plura®

TIMING SOLUTIONS

TRC

Timer Request Protocol to LTC Convertor

Functional Description and Specifications
Version: 1.2
January 11, 2024

CONTENTS

A1   Revision History

No.	Date	Subject
0.n		Preliminary documents, changes without notice.
1.0	February 24, 2021	First release.
1.1	May 23, 2023	Minor changes.
1.2	January 9, 2024	Updated download links and update instructions.

Due to constant product development the features of **TRC** are subject to change. The current functional description always refers to the current firmware and the current configuration tool.

You can download the latest version of the standard firmware from

https://plurainc.com/products/trc/.

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   Certifications & Compliances

CE-Declaration TRC:

We,

Plura Europe GmbH
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herewith declare under our sole responsibility that the

TRC

meets the intent of the following directives, standards and specifications:

    2004/108/EC   EMC Directive

    applying the following standards:
    EN 55022:2006   Emission
    EN 55024:1998 + A1:2001 + A2:2003   Immunity

A3   Warranty

Plura warrants that their products will be free from defects in materials and workmanship for a period of two years from the date of shipment. If this product proves defective during the warranty period, Plura, at its option, will repair or replace the defective product without charge, provided this product are returned to Plura freight prepaid.

In order to obtain service under this warranty, Customer must notify Plura of the defect before expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to Plura, please notice the Shipping Information given below.

This warranty shall not apply to any defect, failure or damage caused by abuse, misuse, improper use, negligence, accident, modification, alteration, or improper or inadequate maintenance and care.

This warranty is given by Plura with respect to this product in lieu of any other warranties, express or implied. Plura and its vendors disclaim any implied warranties of merchantability or fitness for a particular purpose. Plura's responsibility to repair or replace defective products is the sole and exclusive remedy provided to the customer for breach of this warranty. Plura and its vendors will not be liable for any indirect, special, incidental, or consequential damages irrespective of whether Plura or the vendor has advance notice of the possibility of such damages.

A4   Unpacking/Shipping/Repackaging Information

This product has been carefully inspected, tested and calibrated before shipment to ensure years of stable and trouble-free service.

The shipping carton and pads provide protection for the product during transit. Retain the shipping cartons in case subsequent shipment becomes necessary.

Carefully unpack the product from its transit material and carefully check the product for signs of damage. In the event that the product has been damaged during transit, contact the carrier and your Plura dealer.

Please confirm that all items listed on the packing list have been received. Check the items against your original order to ensure that you have received the correct parts. If any item is missing, please contact your Plura dealer.

Ensure that all packaging material is removed from the product and its associated components before installing the unit.

Products returned to Plura for servicing or repair should have a tag attached showing:

- Name and complete address of the owner and the name of the person that can be contacted.

- Unit's serial number and a description of the service required, or failure detected.

Products returned should be shipped prepaid in the original packaging material if possible. If the original packaging is not available or is unfit for use, supply an adequate packaging which should meet the following criteria:

- Packaging must be able to withstand the product weight.

- Product must be held rigid within the packaging.

- Allow at least one inch of space between the product and the container.

- The corners of the product must be protected.

- Seal the carton with shipping tape or an industrial stapler.

If the product is still within the warranty period, the product will be returned by prepaid

1 Description

1.1 Introduction

TRC serves as an LTC generator with two output stages. The data content within the LTC time code is controlled by Plura's Timer Request Protocol, but it can also be fed from an NTP server or an MTDoE master device. Both LTC output signals are phase locked to UTC time which is available as well while being controlled by Timer Request Protocol but also in NTP mode as well as in MTDoE mode. Time addresses as well as user data (binary groups) of the LTC can be independently configured and generated.

These are the key features of **TRC**:

- PoE power supply.

- Connectors: 1 x RJ45 for Ethernet/PoE, 2 x RJ45 for LTC outputs.

- Set-up and firmware update possible via the "UD SC Config" program.

- Set-up and status display possible via the integrated Ethernet server.

- All settings will be stored at a non-volatile memory, so the latest set-up will not get lost if TRC was powered off.

- Frame rate of LTC outputs selectable: 24/25/30/29.97 frames per second.

- LTC signal level adjustable for each output separately.

- Source = TREQ Server:
    - Time addresses of LTC can be local real-time or a time of any MTD counter.
    - A date can be transported in the binary groups (user data) of the LTC.

- Source = NTP:
    - One "Primary" and one "Secondary" NTP Server can be addressed.
    - Various date formats can be transported in the binary groups (user data) of the LTC.
    - Based on UTC received from the NTP Server, TRC can output a time & date LTC of any time zone, with or without Daylight Saving Time switching.

