

TiMo III – Manual



Preface

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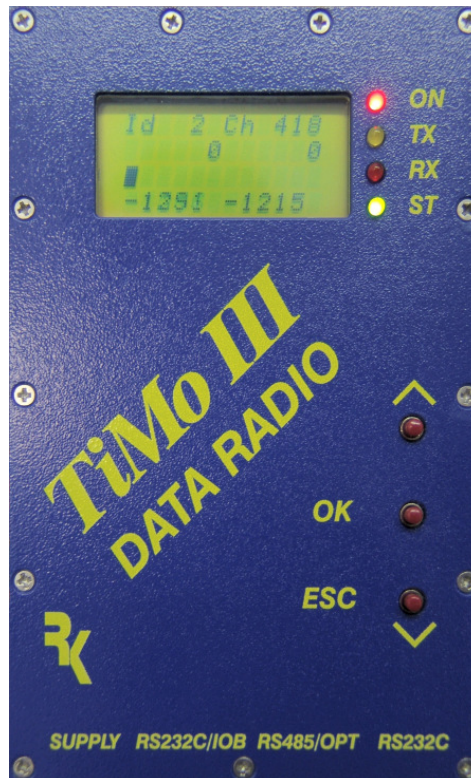


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Modem Properties

Front View

On the front side of the radio modem TiMo is a LCD display with 3 keys for status display, configuration and controlling of every important parameter.



Beside there are 4 status LED's with the following functions:

Display	Meaning
ON (red)	LED on: TiMo is switched on and active
TX (yellow)	LED on: TiMo is sending data
RX (red)	LED on: TiMo is receiving data
ST (green)	LED on: TiMo is connected to other devices via a backed protocol LED flashes: TiMo has no backed connection to other devices

Connectors

On the bottom you can find four Mini-DIN connectors. Their functions in detail are:



Connector	Description
SUPPLY	Connection of the 6-pole mini-DIN connector red, black, yellow = PLUS brown, green, orange = GROUND
RS232C/IOB	serial interface RS-232 C max.19200Bd (COM2)
RS485/OPT	serial interface with RS422/485 levels max.57600Bd (COM1)
RS232C	serial interface with RS-232C max.57600Bd (COM1)



Startup

Assembly Instructions

- Connect a suitable antenna with the SMA – antenna connector.
- Put the plug for the voltage supply into the socket of TiMo marked with „SUPPLY". The maximal Voltage is 12V. The used power supply should be able, using a max. transmission power of 6W, to supply the power of min. 3A., else the transmission will not be possible for reasons of voltage drop.

Startup

Basics

For optimal use of your radio modem, you should carry out some basic settings and execute tests, before the first use.

A more detailed description of the parameters please find in the chapter *Configuration* and the description of the handling in chapter *Handling and Displays*.

Configuration of the Radio Parameters

Normally your radio modem should be already basically configured after delivery, so that a check of the radio communication directly will be possible. Nevertheless you should verify once again the following parameters and align them, if necessary.

Usually the following parameters affect all TiMo radio modems used in one radio network. In case one parameter should change in one device, the other devices should be accordingly reconfigured.

Radio Channel (Set-up – Transceiver – Channel)

According to the radio modem ordered, you have received either a device with a client frequency or a device with a definite usable frequency range. On a fixed frequency this is usually on channel 0. The usable frequency range comes to max. 10 MHz, that means for a channel spacing of 12,5 kHz an amount of channels of max. 800 will be possible.

By default you will receive a list of all selectable channels with corresponding frequencies.

Carrier (Set-up – Transceiver – Carrier)

With the carrier setting the electronic squelch can be configured. The adjusted value is being indicated in dBm. For example -1087 on the display means -108,7 dBm.

For signal strength above the carrier setting indicated, the radio modem switches to receive. This is being indicated by the red RX LED.

The threshold for the carrier should be about 10 dBm on the squelch, so that it only lights up, if data from the other radio modems TiMo are being received. Under normal circumstances this value will be about -110 dBm.

In case the radio modem would switch to other devices to receive without radio signal, the value has to be further increased.

Attention: As the values are being negative, „increasing the carrier level“ based on f. ex. -110 dBm not -115 dBm, but -105 dBm.

Radio baudrate (Set-up – Modem – Bitrate)

The radio modem TiMo depending on design is able to transceive via radio a max. datarate of 9600 respectively 19200 Bd. The radio baudrate has to have the same radio baudrate on every used device (in contrary to the serial interface baudrate).

