SIEMENS

TC35 Terminal

User Guide

Safety information

Radio devices have limitations in the vicinity of electronic devices:

- Switch the TC35 Terminal off when you are in a hospital or near medical devices like pacemakers or hearing aids. The Terminal may interfere with the operation of these devices.

- Switch the TC35 Terminal off when flying. Secure it so that it cannot be switched on inadvertently.

- Switch the TC35 Terminal off when you are near petrol stations, fuel depots, chemical plants or blasting operations. The Terminal can disturb the operation of technical equipment.

- Interference can occur if the device is used near televisions, radios or PCs.

- In order to avoid possible damage, we recommend that you only use the specified accessories. These have been tested and shown to work well with the Terminal. However, the warranty does not cover these accessories.

The warranty does not apply in the event of improper use.
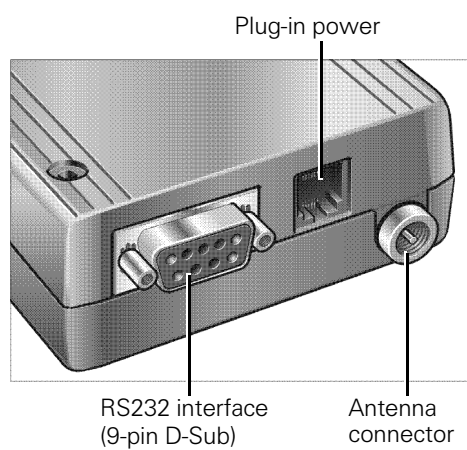
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RS232 interface
(9-pin D-Sub)

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SIEMENS

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card holder

Product description

The TC35 Terminal is a compact GSM modem for the transfer of data, voice, SMSand faxes in GSM networks. Industrial standard interfaces and an integrated SIMcard reader mean it can be used rapidly, easily and universally as a dual band GSM Terminal. Its performance band width and the robust housing make it easier to quickly implement new applications in areas such as telemetry and telematics.

The features, functions and interfaces of the GSM Terminal TC35 T are described below.

The functionality of the Terminal corresponds to the features of the TC35 module, to which a SIM card reader, an RS232 interface, an analog interface for the handset interface and a greater supply voltage range have been added.

All the external interfaces of the GSM Terminal TC35 T are integrated permanently in the housing. The plug-in connections are standardised and suitable for use under vibration.

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Product description

Highlights
- Dual-band EGSM900 / GSM1800
- Data, voice, SMS and fax
- R&TTE approval, GCF approval
- Easy to integrate
- Industrial interfaces
- LED display
- Wide input voltage range
- Highly compact, light and powerful

Applications
- Fleet management
- Teleservice
- Security systems
- Telematics
- Telemetry
- Remote monitoring
- Remote meter reading
- Vending machines

Features

Product data	• Dual-band EGSM900 and GSM1800
	• Certified in accordance with GSM phase2/2+
	• Output performance:
	– Class 4 (2 W) for EGSM900
	– Class 1 (1 W) for GSM1800
	• Control via AT commands
	• Input voltage range +8V ... +30V
	• Dimensions: 65 x 74 x 33mm
	• Weight: approx. 130g
Certification	• R&TTE approval
	• GCF approval
Audio	• Half rate (HR)
	• Full rate (FR)
	• Enhanced full rate (EFR)
SMS	• Point-to-point MT and MO
	• SMS cell broadcast
	• Text and PDU mode
Data	• CSD up to 14.4kbps
	• USSD
	• Non-transparent mode
	• V.110, V.32
Fax	• Group 3, classes 1, 2

Features

Supplementary services	• Phone book • Multiparty • DTMF (Dual Tone Multi Frequency)
External interfaces	• Connector for plug-in power supply unit • Handset audio interface • Mini-SIM card holder • Antenna connector FME (male) • RS232 interface (V.24/V.28 on the Sub-D socket)
Accessories	Antennae, SIM cards, power supply units, RS232 cables, handsets and a mounting kit for top-hat rails can be obtained from different manufacturers. Recommended suppliers are listed in the corresponding interface description.