- Source = MTD Client:
    - Selectable MTDoE group.
    - Time addresses of LTC can be local real-time or a time of any MTD counter.
    - A date can be transported in the binary groups (user data) of the LTC.
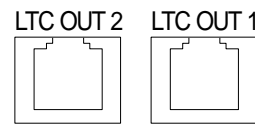
1.2   Connections and Specifications

STAT   ACT

10/100Base-T PoE
RJ45 jack

1: Tx+ / $V_{PoE}+$
2: Tx–   / $V_{PoE}+$
3: Rx+ / $V_{PoE}-$
4: $V_{PoE}+$
5: $V_{PoE}+$
6: Rx–   / $V_{PoE}-$
7: $V_{PoE}-$
8: $V_{PoE}-$
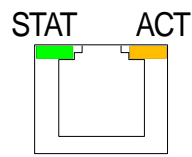
Green LED *STAT* indicates status.

Yellow LED *ACT* indicates Ethernet activity.

LTC OUT 2   LTC OUT 1

2 x RJ45 jack

Pin assignment of both outputs and adaption to XLR3 connector:

Signal	RJ45	XLR3
GND	4	1
LTC OUT +	3	2
LTC OUT –	6	3

|	
Operating voltage	According to PoE specification (48 VDC nominal)
Power consumption	≤ 2 W
Weight	0.2 kg
Dimensions	W x H x D: 100 x 26 x 56 mm; 3.94 x 1.02 x 2.20 inches
Environmental characteristics, operating	Temperature: 5 °C to 40 °C Relative humidity: 30 % to 85 %, non-condensing
Environmental characteristics, non-operating	Temperature: -10 °C to +60 °C Relative humidity: 5 % to 95 %, non-condensing
Ethernet connector	RJ45 jack 10/100 BASE-T
Ethernet	10/100Base-T
LTC output	Balanced LTC (Linear Time Code) outputs. Format: according to SMPTE 12M-1-2008 Output impedance: $< 50\,\Omega$ Connecting and signal levels (adjustable): balanced use unbalanced to XLR3F to Cinch/RCA/BNC GND LTC OUT + LTC OUT - GND LTC OUT + LTC OUT - Minimum: –16.1 dBu/0.3 V_{pp} –22.2 dBu/0.17 V_{pp} Maximum: +8.5 dBu/5.8 V_{pp} +2.5 dBu/2.9 V_{pp}

1.3   Power Supply

TRC receives power via "Power over Ethernet" (PoE). Power over Ethernet or PoE technology describes a system to pass electrical power, along with data, on Ethernet cabling. Just connect **TRC** to a **PoE** port of a switch.

PoE Switch   **TRC**

PoE

10/100Base-T PoE
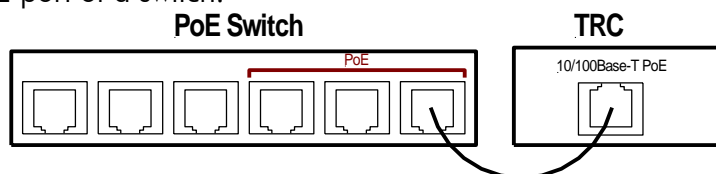
If no **PoE** port is available, use the **PI** external PoE injector. You can order this part with order number 14085015.

Non-PoE Switch   **TRC**

10/100Base-T PoE

Power-over-Ethernet Injector

External Power Supply:
Option PI

AC Power
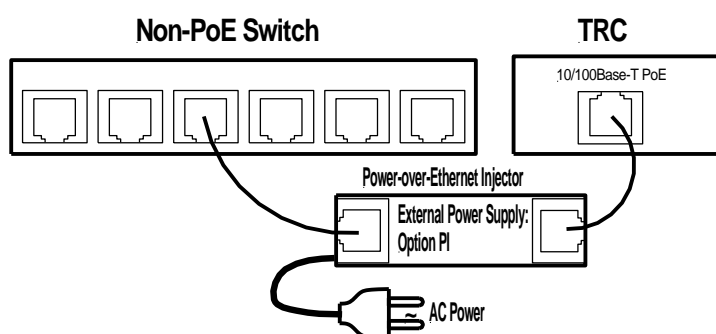
1.4   Status Indication by LED

The green LED *STAT* indicates the operating status of the unit.