Radio FEC Set-up (Set-up – Modem – FEC)

The FEC set-up has to be set identical on every device, either on or off.

Checking of the Radio Communication

When you have checked and if necessary configured every parameter, as previously described you should first check the quality of the radio connection. By means of the modem check and the calibrated field strength indicator the radio modem TiMo offers to you an integrated help to verify the quality of the radio connection.

Please find settings and operation of the modem check in chapter *Modem Check*.

Configuration of the User and Radio Protocol

If the quality of the radio communication is sufficient, the user protocol which is necessary for your application should be set up. These settings you can execute via *Set-up – Lines*.

Therefore please take notice of our instructions for the configuration and our suggestions, to be sure which settings will be optimal for your application.

In the chapter *configuration examples* you can find some exemplary settings for different applications.

Configuration of the Serial Interfaces

At last the settings of the serial Interface have to be verified. You have to configure the radio modem TiMo corresponding to the settings of your connected equipment. Please find an overview of all serial parameters in the chapter *Configuration*.

Antenna Guide

The radio modems TiMo operate with frequencies on the 70cm band ($\lambda = 70\text{cm}$), which allows the use of handy antennas. For working with TiMo several antennas can be used, but they differ in structure and size.

The smallest is a $\lambda/4$ rod with a mech. length of about 17 cm. It works omni-directional in vertical orientation, but you have to take care for a proper HF counterbalance because of its monopole character.

You can as well use a $\lambda/4$ groundplane antenna. In comparison to the $\lambda/4$ rod it offers a proper HF counterbalance in the form of 3..4 $\lambda/4$ radials, which, corresponding to the impedance, build an angle of 90° up to 145° to the rod and which are arranged concentric to the rod.

Yet a simple $\lambda/4$ rod as well as a $\lambda/4$ groundplane antenna have a loss of about 3dB towards a $\lambda/2$ element or dipole.

For operating with TiMo via short distance you as well can use a short rubber antenna, which has to be placed on the antenna plug. This solution can be only partly be recommended, as such antennas often have a too big divergence of the impedance of 50Ω , which leads to a diminished irradiation and to increased return losses. The characteristics of the antenna are being influenced as well by environmental conditions.

If the maximal allowed power shall be radiated, which will be advisable on longer distances, stocked omni-directional antennas are recommended. They carry their gain to the benefit of diminished upward beams, or one of our offered sleeve antennas with a gain towards the $\lambda/4$ -Antenne of 3dB (which is corresponding to twice the radiated power). Certainly this gain is being profitable as well for the transmitter as for the transceiver.

Directive antennas with up to a gain of 10dB can only be applied in the band „F“ (433 MHz) and in the non-public data communication (448MHz).

The wave propagation in the 70cm band is quasi optical, that means, if you have free visibility the radio communication normally functions as well. Under good and normal circumstances a distance of 5 km should be possible with only few bitrate errors. With help of our 6W version you can make 50 km and more. In closed rooms a reduction of the operating range to some 100 m has to be taken into consideration.



Prevention of Disturbances

A consequence of disturbances could be a diminution of the operating range. Almost every modern electrical or electronical device contains oscillators, which are necessary for its function (controllers etc.). These oscillators do not only produce their nominal frequency, but as a result of their often rectangular wave signal, also a range of harmonics, that can frequently produce interferences up to 1 GHz. Devices with CE mark can as well produce disturbances. Although they are within the legal limits for the device in question, they can affect such a sensible receiver like TiMo extremely. It is advisable to separate spatially the antenna system from for ex. the computer or an electronical control unit, to avoid a desensibilisation of the receiver.

Operation and Displays

This chapter deals with the operation of the modem using the three keys and it describes the different status displays of the LCD displays.

The Operation via LCD Display

The LCD display can be operated with help of the following three keys:

- Using the **key OK** you get to the menu and choose there the menu item on top.
- With the **upper key** you can navigate through the individual items and press **OK**, after your choice, to change the value.
- The **ESC key** takes you back to the menu and changes a value in the chosen menu item.

If you want to change something in the *Set-up – Lines* menu you have to operate as follows:

Press the **OK key** to enter the menu. As *Set-up* is located in the upper line, press again the **OK key** to go to the corresponding submenu. Now you have to push the **upper key** to go to the corresponding submenu. Then you push the upper key as often as you can see *Line* in the first line. When pressing again the **OK key** you achieved the aim.

The format as for ex. *Set-up – Lines* is being used in this manual as shortened spelling, to describe the configuration as simple and pregnant as possible. After a short familiarisation you will consider it very easy to use the radio modem TiMo with help of the 2 keys and the LCD displays.

