphanumeric or numeric <stat>: 0 unknown 1 available 2 current 3 forbidden <AcT>: access technology selected: 0 GSM 1 GSM Compact (2 UTRAN)	IPT, RCL, RSV, TAM / Local

AT command	Description	Op. mode / Interface
AT+CRC	**Activate expanded output for incoming calls** Function Incoming calls are signalled with a +CRING message. With an expanded output it is additionally output whether it is a voice, data or fax call. AT+CRC=[<mode>] Responses OK Parameter <mode>: 0: Expanded output deactivated 1: Expanded output activated	IPT, RCL, RSV, TAM / Local
AT+CREG	**Network login status query** Function The read command AT+CREG? delivers the status of the network login. The write command AT+CREG=<n> defines the output format. Responses With read command +CREG: <n>,<stat>[,<lac>,<ci>] OK With write command: OK Parameter <n>: 0: No output of spontaneous messages for network registration 1: Output of spontaneous messages for network registration +CREG: <stat> 2: Output of spontaneous messages for network registration with local information +CREG: <stat>[,<lac>,<ci>] <stat>: 0: not logged in, the device is not currently searching for a new network to log in 1: logged in, home network 2: not logged in, the device is currently searching for a new network to log in 3: login rejected 4: status unknown 5: logged in, roaming <lac>: String variable, two bytes “location area code” in hexadecimal format (z.B. "00C3" corresponds 195 in decimal) <ci>: String variable; two bytes "cell ID” in hexadecimal format.	IPT, RCL, RSV, TAM / Local

AT command	Description	Op. mode / Interface
AT+CRLP	**Configuration of radio link protocol (RLP)** Function The read command AT+CRLP? delivers the current settings of the radio link protocol. With the write command AT+CRLP==<iws>[,<mws>[,<T1>[,<N2>[,<ver>[,<T4>]]]]], the settings can be changed. Responses With read command +CRLP: <iws>,<mws>,<T1>,<N2>,<ver1>,<T4> With write command: OK Parameter <ver>: RLP version number as an integer variable; version display 0 means "RLP version display not available" <iws>: Window size IWF to MS <mws>: Window size MS to IFW <T1>: Configuration timer T1 <N2>: Retransmission attempts N2 <T4>: Re-sequencing duration T4 as an integer variable Basic settings and value ranges depend on the RLP version; see GSM 04.22 [18]. T1 and T4 are specified in 10 ms increments.	IPT, RCL, RSV, TAM / Local
AT+CSQ	**Query of signal quality** Function The command AT+CWQ delivers the current value for the quality of the received signal. Responses +CSQ: <rssi>,<ber> OK Parameter <rssi>: 0: -113 dBm or less 1: -111 dBm 2...30: -109... -53 dBm 31: -51 dBm or more 99: unknown or immeasurable <ber>: 0...7: according to RXQUAL values in the table GSM 05.08 [20], 8.2.4 99: unknown or immeasurable The bit error rate (ber) is only determined with an existing CSD connection.	IPT, RCL, RSV, TAM / Local

10.3 GPRS-specific AT commands

AT command	Description	Op. mode / Interface
AT+CGATT?	**GPRS login/logout query** Function: Shows whether the TAINY GMOD-S3 is logged in on the GPRS or not. The device also logs in independently on the GPRS in TAM operating mode. Responses: +CGATT: <state> Parameter <state> 0: Not logged in in GPRS 1: Logged in in GPRS	IPT, RCL, RSV, TAM / Local
AT+CGDCONT	**Defining the PDP context** Function: Communicates the PDP context to the GPRS and activates it. Parameter: AT+CGDCONT=<cid>,<PDP_type>,<APN>,<PDP_addr>, <d_comp> ,<h_comp> <cid>: (Local) context identification parameter <PDP_type>: Packet Data Protocol type A String-Variable which specifies the type of data protocol package. Only IP (Internet Protocol - IETF STD 5) is supported. <APN>: Access Point Name A string variable with a logical name which defines the GGSN for the IP network outside the GPRS. <PDP_address>: A string variable which specifies the MT in the address space for the PDP. Since only IP is currently supported, it will be an IP address. If the value is zero ("0.0.0.0" or 0), the value of the device can be delivered during the start process. Otherwise, in the event of errors, a dynamic address is required. The query additionally delivers the zero string, even if a n address has been assigned during the PDP start process. The assigned address can possibly be read with the use of the command +CGPADDR. <d_comp>: Numeric parameter for control of the data compression of the PDP. Always 0 (no PDP data compression) <h_comp>:	IPT, RCL, RSV, TAM / Local

