



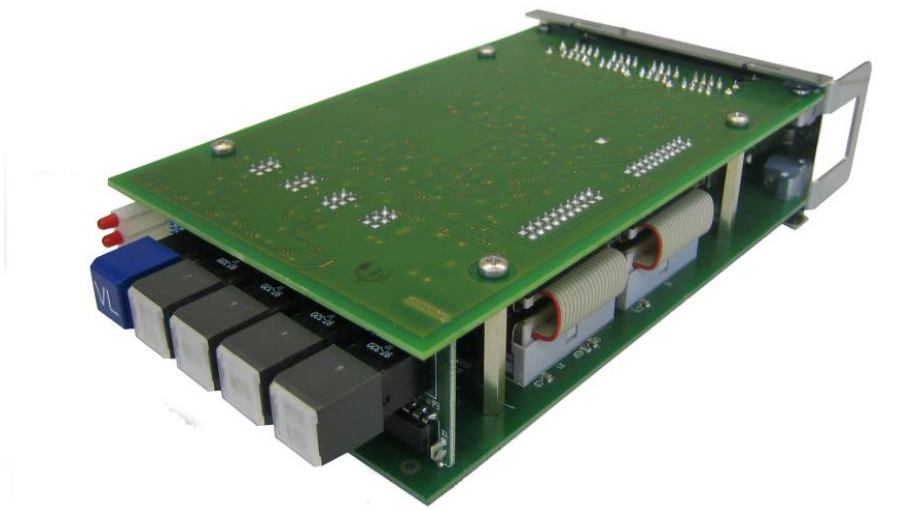
TIMING SOLUTIONS

# Rubidium Series



## RUB VL

# LTC Distribution and LTC Multiplexing/De-Multiplexing Module



Functional Description and Specifications  
Supplement to the "Installation & Systems Manual RUBIDIUM SERIES"  
Version: 4.6  
December 3, 2020





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## A1 Revision History

| No. | Date               | Subject   |
|-----|--------------------|---|
| 0.n |                    | Preliminary documents, changes without notice.  |
| 1.0 | March 15, 2006     | First released document.  |
| 1.1 | March 30, 2006     | Internal jumper, RS422 or RS485 selection.  |
| 2.0 | December 15, 2006  | Revised.  |
| 2.1 | June 04, 2007      | Interface: Two new protocols.<br>Pulse: One new protocol.<br>GPI specifications: Revised.   |
| 2.2 | November 27, 2007  | Interface: Two new protocols.   |
| 2.3 | December 18, 2007  | Interface: Two new protocols.<br>Interface: If a protocol includes an address it is now possible to choose an address value.<br>Revised.              |
| 3.0 | January 12, 2009   | New hardware board 03.<br>TELEGRAM signals now at 24 V.<br>Revised.   |
| 3.1 | October 06, 2009   | New Impulse Telegram output modes.<br>New serial output protocols. Secondary address made available.<br>Revised.                                      |
| 3.2 | February 22, 2010  | Revised.<br>Function "Link" added.  |
| 3.3 | April 30, 2010     | Revised.  |
| 3.4 | May 11, 2011       | More information about cable lengths connecting analogue clocks.  |
| 4.0 | June 06, 2011      | Completely revised.   |
| 4.1 | June 27, 2011      | Interface: Two new protocols.   |
| 4.2 | August 03, 2011    | New output modes available: MTD Main 1 – 3.   |
| 4.3 | January 26, 2012   | Interface: New protocols.   |
| 4.4 | September 24, 2012 | New hardware version with new location of jumpers – chapter "RS422 Output or RS485(MTD) Distribution".<br>"VL Output": drop-down list "gain" revised. |
| 4.5 | September 3, 2019  | Changed address of Plura Europe GmbH.   |
| 4.6 | December 3, 2020   | Re-formatted in new design.   |

Due to constant product development the features of this module are subject to change. The current functional description always refers to the current software and the current configuration tool.

You can download the latest version of the standard software from

<https://www.plurainc.com>.

Please be sure to use the latest configuration program after having done an update. You can download the latest version from the address above.



## A2 Copyright

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## A3 General Remarks

This manual is a supplement to the "Installation & Systems Manual RUBIDIUM SERIES". Please read the below listed chapters of the "Installation & Systems Manual RUBIDIUM SERIES", as these chapters are necessary for the safe and proper use of the Rubidium module "VL".

- A3 Warranty,
- A4 Unpacking/Shipping/Repackaging Information,
- A5 Safety Instructions,
- A6 Certifications & Compliances,
- Plug-In a Module,
- Remove a Module.



# 1 Module “VL”

## 1.1 General Description

The VL module is a signal distribution and amplifier with two separate LTC readers and four independent LTC generators, four RS232 and RS422 outputs and four output stages for impulse telegram. All output signals are phase-locked to the LTC reference input.

LTC time and user bits (binary groups) can be read, processed and converted. The independent outputs can be set up individually and can generate the processed/converted input data with various output formats. For example, the Plura LTC(MTD) can be decoded and converted to various output formats, so that external devices can display the individual stop timers or time zone data. Impulse telegram outputs are available to control Plura analogue clocks.

A **PC** or the **RUB IE** module is required for the configuration of this module.

The front panel label **VL** visibly identifies where each module is located. The serial number is located on the bottom side of the lower circuit board of each module.

The standard hardware of this module has all of the following key features:

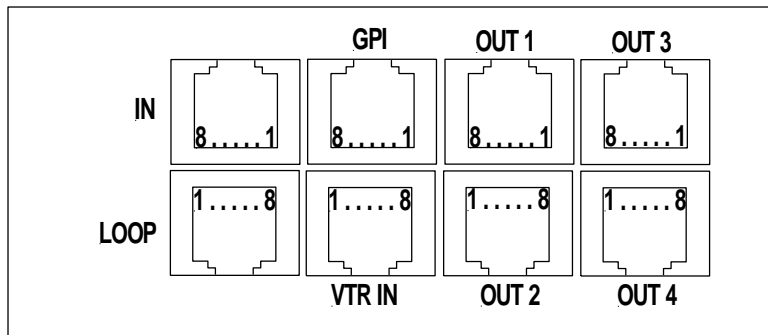
- “Hot Swapping”, i.e. it is possible to insert or remove a module without interrupting the operation of other modules in this frame.
- Failure relay, connected to the FAIL\_A and FAIL\_B pins of the **RLC** connector at the rear of the frame.
- RS232 and TC\_link (RLC connector) interfaces to have access to the internal bus of the chassis.
- Four programmable function keys, lamps and LEDs on the front panel (RUB1 version only).
- Flash memory containing the firmware, so configuration and updates are possible via a PC connection. You can download the latest version of the program from:

<https://www.plurainc.com>.

- Two LTC readers.
- Four LTC generators.
- Four RS422 and four RS232 outputs.
- Four output stages for impulse telegrams, e.g. for controlling analogue clocks.
- Four programmable input or output GPI's (General Purpose Interfaces) designed for customer specific applications.



## 1.2 Rear Panel and Connectors



### Pin assignments

| IN<br>RJ45 jack | LOOP<br>RJ45 jack |
|-----------------|-------------------|
| 1: RS485_TRA_IN | 1: RS485_TRA_IN   |
| 2: RS485_TRB_IN | 2: RS485_TRB_IN   |
| 3: LTC_REF_A    | 3: LTC_REF_A      |
| 6: LTC_REF_B    | 6: LTC_REF_B      |
| 4: GND          | 4: GND            |
| 5: n.c.         | 5: n.c.           |
| 7: n.c.         | 7: n.c.           |
| 8: n.c.         | 8: n.c.           |

| GPI<br>RJ45 jack | VTR IN<br>RJ45 jack |
|------------------|---------------------|
| 1: GND           | 1: n.c.             |
| 2: GPI_1         | 2: n.c.             |
| 3: GND           | 3: LTC_VTR_A        |
| 6: GPI_2         | 6: LTC_VTR_B        |
| 4: GND           | 4: GND              |
| 5: GPI_3         | 5: n.c.             |
| 7: GND           | 7: n.c.             |
| 8: GPI_4         | 8: n.c.             |

|            |   |
|------------|---|
| OUT 1      | 1: RS422_T- or RS485_TRA_OUT – select by jumper |
| OUT 2      | 2: RS422_T+ or RS485_TRB_OUT – select by jumper |
| OUT 3      | 3: LTC_OUT_A                                    |
| OUT 4      | 6: LTC_OUT_B                                    |
| RJ45 jacks | 4: GND  |
|            | 5: TELEGRAM OUT                                 |
|            | 7: RS232_TxD                                    |
|            | 8: VCC12_OUT                                    |







## 1.3 Specifications

Input LTC reference (signals LTC\_REF\_A/LTC\_REF\_B at RJ45 IN)

|                 |   |
|-----------------|---|
| Format          | According to ANSI/SMPTE 12M-1-2008, balanced signals      |
| Input impedance | 18 k $\Omega$   |
| Signal level    | 100 mV <sub>p-p</sub> - 5 V <sub>p-p</sub> , auto-ranging |
| Frequency       | 19 - 33 frames/s  |

Input VTR LTC (signals LTC\_VTR\_A/LTC\_VTR\_B at RJ45 VTR IN)

|                 |   |
|-----------------|---|
| Format          | According to ANSI/SMPTE 12M-1-2008, balanced signals      |
| Input impedance | 18 k $\Omega$   |
| Signal level    | 100 mV <sub>p-p</sub> - 5 V <sub>p-p</sub> , auto-ranging |
| Frequency       | 1.6 - 2500 frames/s                                       |

LTC Output

|                  |  |
|------------------|--|
| Format           | According to ANSI/SMPTE 12M-1-2008, balanced signals   |
| Output impedance | < 50 $\Omega$  |
| Signal level     | Adjustable:<br>balanced use: from -17 dBu/0,31 V <sub>p-p</sub> to +13 dBu/9,8 V <sub>p-p</sub><br>unbalanced use: from -23 dBu/0,16 V <sub>p-p</sub> to +7 dBu/4,9 V <sub>p-p</sub> |

RS422 Output

|                     |                                   |
|---------------------|-----------------------------------|
| Format (electrical) | According to TIA/EIA-422 standard |
| Baud rates          | Selectable 2400 to 115200 bps     |