Status Display

The status display of the radio modem shows the important operation values. By using the upper key you can scroll the different indications. As far as possible the statistical values can be reset by using the **ESC key**.

The Standard Display

The standard display appears after switching on the modem and mainly shows the values of the operation of the actual radio communication situation. Die **ESC key** serves to reset the statistic values.

```

Id 20 Chn 124
 1234 15649
██████████
-950      -650
    
```

Line	Column	Description	Meaning
1	1	Id	Id of the device
1	2	Ch	tuned radio channel
2	1		number of the radio blocks sent since the last reset of the values
2	2		number of the radio blocks received since the last reset of the values
3			the bar symbolises the currently received field strength
4	1		the current value of the field strength in dB * 10. To keep the dB value, you have to visualise a decimal point in front of the last place
4	2		maxhold of the field strength: the maximally received field strength since the last reset

The Send- and Receive Display

This display shows the operation values for send and receive. The ESC key serves to reset the statistical values.

```

Sent      15
Recv      3
Carrier   11
CRCErr    0
    
```

Line	Description	Meaning
1	Sent	number of the radio communication blocks sent since the last reset of the values
2	Recv	number of the radio blocks received since the last reset of the values
3	Carrier	number of the received carriers since the last reset of the values
4	CRCErr	number of the received radio communication blocks with CRC error. These blocks are not being processed.

The Send- and Receive Display

This display shows the operation values for sending and receiving. The ESC key can be used to reset the statistical values.

```

DblSnd    15
Perc      1
DblRcv    3
Perc      0
  
```

Line	Description	Meaning
1	Sent	number of the radio communication blocks sent since the last reset of the values
2	Recv	number of the radio blocks received since the last reset of the values
3	Carrier	number of the received carriers since the last reset of the values
4	CRCErr	number of the received radio communication blocks with CRC error. These blocks are not being processed.

Serial Interface Display

This display shows the operational values for the both serial interfaces of the radio modem. The ESC key can be used to reset the statistical values.

```

Com1 In   320
Com1 Out  23
Com2 In   10
Com2 Out  253
  
```

Line	Description	Meaning
1	Com1 In	number of the received Com 1 packages since the last reset value reset
2	Com1 Out	number of the sent Com 1 packages since the last reset value reset
3	Com2 In	number of the received Com 2 packages since the last reset value reset
4	Com2 Out	number of the sent Com 2 packages since the last reset value reset

RSSI Display

This display shows every received radio modem with names and RSSI value (Received Signal Strength Indication) in dBm.

If the list is empty the display shows RSSI List (empty).

```
TiMo3    -64.5
```

Line	Description	Meaning
1-4		Field strength and name of the TiMos received

Operation Display

This display shows some more operational values.

```
Carrier -1099
Power   63
Temp    42
Version 4.37
```

Line	Description	Meaning
1	Carrier	actual setting of the carrier threshold in dBm
2	Power	actual setting of the transmission power from 0 to 63
3	Temp	actual operational temperature of the radio modem
4	Version	software version

Modem Check

Preliminary

With the modem check the radio modem TiMo offers to you a valuable tool to evaluate a radio link. Configuration, operation, as well as the evaluation of the results are being described in this chapter.

In case your radio connection already has problems with the modem check, you should first find the reasons, before you operate.

Configuration

In the menu modem check the parameters for the modem check can be set.

Parameters	Range of Values	Meaning
Send		start of the modem check with permanent sending of count packages of the defined <i>Size</i>
Impulse		start of the modem check with sending intervals of count packages of the defined <i>Size</i> in defined intervals in ms
Single		sending of single packages of the defined <i>Size</i>
LB-Node	0-255 Default: 0	the radio modem with the Id equal the LB node answers to received packages (loopback)
Loopback	§ no : modem does not respond to incoming modem check packages § yes : modem answers to incoming modem check packages	
LB-Delay	0-1000	delayed sending (in ms) of the loopback on a modem check packages. Only effective, if loopback on yes or LB node of the sending station odd 0
Size	0-1020 Default: 30	length of the modem check packages
Interval	0-2000 Default: 350	interval extent (in ms) on sending of impulses
Count	0-60000 Default: 300	number of the packages to be send. In this case the set-up 0 means endless

Transmission Modes

The modem check contains 3 different transmission modes. You can start them when you press the **OK key** in the corresponding menu item.