AT command	Description	Op. mode / Interface
	Numeric parameter for control of the compression of the PDP header. Always 0 (no PDP data compression) Note: The command specifies the PDP context parameter values for a PDP contexts which is specified by the (local) context identification parameter, <cid>. The number of PDP contexts that can simultaneously be in a defined status is specified by the range delivered by the test command AT+CGDCONT=?. The special form of the command +CGDCONT= <cid> has the effect that the values for the context number <cid> are not defined. Queries and responses: AT+CGDCONT=? delivers: +CGDCONT: (area of supported <cid>s), <PDP_type>,,,(list of supported <d_comp>s), (list of supported <h_comp>s) AT+CGDCONT? delivers, if +CDGCONT set: +CGDCONT: <cid>, <PDP_type>, <APN>,<PDP_addr>, <d_comp>, <h_comp> AT+CGDCONT? delivers, if +CDGCONT not set: OK	

10.4 SMS-specific AT commands

Parameters of SMS commands

The following parameters are used with SMS commands

<ackpdu> Format like with <pdu> but without 3GPP TS 24.011 Service Center call number field. The parameter should be entered in "...", like with a normal parameter of the string type.

<alpha> Representation of <da> or <oa> according to the entry in the telephone book as an alphanumeric string type.

This function is not supported by TAINY GMOD-S3.

<bfr> Always 0: The saved messages are transmitted.

<bm>: Always 0: CBM messages are not forwarded to the connected application

<da> GSM 03.40 TP destination address

Address field as a string variable

<data> GSM 03.40 TP user data in text mode answers

<dcs>: Data Coding Scheme (always 0)

<ds>: Always 0: SMS STATUS REPORTs are not forwarded to the connected application

<err> Error code

<fo>: First Octet (always 17)

<index> Integer variable; value from the available memory area

<length> Integer variable for specification of the length of the 'message body' in characters <data>

<mem1> Memory that is used for the listing, reading and deletion of SMS:

"SM" SMS memory on the SM card

"ME" SMS memory in the TAINY GPRS-S3 itself

"MT" total in "SM" and "ME" memory

<mem2> Memory that is used for writing and sending of SMS:

"SM" SMS memory on the SIM card

"ME" SMS memory in the TAINY GPRS-S3 itself

"MT" total in "SM" and "ME" memory

<mem3> Memory that is used for the intermediate storage of receive messages when the forwarding to the connected application is not possible. See AT command AT+CNMI with parameter <mt>=2

"SM" message memory on the SIM card

"MT" total message memory on the SIM card and in the device

<mode1> Used SMS mode:

0: PDU mode

1: Text mode

<mode2>: Transfer mode of messages

0: Spontaneous messages are temporarily stored in the device. It the intermediate storage for spontaneous messages is full, the messages can be saved in a different location or the oldest messages are deleted and replaced with new messages.

1: Messages are deleted and new spontaneous messages over newly received SMSs are rejected if the connection between the device and the connected application is already occupied, e.g. with an existing data connection. Otherwise the messages are forwarded directly to the connected application.

2: Spontaneous messages are temporarily stored in the device if the connection between the device and the connected application is already occupied, e.g. with an existing data connection. The messages are transferred to the application when the connection is free again. Otherwise the messages are forwarded directly to the connected application.

<mr> Message reference according to 3GPP TS 23.040

TP message reference in integer format

<mt>: Messages with SMS-DELIVER

0: No SMS-DELIVER messages are forwarded to the connected application.

1: If SMS-DELIVER are saved in the device, with the spontaneous message +CMTS: <mem>,<index> information is forwarded over the storage location to the connected application.

