

QUICK START GUIDE

TTL-CONVERTER WITH D-LAB

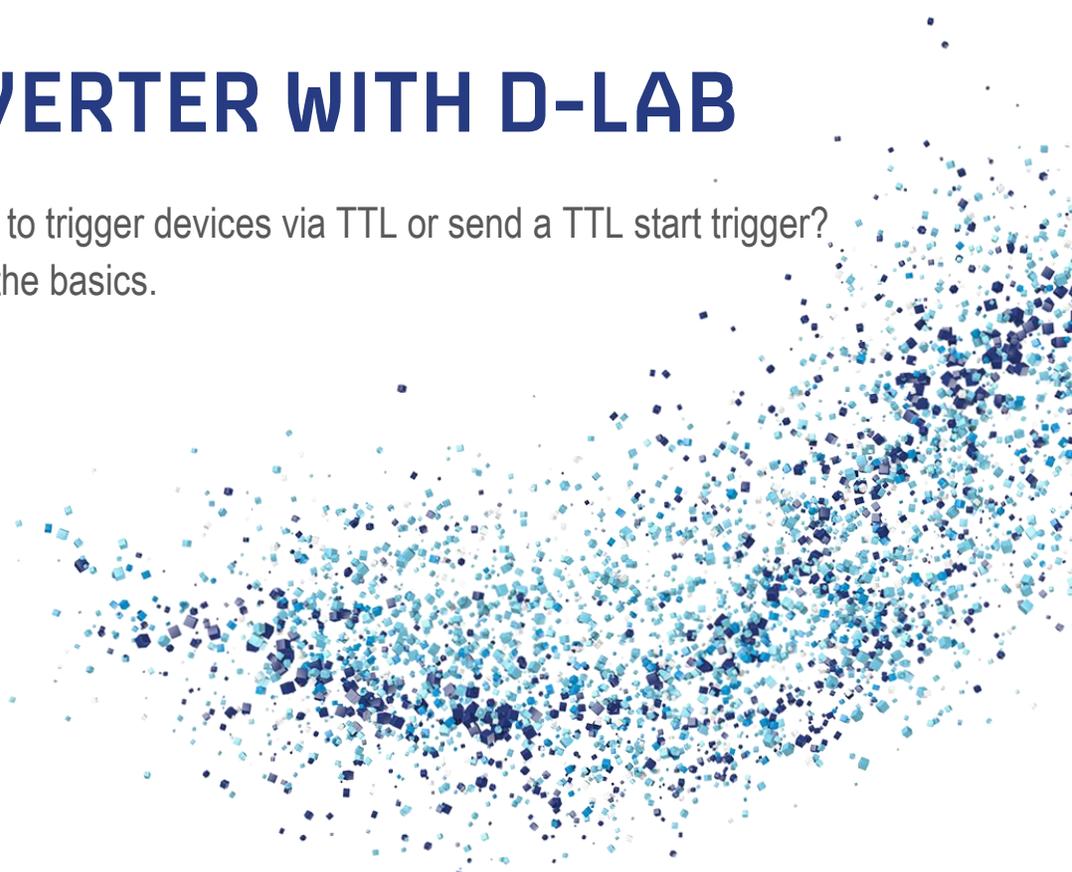
You want to use D-LAB to trigger devices via TTL or send a TTL start trigger?
Use this guide to learn the basics.

Last Modified: 09/2017

SUMMARY

The TTL-Converter is designed to convert values from the D-LAB Data Relay or the D-LAB Remote Tool into a TTL signal. It is able to handle 8 individually configurable channels, each of which can be either active or inactive depending on the incoming data.

The TTL-Converter enables the user to control external devices based on data collected in D-LAB.



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Dear Customer,

Thank you for choosing the Ergoneers TTL Converter for your study.

The TTL-Converter is designed to convert values from the D-LAB Data Relay into a TTL signal.

It is able to handle 8 individually configurable channels, each of which can be either active or inactive depending on the incoming data.

The TTL-Converter enables the user to control extern devices based on data collected in D-LAB.

This manual provides a description of your system's hardware. The fundamental steps of how to use them are explained and illustrated with graphics.

To operate the D-LAB software, reference is made to the D-LAB manual, which discusses in detail all aspects of time-synchronized data recording and the evaluation of measured data.

We are delighted that you have chosen a product from Ergoneers, and we very much hope you enjoy using the TTL Converter.