RS232 Output

|                     |                                   |
|---------------------|-----------------------------------|
| Format (electrical) | According to EIA/TIA-232 standard |
| Baud rates          | Selectable 2400 to 115200 bps     |

TELEGRAM OUT

|                 |  |
|-----------------|--|
| Signal          | Output of an impulse telegram, nominal level $\approx$ 12 V (Version 01 and 02) and $\approx$ 23 V (Version 03) without load.  |
| Maximum current | Fused by a 200 mA auto-recovery fuse each output stage.<br>A continuous current of up to 120 mA can be applied over the whole specified operating temperature range. |



## GPI\_1, GPI\_2, GPI\_3, GPI\_4

|                      |   |
|----------------------|---|
| Input specification  | Input "Low": -15.0 to +0.7 V<br>Input "High": +2.0 to +15.0 V<br>Impedance: $\approx 24 \text{ k}\Omega$<br>Frequency: 0 - 1 kHz  |
| Output specification | Open Collector output of an NPN Darlington transistor.<br>Internal 33k pull-up resistor.<br>Max. power dissipation: 250 mW.<br><br>"High" state: 2.4 V (no load). For higher switching levels an external pull-up to a positive power source of less than or equal to 24 VDC is needed, typically 1 k $\Omega$ if connected to an external +5 VDC power source.<br><br>"Low" state: output switched to GND.<br>Max. collector current: 200 mA DC, not fused.<br>Collector-emitter saturation voltage:<br>@20mA: typ. 0.72 V ( $\leq 0.85 \text{ V}$ )<br>@100mA: typ. 0.9 V ( $\leq 1.1 \text{ V}$ )<br><br>Frequency: 0 - 1 kHz. |

## Others

|  |   |
|--|---|
| Operating voltage                            | 15 - 30 VDC   |
| Power consumption                            | Maximum 3.0 W (without load at the VCC12_OUT pins)  |
| Weight                                       | 0.4 kg approx.  |
| Dimensions                                   | Standard circuit board (W x D): 100 x 160 mm/3.94 x 6.30 inch<br>Rear panel: Rub H1: 103 x 44 mm / 4.06 x 1.73 inch<br>Rub H3: 8HP, 3RU |
| Environmental characteristics, operating     | Temperature: 5 °C to 40 °C<br>Relative humidity: 30 % to 85 %, non-condensing   |
| Environmental characteristics, non-operating | Temperature: -10 °C to +60 °C<br>Relative humidity: 5 % to 95 %, non-condensing   |



## 1.4 Functional Overview

The standard functions of the module are:

- Reading and decoding LTC.
- Generating LTC: As "refresh" of the read LTC, as read LTC time + offset, or as decoded MTD time.
- Sending RS232 and RS422 time and date information (for PCs, UMDs, video walls ...).

Two different time offsets ( $\pm$  HH:MM:SS:FF) can be programmed. These can be added or subtracted from the time information of the read LTCs (LTC\_REF and LTC\_VTR):

LTC\_REF  $\pm$  OFFSET1, LTC\_REF  $\pm$  OFFSET2, LTC\_VTR  $\pm$  OFFSET1, LTC\_VTR  $\pm$  OFFSET2.

This way VL generates four time bases internally which are synchronized to the external LTC\_REF. With an offset = 00:00:00:00 the read time information will be regenerated frame accurately.

Furthermore, two independent free running counters are available as additional time references. These counters can receive start values utilizing one of the configuration tools. These counters can be controlled by external Start/Stop/Reset/Set signals.

If the module receives an LTC of the LTC(MTD) format, the following data of the LTC(MTD) will be decoded: Timers A – F, real-time & date.

If the module receives an LTC which contains any known date format, this date can be decoded.

Thus, different time information is available which can be generated as LTC time addresses, LTC user bits, serial data strings in selectable protocols, and impulse telegrams to feed analogue clocks. Any date encoded in the binary groups of the LTC input can be decoded and converted into any binary group format of the outgoing LTC.

Proper decoding of the input data and conversion to any output signal requires a configuration of the module utilizing one of the configuration tools:

1. For a proper decoding of LTC input data, the respective input format of the LTC must be selected (see chapter "Configuration of the LTC Inputs").
2. Each output connector (OUT1 to OUT4) comprises LTC, serial interfaces, and an impulse telegram. Each output signal can receive an individual set-up (see chapter "Configuration of the Outputs").

PC programs are available for free: Configuration of the module = **RubidiumConfig.exe**, status monitor = **RubStatSE.exe**.

The RUBIDIUM SERIES HTTP server, located in the **Rub IE** module, enables the configuration of the module and offers a status monitor as well.



# 1.5 RS422 Output or RS485(MTD) Distribution

Each output connector (OUT1 to OUT4) offers either an RS422 output or an RS485(MTD) distribution at its pins 1 and 2:

RS422 output, signals RS422\_T-, RS422\_T+:

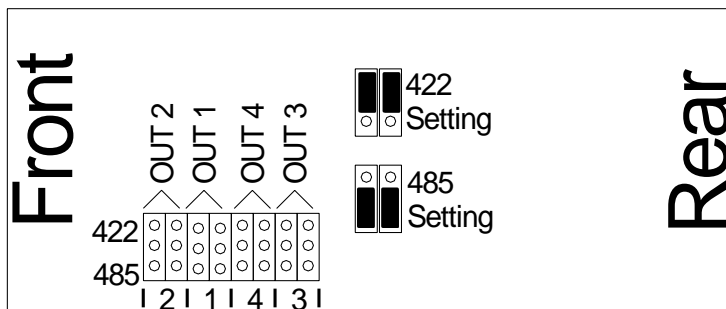
Serial data output, configuration by settings at "Interface" at the **VL Output** function of a configuration tool. Data string is identical to the RS232 output.

RS485(MTD) distribution, signals RS485\_TRA\_OUT, RS485\_TRB\_OUT :

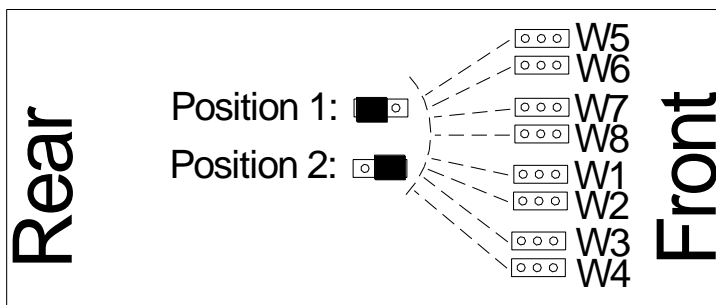
RS485 bus of the MTD Timer System, signals will be received/transmitted from/to the RS485 at RJ45 IN and LOOP jack, whereas each RS485 at the RJ45 OUT jacks is electrical decoupled from all other RS485 signals.

Select by **jumpers** located at the upper board of the VL module.

Jumper setting at latest version delivered since September 2012:



Jumper setting at version delivered before September 2012:



**Position 1 = RS422**  
**Position 2 = RS485(MTD)**

- OUT 1: W1 + W2
- OUT 2: W3 + W4
- OUT 3: W5 + W6
- OUT 4: W7 + W8



## 1.6 Software Update

Software updates require a (windows operating system) computer and the "RUBIDIUM CONFIGURATION" program. You can download the latest version of the program from:

<https://www.plurainc.com>.

Please check the **PC** connector at your RUBIDIUM housing: there is an USB or RS232 (with a DSUB9 connector) interface installed. You now need the same interface at your computer.

The new firmware should already be stored as a **.tcf** file at your computer.

Please now execute the following steps:

1. Connect your computer to the **PC** connector of that RUBIDIUM frame where the module has been plugged.

In case of an RS232 interface: Use a straight (1:1) connection between the **PC** connector at the RUBIDIUM frame and the RS232 of the computer.

In case of an USB interface: Use a USB A-B cable between your computer and the RUBIDIUM frame.

Switch on the power of all units.

2. Execute "Rubidium Config.exe" on your computer. Select the "Port" according to the interface (USB, RS232) you are using.
3. Select the module (unit 1, 2, 3 ...).
4. Select "Flash Update" in the *File* menu.
5. Open the **.tcf**-file. Standard name: "Rubidium VL version.tcf".  
"version" stands for a revision no., e.g. 2.12.27.

Click the OK button, update starts. Click the OK button at the end.

6. Update is finished now. We recommend checking module's configuration utilizing the "RUBIDIUM CONFIGURATION" program.

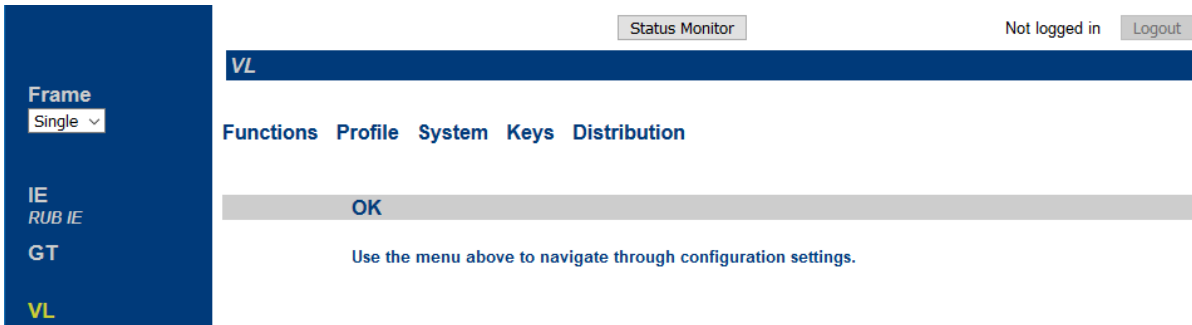
*During the flash update the operation of the module stops!*



## 2 Status Monitor

### 2.1 Status Monitor by the IE Module

The RUBIDIUM SERIES HTTP server, located in the **RUB IE** module, offers a status monitor. Please refer to the “Functional Descriptions and Specifications IE” manual for a detailed description of how to access the RUBIDIUM SERIES system and how to open the RUBIDIUM homepage.