<oa/da> GSM 03.40 TP originating address / TP destination address address value field as a string variable

<oa> GSM 03.40 TP originating address

Address field as a string variable

<pdu> Service Center call number followed by 3GPP TS 23.040 TPDU in hexadecimal format:

The TAINY GMOD-S3 converts each octet of the TPDU to a hexadecimal value that comprises two IRA characters. Example:

Octet with integer value 42 stands for both characters "2A", IRA 50 and 65 (decimal).

<pid>: Protocol Identifier (always 0)

<sca>: Telephone number of the SMS Service Center, entry with " "

<scts> GSM 03.40 TP Service Center time stamp as a string variable

<stat> Integer variable; specifies the status of messages in the memory on the basis of defined values:

0: "REC UNREAD" message received, unread (e.g. new message)

1: "REC READ" message received, read

2: "STO UNSENT" message saved, not sent (only for SMS)

3: "STO SENT" message saved, sent (only for SMS)

4: "ALL" all messages (only for +CMGL command)

<toda> Type of destination address

3GPP TS 24.011 TP destination address type of address

Octet in integer format

(If the first character of <da> uses a + (IRA 43), 145 is used as a default, otherwise 129)

0...255

<tooa> Type of originating address

3GPP TS 24.011 TP originating address (sender address)

Type of address octet in integer format (default see <toda>)

<tosca>: 145: Enter telephone number with country code, e.g. +49xxxxx for Germany

129: Enter telephone number without country code

<totalx> Number of messages that can be saved in <memx>.

<usedx> Number of messages that are saved in <memx>.

<vp>: Defines how ling short messages are saved in the SMS Service Center:

0 to 143:	(<vp> + 1) * 5 minutes (which means 5 minute intervals up to 12 hours))
144 to 167	12 hours + (<vp> - 143) x 30 minutes
168 to 196	(<vp> - 166) x 1 day
197 to 167	(<vp> - 192) x 1 week

List of SMS-specific AT commands

AT command	Description	Op. mode / Interface
+CMGD	**Deletion of an SMS** Function: The command AT+CMGD=<index1> deletes an SMS from the SMS memory of the device or the SIM card Responses: OK or +CMS ERROR: <err>	IPT, RCL, RSV, TAM / Local
+CMGF	**Selection of the SMS format** Function: The selection of the SMS format (PDU or text) takes place with the command AT+CMGF=[<mode1>]. The query AT+CMGF? delivers the currently set format. Responses: With command OK With query +CMGF: <mode1> OK	IPT, RCL, RSV, TAM / Local

AT command	Description	Op. mode / Interface
+CMGL in text mode	**List of SMS messages in preferred memory in text mode (+CMGF=1):** Function: Output of the list of SMS messages Responses With a successfully executed command and SMS-SUBMITs and/or SMS-DELIVERs: If <stat> = "REC READ" or "REC UNREAD" +CMGL: <index1>,<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>[...]] Otherwise: +CMS ERROR: <err>	IPT, RCL, RSV, TAM / Local
+CMGL in PDU mode	**List of SMS messages in the preferred memory** Function: Output of the list of SMS messages Responses With successfully executed command: [+CMGL: <index>,<stat>,[<alpha>],<length><CR><LF><pdu> [<CR><LF>+CMGL:<index>,<stat>,[<alpha>],<length><CR><LF> <pdu> [...]]] OK	IPT, RCL, RSV, TAM / Local

AT command	Description	Op. mode / Interface
+CMGR in text mode	**Reading of SMS in text mode (+CMGF=1)** Function: The command delivers the message from the storage space <index1> from the preferred SMS memory <mem1>. The status of the message and the entire message content <pdu> is output. If the status of the message was 'received unread', it is set to 'received read'. AT+CMGR=<index1> Responses: If command successful and SMS-DELIVER: +CMGR: <stat>,<oa>,<scts>,<length> <CR><LF><data><CR><LF> If command successful and SMS-SUBMIT: +CMGR: <stat>,<da>,<length> <CR><LF><data><CR><LF> Otherwise: +CMS ERROR: <err>	IPT, RCL, RSV, TAM / Local
+CMGR in PDU mode	**Reading of SMS in PDU (+CMGF=0)** AT+CMGR=<index1> Function: The command delivers the message from the storage space <index1> from the preferred SMS memory <mem1>. The status of the message and the entire message content <pdu> is output. If the status of the message was 'received unread', it is set to 'received read'. Responses If command successfully executed: +CMGR: <stat>,[<alpha>],<length><CR><LF><pdu> OK	IPT, RCL, RSV, TAM / Local