Event	Status	LED
Power just turned on	No IP address assigned for the unit, DHCP is still running. No LTC output.	**Flickering**
First NTP query	First NTP query after power has turned on or after changing the set-up regarding NTP server. No LTC output.	**Off**, lights up shortly once per second
Synchronization	NTP query has been successful, but synchronization still is running. No LTC output.	**On**, turns off shortly once per second
Synchronized	Normal operation. As long as the LTC output is switch on, LTC will be generated – even if synchronization will be lost.	**On**
Faults		
DHCP successful, but no communication	"Source = MTD Client": No MTD master found yet. "Source = TREQ Server or NTP": Invalid NTP server address (e.g. 0.0.0.0). No LTC output.	**Flashing**: 1 s on – 1 s off
NTP server not available	No return from NTP server at all. No LTC output.	**Off**, turns off shortly twice per second
NTP server lost	"Source = NTP": Timeout, communication between TRC and NTP server is disrupted. As long as the LTC output is switch on, LTC will be generated.	**On**, turns off shortly twice per second
MTD master lost	"Source = MTD Client": Timeout, communication between TRC and MTD master is disrupted. As long as the LTC output is switch on, LTC will be generated.	**On**, turns off shortly twice per second

1.5 Mounting

There are two threaded holes (M3) at the bottom of the unit.

Maximum screw-in depth: 15 mm/0.59 inches.
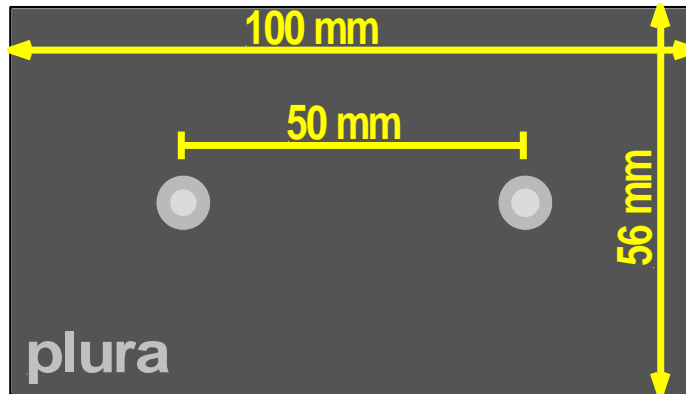
Drawing not to scale!

⚠ PREVENT OVERHEATING

To prevent product overheating, position the unit only where sufficient air circulation can be maintained. Good air circulation is essential to prevent internal heat build-up, do not block any ventilation openings. Do not expose the unit to direct sun light or any other strong lights. Keep the unit away from heat sources.

⚠ PROVIDE PROPER ENVIRONMENT

Dust, humidity, shocks and strong electromagnetic fields must be avoided. Do not expose this unit to dripping or splashing water. Ensure that no objects filled with liquid are placed on the unit.

2   Firmware Update

Firmware updates require a computer with the **UD SC Config** program and an Ethernet connection. Computer and **TRC** have to be connected to the same network. When using a firewall, either disable it or ensure that the computer can connect to the unit on UDP port 8051 for both incoming and outgoing traffic.

Important: Please make sure to always use the latest version of the program. You can download it from:

<div align="center">

https://plurainc.com/products/trc/.

</div>

Please have the new firmware (**.tcf** file) stored on your computer. The latest firmware is available at the address above.

Execute **UD SC Config** on your computer. The program gives a list of all MTD devices found in the network. **TRC** should be on this list. Access via Ethernet can be protected by a password (please refer to chapter *"System": View and Change System Parameters*).
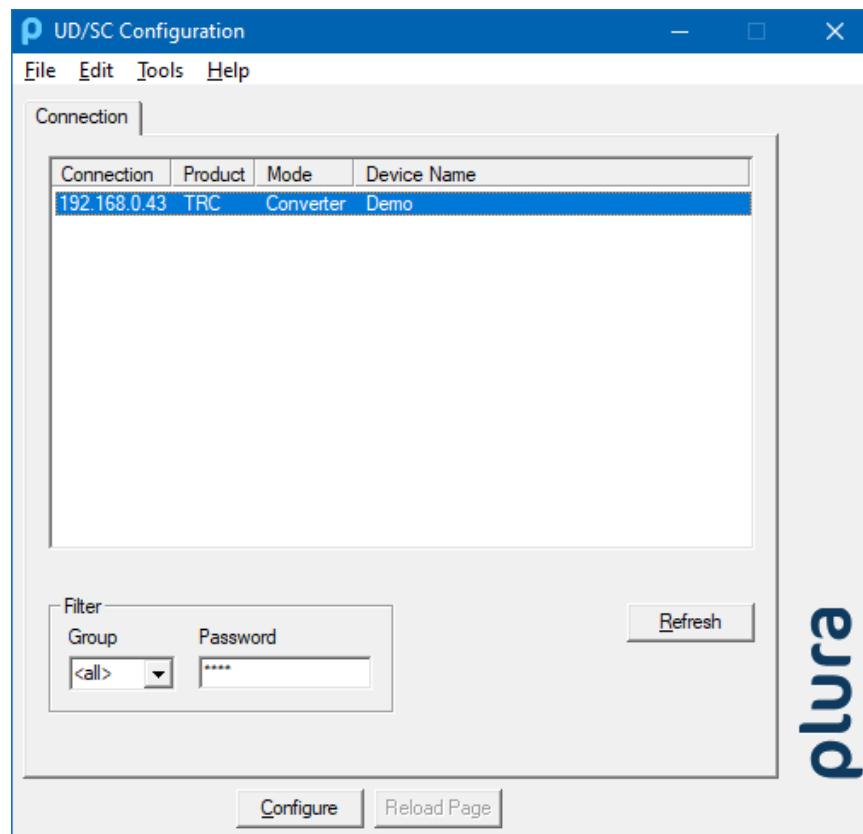
Select the **TRC** line, open the **File** menu, choose **Flash Update...**, and open the **.tcf** file.

