Remote Terminal Annunciator TELEM-RTA

User Manual

Martem AS
2010

Contents

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1. General

The combined Remote Terminal Annunciator TELEM-RTA is a master remote terminal unit for coordinated substation control. TELEM-RTA provides control operations, data collection, protocol cross-referencing and data exchange with the remote control center. At the same time it announces events on the front panel. If required, the units can be cascaded to obtain the desired capacity of the system. The TELEM RTA device is similar to the data concentrator TELEM GW 5 with the same configuration software and main possibilities. It has a reduced quantity of communication ports but it has additional data collection and event indication possibilities.

2. Possible Applications

Data acquisition and control of regional and national electricity utilities in SCADA systems. In other supply networks also of regional public utilities (gas, water, sewage, district heating, power plants).

3. Features

- Analog signal measurements
- Analog outputs for control
- Digital contact and acquisition of pulse counting info
- On/Off control functions
- Online (leased line) or offline exchange operation over Ethernet, GPRS, GSM or PSTN requested by an event or by the remote control centre
- Concentrated data acquisition and control using different communication protocols
- Protocol cross-referencing
- Logical operations between digital and analog signals can be described
- Local or remote programmable configuration
- Local event reporting and acknowledgment
- Time synchronization using GPS

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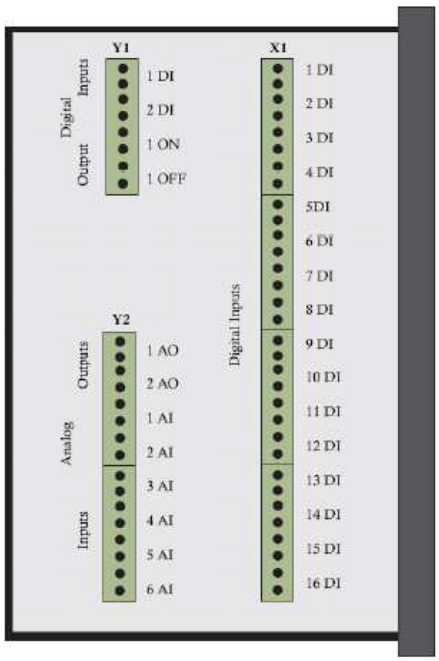
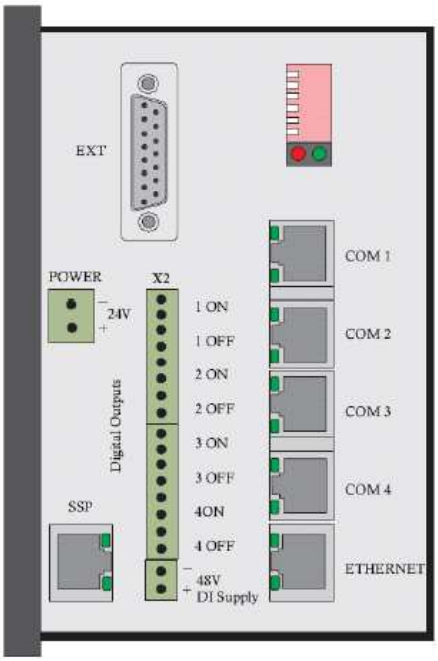
4. View


TELEM-RTA
MARTEM
335 Kõpu LL LAHTI
335 Kõpu LL KINNI
335 Kõpu LL kaugjuhtimisel
336 Puski haru LL LAHTI
336 Puski haru LL KINNI
336 Puski haru LL kaugjuhtimisel
337 Õngu haru LL LAHTI
337 Õngu haru LL KINNI
337 Õngu haru LL kaugjuhtimisel
338 Kõpu haru LL LAHTI
338 Kõpu haru LL KINNI
338 Kõpu haru LL kaugjuhtimisel
Mingi kapi uks lahti
336 Puski haru rikkeidik. töö
337 Õngu haru rikkeidik. töö
338 Kõpu haru rikkeidik. töö


Y1
Digital Inputs
Output
1 DI
2 DI
1 ON
1 OFF
Y2
Analog Outputs
1 AO
2 AO
1 AI
2 AI
Inputs
3 AI
4 AI
5 AI
6 AI
X1
Digital Inputs
1 DI
2 DI
3 DI
4 DI
5DI
6 DI
7 DI
8 DI
9 DI
10 DI
11 DI
12 DI
13 DI
14 DI
15 DI
16 DI


EXT
POWER
24V
X2
Digital Outputs
1 ON
1 OFF
2 ON
2 OFF
3 ON
3 OFF
4ON
4 OFF
48V
DI Supply
SSP
COM 1
COM 2
COM 3
COM 4
ETHERNET

5. Technical Data

• Number of differential analog inputs	6
• Analog input range (hardware specified)	0… 5 mA; -5…+5 mA; 0…20 mA; -20…+20mA
• Number of analog outputs	2
• Analog output range	0…20 mA, 30 V max
• Number of isolated digital inputs	18 (16 dry contacts with an internal supply, 2 with an external supply)
• Number of ON/OFF operations	5 (1x2 open collector and 4x2 open drain outputs), 30 V max, 0,1A max
• Number of event indicators LED	16
• Number of acknowledge buttons	16
• Number of RS 232 communication ports	4
• Ethernet port	optional by request
• SSP port for TELEM DO/DI device	optional by request
• Dimensions (W x H x D):	145 x 145 x 93
• Mounting	onto panel or DIN35 rail
• Weight	0,6 kg
• Dimensions of panel cut-out	138x138

Data communication protocols

• To higher level system	IEC 60870-5-101, IEC 60870-5-104, DNP 3, Modbus
• To lower level devices	IEC 60870-5-103, IEC 60870-5-101, DNP 3, Modbus, SPA-Bus, Telem, EN 62056-21

Data communication parameters

• Start bits	1
• Parity	odd, even or no parity
• Communication rates	from 300 to 38400 bit/sec asynchronous
• Communication modes	RTS/CTS Control, No Control

Power supply:

- Supply voltage 24 V DC
- Supply voltage for dry contact input 48 V DC
- Power consumption < 5 VA

EMC

- Emission EN-55022
- Immunity
  - Static discharge EN-61000-4-2
  - Conducted HF field EN-61000-4-6
  - RF field EN-61000-4-3

- Power and signal inputs
  - Dielectric withstand IEC 60255-5
  - Fast transients EN-61000-4-4
  - Surge EN-61000-4-5

6. Switches

- 1 – not in use
- 2 – not in use
- 3 – ON – force COM1: Addr.1, /9600/8 NI
- 4 – ON – restore default setup*
- 5 – OFF – oper mode, ON – Firmware update mode
- 6 – ON - Reset

* To restore the default setup, follow this sequence:
Sw 4 ON -> Reset -> Sw 4 OFF within 5 sec.

7. Ports

- COM 1 – RS 232 (Communication or Firmware update) + GPS time synchronization
- COM 2 – RS 232 with all modem signals
- COM 3,4 – RS 232 interface
- COM 5 – Ethernet (optional)
- SSP – for connecting the TELEM DO/DI device and LED indication panel (optional)
- EXT – for connecting an external expansion device

COM port's pin layout

Pin	1	2	3	4	5	6	7	8
COM 1	RD*	-	GND	RX	Tx	-	-	
COM 2	DSR	CTS	GND	RX	TX	DCD	RTS	DTR
COM 3,4	-	CTS	GND	RX	TX	GND	RTS	-

* Time synchronization using GPS

8. Indication

For operation

- Green LED – Blinking indicates operating mode
- Red LED – Failure

For communication

- Yellow LED – RX
- Green LED - TX

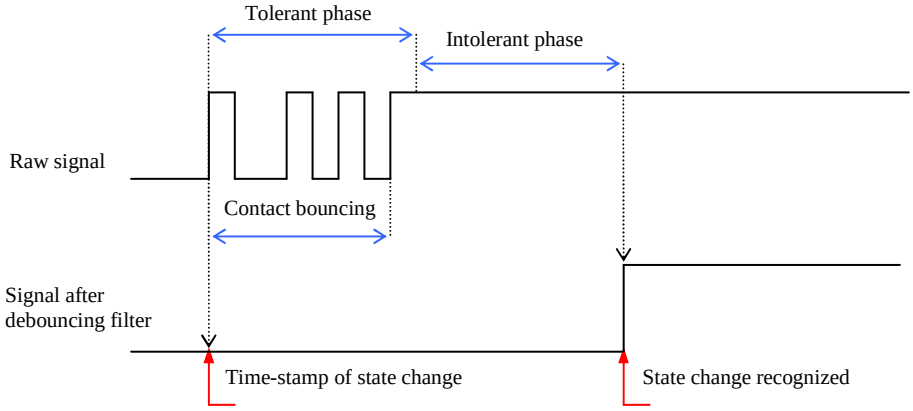
Green LED at SSP port - blinking indicates GPS time synchronization

9. Digital Input Processing

Digital input signals are applied to two filters, at first to "Debouncing" and then to "Chatter" filter.