AT command	Description	Op. mode / Interface
+CMGS in text mode	**Send SMS in text mode (+CMGF=1)** Function: Sends SMS in text mode +CMGS=<da>,<toda><CR> **> *Enter text***<ctrl-Z/ESC> Responses After successful delivery: +CMGS: 0 If the delivery fails: +CMS ERROR: <err>	IPT, RCL, RSV, TAM / Local
+CMGS in PDU mode	**Send SMS in PDU mode (+CMGF=0)** Function: Sends SMS in PDU mode AT+CMGS=<length><CR> PDU entered <ctrl-Z/ESC> Responses Independently of successful delivery: +CMGS: <mr>[,<ackpdu>] OK	IPT, RCL, RSV, TAM / Local
+CMGW in text mode	**Save SMS in text mode (+CMGF=1)** Function: The command saves an SMS that is entered by the local application to the memory <mem2>. After the save, the storage space <index> is output. The status of the message is set to "stored unsent" by default. AT+CMGW=<oa>/<da>[, [<tooa>/<toda>][, <stat>]]<CR> Text can be entered. <CTRL-Z>/<ESC> Responses +CMGW: <index1> OK If writing fails ERROR +CMS ERROR: <err>	IPT, RCL, RSV, TAM / Local

AT command	Description	Op. mode / Interface
+CMGW in PDU mode	**Save SMS in PDU mode (+CMGF=0)** Function The command saves an SMS that is entered by the local application to the memory <mem2>. After the save, the storage space <index> is output. The status of the message is set to "stored unsent" by default. AT+CMGW=<length>[, <stat>]<CR> PDU can be entered. <CTRL-Z>/<ESC> Responses +CMGW: <index1> OK	IPT, RCL, RSV, TAM / Local
+CMSS in text mode	**Send SMS from memory in text mode (+CMGF=1)** Function The command sends the SMS in the storage space <index1> from the memory <mem2> to the GSM network (SMS-SUBMIT or SMS-COMMAND). Insofar as a new destination address <da> is transferred with the command, this is used instead of the one save with the message. If the parameter <da> is transferred, the status of the saved message remains unchanged (see <stat>) AT+CMSS=<index1>[, <da>[, <toda>]] Responses +CMSS: <mr>[, <scts>] OK If sending fails ERROR +CMS ERROR: <err>	IPT, RCL, RSV, TAM / Local
+CMSS in PDU mode	**Send SMS from memory in PDU mode (+CMGF=0)** Function The command sends the SMS in the storage space <index1> from the memory <mem2> to the GSM network (SMS-SUBMIT or SMS-COMMAND). Insofar as a new destination address <da> is transferred with the command, this is used instead of the one save with the message. If the parameter <da> is transferred, the status of the saved message remains unchanged (see <stat>) AT+CMSS=<index1>[, <da>[, <toda>]] Responses +CMSS: <mr>[, <ackpdu>] OK If sending fails ERROR +CMS ERROR: <err>	IPT, RCL, RSV, TAM / Local

AT command	Description	Op. mode / Interface
+CNMI	**Display of new SMS** Function AT+CNMI=[<mode2>][,<mt>][,<bm>][,<ds>][,<bfr>] Responses OK Note: <bm>, <ds>, <bfr> are always set to 0.	IPT, RCL, RSV, TAM / Local
+CPMS	**Selection of the preferred SMS memory** Function The command selects the SMS memory <mem<x>> that is used for reading, writing, etc. AT+CPMS= <mem1>,<mem2>,<mem3> Response +CPMS: <used1>,<total1>,<used2>,<total2>,<used3>,<total3> OK	IPT, RCL, RSV, TAM / Local
+CSCA	**SMS Service Center address** Function The write command AT+CSCA=<sca>[,<tosca>] sets the address of the SMS Service Center through which the SMS sent by the device is delivered. In PDU mode the Service Center entered here is also uses, insofar as the length for the SMSC address entered in the PDU equals zero. The read command AT+CSCA? Delivers the address of the set SMS Service Center. Responses With read command +CSCA: <sca>,<tosca> OK With write command: OK	IPT, RCL, RSV, TAM / Local
+CSMP	**Setting parameters for SMS text mode** Function The write command AT+CSMP=[<fo>[,<vp>[,<pid>[,<dcs>]]]] sets various properties of SMSs in text mode, the read command AT+CSMP? outputs the current settings. Responses With read command +CSMP: <fo>,<vp>,<pid>,<dcs> OK With write command OK	IPT, RCL, RSV, TAM / Local