Send

Count data packages of the defined *Size* are being sent, which are linked together.

For this operation the radio modem switches to the status display. The TX LED is on during the transmission and the counter (please see „Operation and Displays) shows the number of the already sent packages.

Please take care, that the radio modem TiMo should not transmit more than 10 min. on full power, as it could be damaged for reasons of developing heat with insufficient cooling. Therefore please avoid to high *Count* values, respectively stop the transmission after a certain time.

Impulse

In this mode *Count* data packages of the defined *Size* are individually sent in distances of *Interval* milliseconds. The transmitter is keyed on in the chosen interval, the TX LED flashes and the data counter is increased. For the operation the radio modem switches to the status display.

This check should be used for the evaluation of a radio link, as it comes closer to the real transmission attitude.

Single

Every pressing of the **OK key** on *Single* only one data package of the length *Size* is being sent. The radio modem does not switch to the status display during transmission, but stays in the modem check menu.

Operation

The modem check can be used with the loopback parameters, as well unidirectional (1. TiMo sends, 2. TiMo receives) as bidirectional (1. TiMo sends, 2. TiMo receives, 2. TiMo sends, 1. TiMo receives).

Unidirectional

For evaluating the signal quality of a radio communication you should primarily use the impulse check, as this comes closer to the real operation. For the first evaluation the set-up for *Count*, *Size* and *Interval* should be set on default.

The receiving devices should appear in the status display and the statistical values should be reset by pressing the **ESC key**. Please take care also, that during the check no other radio modem is operating, else the data could be corrupted by other radio packages.

Then you can start the check-up with the **OK key**. The sending radio modem TiMo should now count up the packages on the transmission counter. The receiver counter in the receiving devices should now count up at the same time.

Bidirectional

Using the bidirectional connection the loopback parameters have to be configured correctly before the beginning of the check. Here you can execute the loopback check in two different ways:

- With *LB-Node* you can set-up the Id of the outstation to be tested. Take care, that all radio modems have different Ids, do not use one Id twice.
- On the remote station *Loopback* has to be switched *on*. In this version the *Loopback* of no other receiving device should be switched *on*

Furthermore there is the setting *LB-Delay*. This setting can be used to delay the loopback of the outstation for the set milliseconds. The loopback test should only be executed with the impulse or single test, as the transmission check does not function with this setting.

When the test is started with impulse, the LCD display is switched to the status display again. Now you will receive a package for every sent package.

Therefore you can, using this test, evaluate the radio link forth and back.

Evaluation of the Results

The evaluation of the results is rather simple. Depending on the number of data packages to be send, an equivalent number should be received.

The evaluation of the default setting has to be as follows: If you send 300 packages you should not receive less than 298 packages to get a good radio communication at the remote station.

Besides the number of packages the max. receiving field strength can be helpful for evaluating the signal quality. It is being indicated in the status display on the bottom right. The value should be more than -100 dBm in good weather conditions, as the radio communication can be influenced by the weather, too.

Configuration

Set-up

In this chapter we describe the configuration possibilities of the radio modem. These are accessible via LCD display by choosing the sub item **Set-up**.

Modem Id

Here you can enter the identification of the device.

Parameters	Values Range	Meaning
Id	1-255	The Id of this device
Netid	1-255	Id of the network in which this device is operating
Name	Text up to 29 Characters	a name for the device, that describes its location or its function

Transceiver

In this menu the parameters for the radio operation have to be set.

Parameter	Values Range	Meaning
Channel	0-800	Radio channel on which the device shall send and receive.
Carrier	0-63	Here you can select the settings for the squelsh. It should be set approx. between the receiver signal of the weakest outstation, and the noise when no station is sending. Clue: if no station is sending, the RX-LED should be constantly off (no flash!) and if a station is sending, it should be constantly on.
AutoCarrier	still not ready	
Power	0-63, here is 0 the smallest power (80 milliwatts) and 63 the highest (6 watts)	The transmission power of the radio modem.

Modem

Here you can set the parameters for radio transmission.