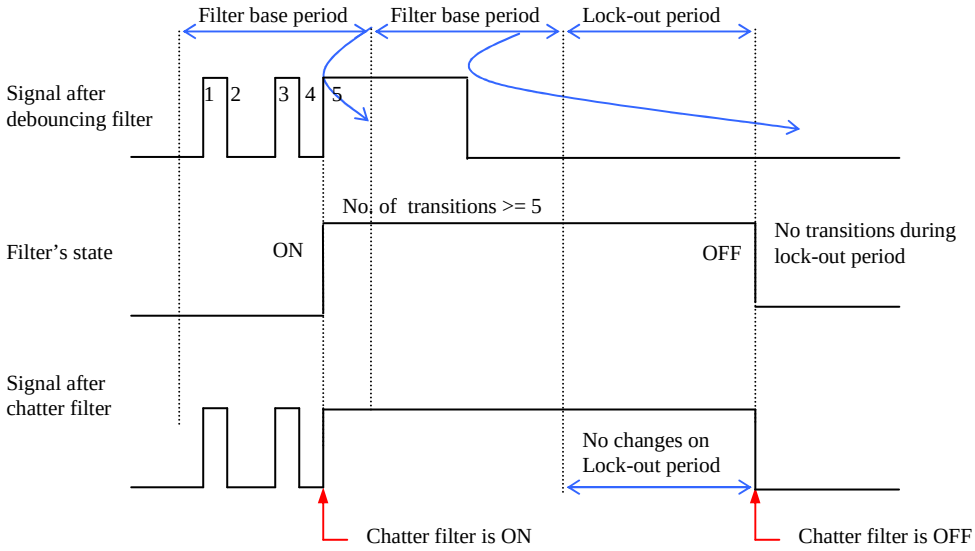
9.1 Debouncing Filter

The digital debouncing filter prevents switching noises.
Configuring parameters:
Tolerant phase - a period of time during which contact bounce is "acceptable". Having a tolerant period allows you to monitor and time-stamp the initial state of change while ignoring any subsequent contact bounces.
Intolerant phase - a period of time following the tolerant phase during which contact bounce is not "acceptable". It ensures that contact bounce is not mistaken for a valid change of state.



9.2 Chatter Filter

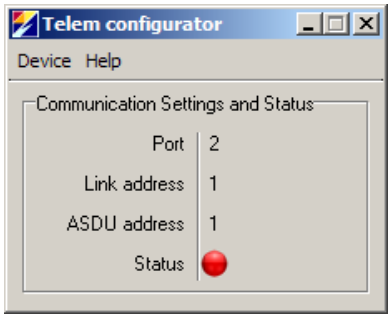
Chatter Filter detects input chatter preventing filling buffers.
Configuring parameters:
Chatter times (changes) - maximum allowed number of state transitions that can occur within a filter base period. If the number of state transitions during the filter period equals or exceeds the maximum allowed number of state transitions, chatter filter will turn ON and any further transitions will be ignored for the duration of the "lock-out" period.
Lock-out period - minimum number of filter base periods during which the chatter filter will remain ON. The chatter filter can proceed from ON to OFF only if no state transitions are detected during the entire lock-out period.
Example: Chatter times (changes) 5, Lock-out period 1



10. TELEM RTA Configuration Tool

10.1 Getting Started

Same configuration tool is used for configuration of RTA and GW5. The difference is in using the RTA IO tab card.
When starting the TELEM GW5/RTA configuration program, user interface window with the main menu is opened:



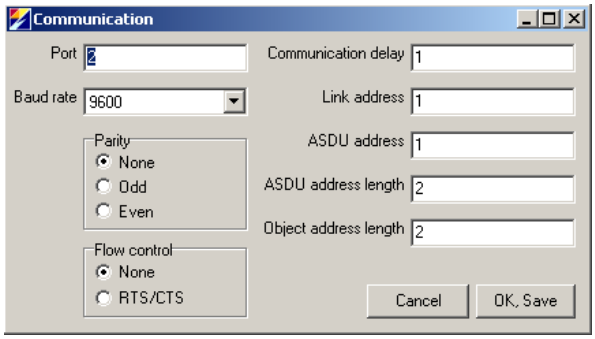
Warning **Check communication** – If there is no connection with the RTA device then the warning message is displayed together with an alarm beep.
Button “Stop sound” – Stops the alarm sound.

The following parameters are shown for information:

- **Port** – PC port which is used to communicate with GW5/RTA
- **Link address** – Link address of the GW5/RTA port
- **ASDU address** – ASDU address of the GW5/RTA port
- **Status -** Status of the connection. RED - no connection, GREEN - connection OK

Main menu

Device – For selecting the device type
Communication - To change communication parameters, open the following window:



Fields in the communication parameters window

- **Port –** PC communication port which is used for communication with GW5/RTA
- **Baud rate –** Data communication rate
- **Parity** – Use of parity control bit
- **Flow control** – Determines whether the RTS/CTS handshaking is used
- **Communication delay** – Delay between reception of data and the next query in milliseconds
- **Link address** – Link address of GW5/RTA
- **ASDU address** – ASDUI address of GW5/RTA
- **ASDU address length** – Length of the ASDU address in bytes: typically 2, possible values are 1 or 2
- **Object address length** – Length in bytes: typically 2, possible values are 1, 2 or 3

10.2 GW5/RTA Configuration Window

To open the GW5/RTA configuration window, select **Device > GW5/RTA Setup** from the user interface main menu.

Shortcut icons below the menu bar:

 - Open a new configuration

 - Open a configuration file

 - Save the configuration to a file

 - Read the configuration from GW5/RTA

 - Write the configuration to GW5/RTA

 - Reset GW5/RTA. Possible Reset codes: 1 – Simple Reset; 2 – Reset that also clears memory buffers; 3 – Reset that also restores the default setup.

Saving, editing and opening configuration data

Configuration data is saved to the hard disk in the form of comma separated files*. CSV files when the **Save** or **Save As** command is chosen from the File menu. Correspondingly, the **Open** command from the File menu opens this type of file. **Open** and **Save** can also be accessed via shortcut icons.
*.CSV files can be conveniently edited with Excel software or even with the Note Pad program. When editing the configuration with Excel, the file has to be saved as a comma separated CSV file.

Table of menu items in the GW5/RTA configuration window

File	Common	View	Help
New (Ctr+N)	Read Config (CTRL+R)	Basic	Help F1
Open (Ctr+O)	Write Config (CTRL+W)	Advanced	About
Save (Ctr+S)	Cancel Active Transfer		
Save As	Send Reset		
Exit	Interval Groups		
	TCP/IP Settings		
	Timing Settings		
	Modem Settings		
	Port Mirroring		
	Options		

10.3 Tab Cards in the Configuration Window

Configuration and setting parameters can be utilized by using topic tab cards:
Ports, Devices, Objects, Formulas, RTA IO, Status.
A click on a tab card button switches between tab cards.

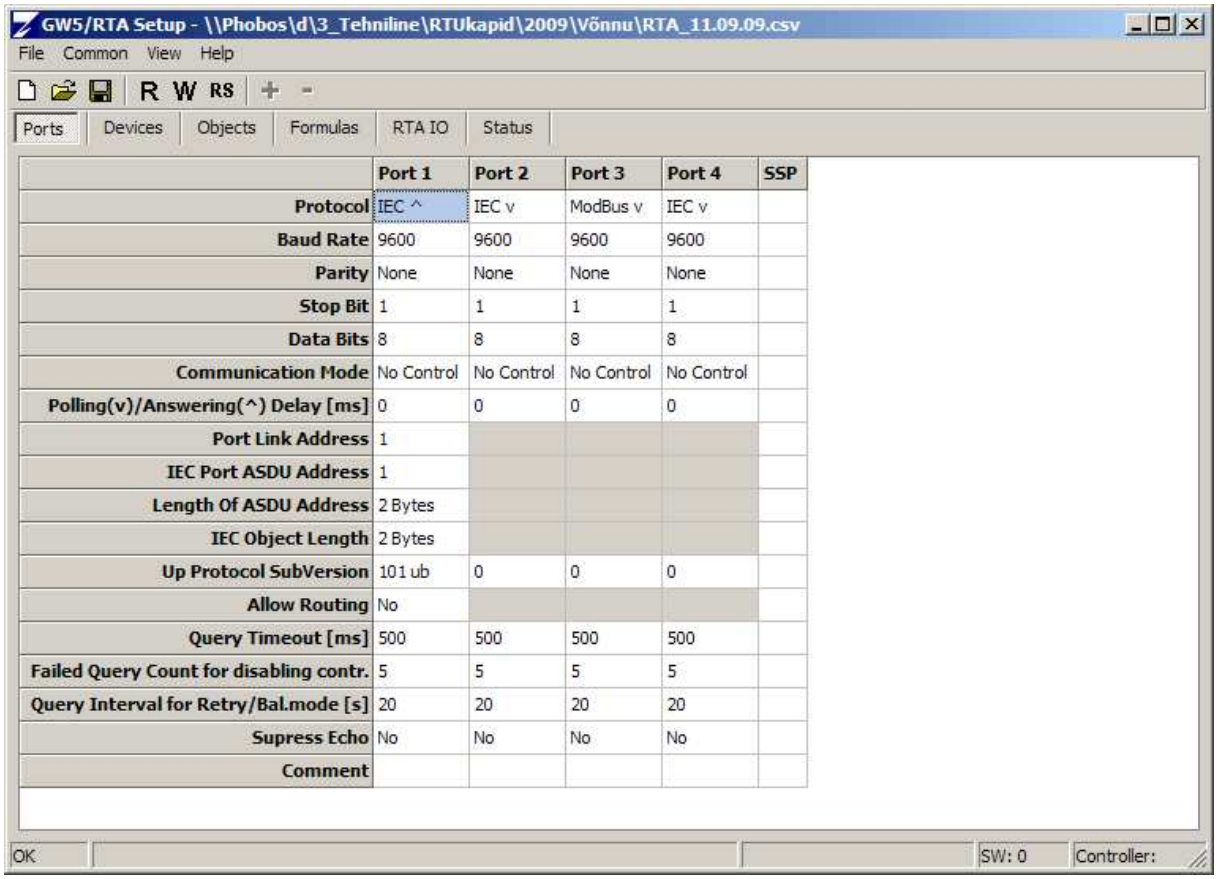
Using the grid area
Parameters can be selected or changed in the grid area cells. Values of some cells can be changed directly and those of others via a list box or a popup window.