Installation

Package contents /
scope of delivery

- Package unit:
  TC35 Terminal
  and user guide   L36880-N8600-A100
- TC35 Terminal   S30880-S8600-A10
- User guide   A31008-H8600-A1-*-7619

Safety and
installation
information

- The Terminal should be installed and set up only by qualified personnel.
- Connect a fast 1.25A fuse to the incoming line for the positive supply voltage to protect the Terminal.
- If a power supply unit is used to supply the TC35 Terminal, it must meet the demands placed on SELV circuits in accordance with EN60950. When using batteries and accumulators, adhere to the relevant regulations.
- The maximum permissible connection length between the TC35 Terminal and the supply source is 3m.
- Your supplier will be pleased to provide you with a detailed technical description and technical support for the SIEMENS TC35 Terminal.

Attaching
theTerminal

The TC35 Terminal can be attached with two screws. Use screws approx.50 mm long and Ø 3mm. The TC35 Terminal can be attached to a top-hat rail using an additional fixture (see the following page).
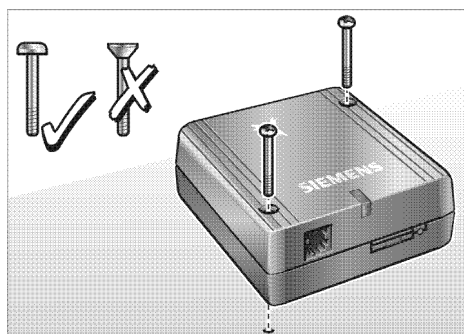
Mounting kit for top-hat rail installation

The TC35 Terminal can be attached to a 35mm top-hat rail using this mounting kit. There are two screws that are used to fix the top-hat rail adapter to the TC35 Terminal. The TC35 Terminal can be inserted onto the top-hat rail using this adapter.
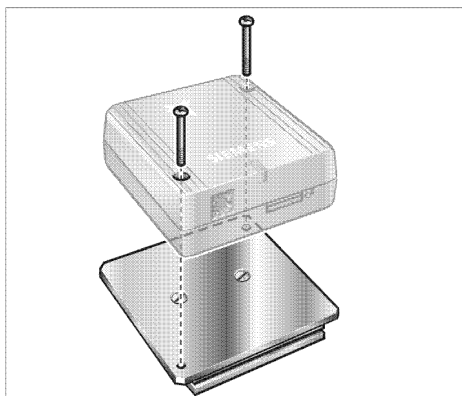
Interface description

The following interfaces are available on the TC35Terminal:

- Connector for the plug-in power supply unit
- Handset connector
- Mini-SIM card holder
- Antenna connector FME (male)
- RS232 interface (V.24/V.28 on the D-Sub socket)

Plug-in power supply unit

The TC35 Terminal receives its power supply in a wide voltage range (+8 V ... +30 V) via the power supply connectors. Two additional control lines are used for switching the Terminal on/off (resetting). The connection is implemented by a 6-pin Mini-Western connector.

Connector for the plug-in power supply unit
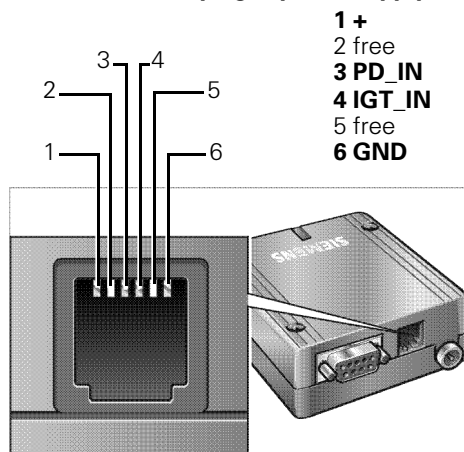
1 +
2 free
3 PD_IN
4 IGT_IN
5 free
6 GND