Your Ergoneers Team

1. GENERAL INFORMATION

Safety information

Read this manual carefully before connecting and commissioning the TTL Converter! As with all technical systems, flawless function and operating safety can only be guaranteed if the usual safety precautions are taken during operation and the specific safety information contained in this manual is complied with. If the safety information and details of proper use in this manual are not followed correctly, we accept no liability for any resulting personal injury or material damage. The warranty / guarantee will also be rendered void in such cases.



Caution !

The following information must be noted in order to reduce the risk of fire or electric shock. Failure to do so can result in serious injury or even death.

1. The mains plug must not be connected or disconnected from a socket with wet hands. Do not use the power packs in damp environments (e.g. bathroom).
2. The equipment must not be exposed to direct sunlight.
3. The system must not be used if the mains cable, mains plug or other current-carrying cables or plugs are damaged.
4. Never operate the TTL Converter unsupervised.
5. Plugs should not be connected with force.
6. Handle the TTL Converter carefully. Heavy impacts, blows or falls from even a moderate height can damage them.
7. The housings do not contain any parts that can be maintained by the user. Opening of the device casing and any accessory parts or their repair must only be carried out by an Ergoneers service engineer. Otherwise the guarantee will be rendered void.
8. Before commissioning the system, ensure that the TTL Converter can be only operated using a 230V power supply.
9. The system must only be operated with original Ergoneers accessories or Ergoneers-approved accessories. No liability is accepted for damage caused by third-party accessories or non-approved accessories.
10. If any modification is made without the written consent of Ergoneers, the guarantee shall be rendered void.

If you are in any doubt about the way the TTL Converter works, its safety or how it is connected, or if you have any other questions that are not answered in these operating instructions, please contact Ergoneers Support (support@ergoneers.com).

Explanation of the symbols used in this manual



General caution



Caution, hazardous electrical voltage: Danger of electric shock!



Caution, hot surface!



Information: Read the information carefully

Liability disclaimer

Compliance with the instructions for use is essential for the safe operation of the TTL Converter and for the fulfillment of the specified product characteristics and performance features. You must therefore read the instructions for use before working with the system!

Ensure that all people who will be working with the system have access to the instructions for use. Ergoneers GmbH accepts no liability for any physical, material or immaterial damage resulting from non-compliance with the instructions for use. Liability for material defects is excluded in such cases.

FAQ

Detailed documentation of all of the questions that have arisen so far and their associated answers can be found online at www.ergoneers.com/faq. If you nevertheless have any questions for which you cannot find an answer, please send an e-mail to Support (support@ergoneers.com).

Disposal



Electrical and electronic equipment as well as spent batteries and accumulator batteries must not be disposed of in domestic waste. Their constituent parts must be taken for recycling or disposal because they contain toxic and hazardous elements which can harm the environment if disposed of incorrectly.

As a consumer, you are obliged to return electrical and electronic equipment to the manufacturer, retailer or public collecting points provided for this purpose free of charge at the end of the equipment's useful life. The individual terms and conditions for this are subject to state law. The symbol on the product, the instructions for use and/or the packaging indicates the applicable terms. With this type of material separation, recycling and disposal of equipment, you are making an important contribution towards protecting our environment.

Supplied package

D-LAB can be used to evaluate a study TTL signals when using the TTL Converter. This program is optionally available from Ergoneers. The license dongle you obtain from Ergoneers contains the installation and license files required for operation. This means that the software can also be restored or reinstalled at a later date. It is also possible to install D-LAB on another computer in order to be able to analyze the data recorded there, for example. The computer specifications recommended for operation with D-LAB can be found in the FAQs database under the entry "Getting Started" (www.ergoneers.com/faq/).

To operate the D-LAB software, reference is made at this point to the D-LAB manual, which discusses in detail all aspects of time-synchronized data recording and the evaluation of measured data.

2. SETUP

The TTL Signal Unit needs to be connected to the D-LAB computer via a network cable. Both devices (D-LAB computer and TTL-Converter) need to be located in the same IP address space. The TTL-Converter has a predefined IP address:

- 192.168.0.150

This IP address can be changed as described in chapter 4 and chapter 5. However it is recommended to use the predefined settings and adjust the D-LAB computer accordingly. Therefore a static IP address needs to be set on the D-LAB computer. The recommended IP address space is:

- 192.168.0.XXX (e.g. 192.168.0.100)

The IP address to which the D-LAB computer is configured, also needs to be set on the TTL-Converter (see chapter 5), in order to enable a proper communication. The IP address to receive information from D-LAB is defined as 192.168.0.100 at the TTL-Converter. It is recommended to set the D-LAB computer to this address. Then, no changes to the TTL-Converter are necessary.