- Click on **VL** on the left.
- Click on the button **Status Monitor** to open the “VL” status monitor.

Requirements:

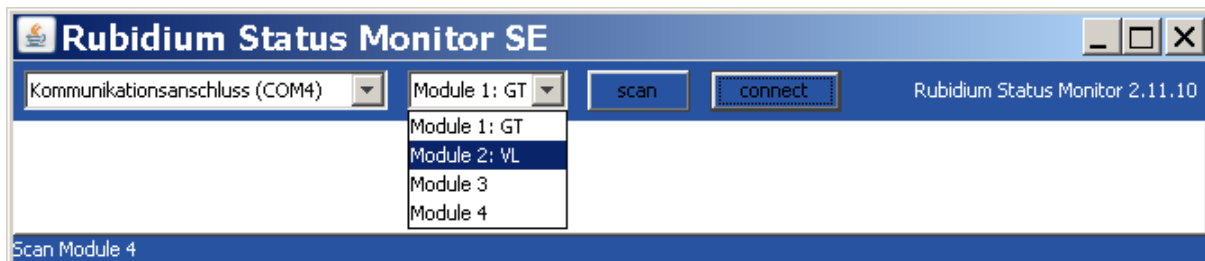
- Please have Java Runtime Environment 1.6.0 or higher installed (for example download at [www.java.com](http://www.java.com)).
- Java should be installed as a browser plug-in (a Windows installation will do this automatically if you download Java from the source mentioned above).
- The Status Monitor works with all operating systems which support Java.

### 2.2 Status Monitor by a PC Program

The PC program **RubStatSE.exe** uses the **PC** interface (RS232 or USB) of the RUBIDIUM housing. This program is part of the “Rubidium Series, config software” packet you can download at:

<https://www.plurainc.com>.

Execute this program, select the COM port or USB connection and press the **scan** button to get a list of the modules plugged to this housing. Select the module and press the **connect** button.



Requirements:

- Please have Java Runtime Environment 1.6.0 or higher installed (for example download at [www.java.com](http://www.java.com)).
- For a Windows operating system: Please follow the description of **RubStatSE\_Readme.txt**.
- For a Linux operating system: Available on request.



## 2.3 System Status

Kommunikationsanschluss (COM4) | Module 2: VL | scan | disconnect | Rubidium Status Monitor 2.11.10

System | Status | Fan Monitor

System Set-up

**reference ltc**

|                   |          |                  |                   |          |
|-------------------|----------|------------------|-------------------|----------|
| <b>frame rate</b> | 25       | <b>vtr ltc</b>   | <b>frame rate</b> | 25       |
| <b>user mode</b>  | MTD Data | <b>user mode</b> | <b>user mode</b>  | Set User |

**preset data:**

|                 |                     |
|-----------------|---------------------|
| <b>start 1</b>  | 00 : 00 : 00 : 00   |
| <b>start 2</b>  | 00 : 00 : 00 : 00   |
| <b>offset 1</b> | + 00 : 00 : 00 : 00 |
| <b>offset 2</b> | + 00 : 00 : 00 : 00 |

**ltc output:**

|              | level         | time mode          | 6/8 digits | still- | still status | user mode | user set    |
|--------------|---------------|--------------------|------------|--------|--------------|-----------|-------------|
| <b>out 1</b> | 6 dB 1.55 Vpp | Ref. Time Offset 1 | 6          | Off    | Off          | Ref. User | 00 00 00 00 |
| <b>out 2</b> | 6 dB 1.55 Vpp | Ref. Time Offset 1 | 6          | Off    | Off          | Ref. User | 00 00 00 00 |
| <b>out 3</b> | 6 dB 1.55 Vpp | Ref. Time Offset 1 | 6          | Off    | Off          | Ref. User | 00 00 00 00 |
| <b>out 4</b> | 6 dB 1.55 Vpp | Ref. Time Offset 1 | 6          | Off    | Off          | Ref. User | 00 00 00 00 |

**serial output:**

|              | mode               | protocol | format     |
|--------------|--------------------|----------|------------|
| <b>out 1</b> | Ref. Time Offset 1 | Off      | 2400/7/E/1 |
| <b>out 2</b> | Ref. Time Offset 1 | Off      | 2400/7/E/1 |
| <b>out 3</b> | Ref. Time Offset 1 | Off      | 2400/7/E/1 |
| <b>out 4</b> | Ref. Time Offset 1 | Off      | 2400/7/E/1 |

**telegram output:**

|              | mode               | protocol |
|--------------|--------------------|----------|
| <b>out 1</b> | Ref. Time Offset 1 | Off      |
| <b>out 2</b> | Ref. Time Offset 1 | Off      |
| <b>out 3</b> | Ref. Time Offset 1 | Off      |
| <b>out 4</b> | Ref. Time Offset 1 | Off      |

Module version 2.11.16.0 (VL)

The **System** page of the status monitor allows verifying the configuration of the inputs and outputs.

Additionally, the "**still status**" indicates whether a "frozen" LTC output is currently being generated.



## 2.4 Signal Status

The screenshot shows the 'Rubidium Status Monitor SE' application window. The title bar includes the application name and standard window controls. Below the title bar, there are dropdown menus for 'Kommunikationsanschluss (COM4)' and 'Module 2: VL', along with 'scan' and 'disconnect' buttons. The 'Status' tab is selected in the menu bar. The main content area displays the following information:

**System Status**

**lrc input:**

|                 | reference lrc | vtr lrc      |
|-----------------|---------------|--------------|
| signal          | Yes           | No           |
| time            | 11 : 15 : 14  | 00 : 00 : 00 |
| user            | 01 06 81 81   | 00 00 00 00  |
| date source     | reference lrc |              |
| lrc(mtd) source | reference lrc |              |

**lrc decoded data:**

|           |              |
|-----------|--------------|
| date      | 01.06.2011   |
| lrc(mtd)  | valid        |
| time A    | 00 : 01 : 04 |
| time B    | 11 : 59 : 00 |
| time C    | 23 : 59 : 08 |
| time D    | 00 : 00 : 00 |
| time E    | 00 : 00 : 00 |
| time F    | 23 : 15 : 14 |
| real-time | 11 : 15 : 14 |

**lrc output lock status:**

|                         |        |
|-------------------------|--------|
| pll lock current        | yes    |
| pll lock after reset    | yes    |
| freq divider, current   | 589789 |
| freq divider, nominal   | 589824 |
| errors no sync          | 0      |
| errors sync disturbance | 0      |

Module version 2.11.16.0 (VL)

The **Status** page of the status monitor shows all the relevant status information.





**ltc input**

|                 |   |
|-----------------|---|
| signal          | "Yes" if a signal can be read. "No" if no signal can be read. This status is similar to the function of the lamp "REF LTC" and "VTR LTC", resp. |
| time            | Time information (HH:MM:SS) of the read LTC.  |
| user            | User bits of the read LTC.  |
| date source     | Source for decoding the date: "reference ltc" or "vtr ltc" – depending on configuration (see chapter „Configuration of the LTC Inputs“).        |
| ltc(mtd) source | Source for decoding the MTD data: "reference ltc" or "vtr ltc" – depending on configuration (see chapter „ Configuration of the LTC Inputs “).  |

**ltc decoded data**

|                                      |   |
|--------------------------------------|---|
| date                                 | If a valid date can be decoded, the date will be shown. "invalid" will be shown if no valid date is present.  |
| ltc(mtd)                             | "valid" will be shown if LTC of the LTC(MTD) format can be decoded. "invalid" will be shown if no LTC(MTD) is present.  |
| time A<br>...<br>time F<br>real time | Timer A – F and real-time are shown as decoded out of the MTD data. These data will be valid only if "ltc(mtd) = valid" is shown.<br><br><u>Note:</u><br>Displaying the MTD data serves for a quick check only and may not be compared with the time representation of an MTD display. MTD displays evaluate status information which influences the time representation. The status monitor neglects this information. For example: "Negative" stop timer values will be shown as positive values (24:00:00 – stop timer). Furthermore, the time accuracy of the MTD timer values at the status monitor is less than one second. |

**ltc output lock status**

|                         |   |
|-------------------------|---|
| pll lock current        | All LTC outputs are synchronized to the LTC at input IN (LTC_REF). A "yes" or "no" indicates the actual status of this phase synchronization. |
| pll lock after reset    | A "yes" or "no" indicates whether VL has been synchronized at least once after power has turned on.   |
| freq. divider, current  | Information for service purposes: Current value of the frequency divider for the internal frame clock.  |
| freq. divider, nominal  | Information for service purposes: Nominal value of the frequency divider for the internal frame clock.  |
| errors no sync          | Error counter: Number of sync signal failures.  |
| errors sync disturbance | Error counter: Number of sync signal disturbances.  |



## 2.5 Status of Fan and Power Supplies

This module – as all configurable RUBIDIUM modules – is able to monitor the fan and power supplies which are plugged to the same housing as “VL”.

The screenshot shows the 'Rubidium Status Monitor SE' application window. The 'Fan Monitor' tab is active, displaying monitoring data for module 'VL'. The data is organized into several sections: Frame, Port, Fan 1, Fan 2, Power Supply 1, and Power Supply 2.

| Frame                    |                        | Port        |     |
|--------------------------|------------------------|-------------|-----|
| housing                  | H1 (or D1, Q1, S1, T1) | detected    | yes |
| fan and ps monitoring    | yes                    | failure     | no  |
| port monitoring          | yes                    | address     | 1   |
| fan failure              | no                     | termination | on  |
| ps failure               | no                     |             |     |
| fans and ps monitored by | this unit              |             |     |

| Fan 1     |       | Fan 2     |      |
|-----------|-------|-----------|------|
| detected  | yes   | detected  | no   |
| failure   | no    | failure   | no   |
| fan fault | no    | fan fault | no   |
| alarm     | no    | alarm     | no   |
| temp      | 36 °C | temp      | 0 °C |

| Power Supply 1 |        | Power Supply 2 |       |
|----------------|--------|----------------|-------|
| detected       | yes    | detected       | no    |
| failure        | no     | failure        | no    |
| alarm          | no     | alarm          | no    |
| temp           | 44 °C  | temp           | 0 °C  |
| 24V output     | 23,9 V | 24V output     | 0,0 V |
| 24V at frame   | 23,7 V | 24V at frame   | 0,0 V |

Module version 2.11.16.0 (VL)

Please refer to the document “Installation & Systems Manual RUBIDIUM SERIES” for a detailed description.