11 Update firmware locally

The firmware contains the basic programming of the TAINY GMOD-S3. If a new firmware has been created by the manufacturer in order to equip the device with new functions, for example, the firmware can be loaded to the TAINY GMOD-S3.

The current respective firmware can be downloaded from the following internet address:

www.neuhaus.de

Compare the offered firmware version with that of your TAINY GMOD-S3.

Preparing the terminal program

To activate the firmware of the TAINY GMOD-S3 over the local interface, you require a PC with a terminal program which you connect to the local serial interface of the TAINY GMOD-S3.

The terminal program must be able to transmit text and/or hex files.

Set the transmission speed of the terminal program to 115200 bps, select 8N1 as the character format and activate the Xon/Xoff flow control (RTS/CTS control off).

Opening the Firmware Update menu

Disconnect the TAINY GMOD-S3 from the power supply.

Re-connect the TAINY GMOD-S3 to the power supply while pressing the service button.

When the firmware update menu appears in the terminal program, the service button can be released again.

Caution

Make sure that during the further update procedure the power supply for the TAINY GMOD-S3 does not fail.

```
DNT 3198 Boot-Loader v4.005


[?]show menu
[a]pplication
[m]onitor program
[d]ownload firmware (RS232 - xon/xoff)


Please select.
```

Enter **d**. An additional query appears:

```
Download firmware (y/n)?
```

Enter **y**. The following messages appear:

```
OK.
Erasing...
Please start uploading now!
```

Start update

After the message `Please start uploading now!` appears, start the **text file transfer** of the terminal program. Select the new firmware of the TAINY GMOD-S3 as the file to be transferred, e.g.

application_1.xxx.hex

The transfer o the new firmware to the TAINY GMOD-S3 begins:

```
Flashing 0h08008000... OK.
Flashing 0h08008800... OK.
Flashing 0h08009000... OK.
Flashing 0h08009800... OK.
*
*
*
Flashing 0h08026800... OK.
Flashing 0h08027000... OK.
OK.
```

The transfer ends with an OK and the firmware update menu appears anew:

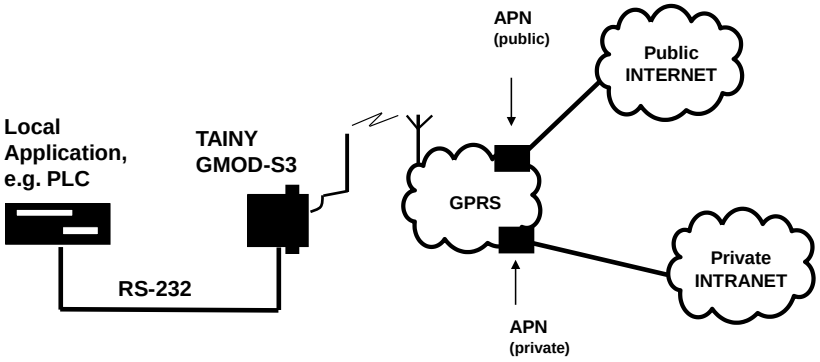
```
DNT 3198 Boot-Loader v4.005

[?]show menu
[a]pplication
[m]onitor program
[d]ownload firmware (RS232 - xon/xoff)

Please select.
```

Now enter **a**. Change the settings in the terminal program back to 19200 bit/s and switch the Xon/Xoff flow control.