Interface description

Purpose of the connectors/connections

Signal name	PIN	I/O	Description	Parameters
+	1	I	Positive supply voltage connection	+8V…+30V max. 33V for 1min
	2		Free	
PD_IN	3	I	Reset input *high active*	$U_{IH} > +5V$ (>3.5s) $U_{IL} < +2V$
IGT_IN	4	I	Ignition input *high active*	$U_{IH} > +5V$ (>200ms) $U_{IL} < +2V$
	5		Free	
GND	6	I	Negative supply voltage connection Reference potential for PD_IN and IGT_IN	0V

Use and operation

The power supply is implemented by the **+**- and the GND wire. To switch the TC35 Terminal on, proceed as follows:

– Either activate the DTR control line via the RS232 interface

– Or connect IGT_IN to **+**. This connection has already been set up in the specified plug-in power supply unit below, see "Connectible plug-in power supply unit" on page 14.

Polarity reversal protection

Polarity reversal protection is implemented by means of a power diode. The diode has a reverse voltage of 400V.

Overvoltage protection

Overvoltages are suppressed by a Zener diode after the polarity reversal protection diode.

Fuses

A permanently installed, non-replaceable fuse in the TC35 Terminal ensures electrical safety in the event of faults. Connect a fast 1.25A fuse to the supply line of the positive supply voltage for general protection of the Terminal, see "Safety and installation information" on page9.

Interference immunity

- The cable length must not exceed 3m
- Current carrying capacity <1.5A (Western modular jack)
- Nominal signal range: 0...+30V
- Max. load current 1.5A
- Electrical fast transient burst requirements in accordance with ETS 300-342-1
- Surge immunity requirements in accordance with ETS 300-342-1
- Electrostatic discharge requirements in accordance with ETS 300-342-1
- Immunity RF common mode 0.15–80MHz in accordance with ETS 300-342-1
- Transients and surges in a vehicular environment
- Voltages dips and interruption

Connectible plug-in power supply unit

Item	Order no.	Supplier
Plug-in power supply unit for the TC35 Terminal	39001	Sphere Design Saarpfalz-Park 10 D-66450 Bexbach Saar Tel.: +49 6826 / 5200-0 Fax: +49 6826 / 5200-25 E-mail: info@spheredesign.de

Interface description

Handset connector

The handset is connected via a 4-pin Mini-Western socket. The audio interface has a symmetrical design. The audio interface can be configured by AT commands. Threeaudio modes are prepared in the GSM module for this purpose.

Mode 1 (default):

The "Handset for Cellular Engine Siemens Terminal M20T, MC35T, TC35T, DSB35" can be connected to the TC35 Terminal (approved configuration and recommended handset).

Mode 4:

Any handset can be connected to the TC35Terminal. The audio parameters can be adapted by means of AT commands. New approval must be obtained for this combination.

Mode 5:

The frequency responses have a linear setting in this mode for any audio equipment. Echo suppression and side tone are switched off.