## 3 The Rubidium Configuration Tools

### 3.1 The Rubidium Configuration PC Program

Please refer to the

“Installation & Systems Manual RUBIDIUM SERIES”

for a general description of this program and how to install it. In this document please notice the following subchapters:

- Overview
- Installation
- Connection to RUBIDIUM SERIES Chassis
- Starting the Program
- Store, Load and Update the Configuration on your PC
- The “Profile” Tab: Store and Load Configurations on the Module

The program RUBIDIUM CONFIGURATION uses various tab cards. With one click on the button **Configure** all available and currently activated tabs of this specific module are displayed.

Any changes at a tab will immediately be stored at the module. If you enter a number or a text press the **tabulator key** at the PC’s keyboard afterwards.



## 3.2 The Rubidium Series HTTP Server

The RUBIDIUM SERIES HTTP server is located in the **RUB IE** module. A 10/100Base-T Ethernet connection and a web browser allow accessing the RUBIDIUM system.

Please refer to the

“Installation & Systems Manual RUBIDIUM SERIES”

for a functional overview and for an installation description of this program. You will find the chapter “The RUBIDIUM SERIES HTTP Server” and its subchapters:

- Overview, Connecting the IE Module
- IP Configuration, the Rubidium Homepage
- Access to a RUBIDIUM SERIES Module
- The “Profile” Page: Store and Load Configurations on the Module or on the PC

As soon as a communication to a single module has been established, the **Configuration** page gives a list of all links to those pages which are actually enabled for a configuration.

Changes at a page will not be stored at the module automatically. At the bottom of each page there are two buttons which should be used to store or load the module’s configuration:

Button **Save To Module**:

- Click on this button to transfer all settings on this page to the module.

Button **Reload From Module**:

- Click on this button to load the current configuration of the module.

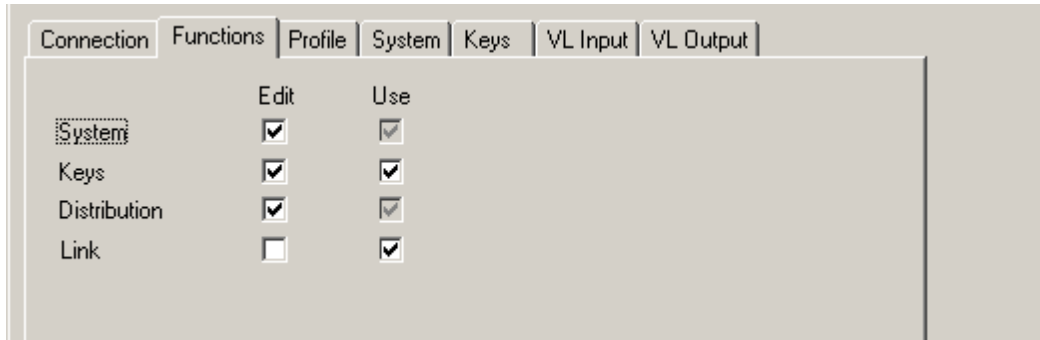


Every time you click on the blue button which indicates the module under configuration a **Reload** will be done automatically.



### 3.3 “Functions“

Click on **Functions** to see all applicable tabs/pages listed, and to activate or deactivate tabs/pages. For example (screen shot of the PC program tab):



A tab/page reflects a function of the module. The columns **Edit** and **Use** determine whether the function in the module is activated/deactivated and whether user configuration of that specific function is allowed or not.

Click on the applicable **Edit** and/or **Use** check boxes to activate/deactivate a function:

| Edit | Use |  |
|------|-----|--|
|      |     | Function is deactivated, the tab/page is not visible.                              |
| √    | √   | Function is activated, the tab/page is visible and configurable.                   |
|      | √   | Function is activated but the tab/page not visible and therefore not configurable. |

- We suggest that you deactivate the **Use** check boxes of all functions you are presently not using.
- We suggest that you deactivate the **Edit** check boxes of all functions you are presently not configuring. That avoids unintentional operating and malfunctions.

List of functions:

- Profile** Store and Load Configurations on the Module (\*)
- System** Identification, Reset, SNMP, Fan Control
- Keys** Keys and Lamps, LEDs and GPIs
- VL Input** Configuration of the LTC Inputs
- VL Output** Configuration of the Outputs
- Link** Communication between Modules

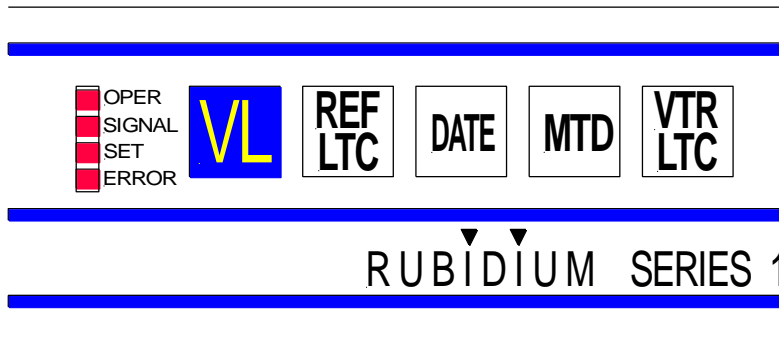
(\*) refer to “Installation & Systems Manual RUBIDIUM SERIES”



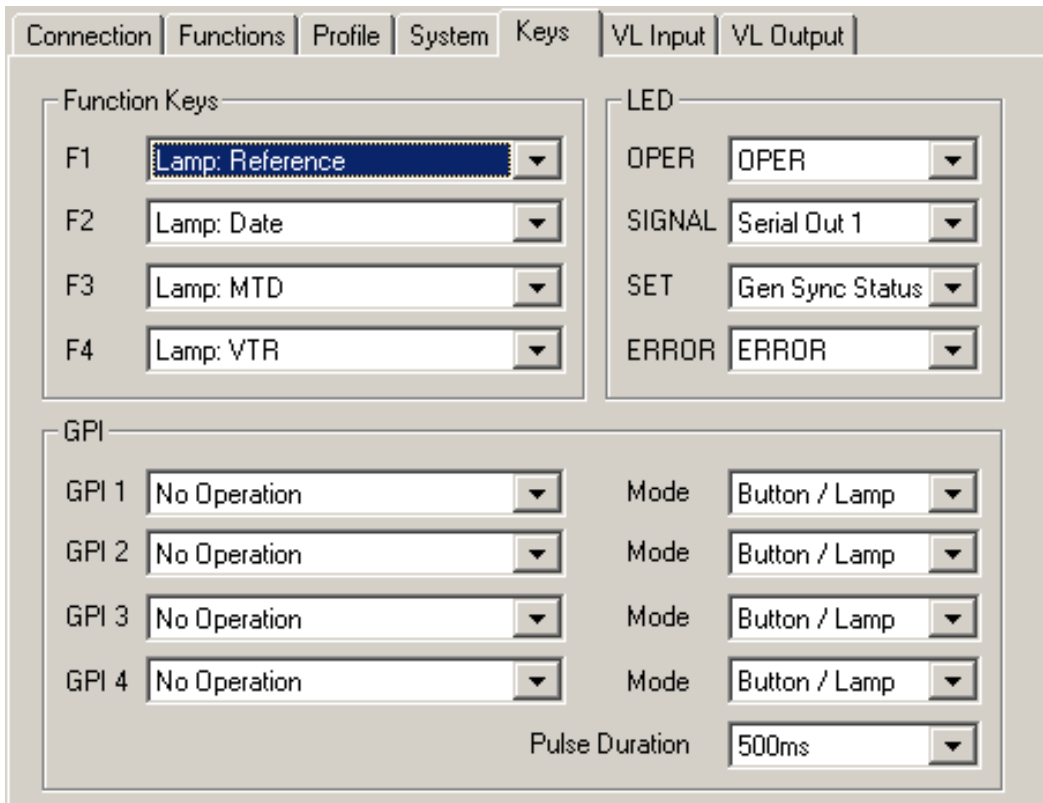
### 3.4 “Keys”: Keys, Lamps, LEDs and GPIs

The module has four GPIs (General Purpose Interface), the RUB1 module additionally has four illuminated buttons (keys and lamps) and four LEDs (Light Emitting Diodes). Basically, the functions of these in- and outputs are programmable.

*Some functions presented by the configuration tool maybe assigned to special options, and therefore are not applicable with the standard firmware. For further information please contact **Plura**.*



Configuration (example shows a screen shot of the PC program tab):



The following functions for the **keys** are provided for this module:

| Function                                      | Descriptions  |
|---|---|
| Start 1/2<br>Stop 1/2<br>Reset 1/2<br>Set 1/2 | Two independent free running counters are available as additional time references. These counters can receive start values utilizing one of the configuration tools. These counters can be controlled by Start/Stop/Reset/Set signals.  |
| Load Profile...                               | Load a previously saved configuration. Example:<br>Assign the "Load Profile 1" function to F3 and the "Load Profile 2" function to F4. Now setup all other functions according to your first application. Store the whole configuration as "Profile 1" utilizing the "Store Profile" function at the <b>Profile</b> tab. Now setup your second application but keep the F3 and F4 functions of the first application. Store the whole configuration as "Profile 2". Now it is possible to switch between both configurations pressing the F3 and F4 keys. |

The following functions for the **lamps** are provided for this module:

| Function  | Descriptions  | Recommended Lamp |
|-----------|---|------------------|
| Reference | Lights up if LTC is present at input "IN".          | F1: REF LTC      |
| Date      | Lights up if a valid date can be decoded.           | F2: DATE         |
| MTD       | Lights up if LTC of LTC(MTD) format can be decoded. | F3: MTD          |
| VTR       | Lights up if LTC is present at input "VTR IN".      | F4: VTR LTC      |

The following functions for the **LEDs** are provided for this module:

| Function   | Descriptions  | Recommended LED |
|--|---|-----------------|
| OPER   | Lights up during normal operating mode.   | OPER            |
| Serial Out 1<br>Serial Out 2<br>Serial Out 3<br>Serial Out 4 | Flashes once per second when a serial data string is being sent at the respective output.   | SIGNAL          |
| Pulse Out 1<br>Pulse Out 2<br>Pulse Out 3<br>Pulse Out 4     | Flashes every time a pulse telegram is being sent at the respective output.   | SIGNAL          |
| Gen Sync Status  | All LTC outputs are synchronized to the LTC at input "IN".<br>With this function the LED shows the status of the frequency and the phase synchronization:<br>LED lights up = Synchronized.<br>LED flashes slowly = Fine tuning.<br>LED flashes fast = Synchronization has failed. | SET             |
| Error  | Lights up shortly as soon as an error has been detected.  | ERROR           |



The following functions for the **GPIs** are provided for this module:

#### **GPI as input**

All functions which are provided for **keys** are available for GPI as well – see description above. Assigning one of these functions switches the GPI to input mode.

