



## ELC

## Ethernet to LTC Convertor



Functional Description and Specifications  
Version: 2.4  
January 11, 2024





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## A1 Revision History

No.	Date	Subject
0.n		Preliminary documents, changes without notice.
1.0	October 16, 2012	First release.
1.1	November 30, 2012	Chapter "Output – Set-Up of LTC Outputs" revised.
1.2	April 02, 2014	Chapter "System: View and Change System Parameters": added note if password is lost.
2.0	July 23, 2014	Completely revised. Set-up can now be done via integrated Ethernet server.
2.1	September 25, 2019	Changed address of Plura Europe GmbH.
2.2	December 7, 2020	Re-formatted in new design. Added Delay Asymmetry for NTP.
2.3	December 5, 2023	Added LTC: MTD user mode. Added Plura logo.
2.4	January 9, 2024	Updated download links and update instructions.

Due to constant product development the features of **ELC** 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/elc/>.

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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Internet: <http://www.plurainc.com>

### A3 Certifications & Compliances

**CE-Declaration ELC:**

We,

Plura Europe GmbH  
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D- 55437 Ockenheim

herewith declare under our sole responsibility that the

**ELC**

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

**ELC** serves as an LTC generator with two output stages. The data content within the LTC time code is either 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 in NTP mode as in MTDoe mode. Time addresses as well as user data (binary groups) of the LTC can be independently configured and generated.


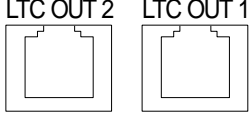
These are the key features of **ELC**:


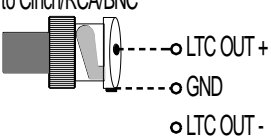
- PoE power supply.
- Connectors: 1 x RJ45 for Ethernet/PoE, 2 x RJ45 for LTC outputs.
- Set-up and firmware update possible via the “UD SC Config” program.
- Set-up and status display possible via the integrated Ethernet server.
- All settings will be stored at a non-volatile memory, so the latest set-up will not get lost if ELC 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 = 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, ELC can output a time & date LTC of any time zone, with or without Daylight Saving Time switching.
- Source = MTD:
  - Selectable MTDoe group.
  - Time addresses of LTC can be a 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

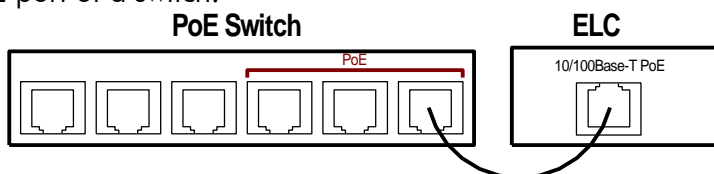
 <p>Green LED <b>STAT</b> indicates status.</p> <p>Yellow LED <b>ACT</b> indicates Ethernet activity.</p>	<p>10/100Base-T PoE</p> <p>RJ45 jack</p> <p>1: Tx+ / V<sub>PoE</sub>+</p> <p>2: Tx- / V<sub>PoE</sub>+</p> <p>3: Rx+ / V<sub>PoE</sub>-</p> <p>4: V<sub>PoE</sub>+</p> <p>5: V<sub>PoE</sub>+</p> <p>6: Rx- / V<sub>PoE</sub>-</p> <p>7: V<sub>PoE</sub>-</p> <p>8: V<sub>PoE</sub>-</p>	 <p>2 x RJ45 jack</p> <p>Pin assignment of both outputs and adaption to XLR3 connector:</p> <table border="1"> <thead> <tr> <th>Signal</th> <th>RJ45</th> <th>XLR3</th> </tr> </thead> <tbody> <tr> <td>GND</td> <td>4</td> <td>1</td> </tr> <tr> <td>LTC OUT +</td> <td>3</td> <td>2</td> </tr> <tr> <td>LTC OUT -</td> <td>6</td> <td>3</td> </tr> </tbody> </table>	Signal	RJ45	XLR3	GND	4	1	LTC OUT +	3	2	LTC OUT -	6	3
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	<p>Temperature: 5 °C to 40 °C</p> <p>Relative humidity: 30 % to 85 %, non-condensing</p>
Environmental characteristics, non-operating	<p>Temperature: -10 °C to +60 °C</p> <p>Relative humidity: 5 % to 95 %, non-condensing</p>
Ethernet connector	RJ45 jack 10/100 BASE-T
Ethernet	10/100Base-T
LTC output	<p>Balanced LTC (Linear Time Code) outputs.</p> <p>Format: according to SMPTE 12M-1-2008</p> <p>Output impedance: &lt; 50 Ω</p> <p>Connecting and signal levels (adjustable):</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><u>balanced use</u></p>  <p>to XLR3F</p> <p>Minimum: -16.1 dBu/0.3 V<sub>pp</sub></p> <p>Maximum: +8.5 dBu/5.8 V<sub>pp</sub></p> </div> <div style="text-align: center;"> <p><u>unbalanced</u></p>  <p>to Cinch/RCA/BNC</p> <p>Minimum: -22.2 dBu/0.17 V<sub>pp</sub></p> <p>Maximum: +2.5 dBu/2.9 V<sub>pp</sub></p> </div> </div>