Interface description

Handset connector

1 MICN
2 EPN
3 EPP
4 MICP
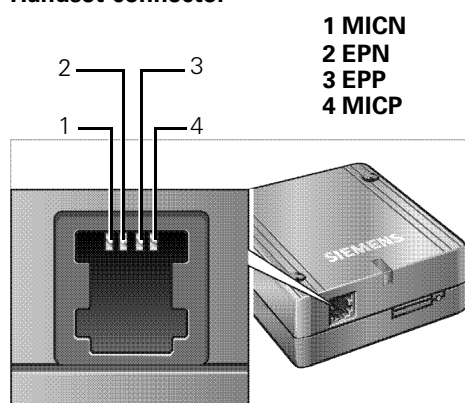
Purpose of the connectors/connections

Signal name	PIN	I/O	Description	Parameters
MICN	1	DC:O AC:I	Microphone input minus	DC (no load): $\quad U_0 = 6.0V \pm 10\%$ (MICP) $\quad U_0 = 0V$ (MICN) $\quad R_i = 4.7k$ (MICP) $\quad R_i = 4.7k$ (MICN)
MICP	4	DC:O AC:I	Microphone input plus	AC: $\quad U_{imax} = 1.03V_{PP}$ $\quad\quad Z_i = 2\,k\,\Omega$ Gain range: 0…42dB
EPN	2	O	Earpiece connector	$U_{0max} = 3.7V_{PP}$, no load $R_i = 15\,\Omega$
EPP	3	O	Earpiece connector	Gain range: −18…0dB

Interface description

Use and operation

A connected handset can be used when the customer application initiates the TALK state with AT commands via the RS232 interface.

Interference immunity

- The connecting cable must not exceed 3m in length.
- Electrical fast transient burst requirements (cable is >3m)
- Surge immunity requirements not specified
- Electrostatic discharge requirements in accordance with ETS 300-342-1
- Immunity RF common mode 0.15–80MHz in accordance with ETS300-342-1

Connectible handset

| Item	Order no.	Supplier
Votronic handset Handset for the TC35 Terminal	HH-SI-30.3/ V1.1/0	Votronic GmbH Saarbrücker Str. 8 D-86386 St. Ingbert Tel.: +4968949255-44 Fax: +4968949255-88

Interface description

SIM card connector

The connector is intended for 3V SIM cards in accordance with GSM11.12 phase2 to operate the Terminal.

The SIM card (3V type) must be inserted in the card holder to put the TC35 Terminal into operation.

1. Make sure that there is no voltage applied to the TC35 Terminal.

2. Operate the eject mechanism (yellow pin next to the card holder) to open the card holder by pressing it down with a pen, for example.
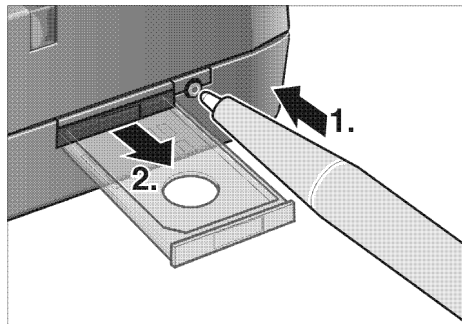
Interface description

3. Insert the SIM card in the SIM card holder and push it back into the housing.
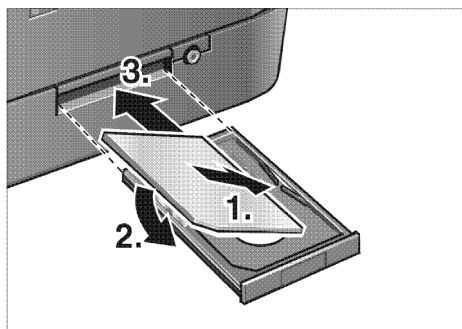
Interface description

Purpose of the connectors/connections

Signal name	PIN	I/O	Description of the GSM module connectors	Parameters
CCIN	24	I	Input for detection of the SIM card; *high active*	$R_i = 100\,\text{k}\Omega$ to GND $U_{iLmax} = 0.4\,\text{V}$ $@\,I = 0.1\,\text{mA}$ $U_{iHmin} = 1.95\,\text{V}$ $U_{iHmax} = 3.3\,\text{V}$
CCRST	25	O	Restart	$R_0 = 220\,\Omega$
CCIO	26	I/O	Date input/output	Input: $R_i \geq 1\,\text{M}\Omega$ Output: $R_0 = 220\,\Omega$
CCCLK	27	O	Clock	$R_0 = 220\,\Omega$
CCVCC	28	O	Supply voltage	$CCVCC_{min} = 2.84\,\text{V}$ $CCVCC_{max} = 2.96\,\text{V}$ $I_{max} = 50\,\text{mA}$
CCGND	29	X		

Use and operation

A SIM card holder from Molex with a SIM_IN contact is used. Only when the card holder is inserted is the switched closed.