For informations, how to set static IP addresses under Windows, please see the Windows Help. The TTL-Converter also needs to be connected to the power supply.



Do NOT use a VGA cable to connect the TTL-Converter to your device. This can destroy the device!

3. TRIGGERING TTL-SIGNALS

TTL-Signals can be triggered in two different ways:

- Using the D-LAB Remote Tool to trigger start and Stop of a recording
- Using the D-LAB Data-Relay to trigger signals based on D-LAB channels

Please note, that at the current development stage, it is not recommended to use both options at the same time, as they might influence each other.

Triggering Start and Stop via the D-LAB Remote Tool:

With the D-LAB Remote Tool in general, it is possible to remote control one or several D-LAB. In the given context however it is also possible to use the signals that are sent from the Remote Tool (to start and stop D-LAB), to trigger Start- and Stop-Signals for the TTL-Converter.

Therefore it is necessary to establish a remote-connection from the Remote-Tool to D-LAB and also open a remote connection to the TTL-Converter. Please see the description of the Remote-Tool for further information. The necessary informations for the connection to the remote tool are described below:

- Name: can be set freely
- User: type anything in here (no user is set on the TTL-Converter)
- PW: type anything in here (no password is set on the TTL-Converter)
- IP: IP address of the TTL-Converter (default 192.168.0.150)
- Port: 9100 (default, and should not be changed)

The settings for the connection to the D-LAB computer depend on the Windows network-settings (IP address) and the settings within the D-LAB options (User, PW, Port. See Manual for Remote-Control).

Example for connection settings:

The screenshot shows a dialog box titled "Add New Connection" with a close button (X) in the top right corner. It contains five input fields: "Name" with the text "TTL", "User" with "anything", "Password" with "anything", "IP Address" with "192.168.0.150", and "Port" with a dropdown menu showing "9100". At the bottom right, there are "OK" and "Cancel" buttons.

Connection to TTL-Converter

The screenshot shows a dialog box titled "Add New Connection" with a close button (X) in the top right corner. It contains five input fields: "Name" with "D-Lab", "User" with "TTL", "Password" with "1234", "IP Address" with "192.168.0.101", and "Port" with a dropdown menu showing "9101". At the bottom right, there are "OK" and "Cancel" buttons.

Connection to D-LAB

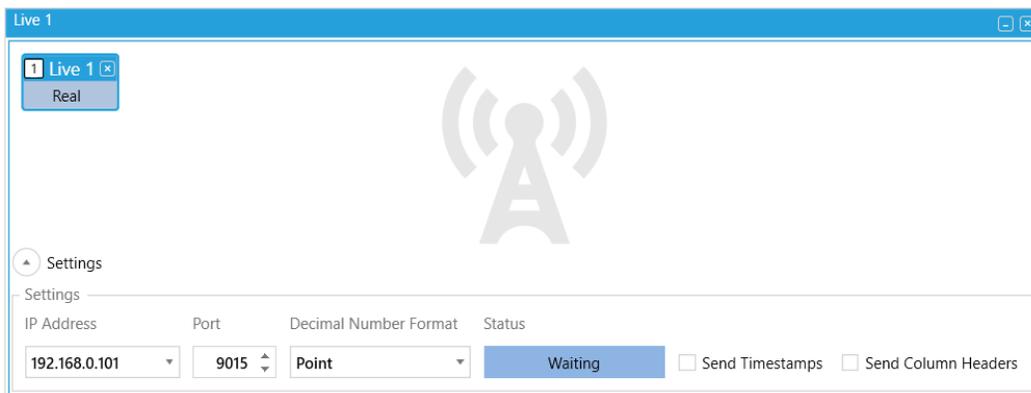
With this setup, a continuous TTL signal will be sent once the Start button in the Remote Tool is activated, until the recording is stopped again (meaning as long as the recording is active, the TTL signal is set to high).

The TTL channel on which the Start / Stop signal is sent, is per default set to Channel 8 of the TTL-Converter. It can be changed in the configuration of the TTL-Converter (see chapter 4 / 5).