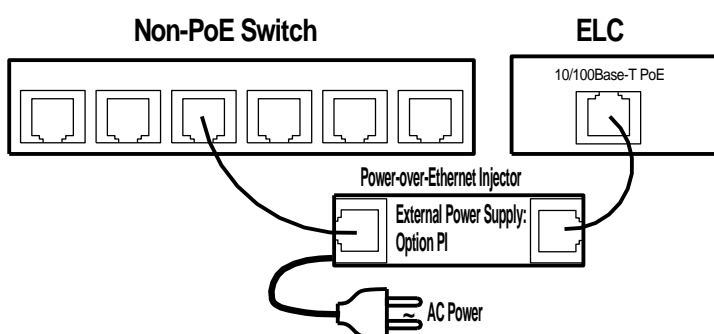


## 1.3 Power Supply

**ELC** 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 **ELC** to a **PoE** port of a switch.



If no **PoE** port is available, use the **PI** external PoE injector. The order code of this part is 14085015.



## 1.4 Status Indication by LED

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

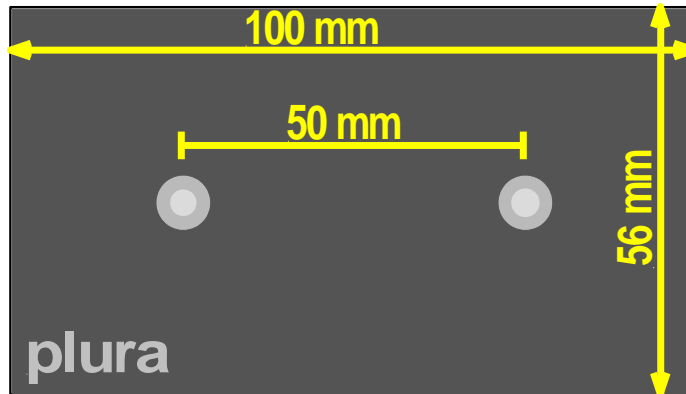
Event	Status	LED
Power just turned on	No IP address assigned for the unit, DHCP is still running. No LTC output.	<b>Flickering</b>
First NTP query	First NTP query after power has turned on or after changing the set-up regarding NTP server. No LTC output.	<b>Off</b> , lights up shortly once per second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