Values in the same column can be copied to clipboard. Use a left mouse click together with the Shift key to copy and a left mouse click together with the Ctrl key for paste operation.

The status message in the bottom left corner of the window shows the result of the last data modification action (OK, Error, etc).

10.3.1 Ports Tab Card

Ports/configuration tab card is active when the GW5/RTA configuration window is opened.



	Port 1	Port 2	Port 3	Port 4	SSP
Protocol	IEC ^	IEC v	ModBus v	IEC v	
Baud Rate	9600	9600	9600	9600	
Parity	None	None	None	None	
Stop Bit	1	1	1	1	
Data Bits	8	8	8	8	
Communication Mode	No Control	No Control	No Control	No Control	
Polling(v)/Answering(^) Delay [ms]	0	0	0	0	
Port Link Address	1				
IEC Port ASDU Address	1				
Length Of ASDU Address	2 Bytes				
IEC Object Length	2 Bytes				
Up Protocol SubVersion	101 ub	0	0	0	
Allow Routing	No				
Query Timeout [ms]	500	500	500	500	
Failed Query Count for disabling contr.	5	5	5	5	
Query Interval for Retry/Bal.mode [s]	20	20	20	20	
Supress Echo	No	No	No	No	
Comment					

From the **View** menu a **Basic** or an **Advanced** view of the **Port configuration tab card** can be selected. The advanced view shows the additional query and echo suppression parameters.

Configuration parameters of a port:

- **Protocol** – Communication protocol used by all the devices of this port. Each protocol name is accompanied with a symbol l"^" or "v " which indicates whether the port is used for an uplink or a downlink channel. For example, "Modbus v" means that this port is used for downlink with Modbus protocol.
- **Baud rate** – Data communication rate
- **Parity** – Use of parity bit for all the devices on this channel
- **Stop Bit** - possible values are 1,2
- **Communication Mode** – Makes it possible to choose between the following handshaking options:
  - No control
  - RTS/CTS Control
  - RTS Callout Request– a Request by the RTS signal to the offline modem for calling out

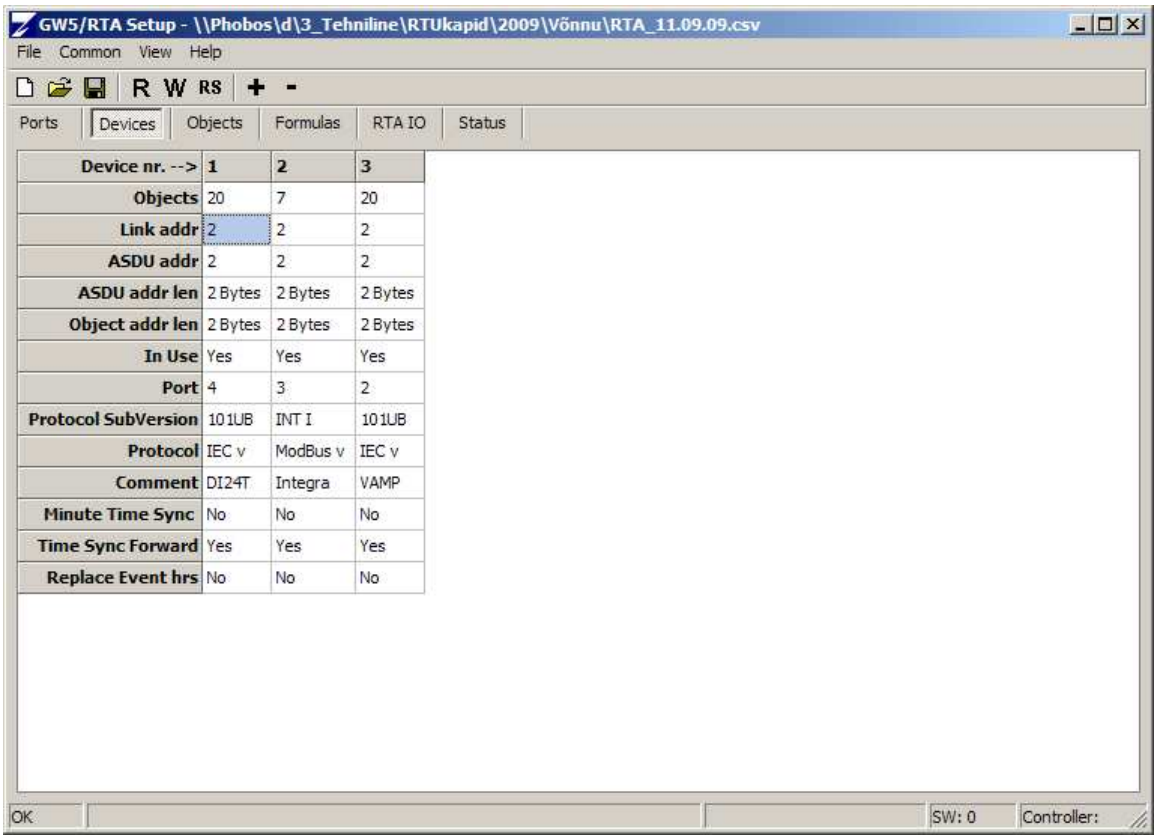
- **Polling / Answering Delay** – Delay between reception and the next query
- **Port Link Address** – Link address of the device on uplink channels
- **IEC Port ASDU Address** – ASDU address on uplink channels
- **Length of ASDU Address** – Length of the ASDU address in bytes on uplink channels. Typically 2, possible values are 1 or 2
- **IEC Object Length** – Length of the IEC object address in bytes on uplink channels. Typically 2, possible values are 1, 2

More on the advance view:

- **Up Protocol Subversion** - Protocol subversion number on uplink channels
- **Allow Routing** – Allows routing of IEC 60870-5-101 protocol messages between the upper and the lower level channels
- **Query Timeout in milliseconds -** Query timeout for the devices on downlink channels
- **Failed Query count for disabling contr.** – Count of timeouts after which the error flag is raised and the query of this device is temporarily suspended
- **Query Interval for Retry / Bal.mode Sec-s** – Time period after which the suspended device is queried again
- **Suppress Echo** – If the sent messages are echoed back by the connected devices then they need to be suppressed

If some parameters in the grid area have a grey background then these are not used for the chosen protocol type but you are still allowed to modify them.

10.3.2 Devices Tab Card



Device nr. -->	1	2	3
Objects	20	7	20
Link addr	2	2	2
ASDU addr	2	2	2
ASDU addr len	2 Bytes	2 Bytes	2 Bytes
Object addr len	2 Bytes	2 Bytes	2 Bytes
In Use	Yes	Yes	Yes
Port	4	3	2
Protocol SubVersion	101UB	INT I	101UB
Protocol	IEC v	ModBus v	IEC v
Comment	DI24T	Integra	VAMP
Minute Time Sync	No	No	No
Time Sync Forward	Yes	Yes	Yes
Replace Event hrs	No	No	No

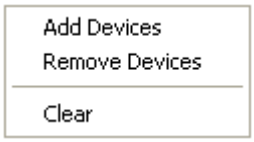
Up to 20 downlink devices can be connected to GW5 and configured on this tab card.

Parameters:

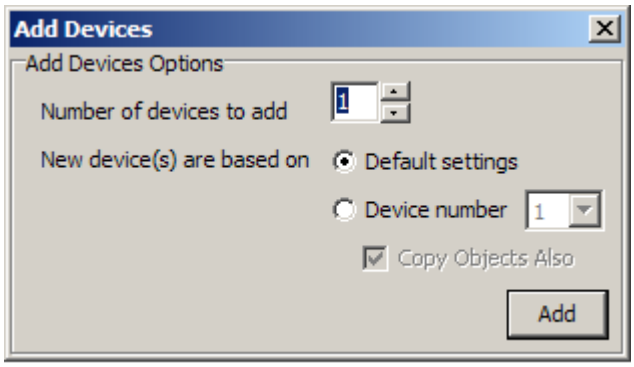
- **Device nr** – Sequence number of the device
- **Objects** – Number of objects in this device
- **Link address** – Link address of the connected device
- **ASDU address** – ASDU address of the connected device
- **ASDU address length** – Length in bytes, possible values are 1 or 2
- **Object address length** – Length in bytes, possible values are 1, 2 or 3
- **In use** – Indicates whether the device is in use or not. If the device is not in use then the whole row has a grey background.
- **Port** – Port no. of GW5 to which the device is connected
- **Protocol Subversion** – Number of protocol subversion
- **Protocol** – For information only. It is filled automatically according to the number of the used port.
- **Minute Time Sync**– Yes/No. If Yes, the device is synchronized with 10 second period
- **Time Sync Forward** – Yes/No. If Yes, the time synchronization which is received from upper channel, it is forwarded to the device
- **Replace Event hrs** – Yes/No. If Yes, events are sent to control centre with UCT time (the time correction value is set in Common Menu, Timing Settings)

Adding devices

By clicking on the + shortcut icon, a new device with default settings is added. It is also possible to add new devices with a right mouse click which makes the extended control menu to appear.



Add Devices dialog box appears.