The card can only be replaced when the GSM engine is in the POWER DOWN state.

Interface description

The Bootbox BB35 enables software to be updated via the SIM interface. The Bootbox is connected instead of a SIM card (see "Bootbox BB35" on page33).
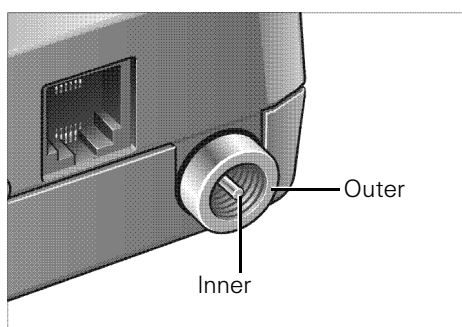
Interference immunity

Electrostatic discharge requirements in accordance with ETS 300-342-1

Antenna connector FME (male)

A dual band antenna (GSM 900/1800) can beconnected to the RF interface. The connection is implemented as a 50Ω FME (male) coaxial jack.

Antenna connector

Purpose of the connectors/connections

Signal name	PIN	I/O	Description
RF	Inner	I/O	RF input/output
GND	Outer	X	Frame connection

Interface description

Transmission type and method
- Digitally modulated RF burst signal
- GMSK in accordance with GSM05.04
- Half duplex
- Bidirectional

Interference immunity
- Electrostatic discharge requirements in accordance with ETS 300-342-1
- Electrical fast transient burst requirements (cable is >3m)
- Surge immunity requirements not specified
- Electrostatic discharge requirements in accordance with ETS 300-342-1
- Immunity RF common mode 0.15–80 MHz in accordance with ETS300-342-1

Connectible antenna

Item	Order no.	Supplier
Dual-band antenna (900/1800MHz) Magflex Dual	300574	Dynaflex Antennen Vertriebs GmbH Genker Str. 16 D-53842 Troisdorf Tel.:+49 224195124-70 Fax:+49 224195124-77

Interface description

RS232 interface
The RS232 interface is the interface for the application software and the connection to the PC. The customer application communicates with the TC35 Terminal or the TC35 GSM engine by means of ATcellular commands. The RS232 interface is implemented as a 9-pin D-Sub socket with a screw fitting.

RS232 interface – 9-pin D-Sub
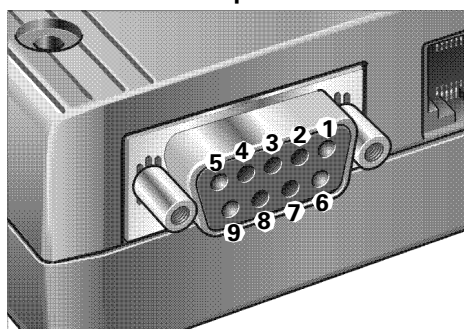
Interface description

Purpose of the connectors/connections

Signal name	PIN	I/O	Description	Parameters
DCD	1	O	The functions correspond to those of a serial interface on the basis of a V.24 protocol.	active high >5V low <−5V
RXD	2	O		logical 1=low <−5V logical 0=high >+5V
TXD	3	I		active high >2.4V low <1.8V
DTR	4	I		active high >2.4V low <1.8V
GND	5			0 V
DSR	6	O		active high >5V low <−5V
RTS	7	I		active high >2.4V low <1.8V
CTS	8	O		active high >5V low <−5V
RI	9	O		active high >5V low <−5V

Use and operation

In order to control the Terminal and transfer data, the customer application (e.g. host computer) is connected via the RS232 cable.

