



# TESTBOX2010

## Dynamic Data Acquisition System

### User's Manual



|            |             |  |
|------------|-------------|--|
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## 1. WARNINGS



- This device has been designed to work with 12VDC power supply. An 220 V AC to 12 V DC adaptor is supplied in the package for supplying the device from mains power. If you are to use the device with oher than 220 V AC mains power, please check and make sure the adaptor input voltage and frequency is compatible with your mains power.
- Do not submerse this device into water to prevent electric shock. Do not pour an undefined liquid on the device.
- Do not use this device with electric connection that does not have an earth connection or with poor earth connection.
- This device has been designed to work under temperature condition between - 25°C - 66°C. Do not run or keep this device under temperature conditions outside of this range.
- This device has been manufactured in compliance with EMI/EMC standards. However, for best analog measurement performance please avoid using next to devices or machines emitting high levels of EMI(Electro-Magnetic Interference).

## 2. GENERAL DESCRIPTION

TESTBOX2010 is a dynamic data acquisition device which may have 4/8 or 16 sensor input channels.

The device has 24-bit resolution and 2 kHz simultaneous sampling capability per channel.

There are two main types of this device namely ATT and PGA versions.

ATT version has been specially designed for acquiring data from ultra-low noise accelerometers and voltage output sensors. It offers a constant input range and very low self-noise in this input range, to reach up to 140 dB dynamic range.

PGA version is designed for maximum sensor type compatibility, such as load cells, strain gauges and full bridge strain based sensors, displacement transducers, accelerometers and almost all millivolt and voltage output sensors.

By the help of this device the user can connect a variety of sensors with analog output that have been installed on a test specimen to analog input channels with push-pull type connectors.

The device is connected to a computer with a twisted ethernet cable directly or with a standard ethernet cable over an ethernet switch. The user can manage the sensor calibration, device settings, test settings, monitoring, plotting and finally the recording of the test data via data acquisition software running on the computer.

The technical specifications of the device are presented at the next chapter.

### 3. TESTBOX2010 DEVICE TECHNICAL SPECIFICATIONS

|                                 |  |
|---------------------------------|--|
| <b>Resolution:</b>              | 24 Bit   |
| <b>Communication Interface:</b> | Ethernet   |
| <b>No of Channels:</b>          | 4/8/16 Channels in one box   |
| <b>Type of Measurement:</b>     | Differential   |
| <b>Synchronization:</b>         | True Simultaneous  |
| <b>Sampling Rate:</b>           | 2 kHz (2000 sps) / Channel   |
| <b>Filtering:</b>               | Anti-Aliasing / Low Pass   |
| <b>Dynamic Range</b>            | 140dB  |
| <b>Measurement Range:</b>       | ±5.5V (ATT version),<br>±17.2 mV to ±12 V user selectable (PGA version)                        |
| <b>Channel Gain</b>             | 1/8, 1/4, 1/2, 1, 2, 4, 8, 16, 32, 64, 128 -each channel can be set independently (PGA option) |
| <b>Sensor Excitation:</b>       | +5V, +12V, -12V  |
| <b>Power:</b>                   | 12V DC, maximum 40W  |
| <b>Connector Structure:</b>     | 9 pin circular IP67 push pull connector  |
| <b>Working Temperature:</b>     | -25°C-66 °C  |
| <b>Storage Temperature:</b>     | -25°C-66 °C  |
| <b>Enclosure:</b>               | Ex-proof mobile casing complies with "NATO Cage Code A7423"                                    |
| <b>Memory Option</b>            | Limited by USB flash disk capacity   |
| <b>Microprocessor</b>           | ARM Cortex, embedded Linux operating system  |

## 4. TESTBOX2010 DEVICE VIEWS

### 4.1 Device Top View



1. 5A Fuse
2. Earth Conneciton Terminal
3. Power Led
4. Power Switch
5. GPS led (valid when the device has GPS functionality)
6. GPS Antenna (valid when the device has GPS functionality)
7. Record led
8. Ready for software connection
9. Record button (Record to USB Flash Disk)
10. Synchronization connections
11. USB port
12. Digital I/O connection

## 4.2 Device Rear and Left Side View



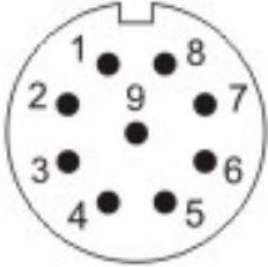
13. Ethernet Connector

14. Power Input

15. Sensor Connectors (9 pin circular IP67 push pull connector)



## 5. WEIPU SF-12 CONNECTOR PIN CONFIGURATION



1. (Signal-)
2. (Shield1)
3. (Excitation GND)
4. +5V (Excitation +5V)
5. +12V (Excitation +12V)
6. -12V (Excitation -12V)
7. (Shield2)
8. (Signal+)
9. Casing Ground



**WARNING:** Always connect the sensor cables to the device, when the device has been switched off

## 6. OPERATION OF THE DEVICE

### 6.1 Sensor Connection

WEIPU SF-12 male connectors must be installed to the sensor cables that will be connected to the device. The pin configuration is presented at Chapter 5.