Triggering TTL signals via Data-Channels:

Another option to trigger TTL events is to send D-LAB Data-Channels via the Relay window to the TTL-Converter. On the TTL-Converter the data is received, and depending on the settings, TTL signals are sent on one or more channels. This feature can send a TTL Signal depending on the values of certain D-LAB data channels (e.g. send a signal as long as a Marker is detected in the field camera).

In order to trigger TTL events via data channels it is necessary to send the data from D-LAB to the TTL-Converter. Therefore, please open a Relay-Window, either in the Plan or in the Measure Mode of D-LAB (please see Manual) and drag and drop the desired data channel from the recording devices window to the Data Relay. For further description of the Relay and its function, please see the Relay User Manual.



In order to send data from D-LAB to the TTL-Converter, it is necessary, that both devices are located in the same IP address space (see above). Therefore open the settings section in the D-LAB Relay-Window and select the correct IP address and Port for the communication with the TTL-Converter (select IP address of the D-LAB computer). Example:

- IP: 192.168.0.XXX (IP address of the D-LAB computer. In case there is more than one selection, choose the IP address that is in the same address space as the TTL-Converter)
- Port: 9015 (default, depending on the settings of the TTL-Converter)
- Deactivate "Send Timestamps"
- Deactivate "Send Column Headers"

Once The Relay Window is opened, and the TTL-Converter is connected to the D-LAB computer, the status of the Relay should go from "Waiting" to "Connected" to indicate an active connection.

Data is then sent from this IP and this Port, and the TTL-Converter reads the data from this source. Depending on the configuration of the TTL-Converter, it transfers this data into TTL signals.

The basic working principle is, that for every TTL channel an interval is defined (min, max). When the data value that is received from D-LAB lies within this interval, the TTL channel is set to 1. If the values sent by D-LAB are not in the given range, the TTL channel is set to 0.

The interval for every channel can be defined in the TTL-configuration (see chapter 4 / 5).

Example:

The goal is to have an active Trigger-Channel every time, and as long as a certain Marker is detected in the scene Image.

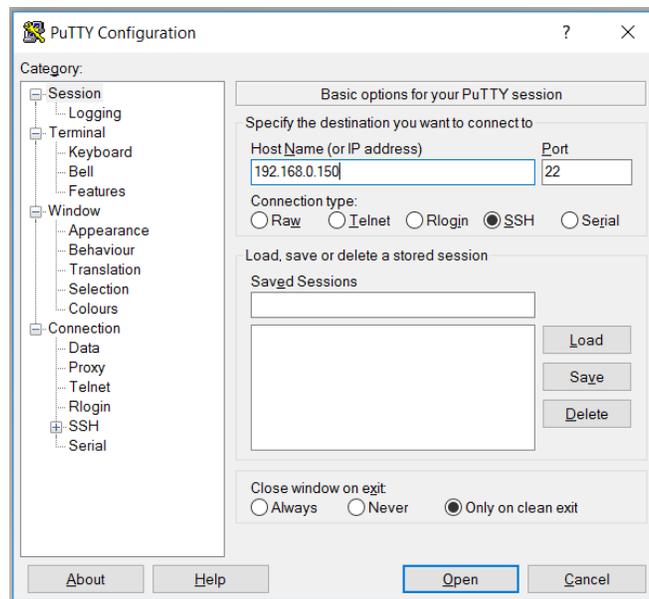
Therefore, it is possible to use one of the coordinates of the marker. A marker is defined by the four edges (P1, P2, P3, P4) with two coordinates (x/y) each. As long as a marker is not detected within the scene image, all coordinates are 0. As soon as a marker is detected the value of the x-coordinate is between 1 and 1920 (resolution of the camera in pixel).

That means that, in order to have a trigger signal whenever a marker is recognized, it would be necessary to drag and drop one of the coordinates (e.g. x-coordinate of Point 3) into the relay and send this data to the TTL Converter. On the TTL-Converter it would be necessary to set the desired channel to the appropriate value range. If it would for example be desired to have the TTL-signal on channel one, the Start of the interval would have to be set to "1" for Channel 1 and the end of the interval would have to be set to "1920" for Channel 1.

Every time a marker now is detected in the scenery, the data relay will send a value between 1 and 1920, which would then cause the TTL-Converter to send the "high-signal" on Channel 1.