Parameter	Values Range	Meaning
Bitrate	4800,9600,19200	The bitrate can be transmitted with the data via radio channel. The highest transmittable bitrate depends on the bandwidth of the modem.
FEC	§ off : FEC is switched off § on : FEC is switched on	Indicate, whether the modem shall operate with or without FEC /Forward Error Correction). With switched-on FEC you can correct certain transmission errors, without the necessity to send the data again. On the other hand the data set on the radio route will be prolonged about 30 percent.
RespectCr	§ no : the modem is sending always at once, even if a carrier is received § yes : the modem starts only if no carrier is received	Here you can choose, whether the modem shall accept a received carrier as transmission procedure and draws back its own transmission, or if a received carrier shall be ignored.
TriggerPtt	§ off : no immediate switch on of the transmitter on receiving data § on : on receiving a byte on the right side of the interface (COM1) the transmitter starts at once	Herewith you can accelerate a transmission process by switching immediately to the right hand side of the interface, when receiving one byte. (depending on RespectCr, see above). Normally the transmitter is being switched on only if the complete data set has arrived.
KeepPtt	0-60000 milliseconds	Here you can set the time after finishing the transmission procedure, which the transmitter shall be online, to send a following data set more rapidly.
KeepPtt	0-10000 milliseconds	Here you can set the time, in which the modem after switching off the transmitter may not send again, so that other modems can send, too.
CtrPort	Id of a digital entry port	This item enables the control function for a given port for transmitting.
PersiProb	0-100 percent	Indicates the probability with which the modem that intends to send, will really send or delays the intention to send.
PersiSlot	0-250 milliseconds	Indicates the time after which the modem in case of a delaying the intention to send, makes a new decision corresponding to the probability.
PersiMax	0-100	Indicates, how often the modem does not send in succession, before it is going to send.

Serial

Configuration of the hardware parameters for the data transmission on the serial interfaces.

Parameters	Values range	Meaning
LineID	1: COM1 (right interface) 2: COM2 (left interface)	Choice of the interface to be configured
Baudrate	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 baud	Transmission velocity of the interface in baud (bits/second)
Bits	7,8	Amount of databits
Stopbits	1,1.5,2	Amount of stopbits
Parity	§ none : no parity § even : even parity § odd : odd parity	Parity bit set-up
FlowCtrl	§ none : no flow control § RTS/CTS : hardware handshake § XON/XOFF : XON – XOFF protocol § RTS : hardware handshake in only one direction with RTS	Flow control set-up
Timeout	5-1000 Milliseconds	This value indicates how much time (in ms) maximally may pass between two incoming characters on the serial interface, until the data block meanwhile received, will be separated and processed.
Mode	§ RS232 : RS232 Modus § RS485 : RS485 Modus	Here you can set the operation mode for the right serial interface (COM1). In COM2 this is without meaning.

Lines

Here the serial interfaces can be allocated to the operational application protocols and there properties are configured. Some values have presets which are used when the user protocol does not determine them. For example the transparent protocol does not determine any of this values and takes over all preset defaults. On the other hand the IEC 870 protocol determines on it's own the values ToNode, ToNet, ToPort and only uses the value Tprot.

Parameters	Values Range	Meaning
LineID	1: COM1 (right interface) 2: COM2 (left interface)	Choice of the interface to be configured
UProt	§ null : no protocol, interface is deactivated § transp : transparent data transmission § cmd : commando mode § control : connection to the basestation § menu : menue guided set-up § iec870 : IEC 870 protocol § gps : GPS sirf protocol for timeslot control § loadprg : reload of operation software § simple : primitive transparent protocol without header § special : choice of special user-specific protocols § diag : protocol for service purposes	The active user protocol for the actual interface
UProtBoot	The same settings possible as in <i>UProt</i> .	The user protocol, that shall be set at this interface, after booting the system.
ToNode	1-255	The node, to which data shall be sent, if not specified by the application program.
ToNet	1-255	The net, to which data shall be sent, if not specified by the application program.
ToPort	1,2	The port on the receiving modem, , to which data shall be sent, if not specified by the application program. Attention: if there is no compatible application protocol set on the receiving modem the data will be dismissed.



TProt	§ transp : simple not secured protocol without routing	The radio transmission protocol which shall send data, in case that this is not specified by the user protocol.
	§ net_sec : secured protocol with routing for building up any net structures	
	§ net_dgr : unsecured protocol with routing for building up any net structures	
	§ net_secp : like <i>net_sec</i> , but on transmission end the package buffer is cleared	
	§ tree_sec : unsecured protocol for building up nets in tree structure	
	§ tree_dgr : unbacked protocol for building up nets in tree structure	

Protocols - TreeProt

Specification of the TreeProt Protocol

Parameter	Ranges	Meaning
TransferTime	0-60000 milliseconds Default: 2000	Here you can set the valid time for a transferred data record. If the time is exceeded the record will not be processed and deleted.
DeviceWait	0-60000 milliseconds Default: 500	Shows the max. time of waiting for a serial answer.
BCRepCount	0-20 Default: 3	Max. amount of repeats in broadcast mode
RequestTop	§ no : the modem does not request topology § yes : the modem requests a new topology, as far as this differs from others	
Dispatch Top		Dispatch of topology, station must have ID 1