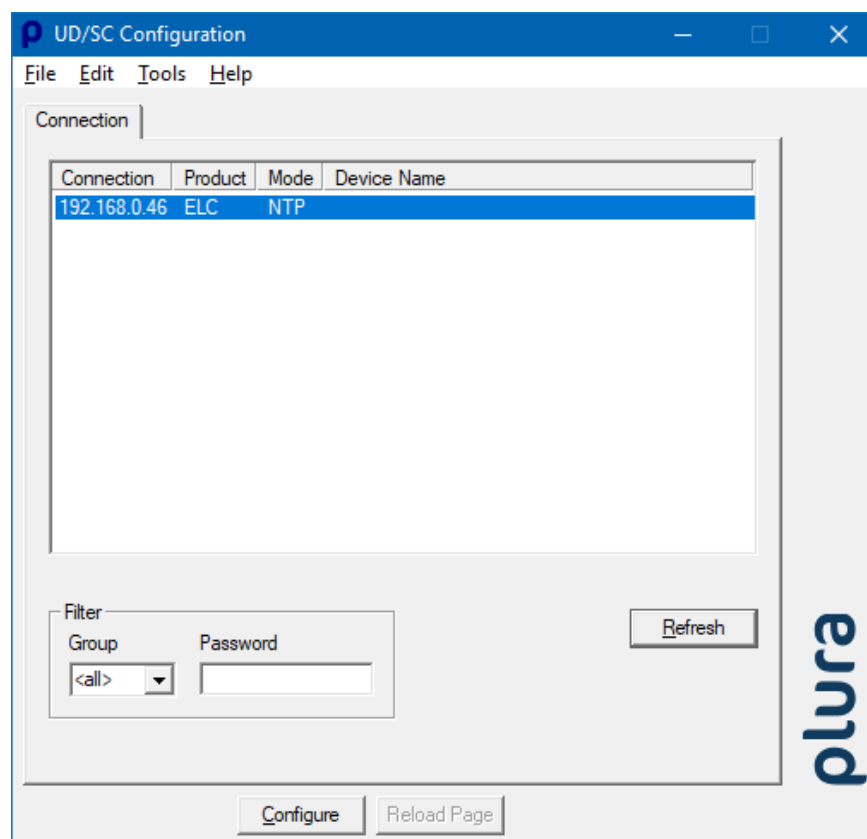
Firmware updates require a (Windows operating system) computer with the **UD SC Config** program and an Ethernet connection. Computer and **ELC** have to be connected to the same network. When using a firewall, either disable it or ensure that the computer can connect to the unit on UDP port 8051 for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

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

<https://plurainc.com/products/elc/>.

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. **ELC** 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 **ELC** 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 ELC

### 3.1 The UD/SC Configuration Program

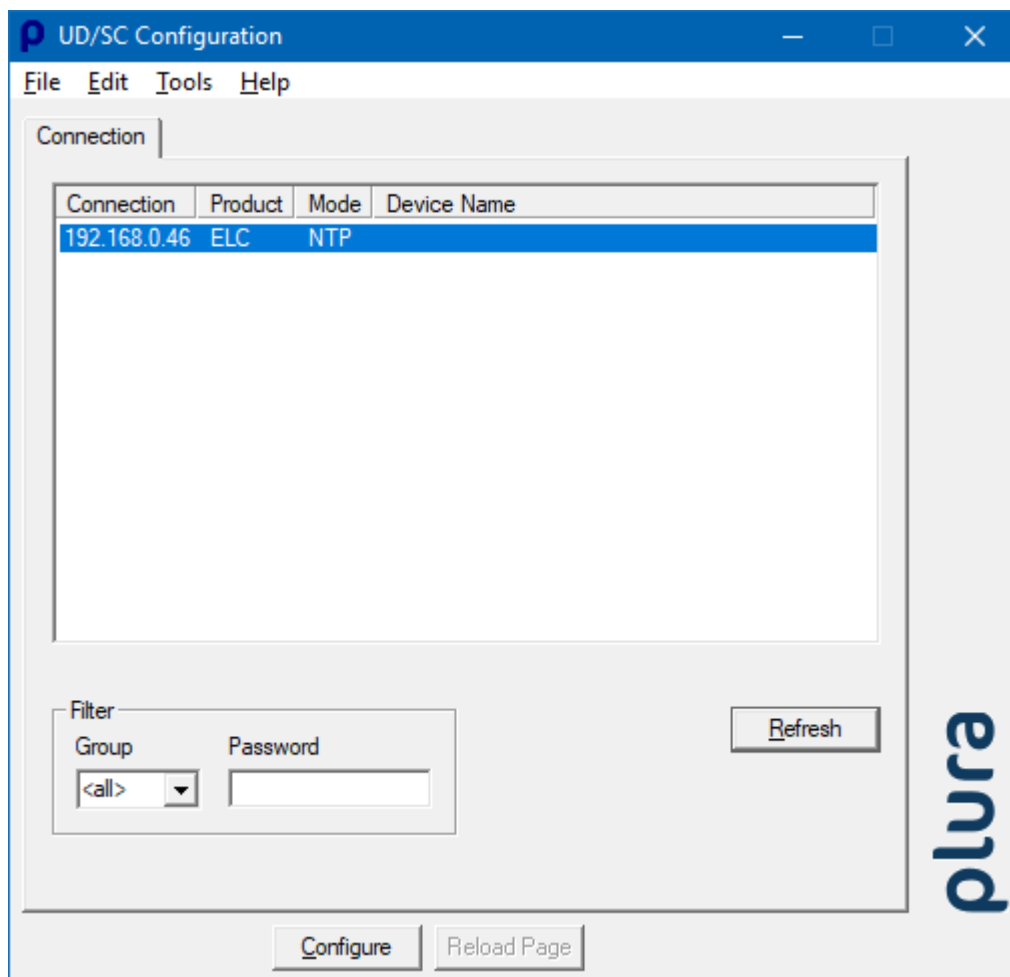
Via the **UD SC Config** program, you can locate and setup ELC units in your network. It runs on a computer (32/64-bit Windows operating systems 2000/XP/2003/Vista/2008/7). You can download the latest version of the program from:

<https://plurainc.com/products/elc/>.

**ELC** 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 **ELC** 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 ELC. 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 ELC module (please refer to chapter “Configuration”).

System NTP Status Configuration	<b>System</b> <b>plura</b>	
	<b>System Information</b>	
	Device Type	ELC
	Device Name	
	Firmware Version	9.24
	Uptime	00:01:43
	<b>Ethernet Configuration</b>	
	Use DHCP	yes
	IP Address	192.168.0.46
	Subnet Mask	255.255.255.0
	Gateway	192.168.0.254
	MAC Address	00-60-35-17-A4-D4
	Host Name	av_17a4d4

**System** indicates the installed firmware and the current network parameters.

System NTP Status Configuration	<b>NTP Status</b> <b>plura</b>	
	<b>General</b>	
	Active Host	Primary
	Last Changeover	N/A
	Last Hard Set	N/A
	Current Date/Time	2019-09-04 14:56:51 UTC
	Offset	0.402 ms
	Poll Interval	12 s
	<b>Primary NTP Host</b>	
	IP Address	192.168.0.94
	Stratum	1
	Reference	GPS
	Lock	yes
	Polls	32
		32 good, 0 bad
	<b>Secondary NTP Host</b>	
	IP Address	0.0.0.0
	Stratum	0
	Reference	
	Lock	no
	Polls	0
		0 good, 0 bad

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




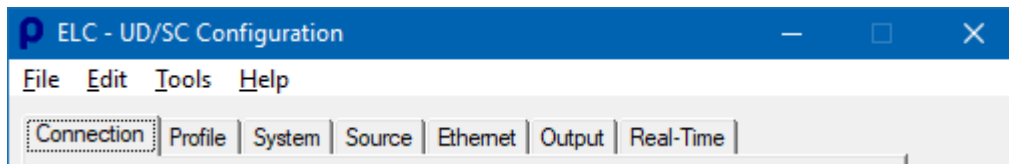
## 3.3 Configuration

### 3.3.1 General

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

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

After program start the ELC module should appear in the list. Select the **ELC** line and click button , 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 ELC 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):

**Profile** System Source Ethernet Output

**Profile**

Name

**Info**

Operator

Date

Comment

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. Five profiles are available.