4. ACCESS THE TTL-CONVERTER

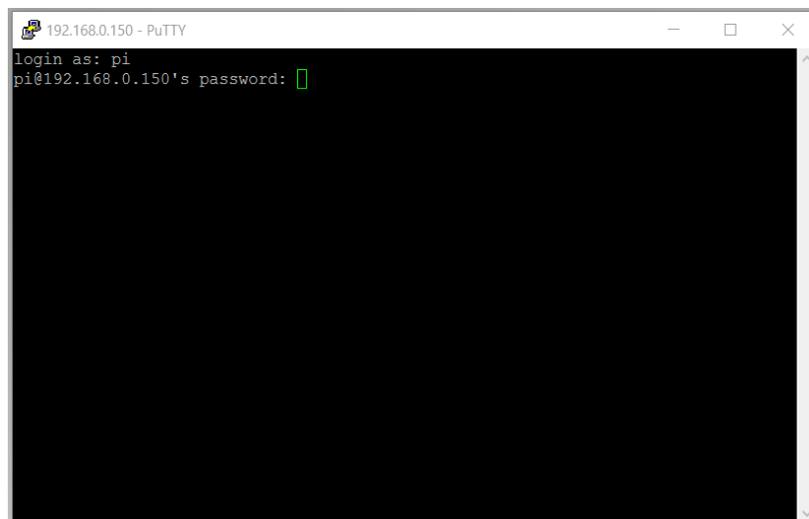
The TTL-Converter can be accessed via an SSH connection. A recommended freeware-tool (Putty) to establish such a connection can be downloaded here: <http://www.putty.org/>. In order to connect to the TTL device, run Putty and enter the IP address of the TTL-Converter. Press Open.



Putty will establish a connection to the TTL-Converter in order to access the settings. It is necessary to enter User and Password.

User: user
Password: TTL-8

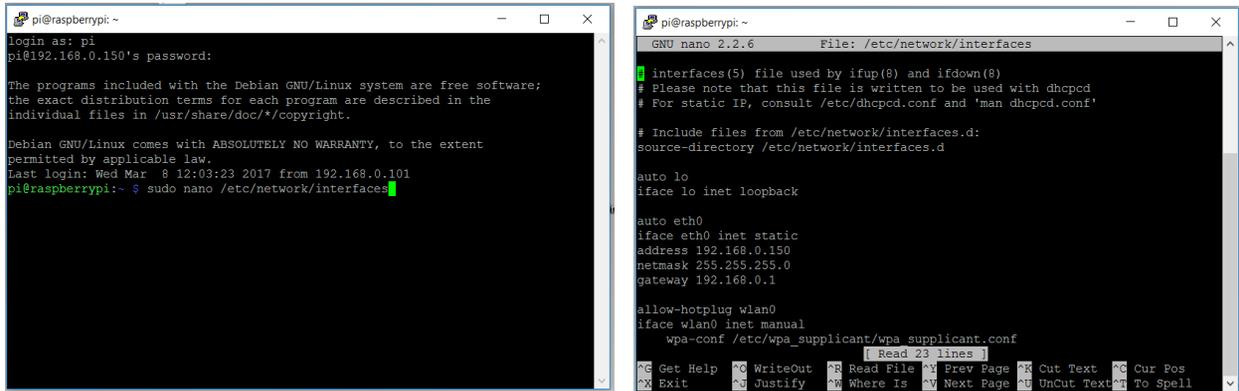
NOTE: Password will not be visible during entering.



After entering the login data a command-interface will be opened. This interface allows to change the static IP address of the TTL-Converter and to change the settings of the signal configuration.

Change static IP address:

Enter "sudo nano /etc/network/interfaces" to change the Converter's static IP address.



```
pi@raspberrypi: ~  
login as: pi  
pi@192.168.0.150's password:  
The programs included with the Debian GNU/Linux system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*/copyright.  
  
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent  
permitted by applicable law.  
Last login: Wed Mar  8 12:03:23 2017 from 192.168.0.101  
pi@raspberrypi:~$ sudo nano /etc/network/interfaces  
  
GNU nano 2.2.6 File: /etc/network/interfaces  
interfaces(5) file used by ifup(8) and ifdown(8)  
# Please note that this file is written to be used with dhcpcd  
# For static IP, consult /etc/dhcpcd.conf and 'man dhcpcd.conf'  
  
# Include files from /etc/network/interfaces.d:  
source-directory /etc/network/interfaces.d  
  
auto lo  
iface lo inet loopback  
  
auto eth0  
iface eth0 inet static  
address 192.168.0.150  
netmask 255.255.255.0  
gateway 192.168.0.1  
  
allow-hotplug wlan0  
iface wlan0 inet manual  
wpa-conf /etc/wpa_supplicant/wpa_supplicant.conf
```