During the flash update the operation of the device stops!

3   Software Tools for TRC

3.1   The UD/SC Configuration Program

Via the **UD SC Config** program, you can locate and setup TRC units in your network. It runs on a computer (32/64-bit Windows operating system). You can download the latest version of the program from:

https://plurainc.com/products/trc/.

TRC set-up is done via Ethernet; the computer must be connected to the same network. Access via Ethernet can be protected by a password (please refer to chapter *"System": View and Change System Parameters*).

Firmware update is performed by this program as well. Please refer to chapter "Firmware Update".

After program start a list is given of all MTD devices and their IP addresses found in your local network:
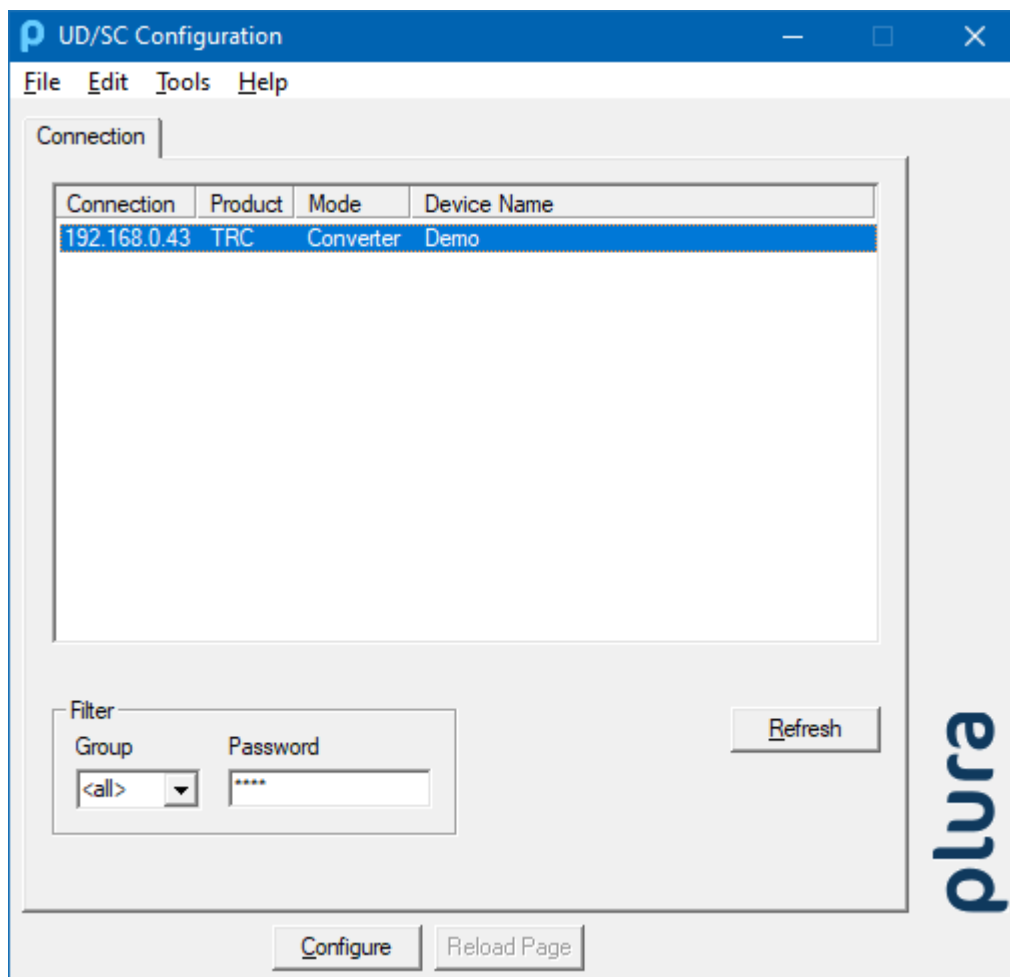
Select the **TRC** line and click button "Configure", or double click on the line. Additional tabs will be shown. On these tabs you can check or change the set-up as described in chapter "Configuration".