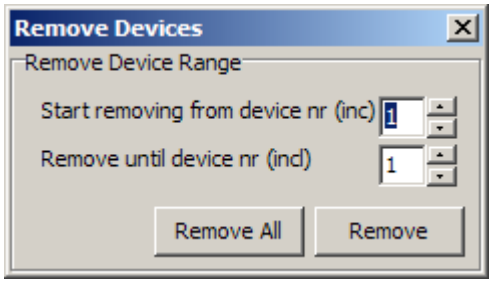
Set the Add Device options:

- Number of the devices to add
- Default settings or the device number from where the settings are derived
- Copy Object Also

Click the Add button.

Removing Devices

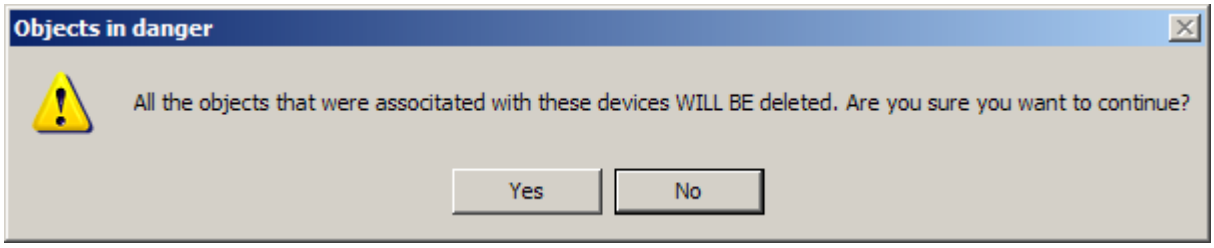
To remove a device, select **Remove Devices** from the extended control menu or click on the shortcut icon.



Select the range of the removed devices and click the **Remove** or **Remove All** button. The selected device is also removed after the warning dialog when - is clicked.

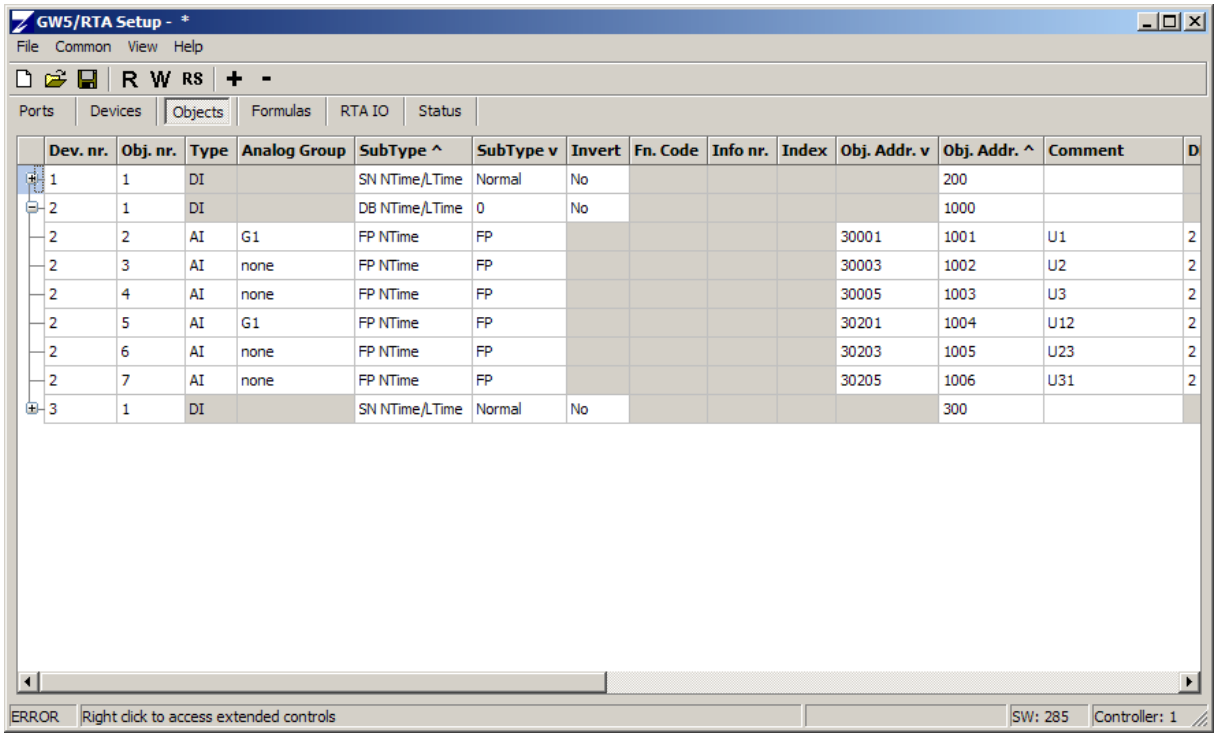
Clearing Devices

To clear the Device Tab Card, select Clear from the extended control menu.
A warning window always appears before removing operations are concluded:



Select **Yes** to accept or **No** to cancel the removal operation of the devices.

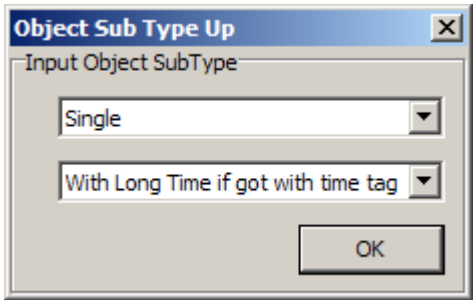
10.3.3 Objects Tab Card



The first object of every device is used as the communication status signal of the device. If its value is “1” then communication with this device is broken.
The object (first object) of communication status signal is not counted in the **Objects** row of the **Device Tab Card.**

Columns:
Type – Object’s type: digital input (DI), digital output (DO), analog input (AI), counter (CN)
Analog Group – G1, G2, G3. Object group for common settings.

Sub Type^ – Object’s subtype for uplink. The following dialog box opens on clicking:



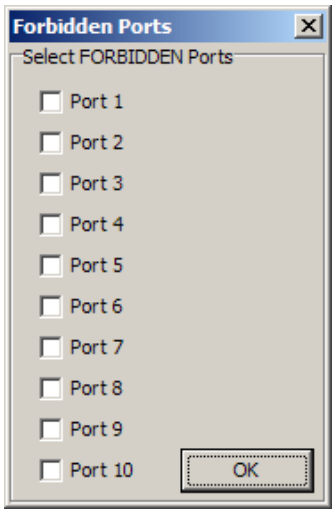
Subtypes of object and time marking modes:

Object type	Format	Time marking
DI – Digital input	Single Double	Without time With Short Time With Long Time With Short Time if got with time tag With Long Time if got with time tag
DO – Digital output	Single Double Direct Execute Select Execute	
AI – Analog input	Normalized Floating point Step position	Without time With Short Time With Long Time With Short Time if got with time tag With Long Time if got with time tag
CN – Counter		

- **Sub Type v -** Object's subtype for downlink.
- **Invert** – Object's value will be inverted
- **Fn.code** – Function code on the IEC 60870-5-103 protocol
- **Info no**. – Information number on the IEC 60870-5-103 protocol
- **Index** – Object index on the IEC 60870-5-103 protocol. It indicates the order number of the object in message types 3 and 9 of analog measurements.
- **Object.Addr v** – Object's downlink address
- **Object.Addr ^** – Object's uplink address
- **DB1, %FS** – Deadband (% of full scale). If the value has changed less than the deadband then it is not spontaneously transferred.
- **DB2, %FS** – This is used instead of DB if the **Crit.Min** and **Crit.Max** fields are used and the value falls within these limits. **In case of offline** (GSM) channel, if the change in value is bigger than deadband 2 (% of full scale) then a call to SCADA system is initiated.

- **Raw Min, Raw Max** – Minimum and maximum raw values of analog measurement (before scaling).
- **Scale Min, Scale Max** – Minimum and maximum scale values of analog measurement.

- **Forb. Ports** – Uplink port to which the object's value transfer is blocked. To select uplink ports, which should not be used for transferring these object values, double-click on the cell of the **Forb. Ports** column and select the corresponding ports from the window that has appeared.

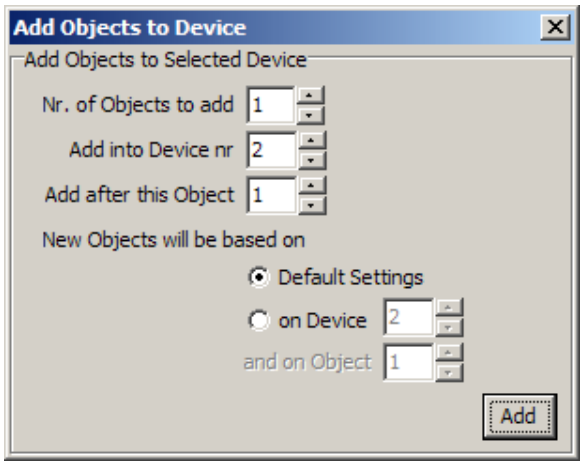


- **Crit.Min %Fs / On Ev. Nr; Crit.Max %Fs / Off Ev. Nr**
  Crit.Min %Fs; Crit.Max %Fs – Minimum and maximum values in % from the full scale of analog measurements on which RTA initializes communication (Fig. 10.5.1). If Crit. Max and Crit. Min do not have values, DB1 and DB2 are in use. If Crit. Max and Crit. Min have the value 'zero', only DeadB1 is in use. If the analog measurement value is between Crit. Min and Crit. Max, DB2 is in use. If the analog measurement value is out of limits, DB1 is in use.
  On Ev. Nr; Off Ev. Nr – Corresponding event number used in SPA-bus
- **Forb. Calling** – Block object's value transfer.
- **Ch. Nr.** – Channel nr. for SPA-bus communication protocol

Adding Objects

By clicking on the + button, a new device with default settings is added. Objects can also be added with a right click on the device tab card. After that the following extended control menu appears:

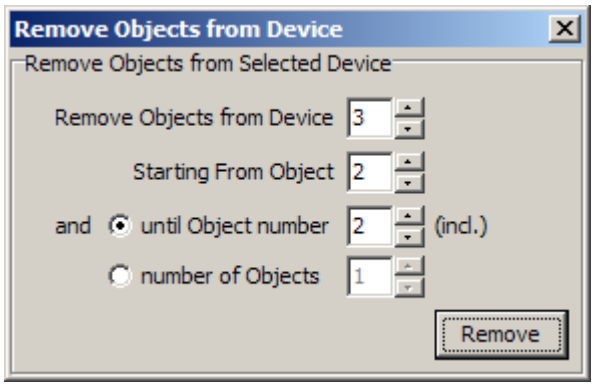
When selecting Add Objects, the following dialog box appears:



Removing Objects

To remove a device, click the - button or select Remove Devices from the extended control menu.