Interference immunity

- The connecting cable must not exceed 1.8m in length.
- Nominal signal range: ±15V
- Max. load current 1A
- Electrical fast transient burst requirements not specified
- Surge immunity requirements not specified
- Electrostatic discharge requirements in accordance with ETS 300-342-1
- Immunity RF common mode 0.15–80MHz in accordance with ETS300-342-1

Connectible RS232 connecting cable

Item	Order no.	Supplier
RS232 connecting cable 9-pin D-Sub extension 1:1	300574	Tecline Behrener Str. 8 D-66117 Saarbrücken Tel.:+49(0)68192678-29 Fax:+49(0)68192678-50

Startup

Before startup, the components required for your application must be connected. The SIM card must be inserted in a deenergized state.

The TC35 Terminal is ready for operation when supply voltage is applied and the ignition line is activated. If the recommended plug-in power supply unit is used, the ignition line is already connected to the supply voltage line, and the TC35 Terminal is thus immediately switched to the active state. It starts the network search and registers with network operator. Please read the following conditions for switching the Terminal on and off:

Switching onTerminal

Simply applying supply voltage (**+** to pin 1 and GND to pin 6) alone is not enough to switch on the TC35 Terminal.

It can be switched on in two different ways:

Activation of the IGT_IN ignition signal on the power supply connection

The switching regulator is switched on with the IGT_IN=high signal. When the switching regulator is switched on, VBAT is generated as the operating voltage for the GSM module. This still does not activate the GSM module. Triggered by VBAT, a transistor switch generates the IGT ignition signal with a delay of approx. 100ms for the GSM module. Only then is it switched on. (It exits the POWER DOWN operating state.)

Startup

In its energized state, the GSM module provides the supply voltage (VDD). VDD ensures that the switching regulator remains on, even when its closing condition is lost (i.e. IGT_IN=low).

Explanation:
VBAT=operating voltage for the GSM module
VDD=supply voltage from the module

Activation of the RS232 control line DTR

The TC35 Terminal can be switched on in the same way as via IGT_IN by activating the RS232 control line DTR (high signal).

Note

The TC35 Terminal is switched on immediately using the recommended plug-in power supply unit (see the above explanation on startup).

Switching off / resetting the Terminal

The Terminal can be switched off in two different ways:

Using a software command by means of an AT command

A software shutdown via an AT command is always advisable for a controlled shutdown of the TC35 Terminal. In this case, the GSM module signs off before the watchdog condition results in the specific switching off of the supply voltages.

Activation of the PD_IN reset signal on the power supply connection

The POWERDOWN line on the GSM module is connected to the watchdog input pin of the power supply ASIC, which can only be switched off by changing the watchdog condition. To do this, the PD_IN Terminal reset line is active (high) for at least 3.5s. This results in immediate, "hard" disconnection, with the TC35 Terminal unable to sign off correctly from the base station in the STANDBY and TALK operating states .

In the case of this hardware shutdown, the software is no longer able to respond before the voltage is switched off. This corresponds to a direct, unannounced disconnection of the operating voltage. In the application you can switch off or reset the module without interrupting the input voltage supply.

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Operating states / LED

LED
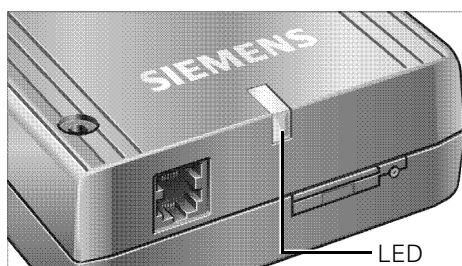
The LEDs display the following operating states of the Terminal:

Operating state	LED
After connecting the plug-in power supply unit	On for 2 s
POWER DOWN	Off
– Network search or – no SIM card is inserted or – no PIN is entered (via PC) or – no GSM network is available	Flashes rapidly
STANDBY (registered in the network)	Flashes slowly
Connection (TALK)	On

Note:

Usually, the network search takes only a fewseconds till the Terminal is registered. If the flashing continues, this means that no SIM card is inserted, no PIN number is entered or no GSM network is available.