3.2   The Integrated Ethernet Server

Start an Internet Browser and type in the IP address of TRC. If you do not know the IP address, start the **UD SC Config** program (refer to chapter "The UD/SC Configuration Program").

The menu at the left border offers three links: **System** and **NTP Status** – where you can have status information; and **Configuration** – which enables to set-up the TRC module (please refer to chapter "Configuration").

System indicates the installed firmware and the current network parameters.

**NTP Status** indicates the most relevant information regarding the **NTP Client** functionality.

3.3   Configuration

3.3.1   General

You can do a set-up of TRC via the **UD SC Config** PC program or via the integrated Ethernet server.

Set-up via **UD SC Config**:

> After program start the TRC module should appear in the list. Select the **TRC** line and click button [Configure], or double click on the line – this opens the configuration. Additional tabs will be shown which will be described in the following chapters.
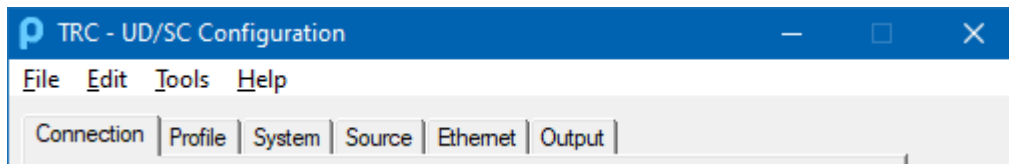
Set-up via integrated Ethernet server:

> Start an Internet Browser and type in the IP address of the TRC module. Click **Configuration** in the menu at the left border – this opens the configuration. A new menu appears which shows a list of all configuration pages which are currently available. With a click on one of these entries of the menu a configuration page will be opened where you can see and change parameters. Each configuration page will be described in the following chapters.

3.3.2 "Profile": Store and Load a Complete Set-Up

Configuration options (example shows a screen shot of the Ethernet server):

This feature enables to easily change the complete set-up of the unit during normal operation. During installation, the current set-up can be stored as a "profile". You can enter a name in the "name" entry before storing. Now choose a different set-up and store this as a different profile. Fife profiles are available.

Five different set-ups can be stored into the non-volatile memory of the unit.
Click **Store**:

Profile: Select 1 – 5.

Info   Operator: You may enter a text.
Comment: You may enter a text.

Click **OK** to store the current set-up.

Any set-up stored as a profile can replace the current set-up.
Click **Load**:

Profile: Select "Factory Settings" or 1 – 5. "Factory Settings" installs the default set-up.

Click **OK** to replace the current set-up by the selected profile. If no valid set-up has been stored, an error message is given.

3.3.3   "System": View and Change System Parameters

Configuration options (example shows a screen shot of the Ethernet server):

Unit

Name	Give the device a significant name. This name appears wherever TRC devices can be found.
	Enter a text (10 characters) in the *Name* field. Complete with *Enter* or *Tab* key.
Reboot	Warm boot of the unit.

Security

It is provided to protect the unit against non permission or unintentional access via Ethernet.

With a click on the **Change** button the following entry opens:

Enter the password twice and press the **OK** button.

Clear an existing password by checking **No Password**.

Password forgotten? → Please read chapter *"Passwords"* of *"The MTD System"* manual.

Info

Indicates some device status, e.g. the version of the installed firmware.

3.3.4   "Source": Select the Signal Source

Configuration options (example shows a screen shot of the Ethernet server):

TREQ Server TRC is able to convert the Timer Request Protocol to LTC. Six independent programmable timers can be controlled, two of them can be converted to LTC. Each timer can show a stop timer, a remaining time, a time difference, a time of a time zone etc.

For a detailed description of the Timer Request Protocol please read the corresponding manual.

MTD Client TRC converts data of an MTDoE system to LTC. These data include six independent programmable timers, real-time, date, and a time of a time code. Each timer can show a stop timer, a remaining time, a time difference, a time of a time zone etc.

For a detailed description of the MTDoE system please read the manual *The MTD System – Installation and Operation Manual*.

NTP   TRC transfers a time & date into LTC. The reference time, received from an NTP server, can get a programmable offset. It is possible to enable a Daylight-Saving Time handling.

3.3.5 "Ethernet": Set-Up of Network Parameters

Configuration options (example shows a screen shot of the **UD SC Config** PC program):

"Source = TREQ Server"   "Source = MTD Client"   "*Source = NTP*"

Current Settings

This box indicates the current network parameters of the device.

Only available with the **UD SC Config** PC program:

A click on **Change...** enables to change parameters:

Use DHCP   If checked, the device will automatically request its IP parameters (IP address, subnet mask, and gateway) from a DHCP server. In this case the "IP Address", "Subnet Mask", and "Gateway" boxes have no relevance.