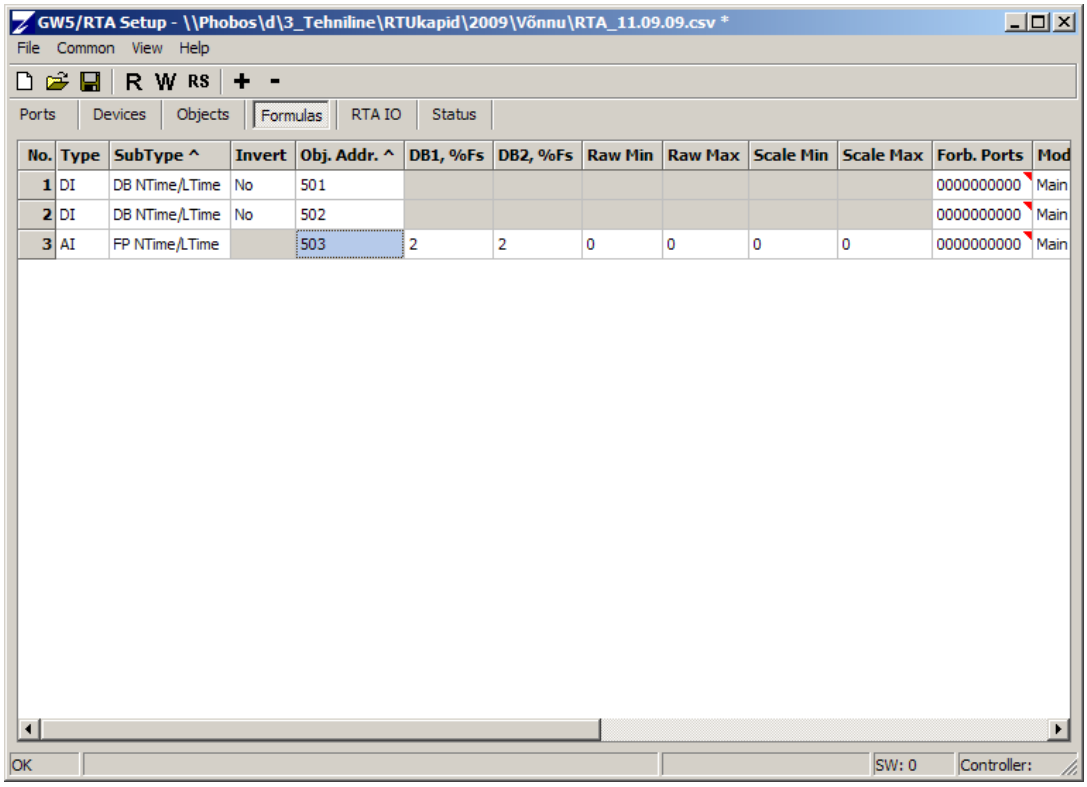
When selecting Remove Objects from the extended control menu, the following dialog box appears:



Hints

- Repeated object addresses are shown on yellow background.
- When leaving the Object Tab Card, all objects are hidden. To see the objects on returning to Object Tab Card, use **Expand All** from the extended control menu that appears after a right click.

10.3.4 Formulas Tab Card



Columns:

- **Type, Sub Type, Sub Type , Invert, Object Adr ^, DB1, DB2, Crit.Value, Raw Min, Raw Max, Scale Min, Scale Max, Forb.Ports, Forbid Calling, obj. -** as in **Objects Tab Card**
- **Module** – Determines the RTA module (Main Module, Exp. Module 1, Exp. Module 2)
- **DO/LED no.** – Number of the digital output (1…16) in the TLM GW-IO device controlled by the result of this formula or the Alarm (LED) number (1…16) on the LED Alarm panel that corresponds with the result of this formula.
- **Alarm** – Alarm (LED) number (1…16) on the LED Alarm panel that corresponds with the result of this formula.
- **Formula** – formula string
- **DO addr.** – Number of the digital output (1…16) in the TLM GW-IO device controlled by the result of this formula

Editing formulas

Formulas can be created between the values of analog and/or digital objects.

Referencing to object values
To use the measurement object in the formula, insert an @ sign together with the **object address up.**
Example: @101 points to the value of the object with an address to uplink 101.

Constants
Constants can be used in formulas.

Example: 1.1+2.2+3 consists of 3 floating point constants

Brackets
Brackets can be used in formulas to change the priority of the operation.

Example: sqrt(@101/2+@102); (@201+@202+@203)/3

Operators

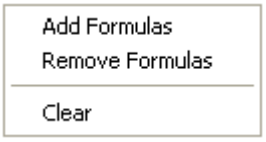
Oper.	Obj. type	Description	Sample	*Priority
+	DI/AI	Addition	@101+3,2	3
-	DI/AI	Subtraction	@101-0,49	3
*	DI/AI	Multiplication	@101*2	2
/	DI/AI	Division	@101/2	2
^	DI/AI	Exponentiation	@101^2	1
<	DI	Greater than	@101<0,499	4
>	DI	Less than	@101>0,5	4
sqr	DI/AI	Square	sqr(@101*10)	0
sqrt	DI/AI	Square route	sqr(@101*10)	0
and	DI	Logical conjunction	@201and@202	5
or	DI	Logical disjunction	@201or@202	6
xor	DI	Exclusive disjunction	@201xor@202	6
not	DI	Logical negation	not@201	0
dbl	DI	Converts 2 single digital inputs into a double signal	@201dbl@202	7
sin	DI/AI		sin@301	0
cos	DI/AI		cos@301	0
tan	DI/AI		tan@301	0
arcsin	DI/AI		arcsin@301	0
arccos	DI/AI		arccos@301	0
arctan	DI/AI		arctan@301	0

* priority determines the order of operations in the formula (the highest priority is 0)

Notes

- All analog values should be scaled before making calculations; therefore, it is very important to fill the **Raw Min, Raw Max, Scale Min, Scale Max** fields with Normalized values that are used in calculations.
- After editing the formula, the program automatically validates this formula and shows the result in the status area. If the formula is incorrect, the background of the edited formula is changed to pink and an error message is displayed in the status area.
- By clicking on the + button, a new formula row with default settings is added.

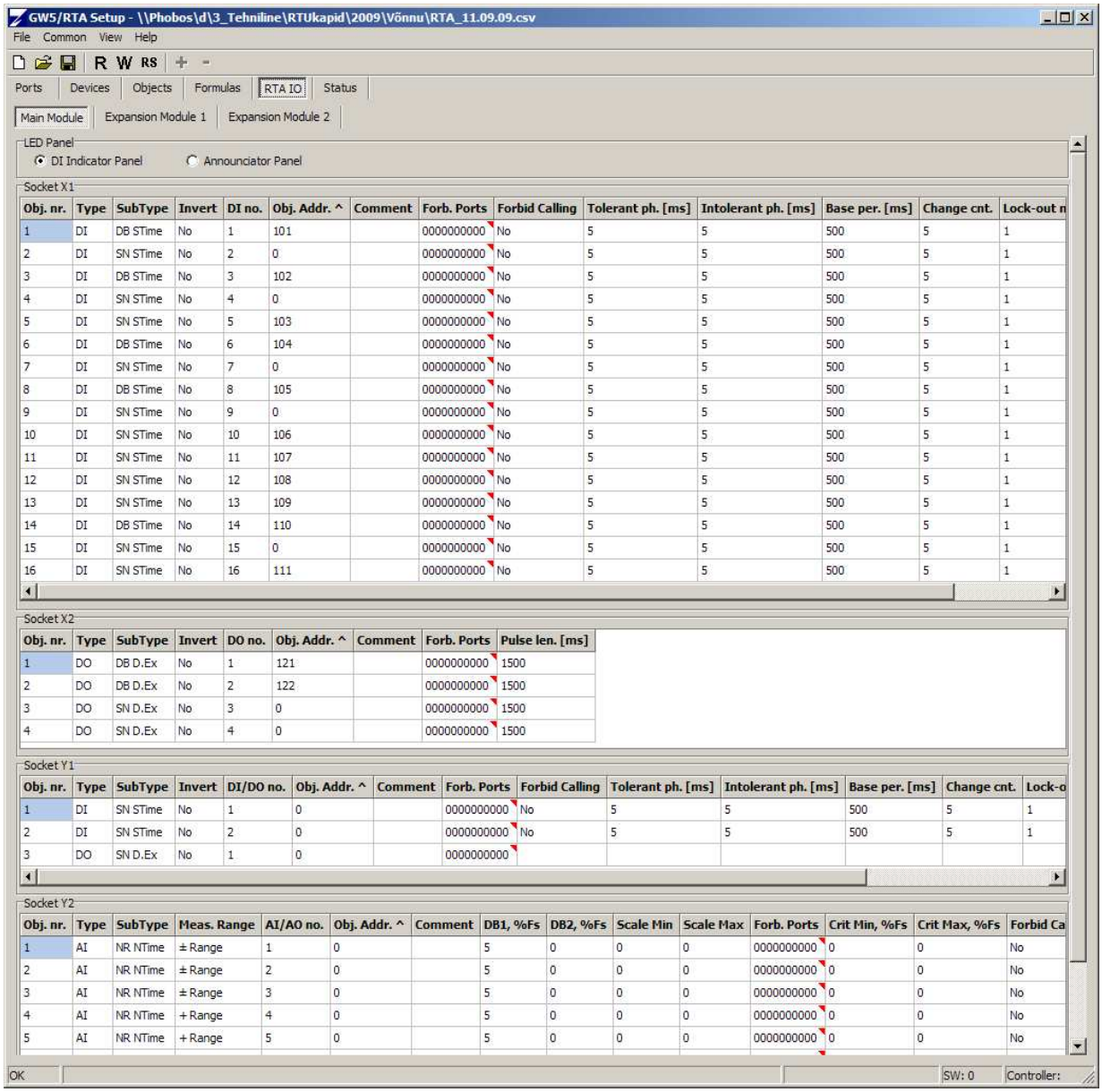
  By clicking on the - button, the selected formula row is removed.
- Formula rows can also be added, removed or cleared by using the extended control menu like in the Object Tab Card. It appears with a right mouse click on the Formula Tab Card.