#### **GPI as output**

All functions which are provided for **lamps** are available for GPI as well – see description above. Assigning one of these functions switches the GPI to output mode.

Additionally, the output characteristic is selectable:

| Drop-down list at <b>Mode</b> | Description   |
|-------------------------------|---|
| Button/Lamp                   | Statically, active "Low" [recommended]  |
| Inv. Button/Lamp              | Statically, active "High"   |
| Switch/On Pulse               | Pulse, active "Low"; pulse width selectable from 100 ms to 2 s.<br>Pulse will be generated at event entry.                          |
| Inv. Switch/Off Pulse         | Pulse, active "High"; pulse width selectable from 100 ms to 2 s.<br>Pulse will be generated at the end of the event.                |
| <b>Pulse Duration</b>         | The pulse width is selectable as 100 ms, 200 ms, 500 ms, 1 s, 2 s.<br>This selection refers to all GPI outputs set to a pulse mode. |





### 3.5 “VL Input“: Configuration of the LTC Inputs

Configuration (example shows a screen shot of the PC program tab):

The settings at 'Reference Input' refer to the LTC input at connector IN (LTC\_REF).

The settings at 'VTR Input' refer to the LTC input at connector VTR IN (LTC\_VTR).

#### **Frame Rate**

The frame rate of the LTC must be selected correctly.

**Because the LTC at connector IN (LTC\_REF) synchronizes the LTC outputs, all LTC outputs automatically get the same frame rate as what is set at ,Reference Input'!**

#### **User Mode**

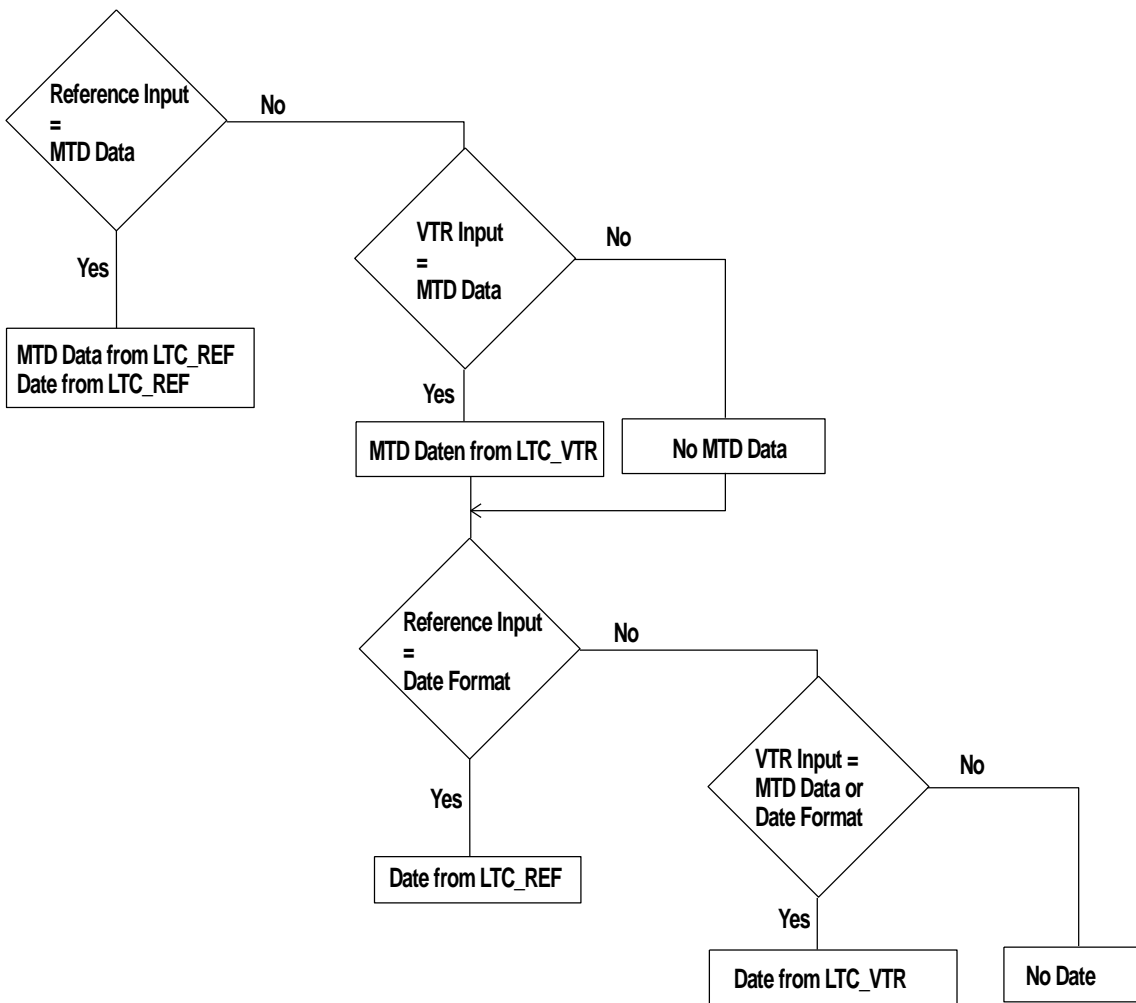
The usage of the LTC's user bits (Binary Groups) can be selected from the drop-down list:

| User Mode                | Description  |
|--------------------------|--|
| Set User                 | No specified format. No date can be decoded.   |
| MTD Data                 | There is LTC with an LTC(MTD) format connected. The timers A – F, the MTD real-time and the date can be decoded. |
| Date: UU.DD.MM.YY<br>... | 14 different formats are available to decode a date.   |
| SMPTE 309M: MJD          |  |
| MTD Timer                | Reserved. Neither MTD data nor a date can be decoded.  |



Decoding of a date and of LTC(MTD) data can only be done once in each case. The following priority rules are valid for both of the LTC inputs:

1. If 'Reference Input' has been set to "User Mode = MTD Data", all the MTD data and the date will be decoded from the LTC at input **IN**.
2. If 'VTR Input' has been set to "User Mode = MTD Data", all the MTD data will be decoded from the LTC at input **VTR IN**.
3. If 'Reference Input' has been set to "User Mode = ... (any date format)", the date will be decoded from the LTC at input **IN**.
4. If 'VTR Input' has been set to "User Mode = MTD data or ... (any date format)", the date will be decoded from the LTC at input **VTR IN**.



**Start**

Input of a start value (HH:MM:SS:FF) for a free running counter.

**Offset**

Input of a time offset (± HH:MM:SS:FF).



### 3.6 “VL Output”: Configuration of the Outputs

Configuration (example shows a screen shot of the PC program tab):

#### **Output**

Four LTC outputs, four serial interfaces and four impulse outputs are available. Each output can individually be programmed. First step of the configuration will be to select the channel number (Output = OUT1 ... OUT4). Now you can set-up the LTC, serial interface, and impulse telegram outputs.

**LTC – Gain** Select the output level from the drop-down list.

The values in this list refer to a use of balanced signals for output and input, i.e.  $V_{PP}$  (= peak-to-peak value) will be the difference between LTC\_OUT\_A and LTC\_OUT\_B.  $V_{PP}$  will be half of the indicated value if unbalanced signals are used, i.e. the peak-to-peak value of the single LTC\_OUT\_A or LTC\_OUT\_B signal.

Correspondence between balanced use and unbalanced use:

| Use of balanced signals        | Use of unbalanced signals       |
|--------------------------------|---------------------------------|
| + 12 dBu / 8.7 V <sub>PP</sub> | + 6 dBu / 4.4 V <sub>PP</sub>   |
| + 6 dBu / 4.4 V <sub>PP</sub>  | 0 dBu / 2.2 V <sub>PP</sub>     |
| 0 dBu / 2.2 V <sub>PP</sub>    | - 6 dBu / 1.1 V <sub>PP</sub>   |
| - 6 dBu / 1.1 V <sub>PP</sub>  | - 12 dBu / 0.55 V <sub>PP</sub> |