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

Click **Store**:

**Store Profile**

Profile

**Info**

Operator

Date Wed Jul 23 2014 15:36:30 GMT+0200

Comment

**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**:

**Load Profile**

Profile

**Info**

Operator

Date

Comment

**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):

Profile **System** Source Ethernet Output

Unit	
Name	<input type="text" value="Test_TM"/>
	<input type="button" value="Reboot"/>

Security	
Password is empty	<input type="button" value="Change..."/>

Info	
Device Type	ELC
Firmware Version	4.12.0

#### Unit

<b>Name</b>	Give the device a significant name. This name appears wherever ELC devices can be found. Enter a text (10 characters) in the <i>Name</i> field. Complete with <i>Enter</i> or <i>Tab</i> key.
<b>Reboot</b>	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 Password**

Enter Password:

Re-Enter Password:

☐ No Password

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):



**MTD** **ELC** is able to convert data of an MTD<sub>o</sub>E 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 MTD<sub>o</sub>E system please read the manual *The MTD System – Installation and Operation Manual*.

**NTP** **ELC** 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 = MTD”

The screenshot shows the 'Ethernet' tab in the UD SC Config PC program. The 'Current Settings' section includes: Use DHCP (Yes), IP Address (192.168.0.34), Subnet Mask (255.255.255.0), Gateway (192.168.0.254), MAC Address (00-60-35-17-A4-DF), Host Name (av\_17a4df), and MTD Master IP Address (192.168.0.60). The 'MTD' section includes: Automatic MTD Master IP Address (checked), MTD Master IP Address (0.0.0.0), and Group (1). A 'Change...' button is visible next to the IP Address field.

“Source = NTP”

The screenshot shows the 'Ethernet' tab in the UD SC Config PC program. The 'Current Settings' section includes: Use DHCP (Yes), IP Address (192.168.0.24), Subnet Mask (255.255.255.0), Gateway (192.168.0.254), MAC Address (00-60-35-17-A4-D4), Host Name (av\_17a4d4), Primary NTP Server IP (192.168.0.91), and Secondary NTP Server IP (0.0.0.0). The 'NTP Client' section includes: Primary Server IP Address (192.168.0.91) and Secondary Server IP Address (0.0.0.0). The 'Delay Asymmetry' section includes: Delay time by (0 ms). A 'Change...' button is visible next to the IP Address field.

#### 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:

The screenshot shows the 'Ethernet' configuration dialog box. The 'Interface' section includes: Use DHCP (checked), IP Address (192.168.0.104), Subnet Mask (255.255.255.0), and Gateway (0.0.0.0). There are 'OK' and 'Cancel' buttons at the bottom.

**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.



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

<b>Automatic MTD Master IP Address</b>	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.
<b>MTD Master IP Address</b>	If "Automatic Host IP Address" is not checked, the IP address of the MTDoE central unit has to be entered manually.
<b>Group</b>	Indicates the MTDoE group number. Likewise, you can change this number here.
Click <b>Reload Page</b> 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.	
<b>Primary Server IP Address</b>	Address of the primary (1st) NTP server.
<b>Secondary Server IP Address</b>	Address of a secondary (back-up) NTP Server.
Click <b>Reload Page</b> 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.	
<b>Delay time by</b>	Enter a delay in milliseconds between -999 and 999. ELC's clock will be 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):

**Profile System Source Ethernet Output Real-Time**

Enable Real-Time ☒

**Local Time Zone 1** **Local Time Zone 2**

Offset from UTC + ▾ 1 : 00 CET/CEST: Central European Time ▾

Automatically set Daylight Saving Time ☒

DST Bias 1 : 00

DST Start Last ▾ Sunday ▾ of March ▾ at 2 : 00

DST End Last ▾ Sunday ▾ of October ▾ at 3 : 00

**ELC** 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. ELC 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):

**Profile System Source Ethernet Output**

Output	
Frame Rate	Auto

LTC 1	
Time	Real-Time
User	Set
Set User	00000000
Gain	6.2 dBu 4.5 Vpp
Digits	6 Digits
PC Bit	<input type="checkbox"/>
Still -	<input type="checkbox"/>
Down Reverse	<input checked="" type="checkbox"/>

LTC 2	
Time	Timer A
User	Set
Set User	00000000
Gain	6.2 dBu 4.5 Vpp
Digits	6 Digits
PC Bit	<input type="checkbox"/>
Still -	<input type="checkbox"/>
Down Reverse	<input checked="" type="checkbox"/>

**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 = NTP”: frame rate equal to 25.

If “Source = MTD”: 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 = MTD"

*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 = MTD": 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 = MTD”: 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 MTD<sub>oE</sub> 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	ELC-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	ELC-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 check "Still -", otherwise "Still -" should be checked.