  To add a Formula, select **Add Formulas**, to remove a Formula, select **Remove Formula,** and to clear all formulas, select **Clear.**
- The formulas of DI type of objects can contain AI values and floating point constants. If the result of the formula is greater than 0, the value of the DI object is “1”; if the result of the formula is less than or equal to 0, the value of the DI object is “0”.
- < or > statement: if the statement is true, the value of the DI object is 1; if the statement is false, the value of the DI object is 0.

10.3.5 RTA IO Tab Card

RTA IO Tab Card allows you to determine input-output object parameters of Main and Expansion Modules



10.3.5.1 Configuration Parameters of Digital Inputs and Counters

The following data fields are configured for each input signal:

- **Type**: Digital input (DI) or counter (CN)

Parameters for DI type:

- **Subtype**: Single or Double and time tagging. If the Double is selected then it works together with the next DI forming a pair of signals.
- **Invert**: Inverts the input signal
- **Obj. addr.^**: Object address for the upper level device
- **Comment**
- **Forb.Ports**: Numbers of the ports to where this data object is not transferred (forbidden ports)
- **Forbid calling**: Possibility to forbid the callout on upper level offline channels (PSTN, GSM data)

Debouncing filter parameters

- **Tolerant ph.[ms**]: A period of time during which state changes are ignored. Range: 0 … 65567 ms. Default: 5 ms.
- **Intolerant ph.[ms]**: A period of time during which the state of digital input must remain unchanged. Range: 0 … 65567 ms. Default: 5 ms.

Chatter filter parameters

- **Base per.[ms]**: Time interval for checking the number of changes
- **Change count**: Number of allowed changes during the base period
- **Lock-out multiplier**: Number of filter base periods after which the chatter filter will be reset if there are no more state changes

Parameter for the CN type:

- **Imp.cnt.**: Impulse counter for the counter (CN) type. If the value change exceeds it then it writes the value to output buffer (creates an event)

10.3.5.2 Configuration Parameters of Digital Outputs

The following data fields are configured for each digital output:

- **Subtype**: Single or Double, “Direct Execute” or “Select and Execute”
- **Invert**: Inverts the output signal
- **Obj. addr.^**: Object address for the upper level device
- **Comment**
- **Forb.Ports**: Numbers of the ports to where this data object is not transferred (forbidden ports)
- **Pulse len.[ms]**: Length of control pulse in milliseconds

10.3.5.3 Configuration Parameters of Analog Inputs

The following data fields are configured for each analog input:

- **Subtype**: Normalized or floating point value and time tagging
- **Meas. Range**: Indicates the measurement range: +-Range, +Range, 0..20mA. It has to mach the ordered hardware configuration!
- **Obj. addr.^**: Object address for the upper level device
- **Comment**
- **DB1, %Fs**: Deadband in %-s from the full scale to determine the considerable change. If the value change exceeds it then it writes the value to output buffer (creates an event)
- **DB2, %Fs**: Deadband in %-s from the full scale to cause the callout on upper level offline channels (PSTN, GSM data)
- **Scale min**.: The scaled value on the floating point value which corresponds with the minimum (zero) input value
- **Scale max**.: The scaled value on the floating point value which corresponds with the maximum measured input value
- **Forb.Ports**: Numbers of the ports to where this data object is not transferred (forbidden ports)
- **Crit.Min., %Fs**: Critical minimum in %-s from the full scale. If the value falls below this limit then the callout is initiated on upper level offline channels (PSTN, GSM data)
- **Crit.Max., %Fs**: Critical maximum in %-s from the full scale. If the value rises above this limit then the callout is initiated on upper level offline channels (PSTN, GSM data)
- **Forbid calling**: Possibility to forbid the callout on upper level offline channels (PSTN, GSM data)
- **Avg per.[ms]**: Averaging period for smoothening the measurement.
- **Zero zone**: The zone around the zero in %-s from the full scale. If the value falls into this zone then it is equalized with zero.

Remark

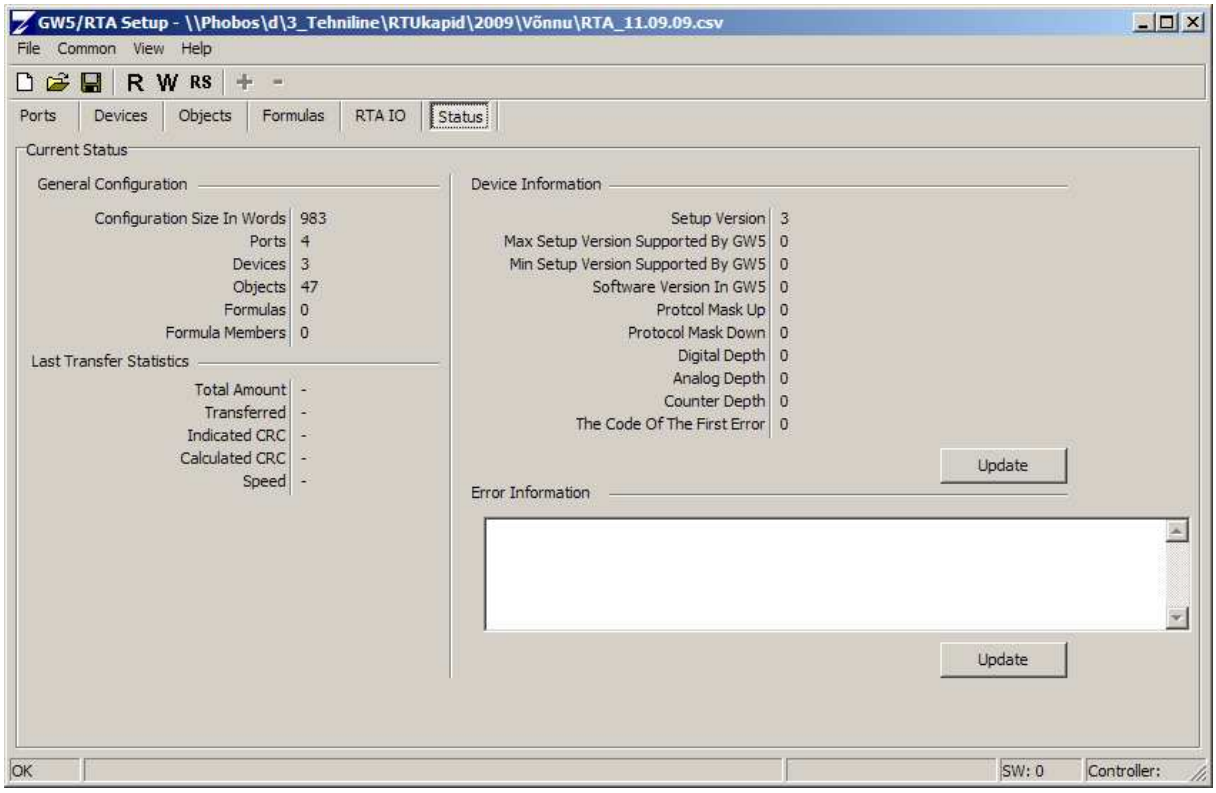
Ranges of analog inputs are hardware specified. If **+ -** values are specified and range **+** is determined then negative values are presented as zero. Measurement ranges have to be determined according to the specified input values.

10.3.5.4 Configuration Parameters of Analog Outputs

The following data fields are configured for each analog output:

- **Range**: Determines the output range: 0..20mA or 4..20mA.
- **Obj. addr.^**: Object address for the upper level device
- **Comment**
- **Scale min**.: The scaled value on floating point value which corresponds with the minimum output value
- **Scale max**.: The scaled values on floating point value which corresponds with the maximum output value
- **Forb.Ports**: Numbers of the ports to where this data object is not transferred (forbidden ports)

10.3.6 Status Tab Card

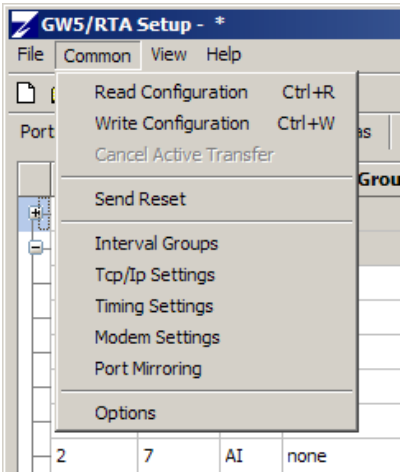


Status tab card presents the status of GW5/RTA general configuration parameters and transfer statistics.