|                          |  |                              |                           |                              |                  |             |             |                          |                           |                              |             |             |             |           |                   |                  |                  |          |             |          |          |          |             |          |          |
|--------------------------|--|------------------------------|---------------------------|------------------------------|------------------|-------------|-------------|--------------------------|---------------------------|------------------------------|-------------|-------------|-------------|-----------|-------------------|------------------|------------------|----------|-------------|----------|----------|----------|-------------|----------|----------|
| <b>LTC - Time</b>        | Settings which affect the time addresses of the LTC.   |                              |                           |                              |                  |             |             |                          |                           |                              |             |             |             |           |                   |                  |                  |          |             |          |          |          |             |          |          |
| Mode                     | Selection of a decoded time (see table at the end of this chapter).  |                              |                           |                              |                  |             |             |                          |                           |                              |             |             |             |           |                   |                  |                  |          |             |          |          |          |             |          |          |
| Digits                   | <p>Six or eight digits can be selected. This set-up is relevant only if at "mode" one of the MTD timers A - F or MTD Main 1 – 3 has been selected and this timer is counting down. If a display or a similar device reads this LTC and displays the time without frames (e.g. HH:MM:SS), the '6 digits' mode should be selected. If this device displays the time with frames, the '8 digits' mode should be selected. The correct choice ensures that the down-counting time at the display reaches 0 synchronous with the original MTD time.</p> <p>For example: MTD timer counting down from 1s to 0s:</p> <table border="0"> <tr> <td>MTD Timer</td> <td>VL LTC '6 Digits'</td> <td>Display HH:MM:SS</td> <td>Display MM:SS:FF</td> </tr> <tr> <td>00:00:01</td> <td>00:00:01:00</td> <td>00:00:01</td> <td>00:01:00</td> </tr> <tr> <td>00:00:00</td> <td>00:00:00:24</td> <td>00:00:00</td> <td>00:00:24</td> </tr> </table><br><table border="0"> <tr> <td>MTD Timer</td> <td>VL LTC '8 Digits'</td> <td>Display HH:MM:SS</td> <td>Display MM:SS:FF</td> </tr> <tr> <td>00:00:01</td> <td>00:00:00:01</td> <td>00:00:00</td> <td>00:00:01</td> </tr> <tr> <td>00:00:00</td> <td>00:00:00:00</td> <td>00:00:00</td> <td>00:00:00</td> </tr> </table> | MTD Timer                    | VL LTC '6 Digits'         | Display HH:MM:SS             | Display MM:SS:FF | 00:00:01    | 00:00:01:00 | 00:00:01                 | 00:01:00                  | 00:00:00                     | 00:00:00:24 | 00:00:00    | 00:00:24    | MTD Timer | VL LTC '8 Digits' | Display HH:MM:SS | Display MM:SS:FF | 00:00:01 | 00:00:00:01 | 00:00:00 | 00:00:01 | 00:00:00 | 00:00:00:00 | 00:00:00 | 00:00:00 |
| MTD Timer                | VL LTC '6 Digits'  | Display HH:MM:SS             | Display MM:SS:FF          |                              |                  |             |             |                          |                           |                              |             |             |             |           |                   |                  |                  |          |             |          |          |          |             |          |          |
| 00:00:01                 | 00:00:01:00  | 00:00:01                     | 00:01:00                  |                              |                  |             |             |                          |                           |                              |             |             |             |           |                   |                  |                  |          |             |          |          |          |             |          |          |
| 00:00:00                 | 00:00:00:24  | 00:00:00                     | 00:00:24                  |                              |                  |             |             |                          |                           |                              |             |             |             |           |                   |                  |                  |          |             |          |          |          |             |          |          |
| MTD Timer                | VL LTC '8 Digits'  | Display HH:MM:SS             | Display MM:SS:FF          |                              |                  |             |             |                          |                           |                              |             |             |             |           |                   |                  |                  |          |             |          |          |          |             |          |          |
| 00:00:01                 | 00:00:00:01  | 00:00:00                     | 00:00:01                  |                              |                  |             |             |                          |                           |                              |             |             |             |           |                   |                  |                  |          |             |          |          |          |             |          |          |
| 00:00:00                 | 00:00:00:00  | 00:00:00                     | 00:00:00                  |                              |                  |             |             |                          |                           |                              |             |             |             |           |                   |                  |                  |          |             |          |          |          |             |          |          |
| Still -                  | <p>Usually an LTC reader compensates the decoding delay of one frame by adding one frame to the current value being indicated. Some readers can switch off this compensation automatically receiving a "still" LTC, this ensures a frame accurate value while the LTC time stands still. If the LTC is connected to a display or a similar device which utilizes this compensations mechanism, do not click "Still -", otherwise "Still -" should be clicked.</p> <p>Example: Standing LTC time = 01:02:03:04</p> <table border="0"> <tr> <td>VL LTC with "Still -"</td> <td>Display with compensation</td> <td>Display without compensation</td> </tr> <tr> <td>01:02:03:03</td> <td>01:02:03:03</td> <td>01:02:03:04</td> </tr> </table><br><table border="0"> <tr> <td>VL LTC without "Still -"</td> <td>Display with compensation</td> <td>Display without compensation</td> </tr> <tr> <td>01:02:03:04</td> <td>01:02:03:04</td> <td>01:02:03:05</td> </tr> </table>  | VL LTC with "Still -"        | Display with compensation | Display without compensation | 01:02:03:03      | 01:02:03:03 | 01:02:03:04 | VL LTC without "Still -" | Display with compensation | Display without compensation | 01:02:03:04 | 01:02:03:04 | 01:02:03:05 |           |                   |                  |                  |          |             |          |          |          |             |          |          |
| VL LTC with "Still -"    | Display with compensation  | Display without compensation |                           |                              |                  |             |             |                          |                           |                              |             |             |             |           |                   |                  |                  |          |             |          |          |          |             |          |          |
| 01:02:03:03              | 01:02:03:03  | 01:02:03:04                  |                           |                              |                  |             |             |                          |                           |                              |             |             |             |           |                   |                  |                  |          |             |          |          |          |             |          |          |
| VL LTC without "Still -" | Display with compensation  | Display without compensation |                           |                              |                  |             |             |                          |                           |                              |             |             |             |           |                   |                  |                  |          |             |          |          |          |             |          |          |
| 01:02:03:04              | 01:02:03:04  | 01:02:03:05                  |                           |                              |                  |             |             |                          |                           |                              |             |             |             |           |                   |                  |                  |          |             |          |          |          |             |          |          |
| <b>LTC - User</b>        | Settings which affect the user bits (Binary Groups) of the LTC.  |                              |                           |                              |                  |             |             |                          |                           |                              |             |             |             |           |                   |                  |                  |          |             |          |          |          |             |          |          |
| Mode                     | Selection of a decoded time or various date or user formats (see table at the end of this chapter).  |                              |                           |                              |                  |             |             |                          |                           |                              |             |             |             |           |                   |                  |                  |          |             |          |          |          |             |          |          |
| Set                      | <p>Set a fixed value for the user bits, for example an 8-digits number or a text with four characters.</p> <p>Allowed are numbers 0 – 9 and letters A – F. These user bits will be generated if "User Mode = Set" has been selected.</p>   |                              |                           |                              |                  |             |             |                          |                           |                              |             |             |             |           |                   |                  |                  |          |             |          |          |          |             |          |          |



**Interface (RS232 and RS422 of the same channel transmit identical data)**

| Mode      | Selection of a decoded time (see table at the end of this chapter).  |
|-----------|--|
| Protocol  | <p>Selection of a data string. Notes:</p> <p><math>h_{10}, h_1, m_{10}, m_1, s_{10}, s_1, f_{10}, f_1</math> = ASCII numbers of hours, minutes, seconds, and frames – tens and units.</p> <p>&lt;ADDR&gt; ASCII address (30h – 39h) – see below.</p> <p>– These protocols can transmit a minus sign. The minus sign replaces the tens of hours.</p> <p><b>8</b> These protocols require 8 data bits.</p> <p><b>S or F</b> Transmission every second (=S) or every frame (=F).</p>  |
|           | <p>Off No data to transmit.</p> <p>– <b>S</b> ASCII Seconds <math>h_{10}h_1:m_{10}m_1:s_{10}s_1&lt;CR&gt;</math></p> <p>– <b>F</b> ASCII Frames <math>h_{10}h_1:m_{10}m_1:s_{10}s_1.f_{10}f_1&lt;CR&gt;</math></p> <p>– <b>S</b> BFE <math>&lt;STX&gt;&lt;ADDR&gt;h_{10}h_1:m_{10}m_1:s_{10}s_1&lt;ETX&gt;</math></p> <p>– <b>S</b> LOUTH <math>&lt;STX&gt;&lt;ADDR&gt;&lt;E&gt;h_{10}h_1m_{10}m_1s_{10}s_1&lt;ETX&gt;</math><br/> <math>&lt;STX&gt;&lt;ADDR&gt;&lt;D&gt;&lt;ETX&gt;</math></p> <p><b>8 – S</b> OMNIBUS/TSL <math>&lt;HEADER&gt;&lt;00h&gt;h_{10}h_1:m_{10}m_1:s_{10}s_1</math><br/> <math>[&lt;HEADER&gt; = 80h + \text{address (00h – 09h) – see below}]</math></p> <p>– <b>S</b> DIS-11 HH.MM.SS <math>&lt;STX&gt;&lt;ADDR&gt;&lt;14h&gt;&lt;20h&gt;&lt;20h&gt;&lt;20h&gt;&lt;20h&gt;</math><br/> <math>h_{10}h_1.m_{10}m_1.s_{10}s_1&lt;ETX&gt;</math></p> <p>– <b>F</b> DIS-11 MM.SS.FF <math>&lt;STX&gt;&lt;ADDR&gt;&lt;14h&gt;&lt;20h&gt;&lt;20h&gt;&lt;20h&gt;&lt;20h&gt;</math><br/> <math>m_{10}m_1.s_{10}s_1.f_{10}f_1&lt;ETX&gt;</math></p> <p>– <b>S</b> DIS-6 HH.MM.SS <math>&lt;STX&gt;&lt;ADDR&gt;&lt;14h&gt;h_{10}h_1.m_{10}m_1.s_{10}s_1&lt;ETX&gt;</math></p> <p>– <b>F</b> DIS-6 MM.SS.FF <math>&lt;STX&gt;&lt;ADDR&gt;&lt;14h&gt;m_{10}m_1.s_{10}s_1.f_{10}f_1&lt;ETX&gt;</math></p> <p>– <b>S</b> NEWP HH.MM.SS <math>&lt;STX&gt;&lt;ADDR&gt;&lt;14h&gt;h_{10}h_1.m_{10}m_1.s_{10}s_1&lt;CR&gt;&lt;ETX&gt;</math></p> <p>– <b>F</b> NEWP MM.SS.FF <math>&lt;STX&gt;&lt;ADDR&gt;&lt;14h&gt; m_{10}m_1.s_{10}s_1.f_{10}f_1&lt;CR&gt;&lt;ETX&gt;</math></p> <p><b>S</b> Meinberg Std. Time &amp; date (mode = Ref. Time Offset1)</p> <p><b>8 S</b> NMEA \$GPRMC Time &amp; date (mode = Ref. Time Offset1)</p> <p><b>8 S</b> NMEA \$GPGGA Time &amp; date (mode = Ref. Time Offset1)</p> <p><b>8 S</b> NMEA \$GPZDA Time &amp; date (mode = Ref. Time Offset1)</p> <p>– <b>S</b> MaMu „T“ <math>&lt;T&gt;h_{10}h_1:m_{10}m_1:s_{10}s_1&lt;CR&gt;</math></p> <p>– <b>S</b> MaMu „t“ <math>&lt;t&gt;h_{10}h_1:m_{10}m_1:s_{10}s_1&lt;CR&gt;</math></p> <p><b>S</b> Wharton F1 Time &amp; date (mode = Ref. Time Offset1)</p> <p><b>S</b> Wharton F1 + Status Time &amp; date (mode = Ref. Time Offset1)</p> <p><b>S</b> Wharton F2 Time &amp; date (mode = Ref. Time Offset1)</p> |
| Baud rate | Select: 2400/4800/9600/19200/38400/57600/115200.<br>A baud rate $\geq 9600$ should be selected if a data string is sent every frame!   |
| Data Bits | Number of data bits: 7 or 8 (some protocols require 8, see above).   |
| Parity    | Parity bit: None/Even/Odd.   |
| Stop Bits | Number of stop bits: 1 or 2.   |
| Address   | Enter an address (0 – 9) for protocols which include <ADDR> - see above.   |