Please let the device restart (power off – on) if you select this mode.

TREQ Server - if *"Source = TREQ Server"* has been selected

Enter the IP addresses which the NTP client of the device uses to request time & date information of an NTP server.
Primary Server IP Address   Address of the primary (1st) NTP server.
Secondary Server IP Address   Address of a secondary (back-up) NTP Server.
Group   Indicates the MTDoE group number. Likewise, you can change this number here.
Click **Reload Page** at the bottom of the tab if the „Current Settings" box does not show the new parameters.

MTD Client - if *"Source = MTD Client"* has been selected

Automatic MTD Master IP Address   If checked, the device will automatically find the MTDoE central unit responsible for the group number below. In a redundant system (two MTDoE central units), an automatic changeover can take place in case one central unit fails.
MTD Master IP Address   If "Automatic Host IP Address" is not checked, the IP address of the MTDoE central unit has to be entered manually.
Group   Indicates the MTDoE group number. Likewise, you can change this number here.
Click **Reload Page** at the bottom of the tab if the „Current Settings" box does not show the new parameters.

NTP Client - if *"Source = NTP"* has been selected

Enter the IP addresses which the NTP client of the device uses to request time & date information of an NTP server.
Primary Server IP Address   Address of the primary (1st) NTP server.
Secondary Server IP Address   Address of a secondary (back-up) NTP Server.
Click **Reload Page** at the bottom of the tab if the „Current Settings" box does not show a changed address.

Delay Asymmetry - if *"Source = NTP"* has been selected

Enter an offset to the NTP server. That can be used to settle delay asymmetries of the IP connection.
Delay time by   Enter a delay in milliseconds between -999 and 999. TRC's clock will delayed by this time span.

3.3.6 "Real-Time": NTP Real-Time Parameters

"*Source = NTP*" only.

Configuration options (example shows a screen shot of the Ethernet server):

TRC receives time & date from an NTP server according to the set-up at the "Ethernet" tab. Time and date refers to UTC (Universal Time Coordinated = world time reference without a Daylight-Saving Time [DST]). Having the UTC as a time base, any local time zone can be calculated and displayed.

Enable Real-Time   Enables or disables the time zone handling.
- If checked, offsets will be calculated, and a DST switching can be done automatically.
- If not checked, the generated time corresponds to the reference time without offset.

Local Time Zone 1 / 2   Local time zone will be defined with respect to UTC. TRC has two independent programmable LTC outputs; therefore two time zones can be programmed independently.

> **Offset from UTC**   Sign and hours/minutes offset for standard time (wintertime).

If the time zone has a DST period, the following parameters should be programmed:

> **Automatically set Daylight Saving Time**   Check, if reference input has a DST period.
>
> **DST Bias**   Enter the DST correction value. Most of the cases the correction value will be (+) one hour.
>
> **DST Start**   Using these inputs (e.g. last Sunday of March at 2 o'clock) the device calculates the start of DST for the current year.
>
> **DST End**   Using these inputs (e.g. last Sunday of October at 3 o'clock) the device calculates the end of DST for the current year.

3.3.7   "Output": Set-Up of LTC Outputs

Configuration options (example shows a screen shot of the Ethernet server):

Frame Rate   Select the frame rate of both LTC outputs:

> *Auto*
> *24*
> *25*
> *30*
> *30 df / 29.97*

Please note: An LTC counting for a 29.97 Hz system (drop-frame mode) has severe difficulties in a real-time application, because an odd number of frames per second will be generated.

"Auto":   If *"Source = TREQ Server or NTP"*: frame rate equal to *25*.

If *"Source = MTD Client"*: frame rate set from MTDoE master device.

LTC 1 / LTC 2

Data content and level of both LTC outputs can be set individually. The mode of synchronization is fixed for both outputs, so that each time code word starts at exactly the same time.

Time   This entry determines what will be the data content of the time addresses of the time code. Any time code reader will display these data in a "time" mode.

"Source = TREQ Server or MTD Client"

Real-Time   Local real-time.

Timer A (B, C, D, E, F)   Time of counter A (B, C, D, E, F).

Main 1 (2, 3)   Time of MTD "main time" 1 (2, 3).

Time Code   Time of a time code of the MTDoE system.

"Source = NTP"

UTC   Reference time without any offset or DST correction.

Time Zone 1   Time of time zone 1 – refer to "Real-Time" tab.

Time Zone 2   Time of time zone 2 – refer to "Real-Time" tab.

User   This entry determines what will be the data content of the user data (binary groups) of the time code. Any time code reader will display these data in a "user" mode.

The user data consists of eight four-bit groups which will be denoted as BG1 to BG8, and they are paired in the following way:

          BG8/7 = "Hours",
          BG6/5 = "Minutes",
          BG4/3 = "Seconds",
          BG2/1 = "Frames".