Update button is used to get information from the connected GW5/RTA and it is displayed under Device Information.

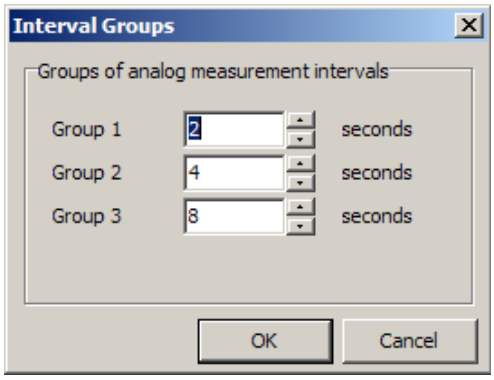
11. Common Settings

Common settings are accessible from the menu of the GW5/RTA Setup window.



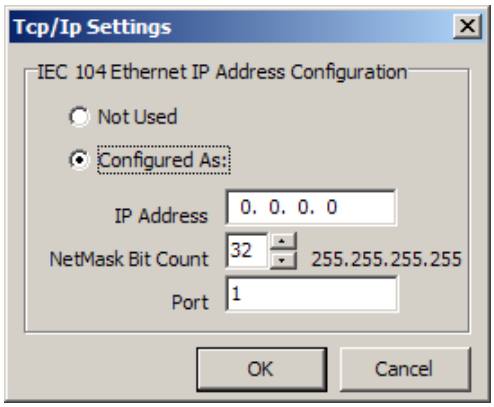
11.1 Interval Groups

Interval groups are used to specify the time interval of sending analog input value to the remote control center when the value has changed less than the deadband. Interval groups can be added to analog input objects in the Configuration tool in the Objects tab (Analog groups).



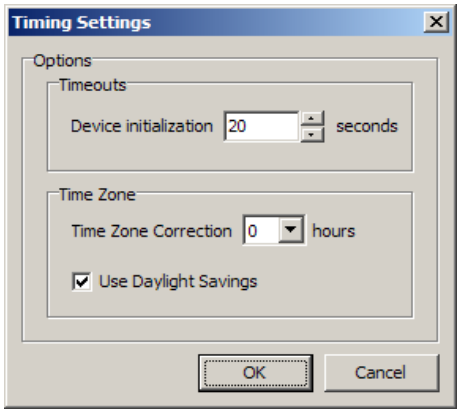
11.2 TCP/IP Settings

TCP/IP Settings are only used for GW5/RTA with an Ethernet port and used to determine the IP address and number of the socket port.



11.3 Timing Settings

Timing Settings are used to determine RTA initialization timeout and time zone correction.

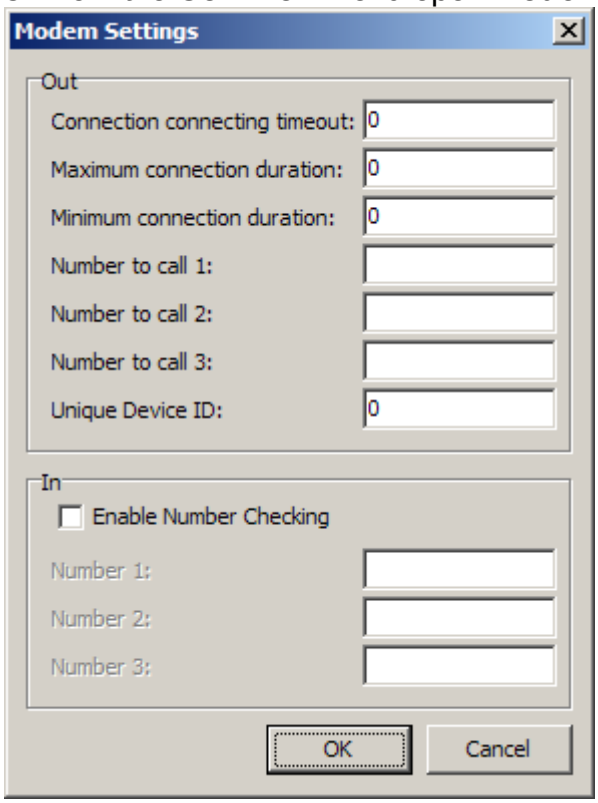


11.3 Telephone Modem Settings

Modem Settings are used to determine calling parameters in the dial-up mode operation.

The modem can be used only through communication port 2. Only this port has all the necessary handshaking signals for the modem.

1. Open **Ports** tab card in the GW5/RTA configuration window.
2. Set **Communication Mode** to port 2 **Modem Callout**.
3. From the **Common** menu open **Modem Settings**.

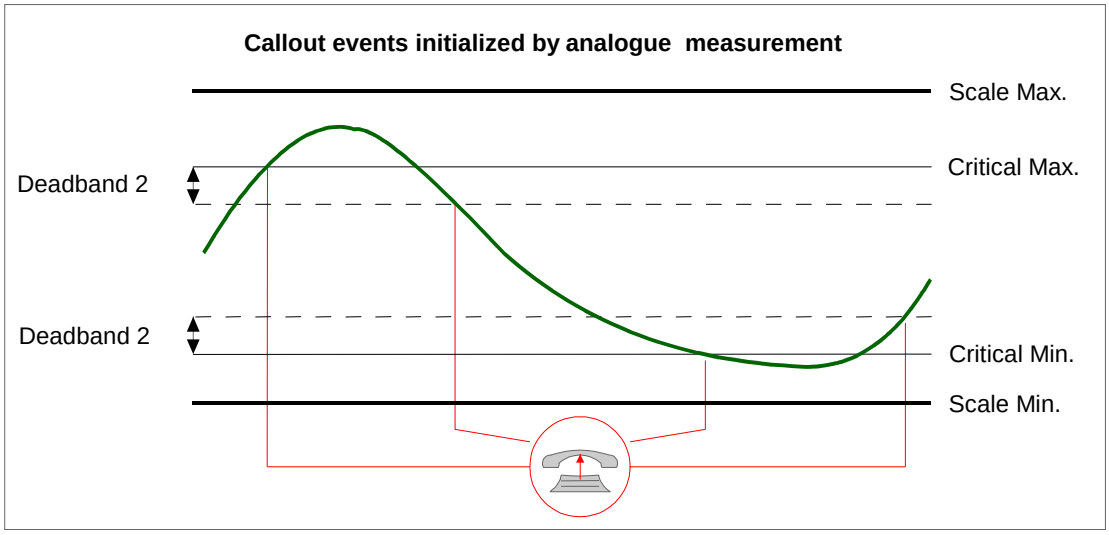


Callout parameters:

- **Connection connecting timeout** - if the connection was not established during this time (seconds), GW5/RTU will try to call out again.
- **Maximum connection duration** - if the connection is still open after this time, it will be closed by GW5/RTA. If the value of this parameter is 0 then GW5/RTA will never close the connection.
- **Minimum connection duration** - if the connection was broken during this time, GW5/RTA will try to call out again.
- **Number to call** – if the first number is busy then the gateway will call the next number. If all the numbers are busy then the gateway will call around the numbers until some number answers.
- **Unique Device ID** - additional identification no. used when calling out (ID number, may be used if modem cannot send its phone number).

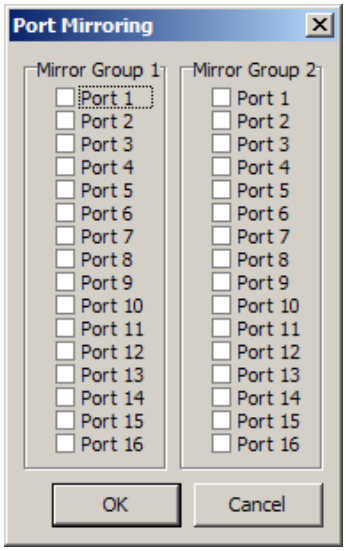
Number Checking may be enabled for **incoming** calls. In this case, the connection may be established only from these 5 phone numbers maximum. (The phone numbers must be typed up exactly as the modem receives them)

GW5/RTA initializes a communication line when one of the digital inputs changes or when analog measurement value changes over the determined minimum and maximum ranges and the callout event is not forbidden for this input. If communication is initialized by GW5/RTA, it terminates the connection after all data is sent.



11.4 Port Mirroring for Redundant Channels

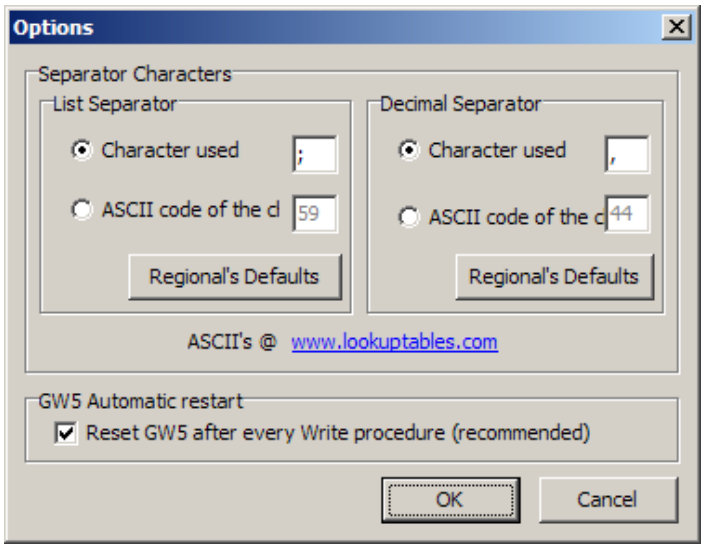
The port mirroring menu option is used for configuration of upper level redundant channels.