12 Glossary

APN (Access Point Name)

(Access Point Name). Cross-network connections, e.g. from the GPRS network to the internet, are established in the GPRS network over so-called APNs.



An end device that wants to establish a connection over the GPRS network indicates which network it wants to connect to by specifying the APN: internet or private company network that is connected over the dedicated connection.

The APN refers to the transfer point to the other network. It is provided to the user by the network operator.

Client / Server

In a client-server environment a server is a program or computer that receives and answers queries from the client program or client computer.

With data communication the computer is also referred to as a client which establishes a connection to a server (or host). That means the client is the calling computer, the server (or host) is the callee.

CSD 9600

CSD (9600) stands for Circuit Switched Data or data dial-up connection. In the process, a connection is established between two participants (end points of the connection), similarly as with a telephone in the public network. Participant 1 selects the call number of Participant 2. The network signals the call to Participant 2, Participant 2 accepts the call and the network establishes the connection until one of the participants terminates the connection.

In the GSM network this service is called CSD and permits data transmission with 9600 bit/s or 14400 bit/s, wherein the transmission takes place secured or unsecured. Possible connections are GSM modem to GSM modem, analogue modem to GSM and ISDN modem to GSM modem.

Datagram

With the transfer protocol TCP/IP, data is sent in the form of data packages, so-called IP datagrams. An IP datagram has the following structure:

1. IP header
2. TCP/UDP header
3. Data (payload)

The IP address contains:

- the IP address of the sender (source IP address)
- the IP address of the recipient (destination IP address)
- the protocol number of the protocol of the next higher protocol layer (according to the OSI layer model)
- the IP header check sum (checksum) for verifying the integrity of the header on receipt.

The TCP/UDP header contains the following information:

- Port of the sender (source port)
- Port of the recipient (destination port)
- a check sum over the TCP header and some information from the IP header (including source and destination IP address)

DHCP

Dynamic Host Configuration Protocol (DHCP) assumes the automatic dynamic assignment of IP addresses and additional parameters in a network. The Dynamic Host Configuration Protocol uses UDP. It was defined in RFC 2131 and assigned with the UDP ports 67 and 68. DHCP works in the client – server method, wherein the client is assigned the IP address by the server.

DNS

The addressing in IP networks takes place over IP address as a basic rule. However, addressing in the form of a domain address is generally preferred (in other words, in the form www.abc.xyz.de). The addressing takes place over the domain address, the sender first sends the domain address to a Domain Name Server (DNS) and receives the corresponding IP address. Only then does the sender address its data to this address.

GPRS

GPRS is the abbreviation for "General Packet Radio Service" and a data transfer system of GSM2+ mobile radio systems. GPRS systems use the base station of the GSM network for the radio technology and an internal infrastructure for the networking and coupling to other IP networks, such as the internet. In the process, data is communicated packet-oriented, wherein the internet protocol (IP) is used. GPRS provides data rates of up to 115.2 KBit/s.

GSM

GSM (= Global System for Mobile Communication) is a worldwide standard for digital mobile radio networks. In addition to the voice service for telephony, GSM supports various data services, such as fax, SMS, CSD and GPRS. Depending on legal regulations in various countries, the frequency bands 900 MHz, 1800 MHz or 850 MHz and 1900 MHz are used.

Intranet

An intranet is a private IP network varying in size. For example, the IP network of a company is an intranet, as is also the case with several networked private computers.

The internet, on the other hand, is a public network. Intranet and internet should only be connected to each other over protective devices, such as a firewall.

IP package

See datagram

IP telemetry

IP telemetry according to D DIN 43863-4 is a protocol for the transmission of telemetry data over IP networks. It is optimised to add only minimal control data to the user data and enables clients to work with dynamically assigned IP addresses.

The IP telemetry client first establishes a TCP/IP connection to the IP telemetry master. Then the IP telemetry client logs in at the IP telemetry master with specification of user name and password.

If the login is successful, user data and control data are exchanged. All data is encrypted. Control data differs from user data by an additional escape sequence.

IP address

Each host or router in the internet/intranet has a unique IP address (IP = internet protocol). The IP address is 32 bits (= 4 bytes) long and is written as 4 numbers (in the range 0 to 255 in each case), which are separated from each other by a period.