Date formats: A "**U**" in a date format receives that value of the binary group which has been entered at the "Set User" entry for this position. **DD** denotes the day, **MM** the month, **YY** the year – all BCD coded.

Set   Fixed values as programmed at the "Set User" entry.

--- Date ---   Various date formats.
                "Source = TREQ Server or MTD Client": Date refers to local time.
                "Source = NTP": Date refers to the time zone selected at *"Time"*.

Survey of various BCD coded formats:

	BG8/7	BG6/5	BG4/3	BG2/1
UU.DD.MM.YY	U U	DD	M M	YY
DD.MM.YY.YY	DD	M M	YY	YY
YY.MM.DD.UU	YY	M M	DD	U U
UU.YY.MM.DD	U U	YY	M M	DD
UY.YM.MD.DU	U Y	Y M	M D	D U
DD.MM.YY.UU	DD	M M	YY	U U
MM.DD.YY.UU	M M	DD	YY	U U
UU.MM.DD.YY	U U	M M	DD	YY

BBC   Date coded according to the "EBU Technical Information I29-1995" (so-called BBC format). The date is BCD coded and assigned to the binary groups as follows:

BG1	Reserved	All bits = 0
BG2	Units of the day	4 bits, LSB = bit 12
BG3	Units of the month	4 bits, LSB = bit 20
BG4	Tens of the day	2 bits, LSB = bit 28
	Tens of the month	1 bit = bit 30, bit 31 = 0
BG5	Reserved	All bits = 0
BG6	Units of the year	4 bits, LSB = bit 44
BG7	Reserved	All bits = 0
BG8	Tens of the year	4 bits, LSB = bit 60

309M: YYMMDD   Date and time zone information according to the SMPTE 309M-1999 "YYMMDD" format.

309M: MJD   Date and time zone information according to the SMPTE 309M-1999 "MJD" format.

--- MTD ---   "*Source = TREQ Server or MTD Client*": Counter values decoded out of the MTD data:

Timer A (B, C, D, E, F)   Time of counter A (B, C, D, E, F).

Real-Time   Local real-time.

Main 1 (2, 3)   Time of MTD "main time" 1 (2, 3).

Time Code   Time of a time code of the MTDoE system.

LTC: MTD   All MTD timers. MTD displays can extract any MTD timer from it if used in "LTC: MTD" source mode.

Set User   Manual entry of user data. Enter 8 characters (0 – 9, A – F). Complete with *Enter* or *Tab* key.

Gain   Select the output level from the drop-down list. You can mute an output by selecting "off".

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 + and LTC OUT –. 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 + or LTC OUT – signal.

Correspondence between balanced use and unbalanced use:

Use of balanced signals	Use of unbalanced signals
Maximum: +8.5 dBu / 5.8 V_{PP}	+2.5 dBu / 2.9 V_{PP}
+6.2 dBu / 4.5 V_{PP}	0.2 dBu / 2.2 V_{PP}
+2.0 dBu / 2.8 V_{PP}	–4.0 dBu / 1.4 V_{PP}
–6.5 dBu / 1.0 V_{PP}	–12.5 dBu / 0.5 V_{PP}
Minimum: –16.1 dBu / 0.3 V_{PP}	–22.1 dBu / 0.17 V_{PP}

Digits   *"6 Digits"* or *"8 Digits"* can be selected. This set-up is relevant only if one of the MTD timers *"Timer A – F"* or *"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.

For example: MTD timer counting down from 1s to 0s

MTD Timer	TRC-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	TRC-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 -   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.

Example: Standing LTC time = 01:02:03:04

TRC-LTC with "Still –"	Device with compensation	Device without compensation
01:02:03:03	01:02:03:03	01:02:03:04

TRC-LTC without "Still –"	Device with compensation	Device without compensation
01:02:03:04	01:02:03:04	01:02:03:05

PC Bit   If checked: The polarity of the synchronization word of the LTC output will be stabilised. The polarity correction bit is put in a state, so that every 80-bit word contains an even number of logical zeros. The polarity correction bit is bit no. 27 in the 525/60 system, no. 59 in the 625/50 system. Checking this checkbox is helpful if you do some LTC measurements with an oscilloscope.

During normal operation mode it can be let unchecked.

Down Reverse   The LTC word can be generated with a "forward" or "reverse" code. Independent from this, the time addresses of the LTC can count upwards, downwards, or can stop counting. This especially will become true if TRC generates the time of a stop timer (e.g. timer A of the MTD system).

If **Down Reverse** is not checked, the LTC signal always has the "forward" code.