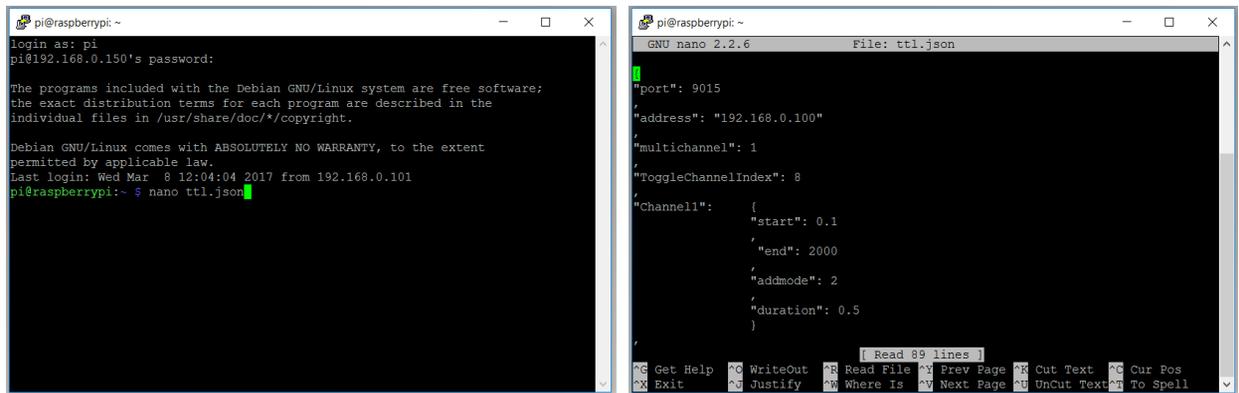
Change the IP address (the cursor in the interface can be moved with the arrow keys). After you made your changes save the file via Ctrl + X then hit Enter.

NOTE: Keep in mind that all further SSH communication is performed via this IP from now on. So make sure to have the new IP address available. Otherwise the TTL-Converter cannot be accessed anymore.

After changing the IP address call "sudo reboot" and type in the credentials. The unit will now reboot and is ready to use after a few seconds.

Change settings:

Access the configuration file by calling "nano ttl.json". Change the values to fit your needs (meaning of the values, please refer to chapter 5)



```
pi@raspberrypi: ~  
login as: pi  
pi@192.168.0.150's password:  
The programs included with the Debian GNU/Linux system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*/copyright.  
  
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent  
permitted by applicable law.  
Last login: Wed Mar  8 12:04:04 2017 from 192.168.0.101  
pi@raspberrypi:~$ nano ttl.json  
  
GNU nano 2.2.6 File: ttl.json  
{"port": 9015  
,"address": "192.168.0.100"  
,"multichannel": 1  
,"ToggleChannelIndex": 8  
,"Channel1":  
  {"start": 0.1  
  ,"end": 2000  
  ,"addmode": 2  
  ,"duration": 0.5  
  }  
}
```

Save your changes via Ctrl + X and hit Enter afterwards. After changing the configuration call "sudo reboot" and type in the credentials. The unit will now reboot and is ready to use after a one minute.

5. CONFIGURATION OF THE TTL-CONVERTER

The configuration section of the TTL-Converter allows to adjust the settings for every channel and to define global settings. A file with the following content is used to configure the TTL-Converter:

```
"{  
  
  "port": 9015,  
  
  "address" : 192.168.0.100  
  
  "multichannel": 1,  
  
  "ToggleChannelIndex": 8,  
  
  "Channel1": {"start": 1, "end": 960, "addmode": 2, "duration": 0,5},  
  
  "Channel2": {"start": 960, "end": 1920, "addmode": 2, "duration": 0,5},  
  
  "Channel3": {"start": 1, "end": 1920, "addmode": 2, "duration": 0,5},  
  
  ...  
  
}"
```

Open this file as described in Chapter 3 (“Access the TTL-Converter”), Section “Change settings”. The entries can simply be edited with the keyboard. In order to change the entries you can use the arrow keys to move the cursor to the location where you want to apply changes.