An IP address is comprised of two parts: the network address and the host address.

All hosts of a network have the same network address, but different host addresses. Depending on the size of the respective network - varying between networks of the categories Class A, B and C - both address parts vary in size:

<table>
<tr><td></td><td>1st byte</td><td>2nd byte</td><td>3rd byte</td><td>4 byte</td></tr>
<tr><td>Class A</td><td>Network add.</td><td colspan="3">Host add.</td></tr>
<tr><td>Class B</td><td colspan="2">Network add.</td><td colspan="2">Host add.</td></tr>
<tr><td>Class C</td><td colspan="3">Network add.</td><td>Host add.</td></tr>
</table>

The first byte of the IP address indicates whether an IP address is refers to a device in a network of the category Class A, B or C. The following is defined:

	Value of the 1st byte	Bytes for the network address	Bytes for the host address
Class A	1-126	1	3
Class B	128-191	2	2
Class C	192-223	3	1

In terms of figures, there can only be a maximum of 126 Class A networks in the world; each of these networks can comprise a maximum of 256 x 256 x 256 hosts (address space 3 bytes). There can be a maximum of 64 x 256 Class B networks and each can contain up to 65,536 hosts (address space 2 bytes: 256 x 256). There can be a maximum of 32 x 256 x 256 Class B networks and each can contain up to 256 hosts (address space 1 byte).

Location Area Code

A location area is a group of adjacent GSM base stations connected to each other in order to facilitate the finding and call signalling for a GSM end device, like the CM-E1P01-GPRS module. The group can comprise between 10 and 100 GSM base stations. Each of these groups has a unique worldwide identifier (Location Area Code = LAC)

MCC/MNC

The MCC (Mobile Country Code) and the MNC (Mobile Network Code) are unique worldwide identifiers for a mobile radio network.

The MCC is three-digit and the MNC is two- or three-digit.

There are many websites on the internet with the MCC/MNC of various countries and network operators.

Port number

The port number field is field of 2-bytes in UDP and TCP headers. The assignment of port numbers serves for the identification of the various data steams, which the UDP/TCP process simultaneously. The entire data exchange between UDP/TCP and the application processes takes place over these port numbers. The assignment of port numbers to application processes take place dynamically and randomly. For specific, frequently used application processes, fixed port numbers are assigned. They are referred to as Assigned Numbers.

Protocol, transfer protocol

Devices that communicate with each other must use the same rules for this purpose. They must "speak the same language". Such rules and standards are referred to as protocol or transfer protocol. Protocols which are often used include IP, TCP, PPP, HTTP or SMTP. TCP/IP is an umbrella term for all protocols building on IP.

TCP/IP (Transmission Control Protocol/Internet Protocol)

Network protocols that are used for the connection of two computers over the internet.

IP is the base protocol.

UDP builds on IP and sends individual packages. These can arrive at the recipient in a different sequence than they were sent in, or they can even be lost.

TCP serves for securing the connection and ensures, for example, that data packages are forwarded in the correct sequence.

UDP and TCP additionally provide port numbers between 1 and 65535 for the IP address, through which the various services can be differentiated.

A series of additional protocols build on UDP and TCP, such as HTTP (Hyper Text Transfer Protocol), HTTPS (Secure Hyper Text Transfer Protocol), SMTP (Simple Mail Transfer Protocol), POP3 (Post Office Protocol, Version 3) and DNS (Domain Name Service).

ICMP builds on IP and contains control messages.

SMTP is an email protocol based on TCP.

IKE is an IPsec protocol based on UDP.

ESP is an IPsec protocol based on IP.

On a Windows PC, WINSOCK.DLL (or WSOCK32.DLL) assumes the development of the two protocols.