Mailbox

Configuration of the mailbox mode characteristics

Parameters	Values Range	Meaning
Capacity	0-1000 Default: 100	Amount of mailbox packages with the length MaxConcatSize
StoreTime	0-100000 Default: 0	Lifetime duration for every package after input via serial interface. 0 = infinite
MaxConcatSize	0 – 1000 Default: 100	Maximum size per package. New incoming data are being added, if there is still space in the actual package,.

IEC870

Specification of the IEC 870 protocols characteristics

Parameters	Values Range	Meaning
AddressBits	8 or 16	Here you can determine whether the address field of the IEC data set consists of one or two bytes.
NodeBits	1 – 16 Default: equal with the address bits	Indicates, of how many bits (counted from the left) the receiving radio modem consists.
LineBits	0 – 15 Default: 0	<p>If not 0, these bits right hand of the node Id are considered as identification for the interface of the receiving radio modem, to which the data set shall be sent. If this value is ZERO, the master transmits to the interface, which is indicated under menue Lines, item ToPort.</p> <p>Remark 1: the index is 0-based, that means 0 the COM1 of the counterpart and 1 means COM2.</p> <p>Remark 2: on the corresponding interface of the receiving modem the IEC protocol has to be activated as user protocol, too.</p>
SubstationBits	0 – 15 Default: 0	This amount of bits, counted from the right side, are being ignored from TiMo and can be used to address several devices via a serial interface.
FixedLen	-1 – 220 Default: -1	<p>Here you can set the length of payload for a <i>FT 1.2</i> package on a fixed length. If the length is –1, it is recognised automatically.</p> <p>Attention: up to v4.83 the setting for automatical recognition is 0.</p>

Problem Diagnosis and Correction

Test Possibilities

LCD display and LEDs

On the LCD display the most important data for radio link and serial interfaces are accessible.

When problems appear the following items should be verified first:

- Does the radio modem transmit and receive?
- Are the counter for the serial interface counting up?

If already here are appearing problems, please check once again all items of the startup and make the modem test.

In case there should be still problems afterwards, please see the following chapter *Problems and Answers*.

Modem Test

The functionalities of the modem test are described in chapter *Modem Test*.

Problems and Answers

This chapter shall give you support to solve frequently appearing problems and gives you instructions what you can check to come to a solution. Principally you should check every item of the startup, if you do not succeed with this instructions.

The radio modem TiMo does not transmit!

- Is the RX LED lit permanently?
- Does the serial interface receive data? (status display for serial interfaces)



- Is the setting of user- and radio protocol correct?
- Breakdown of the power supply?

The radio modem TiMo does not receive!

- Setting of carrier and channel?
- Modem baudrate and FEC?

The radio modem TiMo is not receiving correct!

- Carrier settings?
- Sufficient receiving field strength?

The receive data counter (serial interface display) does not count up!

- Has the with the radio modem connected interface the correct level?
- Is RX connected with TX and TX with RX?

The transmitted data look corrupted!

- Are serial baudrate, databits, stopbits and parity correct?

The radio modem does not show any display on the display and does not react anymore!

- May be the radio modem is deactivated because of a voltage drop. Pull the power plug and plug it in again and the problem should be solved.

Configuration Example

Transparent Radio Route 1:1

With help of the LCD display and the three keys the radio modem TiMo can be configured fast and easily for a transparent 1:1 data connection.

Configuration

The precondition for a 1:1 connection are 2 radio modems TiMo. These have to have different Ids but the same channel and the same radio baudrate. The actual setting can be seen in the status display in the first line of the LCD display with „*Id*“ and „*Chn*“.

1. Channel Configuration — „Set-up - Transceiver - Channel“

With the upper and lower key you can choose the channel. The setting has to be confirmed with OK afterwards.

2. Configuration of the Id — „Set-up – ModemId - Id“

Here you can choose the Id with help of the upper and lower key. The setting has to be confirmed with OK afterwards. Please note, the NetId „Set-up - ModemId - NetId“ is to be set on value 1.

3. Configuration of the Radio Baudrate — „Set-up - Modem - Bitrate“

Here you can choose the radio baudrate with the upper and lower key. The setting has to be confirmed with OK afterwards. Please note, that some devices have a max. radio baudrate of 9600bd (visible on the label on one side of the device) In this case both devices have to be set on 9600bd.