Some LTC readers may run into problems if the code will not match the direction of counting. Check **Down Reverse** to overcome this problem.
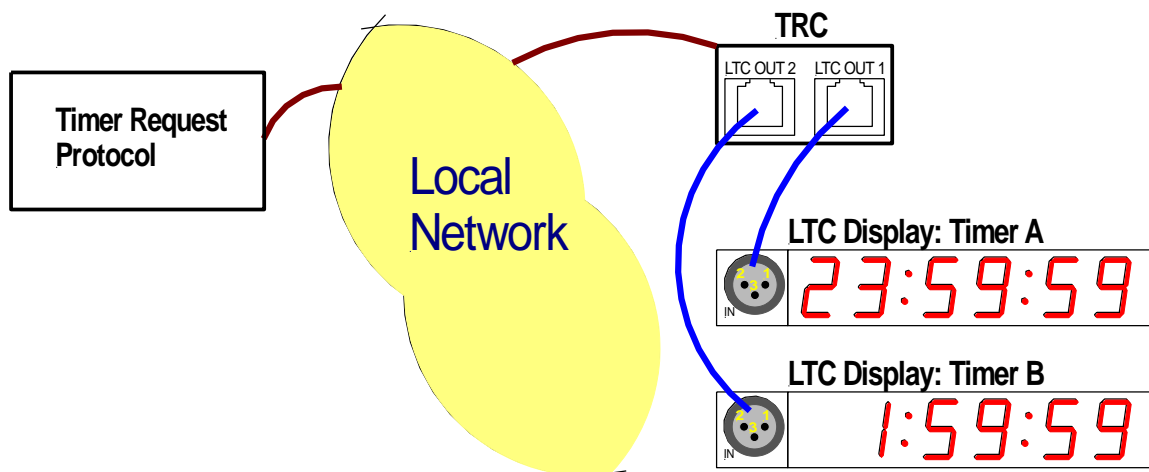
During normal operation mode it can be let checked.

4 Applications

4.1 Timer Request Protocol and LTC Displays

TRC offers an easy opportunity to display UP or DOWN counters controlled by Plura's Timer Request Protocol at Non-Plura displays. These displays must be able to read SMPTE/EBU time code (LTC).
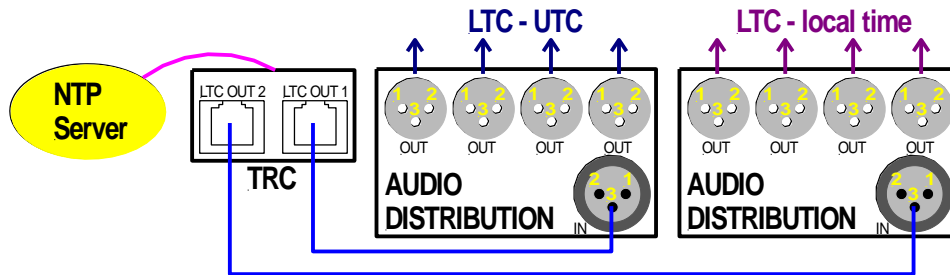

TRC set-up: "**Source**": Select TREQ Server.

"**Ethernet**": Enter the IP address of your NTP server at the *NTP Client* entry and select an MTD group (normally = 1).

"**Output**": *LTC 1 – Time*: e.g. "Timer A"; *LTC 1 – User*: e.g. "Set".
LTC 2 – Time: e.g. "Timer B"; *LTC 1 – User*: e.g. "Set".

Digits = "*6 Digits*", if the connected device (display) does not indicated frames.
Digits = "*8 Digits*", if the connected device (display) indicates frames.

4.2   Generate *LTC - UTC* and *LTC - Local Time*

TRC offers an easy and cost-effective opportunity to provide one LTC line with UTC reference time and a second LTC line with local time.

TRC set-up:	"**Source**":	Select *NTP*.
	"**Ethernet**":	Enter the IP address of your NTP server at the *NTP Client* entry.
	"**Real-Time**":	Check *Enable Real-Time* and program *Local Time Zone 1*.
	"**Output**":	*LTC 1 – Time* = UTC; *LTC 1 – User* = any date format. *LTC 2 – Time* = Time Zone 1; *LTC 2 – User* = any date format.

Notes: This application basically does not provide LTC outputs which are phase locked to a video sync signal. The LTC outputs are locked to video, if

- the video sync generator (SPG) is frequency and phase locked to a real-time source (e.g. locked by PPS <u>and</u> 10 MHz signals of a GPS receiver),

- *and* the NTP server for TRC uses the same real-time reference as the video sync generator (SPG),

- *and* the video system provides an even number of pictures per second (PAL 625/50, but not NTSC 525/59.94).

- Please remember that an LTC counting for a 29.97 Hz system (drop-frame mode) has severe difficulties in a real-time application.

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