(see also datagram)

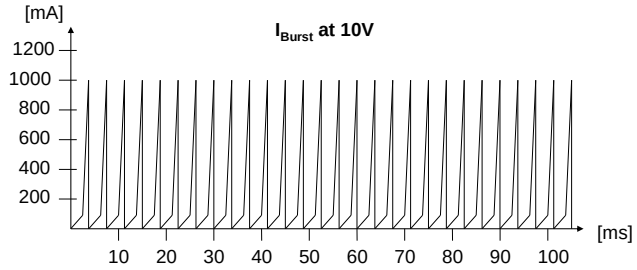
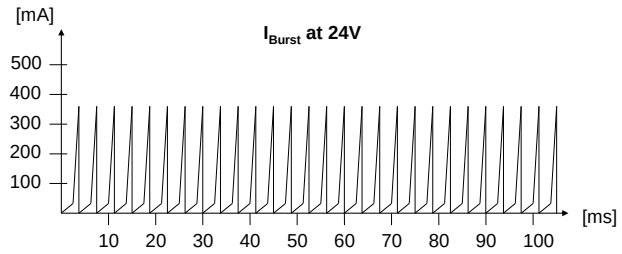
TSC protocol

The TSC protocol is the predecessor of the IP telemetry protocol and has been the basic concept for its standardisation. It has been devellopped by Dr. Neuhaus for its **T**AINY **S**witching **C**enter. In general it acts like the IP telemetry protocol.

UDP

See TCP/IP

13 Technical data

Local serial interface	Function	Interface for connection of the local application, e.g. SPS
	Type	RS-232 (V.24 / V.28)
	Bit rates	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 bit/s
	Character formats	8E1, 7E1, 8O1, 7O1, 8N2, 8E2, 7E2, 8O2, 7O2, 8N1
	Signals	TxD, RxD, RTS, CTS, DTR, DSR, DCD, RI, GND
	Sockets	D-SUB 9-pin (female)
Wide traffic interface	Function	Interface for the remote station
	Type	GSM radio interface
	Services	CSD9600 (outgoing, incoming) ; GPRS; SMS (receipt ; sending).
	Frequency bands / transmission output	GSM 850 MHz (max. 2W), GSM 900 MHz (max. 2W), DCS 1800 MHz (max. 1W), PCS 1900 MHz (max. 1W)
	GPRS	Up to 2 uplinks / up to 4 downlinks (max. 5 slots)
	Antenna connection	SMA / 50 Ohm
Voltage supply	Power consumption	$P_{MAX.}$ = 3.25 W, P_{IDLE} = 0.63 W (at 30V) P_{IDLE} = 0.44 W (at 10V)
	Input voltage	10 - 30 VDC (24 VDC nominal)
	Input current / existing GPRS connection with data exchange	  4.62ms burst repeat rate
	Input current / no connection or connection without data traffic	10 VDC : I_{IDLE} = 45 mA I_{LOAD} = 326 mA 12 VDC : I_{IDLE} = 42 mA I_{LOAD} = 265 mA 24 VDC : I_{IDLE} = 24 mA I_{LOAD} = 135 mA 24 VDC : I_{IDLE} = 22 mA I_{LOAD} = 109 mA
Environmental conditions	Temperature range	-20°C to +65°C ; > 55°C derating (operation) -25°C to +85°C (storage)
	Air humidity	Up to 95%, non-condensing

Housing	Design	Cap rail housing
	Material	Plastic
	Protection class	IP40
	Dimensions	92 mm x 22,5 mm x 99 mm (D x W x H)
	Weight	approx. 110g
Certifications, approvals	CE sign	Conformity to the DIRECTIVE 1999/5/EC OF THE EUROPEAN PARLIAMENT AND THE COUNCIL of 09 March 1999 on Radio and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE).
	Radio	ETSI EN 301 511 v.9.0.2
	GSM	Integrated GSM module with GCF and PTCRB certification
	EMC	ETSI EN 301 489-1 (2011); ETSI EN 301 489-7 (2005) EN55022 (class B); EN 61000-6-2; EN 61000-4-3; EN 61000-4-4; EN 61000-4-5; EN 61000-4-6
	Electrical safety	EN60950-1: 2006 + A1: 2010
	ROHS	Conformity to the DIRECTIVE 2011/65/EU OF THE EUROPEAN PARLIAMENT AND THE COUNCIL of 8 June 2011 for limitation on the use of certain hazardous substances in electrical and electronic devices (ROHS).
	WEEE	Registration no. **3132 3053**