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

ELC-LTC with "Still -"	Device with compensation	Device without compensation
01:02:03:03	01:02:03:03	01:02:03:04
ELC-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 ELC 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.

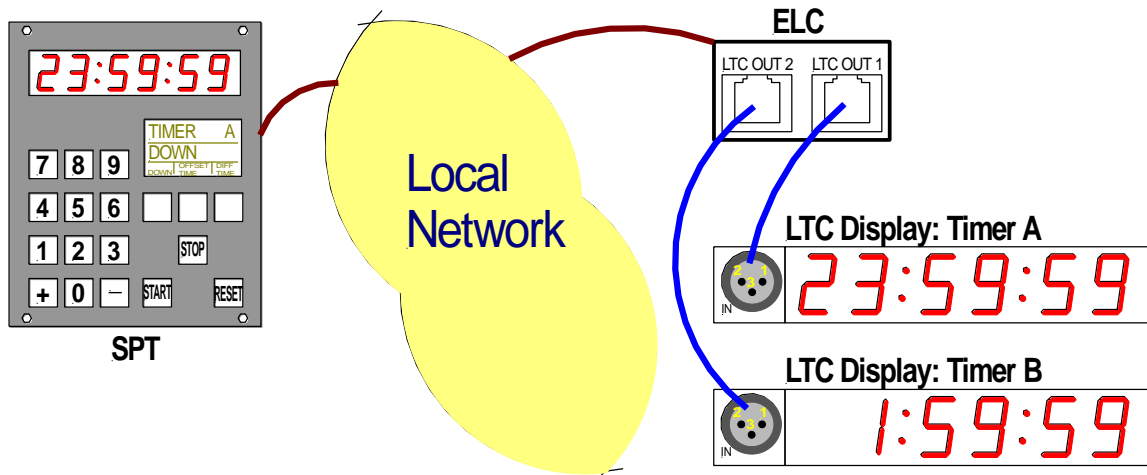
During normal operation mode it can be let checked.



## 4 Applications

### 4.1 MTD Timer System and LTC Displays

**ELC** offers an easy and cost-effective opportunity to display UP or DOWN counters of the Plura MTD system at Non-Plura displays. These displays must be able to read SMPTE/EBU time code (LTC).



ELC set-up:

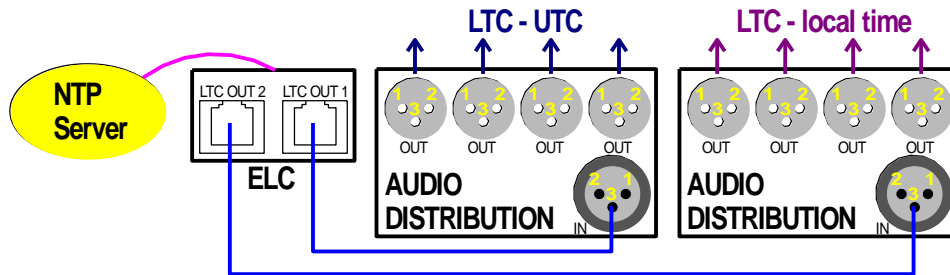
- "Source":** Select *MTD*.
- "Ethernet":** Check *Automatic MTD Master IP Address* and select your MTD group (normally = 1).
- "Output":**
  - LTC 1 – Time: e.g. "Timer A"; LTC 1 – User: e.g. "Set".
  - LTC 2 – Time: e.g. "Timer B"; LTC 1 – User: e.g. "Set".
  - Digits = "6 Digits", if the connected device (display) does not indicate frames.
  - Digits = "8 Digits", if the connected device (display) indicates frames.

**Note:** If it is required to show more than two counters, additional ELC units can be integrated.



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

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



ELC 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 and 10 MHz signals of a GPS receiver),
- **and** the NTP server for ELC 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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