Two redundant (mirror) groups can be configured. The marked ports of one mirror group share the same event buffer. So if the upper level channel is switched over to another redundant channel then there will be no double events.

11.5 Options

The common settings of GW5/RTA configuration module are set up in this window.



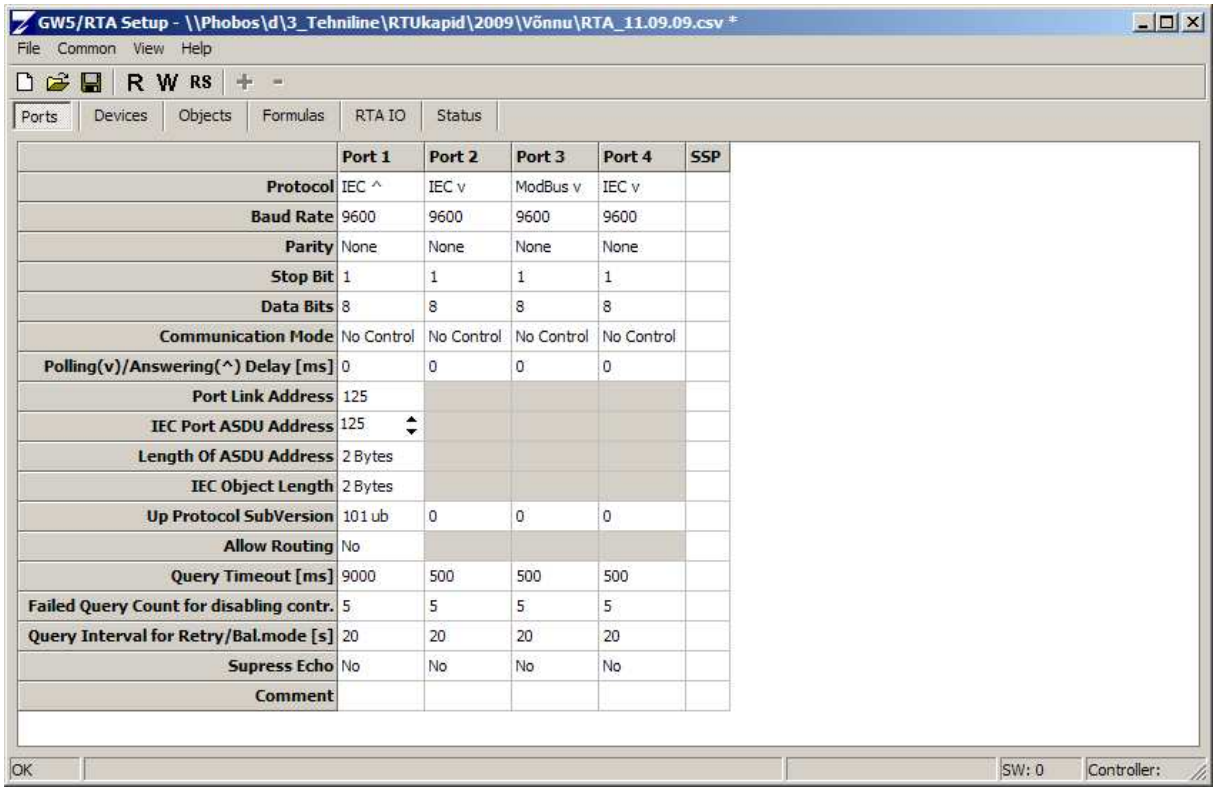
Separator characters are related to the CSV file format of the GW5/RTA configuration file.

If the automatic restart option is marked then the program automatically sends the restart command to GW5/RTA after having downloaded the settings.

12. Specific Settings of the GPRS modem

If the GPRS modem is used for communication with the central system then the following changes in settings are recommended.

Open the **Ports** tab card in the GW5/RTA configuration window.



	Port 1	Port 2	Port 3	Port 4	SSP
Protocol	IEC ^	IEC v	ModBus v	IEC v	
Baud Rate	9600	9600	9600	9600	
Parity	None	None	None	None	
Stop Bit	1	1	1	1	
Data Bits	8	8	8	8	
Communication Mode	No Control	No Control	No Control	No Control	
Polling(v)/Answering(^) Delay [ms]	0	0	0	0	
Port Link Address	125				
IEC Port ASDU Address	125				
Length Of ASDU Address	2 Bytes				
IEC Object Length	2 Bytes				
Up Protocol SubVersion	101 ub	0	0	0	
Allow Routing	No				
Query Timeout [ms]	9000	500	500	500	
Failed Query Count for disabling contr.	5	5	5	5	
Query Interval for Retry/Bal.mode [s]	20	20	20	20	
Supress Echo	No	No	No	No	
Comment					

The recommended changes for the upper level GPRS channel are:

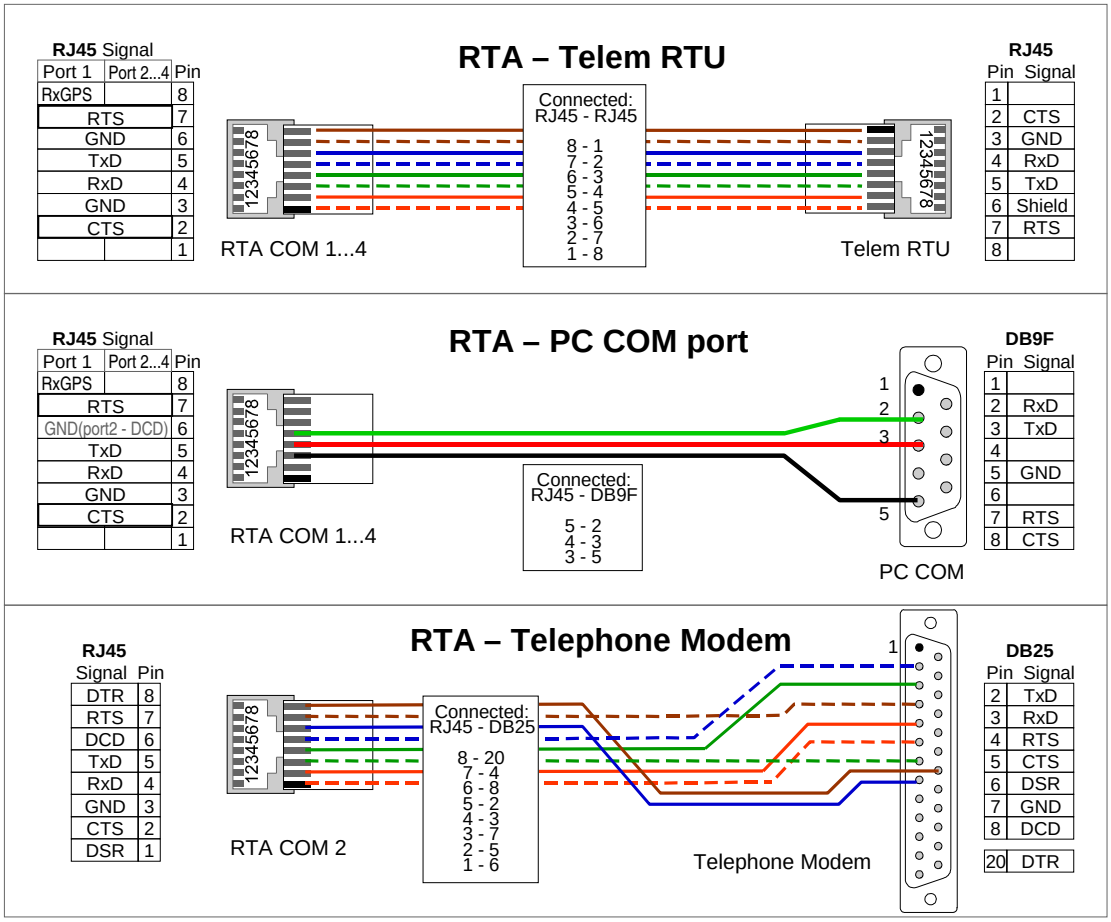
- Querry timeout: 9000 ms
- UP protocol Subversion: 101b – Balanced IEC 60870-5-101
- Querry Interval for Retry: 255 sec.

For the settings of port 2 look at the example above.

13. Communication Cables

TELEM RTA Communication Port RJ-45 pin layout.

PIN	Port 1 RS232/Load GPS	Port 3, Port4 RS232	Port 2 RS232
1			DSR
2		CTS	CTS
3	GND	GND	GND
4	RxD	RXD	RXD
5	TxD	TXD	TXD
6	GND	GND	DCD
7		RTS	RTS
8	RX (for GPS time synchronization)		DTR



14. Notes

- If not stated otherwise on the individual pages of this document, AS Martem reserves the right to make modifications.
- Although the contents of this publication have been checked for conformity with the hardware and software described, we cannot guarantee complete conformity since errors can not be excluded.
- The information provided in this manual is checked at regular intervals and any corrections that might become necessary are included in the next releases.
- Any suggestions for improvement are welcome.
- The contents of this manual are subject to change without prior notice.

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