Global Settings

The first four entries of the configuration describe the global configuration for the communication with D-LAB.

- Port: Predefined Port on the D-LAB computer for the communication with the TTL-Converter
- Address: IP address of the D-LAB computer
- Multichannel: defines whether more than one channel can be active at a time (0 = false, 1= true)
- ToggleChannelIndex: Channel for the Start / Stop signal of the Remote-Tool.

Channel Settings

In addition to the global settings, it is possible to change the setting for every TTL channel separately. For every channel, the following entries are available:

- Start: Defines the Minimum of the interval of values that cause the channels activation
- End: Defines the Maximum of the interval of values that cause the channels activation
- Addmode: Defines the channels behaviour when a new request occurs, while the signal is already active
 - Addmode = 0: further requests are ignored
 - Addmode = 1: Duration is added to the activation time
 - Addmode = 2: activation time is reset
- Duration: Defines the activation time in seconds for a single request of this channel (minimum activation time)

Configuration Guidelines

Here are a few tips for configuring the TTL-Converter:

- to define a single value triggering a channel instead of an interval use start = end = value for this channel
- If you want to keep a channel active while values in a certain range occur it's best to use addmode 2. This way the signals duration is reset each time a new request comes in. Choose a duration that is larger than the time interval between two values.
- Do not use addmode 1 on a channel when it's configured duration is greatly larger than the expected time interval between signals from D-LAB. Doing this will lead to a massive delay between the last signal and the channels deactivation. (e.g. configured duration is 1s and the time between two values triggering the channel is 0.1s → After just 6 seconds of usage the channel stays on for about a minute after the last value)

6. HARDWARE

The TTL-Converter is a "Raspberry Pi 3 Model B V1.2" running Ubuntu Linux. The image and table detail the 15-pin Sub-D 15 connector; the diagram's pin numbering is that of a female connector output. In the male connector, this pin numbering corresponds with the mirror image of the cable's wire-and-solder side. The male connector is not part of the TTL-Converter and has to be customized to the device to that it is connected to.



Do **NOT** use a VGA cable. This can destroy the device.

Pin	Description
1	Channel 1
2	Channel 2
3	Channel 3
4	Channel 4
5	Channel 5
6	Channel 6
7	Channel 7
8	Channel 8
9	carries a low-voltage +5V power supply
10	n.c.
11	carries a low-voltage +3,3V power supply
12	n.c.
13	n.c.
14	n.c.
15	Ground

7. ERGONEERS WARRANTY PROGRAM

Ergoneers offers contractual partners a comprehensive and global warranty program (defect claims) under German law by explicit exclusion of the rules of the Convention on the International Sale of Goods (CISG). Ergoneers runs a quality assurance plan and all products are tested before they are shipped.

Entitled for warranty repair

The warranty program is provided for a period of 12 months after delivery of the product. The product; only in this period the product will be repaired or replaced free of charge if one or various facts pointed out below become true:

- DOA (Dead On Arrival)
- Product no longer functioning
- Electronic or electrical damage
- Mechanical malfunction
- Optical malfunction

Not included in Warranty

- Damaged due to over-voltage
- Damaged due to incorrect use
- Damaged due to using the product in improper environments
- Damaged due to dropping
- Wastage

RMA

Before returning a product to Ergoneers for a warranty or non-warranty repair, an RMA number needs to be requested from support@ergoneers.com.

Shipping rules

Warranty repairs are done in our office in Geretsried/Germany. Products need to be send in all shipment costs and fees paid. Ergoneers will return the product free of charge if

- a) the product was sent in with a valid RMA number and
- b) the failure is caused by one of the reasons listed under "entitled for warranty repair".

Repair times

We aim to return the repaired product as soon as possible back to the customer. Please note that repair times might depend on availability of spare parts and other resources. Customers can request the estimated shipment date by quoting the RMA Number and send an email to support@ergoneers.com.

8. GET HELP

You can find answers to your questions, as well as instructions and troubleshooting information on the Ergoneers FAQ (<http://www.ergoneers.com/faq>).

In case of other questions regarding the Ergoneers Product Family (D-LAB, Dikablis, TTL-8 etc.), please refer to support@ergoneers.com.

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