**Interface: Secondary Addressing**

With protocols including an address it is possible to send a second data string on the same interface line with time information independent from the first data string. Select the "Mode" (the time information) and the "Address" different from the selection above. The receiving device decides upon the address which time has to be displayed.

|         |  |
|---------|--|
| Mode    | Selection of a decoded time (see table at the end of this chapter).                              |
| Address | Select the secondary address out of 0 – 9.<br>Selection = 0 switches off the second data string. |

The secondary data string will be sent only if a baud rate of  $\geq 9600$  and a protocol with an address byte have been selected.

**Pulse (Output TELEGRAM)**

|          |  |
|----------|--|
| Mode     | Selection of a decoded time (see table at the end of this chapter).  |
| Protocol | Selection of an impulse telegram:<br>Off                    No pulses, output = "Low".<br>DCF                    DCF77 impulse telegram, output positive going impulses, e.g. suitable for Plura analogue clocks with 3-wire or 4-wire interface.<br>DCF inverted        DCF77 impulse telegram, inverted, output negative going impulses, e.g. suitable for Plura analogue clocks with 2-wire interface.<br>DC                     No pulses, output = "High".<br>PPS                    200 ms positive going pulses every second, no DCF77 bit coding.<br>PPS inverted        200 ms negative going pulses every second, no DCF77 bit coding. |



Table of available output modes:

|  | <b>Selection for LTC Time, LTC User, Interface, and Pulse</b>  |
|--|--|
| Ref. Time Offset 1<br>Ref. Time Offset 2<br>VTR Time Offset 1<br>VTR Time Offset 2   | Time of the LTC at input IN (LTC_REF) and/or VTR IN (LTC_VTR) $\pm$ offset. Frame compensation method will be applied: If offset = 00:00:00:00, the read time will be regenerated frame accurate.  |
| Start 1<br>Start 2   | Time of the first/second free running counter. These counters can be controlled via an external Start/Stop/Reset/Set signal.   |
| MTD Timer A<br>MTD Timer B<br>MTD Timer C<br>MTD Timer D<br>MTD Timer E<br>MTD Timer F   | Timer decoded out of an LTC(MTD), for e.g. a stopwatch or a specific time zone.<br><br>The MTD lamp lights up to indicated that an LTC(MTD) has been detected.<br><br>The "6 digits" or "8 digits" set-up has to be considered!  |
| MTD Realtime   | "Real-Time" decoded out of an LTC(MTD).  |
| MTD Main 1<br>MTD Main 2<br>MTD Main 3   | "Main 1" decoded out of an LTC(MTD).<br>"Main 2" decoded out of an LTC(MTD).<br>"Main 3" decoded out of an LTC(MTD).   |
|  | <b>Other optional selections for the LTC User</b>  |
| Set  | Fixed values, independent of the values of a read LTC.   |
| Ref. User<br>VTR User  | The user bits of the read LTC (LTC_REF) and/or VTR IN (LTC_VTR) are regenerated 1:1. Frame compensation is not possible, i.e. a change of the user bits develops a delay of two frames.  |
| UU DD MM YY<br>BBC<br>DD MM YY YY<br>YY MM DD UU<br>UU YY MM DD<br>UY YM MD DU<br>DD MM YY UU<br>MM DD YY UU<br>UU MM DD YY<br>309M: YYMMDD<br>309M: MJD | Various date formats are available.<br>DD = Day, MM = Month, YY = Year.<br><br>The UU described fields, that are not being used for the date, get the value as set up at the "Set" menu.<br>Example: Date = 31.12.2006, Set User = AB1234CD,<br>result to be generated:<br>Format "UU DD MM YY": "AB 31 12 06".<br>Format "YY MM DD UU": "06 12 31 CD".<br><br>The lamp <b>DATE</b> lights up indicating that a valid date can be decoded. |

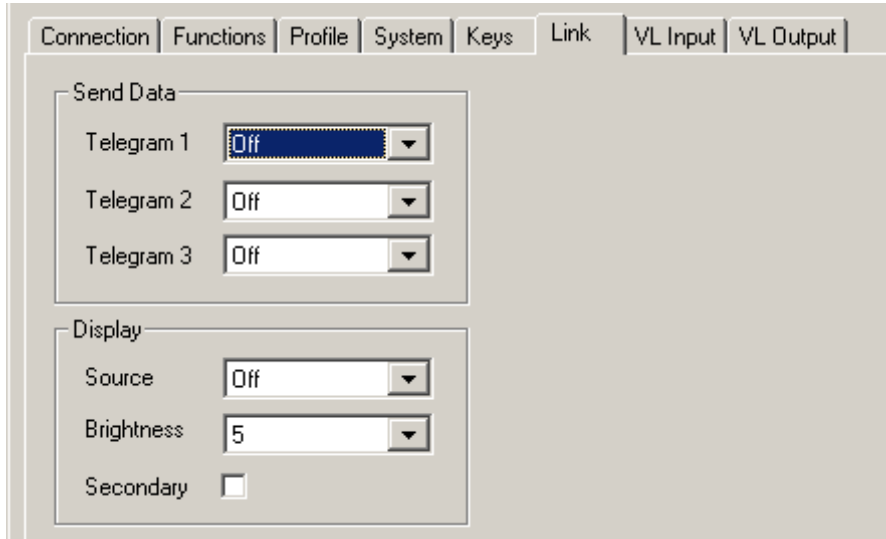


### 3.7 “Link”: Communication between Modules

**Link** uses the Rubidium internal *TC\_link* interface to transmit data. This interface is shared by all the modules in one frame, and via the **RLC** connector it is possible to link further modules at different frames.

In case that the module should transmit data, **Link** selects the channel and the kind of data.

Configuration (example shows a screen shot of the PC program tab):



#### Send Data

Three channels have been provided: **Telegram 1, Telegram 2, Telegram 3.**  
 For each channel select the kind of data which should be sent:

|           |   |
|-----------|---|
| Off       | This channel will not be used to transmit data, data can be received. |
| Reference | Time code of the LTC at input IN (LTC_REF).                           |
| VTR       | Time code of the LTC at input VTR IN (LTC_VTR).                       |

#### Display

Sending data to the RUBIDIUM **D1** display:

**Source** Select the kind of data:

|                |   |
|----------------|---|
| Off            | No data will be sent from this module.                          |
| Reference Time | Time of the LTC at input IN (LTC_REF).                          |
| Reference User | Binary groups (user bits) of the LTC at input IN (LTC_REF).     |
| VTR Time       | Time of the LTC at input VTR IN (LTC_VTR).                      |
| VTR User       | Binary groups (user bits) of the LTC at input VTR IN (LTC_VTR). |

**Brightness** Adjust the brightness of the LEDs, steps 1 to 7.

**Secondary** Address the “secondary” display instead of the “primary” display.





## 3.8 “System“: Identification, Reset, SNMP, Fan Control

Configuration (example shows a screen shot of the PC program tab):

### Unit

**Name:** The connected module can get a name. You may enter, change, or verify this name at this window.

**Frame:** Modules in a network can be uniquely identified by a frame number and the module’s position within the frame. In a single frame system, you may select “Single” or “Auto” at this set-up. If a system is built-up of more than one frame, each frame has to receive a unique address (adjusted at the fan module). If you select “Auto”, the module will request this frame number automatically and will show it on the info box. Likewise, it is possible to select a frame number manually.

### Boot

**Cold Boot:** Do a cold boot of the module.

**Warm Boot:** Do a warm boot of the module.

### Info

Displays module’s status information.

### SNMP Trap Enable

Activate the “Any Trap” check box to enable the SNMP functionality in general. If not checked, this module will not send any SNMP traps.

The individual traps can be enabled/disabled by a click on the corresponding check box. Please notice the chapter “Alarms by SNMP Traps” as well.