POWER DOWN

Once the operating voltage is applied (**+** and GND), the TC35 Terminal is in the POWER DOWN state.

The operating voltage for the GSM module is disconnected (the switching regulator is off). In other words, the software of the GSM module is not active.

A transition to the POWER DOWN state always occurs in the following circumstances:

• When the Terminal (module) is shut down by means of AT commands (e.g. sleep mode).

• When the external reset line is active.

Operating states / LED

**Network search
(no SIM card,
no PIN number,
no GSM network)**

In the network search state, the TC35 Terminal searches for a GSM network. All the components in the GSM Terminal (module) that are not required are shut down in several stages by the energy-saving software.

This state is reached:

- From the POWER DOWN state: by an active ignition (on) signal at the power supply connection or
- From the TALK or STANDBY state: when the network is lost (out of range)

Standby

In the STANDBY state, the TC35 Terminal is ready to send and receive and registered in the network. Paging is performed with the GSM network in order to obtain synchronisation with the GSM network (repetition rate dependent on the BSPA_Mutiframe=2...9 parameter). All the components that are not required are shut down in several stages by the energy-saving software. Power consumption in this state depends on the current network availability.

Talk

In TALK mode a connection has been established between two subscribers via the GSM network. Power consumption is at the maximum and depends on the GSM network availability and several connection settings (e.g. DTX off/on, FR/EFR/HR, hopping sequences and antenna coupling).

AT command control

The TC35 Terminal is controlled and programmed by means of AT commands. The AT command structure corresponds to the TC35 module used. The AT commands can be obtained from the ICM WM home page: www.siemens.com/wm.

SW update

A SW update for the TC35 Terminal takes place via the RS232 interface or the SIM interface. These interfaces must be designed in such a way that the upgrading of the TC35 Terminal is integrated in the application. The software can be obtained from the ICM WM home page. The SW package is self-unpacking and menu-driven. The Bootbox BB35 is required for updating via the SIM interface.

Ordering data for the Bootbox:

Item	Product code	Source
Bootbox BB35	L36880-N8102-A100	Via the indirect sales channel, orders can be placed with your distributor or system integrator.
		Via the direct sales channel (local companies), orders can be placed with ICM WM by using the familiar sales structure.

Compatibility

The direct predecessor of the TC35 Terminal is the M20 Terminal.

The antenna connector is not compatible.

The modified version (passive version) of the Votronic handset must be operated at the audio interface in accordance with HH-SI-30.3/V1.1/0.

The following table shows the compatibility:

Hardware:

Interfaces	M20 Terminal	TC35 Terminal	Compa-tible
Power supply unit	Mini-Western socket	Mini-Western socket	Yes
Audio interface	Mini-Western socket	Mini-Western socket	Yes *1)
Antenna connector	FME (female)	FME (male)	No
PC interface	RS232 interface	RS232 interface	Yes *2)

*1) The studio interface is no longer available with the TC35 Terminal.

*2) All the control lines are brought out of the TC35T.

Software:

The command set of the M20 Terminal has been modified and extended for the TC35 Terminal and is thus not 1:1 compatible. A migration paper with the modifications is available at the ICM WM home page on the Internet.

Certification / maintenance

Certification   The TC35 with its IMEI number is approved for operation in GSM networks and complies with the following EU directives:

- Directive 89/336/EEC on electromagnetic compatibility
- Directive 98/13/EC, CTR 19 and CTR 20, on telecommunications Terminal equipment
- Directive 98/13/EC, CTR 31 and CTR 32, on telecommunications Terminal equipment
- Directive 73/23/EEC on low voltage, supplemented by Directive 93/68/EEC

CE

Maintenance tips
- Treat the SIM card with the same care as your credit card. Do not bend or scratch the SIM card or expose it to static electricity.
- Wipe the Terminal housing with a moist or antistatic cloth. Do not use a chemical cleaning agent.

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be inspired

Wireless
Modules