Now we describe the configuration of the user- and radio protocol. The radio modem TiMo has 2 serial interfaces (**LineId 1** RS232C respectively RS485/OPT and **2** RS232C/IOB). **LineId 1** can be switched to RS485.

4. Configuration of the User Protocol — „Set-up - Lines - UProt and UProtBoot“

You can choose the item „*transp*“ with the upper or the lower key. Afterwards the setting has to be confirmed with OK.

5. Configuration of the Radio Protocols — „Set-up - Lines - TProt“

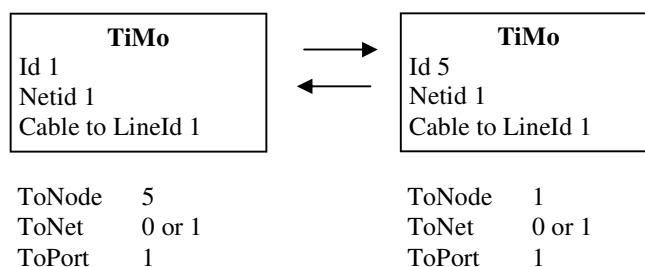
Here you have to distinguish between a secured transmission „*net_sec*“ (with confirmation and in necessary) or a non-secured transmission „*transp*“. The desired setting has to be chosen by the upper respectively lower key and confirmed with OK.

Please not, that for the setting „*net_sec*“ the not transmitted package has to repeated as often, as the radio connection is in operation again. If, after a connection break every available package in the memory shall be cleared (because they are only valid for a certain time), please use the protocol „*net_secp*“.

6. Configuration of the Counter Station — „Set-up - Lines - ToNode / ToNet / ToPort“

These three menu items show to which counter station the incoming data are being sent. In „*ToNode*“ is indicated the Id of the counter station, in „*ToNet*“ the Net Id of the counter station (in the same net 0 possible) and in „*ToPort*“ the line Id of the counter station.

Example:



On radio routes 1:1 the cable is being usually connected only to the **LineId 1** (RS232C). In case you want to send data via TiMo to **LineId 2** (that means RS232C/IOB) you have to set the „*ToPort*“ at the counter station on 2.

7. Configuration of the Serial Interface — „Set-up - Serial“

The different menu items may be more or less self-evident. The parameter „*Timeout*“ should be set on **20** (ms) at a baudrate of 9600/19200bd. Using baudrates smaller than 9600bd the timeout should be increased up to **50** (ms), else incoming serial data could be split into 2 radio packages, which could lead to problems with devices that are connected to the counter station.



Operation

After a successful configuration the radio connection should be possible. If data arrive at the serial interface, they should be sent immediately.

Technical Data

TiMo III – Radio Modem

Modulation	4- FSK, optional GMSK
Baudrate via Radio	4800Bd, 9600Bd, 19200Bd
Baudrate RS-232C / RS-485	110Baud...57,6 KBd.
Handshake	RTS/CTS, Xon/Xoff
Radio Protocol	TMNP Point to Point, Point to Multipoint, Transparent Mode, Broadcast Mode, Datagram
Addressable Stations	255
Routing / Autorouting	Automatically via Various Stations (Relais)
Error Recognition	CRC32
Error Correction	FEC/ARQ , Interleaving
Memory / Buffer	1MB RAM
Firmware Memory	1MB Flash programmable via RS-232C
Processor	16Bit / 16MHz
Display	LCD Matrix - Display 4 X 12 Characters
In/Outputs (User)	2 X RS232C (8pol Mini – DIN) 1 X RS485 (9pol Mini – DIN) Voltage Supply (9 V +/- 20%) (6pol. – Mini – DIN) 2 X Analog In/Outputs 10Bit 2 X Digital In/Outputs 1 X Antenna Socket RK-1 (SMA)
Operating Current	ca. 200mA @ 7...12,0V
Size TiMo II - C Box with Radio	(1335 x 85 x 35) mm (L x B x H)
Radio Modules available	10mW, 500mW, 6W