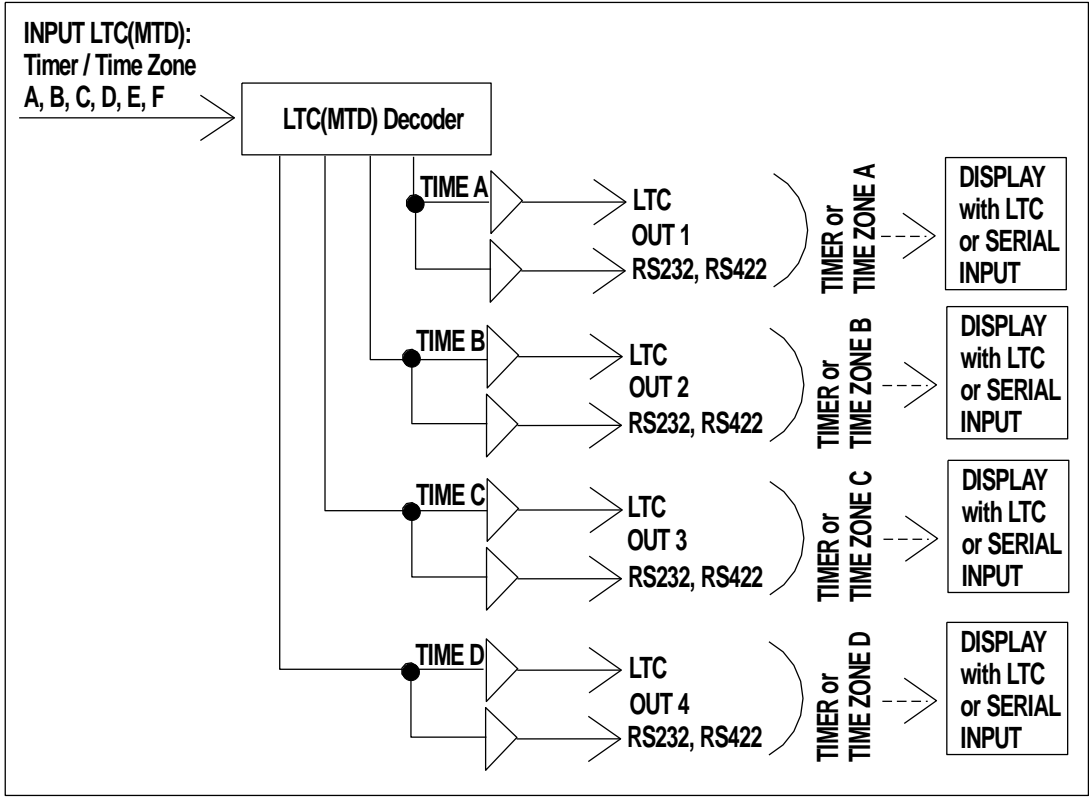
### Thermal Control

At least one module of each frame should have the fan monitoring activated. This enables the power supply monitoring – for power supplies within this frame - as well.

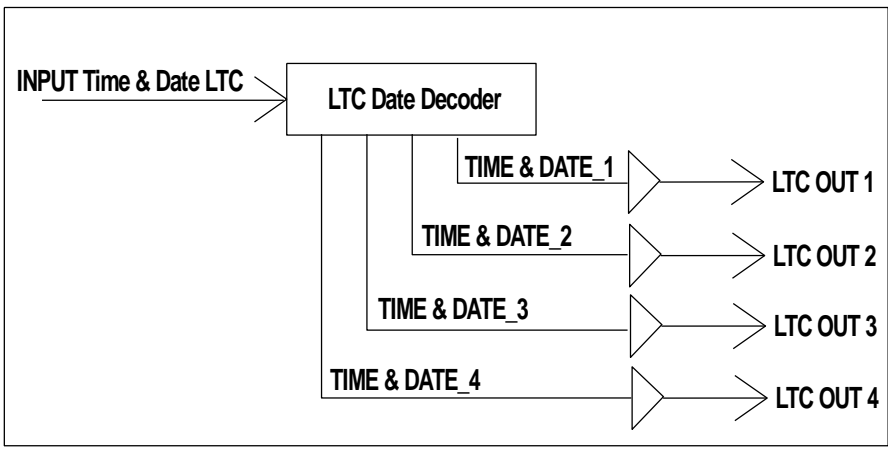


## 4 Typical Applications

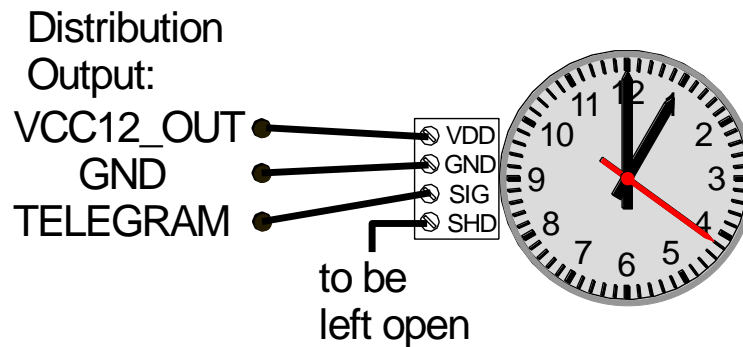
### 4.1 LTC(MTD): Timer or Time Zone Decoder



### 4.2 Real-Time LTC: Format Conversion of Date



## 4.3 Connecting 3-Wire or 4-Wire Interface Analogue Clocks



Every slave clock requires  $\leq 11$  mA at  $\geq 6$  V. To calculate the maximum cable length the output voltage, cross section, specific resistance and number of clocks have to be involved. For radial arrangement of copper cables with a cross section of  $0.22 \text{ mm}^2$  and an output voltage of 12 V, the following cable lengths are possible for each output stage:

| No. of clocks | 1    | 2    | 5   | 10  | 20  | 30  |
|---------------|------|------|-----|-----|-----|-----|
| Length (m)    | 3500 | 1750 | 700 | 350 | 175 | 117 |

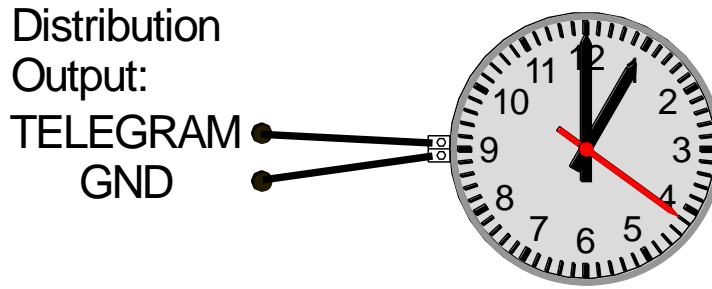
The maximum count of clocks is limited by a 500 mA fuse to 45 clocks each output stage. A continuous current of up to 330 mA can be applied over the whole specified operating temperature range. At an ambient temperature of e.g.  $22^\circ\text{C}$  the output switches to a high-resistance state after a few seconds if a current of 1000 mA is applied.

The 3-wire or 4-wire interface requires TELEGRAM output with **positive-going** pulses.

Select **DCF** at "Pulse – Protocol".



## 4.4 Connecting 2-Wire Interface Analogue Clocks

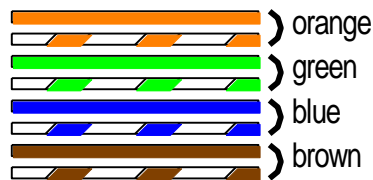


The following specifications are not applicable to SC Series clocks! Please read next chapter.

A maximum of 12 clocks can be connected to each output stage to guarantee a faultless operation over the whole specified temperature range. The following table shows standard values of maximum cable length calculated for a typical copper material:

| Cross section [mm <sup>2</sup> ] | 0.141                  | 0.205                       | 0.324                       | 0.519                       |
|----------------------------------|------------------------|-----------------------------|-----------------------------|-----------------------------|
|                                  | Example:<br>AWG26-7/34 | Example:<br>AWG24 solid bar | Example:<br>AWG22 solid bar | Example:<br>AWG20 solid bar |
| Length [m] 12 clocks             | 275                    | 400                         | 630                         | 830                         |
| Length [m] 10 clocks             | 350                    | 510                         | 800                         | 1060                        |
| Length [m] 8 clocks              | 460                    | 670                         | 1070                        | 1410                        |
| Length [m] 6 clocks              | 650                    | 950                         | 1500                        | 1980                        |

CAT (network) cables contain four pairs of wires. The wires of a pair are twisted together. The wires could conform to AWG24 or AWG26. It is possible to enlarge the cross section or to reduce the number of clocks per line by using several pairs of the cable. A pair can be identified by the colour: Solid colour wire + white and colour striped wire.

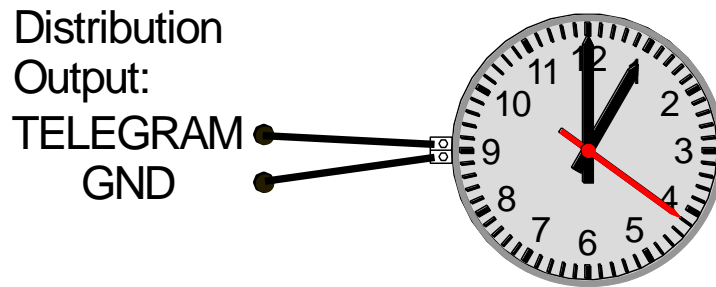


The 2-wire interface requires TELEGRAM output with **negative-going** pulses:

Select **DCF inverted** at "Pulse – Protocol".



## 4.5 Connecting the 2-Wire Interface to SC306T

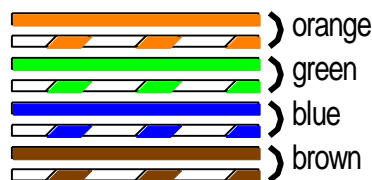


Each output stage of VL is capable of driving **two** studio clocks. The VL module must receive power from a **24 VDC** power supply.

It is recommended not to exceed the following cable lengths dependent on the number of studio clocks (1 or 2) connected:

| Cross section [mm <sup>2</sup> ] | type of wire      | length [m] |          |
|----------------------------------|-------------------|------------|----------|
|                                  |                   | 1 Clock    | 2 Clocks |
| 0.205                            | AWG24 solid bar   | 165        | 45       |
| 0.280                            | J-Y(ST)Y ..x2x0.6 | 225        | 60       |
| 0.324                            | AWG22 solid bar   | 260        | 70       |
| 0.500                            | J-Y(ST)Y ..x2x0.8 | 410        | 100      |
| 0.519                            | AWG20 solid bar   | 430        | 110      |

Note: Network CAT5 cables use AWG24 or AWG26 wires, please check. It is not recommended to use conductors with cross sections less than 0.2 mm<sup>2</sup> (AWG24/1). AWG26-7/34 wires have a cross section of 0.141 mm<sup>2</sup>. CAT cables contain four pairs of wires. The wires of a pair are twisted together. It is possible to enlarge the cross section or to reduce the number of clocks per line by using several pairs of the cable. A pair can be identified by the colour: Solid colour wire + white and colour striped wire.



The 2-wire interface requires TELEGRAM output with **negative-going** pulses:

Select **DCF inverted** at "Pulse – Protocol".



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