Radio Module RK-1/6000

Frequency Range	400 - 470MHz
Usuable Frequency Range	10MHz
Sensitivity	0,25µV for 12dB SINAD
Receiver Bandwidth	0 - 5/10KHz +/-2dB
Neighbour Channel Selection	> 70dB
Image Frequency Rejection	> 70dB
Attenuation of Intermodulation	> 70dB
Blocking	> 84dB
Receiver Interference Radiation	< -57dBm
Transmissionpower	6W (internally controllable)
Deviation	+/- 4KHz max.
Bandwidth	0...10KHz +/- 1dB
S/R - Switching	< 5ms
Out-of-Band Emissions	< -70dBc
Frequency Deviation	< 2,5ppm (-20...+60°C)
Power Consumption Send	2,6 A
Power Consumption Receive	90 mA
Temperature Range	-20°C...+60°C
In/Outputs	see table Antenna (SMA - Jack)
Weight	250g
Chassis	Aluminium milled
Size	(133,2 X 83X 15,5) mm



Radio Module RK-1/500

Frequency Range	400 - 470MHz
Usable Frequency Range	10MHz
Sensitivity	0,25 μ V for 12dB SINAD
Receiver Bandwidth	0 - 5/10KHz +/-2dB
Neighbour Channel Selection	> 70dB
Image Frequency Rejection	> 70dB
Attenuation of Intermodulation	> 70dB
Blocking	> 84dB
Receiver Interference Radiation	< -57dBm
Transmissionpower	0,5W (internally controllable)
Deviation	+/- 4KHz max.
Bandwidth	0...10KHz +/- 1dB
S/R - Switching	< 5ms
Out-of-Band Emissions	< -70dBc
Frequency Deviation	< 2,5ppm (-20...+60°C)
Power Consumption Send	0,6 A
Power Consumption Receive	ca. 90 mA
Temperature Range	-20°C...+60°C
In/Outputs	see table Antenna (SMA - Socket)
Weight	250g
Chassis	Aluminium milled
Chassis OEM - Version	Tin Chassis (120 X 75 X 11)mm
Size	(132,2 X 82 X 15,6) mm



Radio Module RK-1/10

Frequency Range	433,05 - 434,79MHz
Sensitivity	0,25 μ V for 12dB SINAD
Receiver Bandwidth	0 - 5/10KHz +/-2dB
Neighbour Channel Selection	> 60dB
Image Frequency Rejection	> 70dB
Attenuation of Intermodulation	> 60dB
Blocking	> 84dB
Receiver Interference Radiation	< -57dBm
Transmissionpower	10mW
Deviation	+/- 4KHz max.
Bandwidth	0...10KHz +/- 1dB
S/R - Switching	< 5ms
Out-of-Band Emissions	< -54dBm
Frequency Deviation	< 2,5ppm (-20...+60°C)
Power Consumption Send	170mA
Power Consumption Receive	80 mA
Temperature Range	-20°C...+60°C
In/Output	see table Antenna (SMA - Jack)
Weight	ca. 100g OEM - Version
Chassis	Tin Chassis (OEM - Module)
Size	(100 X 75 X 10)mm



DECLARATION OF CONFORMITY Directive 99/5/EC (R&TTED)

Manufacturer: Reimesch Kommunikationssysteme GmbH
Address: Friedrich-Ebert-Str. 1, 51429 Bergisch Gladbach, Germany

We declare under our sole responsibility that the product:

Kind of equipment: Radio equipment for the use in the land mobile service

Type-designation: TiMo III/6000

to which this declaration relates is in conformity with the essential requirements and other relevant provisions of the R&TTE Directive (1999/5/EC).

The product is compliant with the following standards:

EN 300 113: June 1996 A1 March 1997

Bergisch Gladbach, 19.11.08

(Christian Reimesch, CEO)



DECLARATION OF CONFORMITY Directive 99/5/EC (R&TTED)

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Address: Friedrich-Ebert-Str. 1, 51429 Bergisch Gladbach, Germany

We declare under our sole responsibility that the product:

Kind of equipment: Radio equipment for the use in the land mobile service

Type-designation: TiMo III/500

to which this declaration relates is in conformity with the essential requirements and other relevant provisions of the R&TTE Directive (1999/5/EC).

The product is compliant with the following standards:

EN 300 113: June 1996 A1 March 1997

Bergisch Gladbach, 19.11.08

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Address: Friedrich-Ebert-Str. 1, 51429 Bergisch Gladbach, Germany

We declare under our sole responsibility that the product:

Kind of equipment: Radio equipment for the use in the land mobile service

Type-designation: TiMo III/10

to which this declaration relates is in conformity with the essential requirements and other relevant provisions of the R&TTE Directive (1999/5/EC).

The product is compliant with the following standards:

EN 300 113: June 1996 A1 March 1997

Bergisch Gladbach, 19.11.08

(Christian Reimesch, CEO)