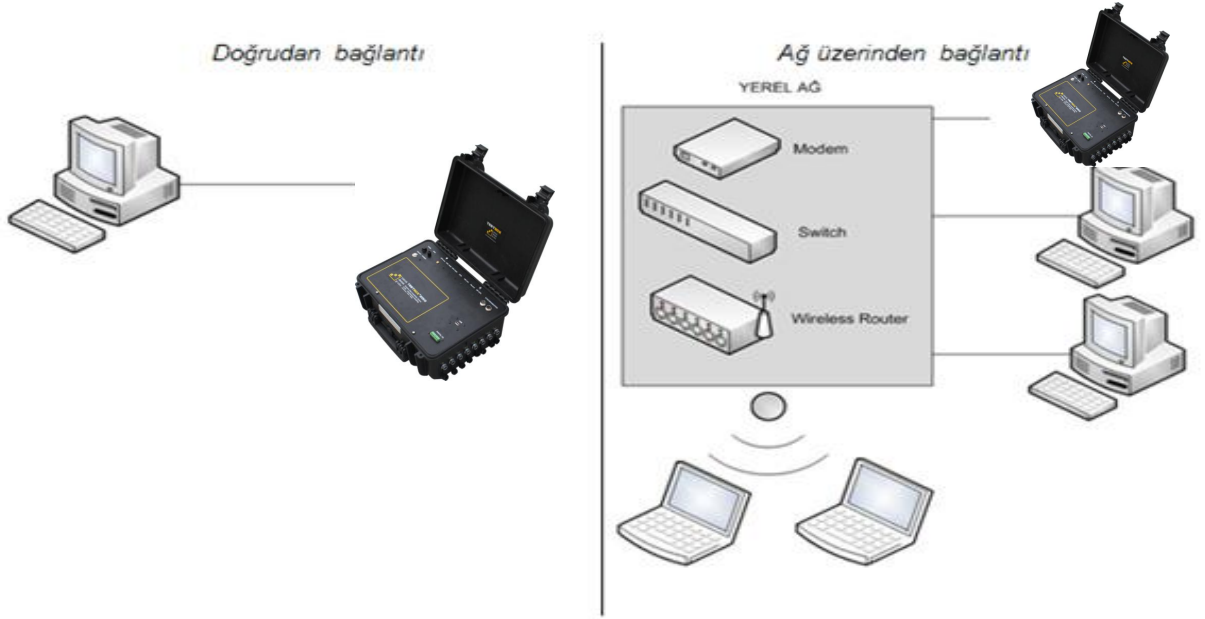
#### WARNINGS:



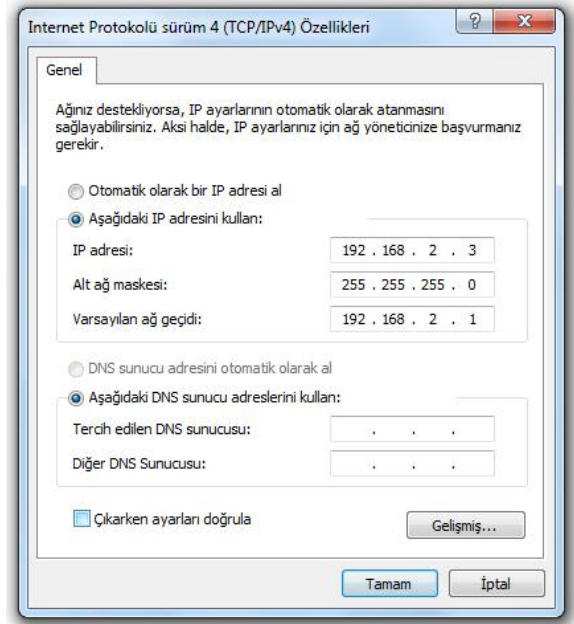
1. Pay attention to the pin diagram when making a new sensor cable. Wrong connection may harm either the sensor or the device or both.
2. Connect/Disconnect the sensor when the device is switched off.
3. Try to avoid touching directly to the sensor or the sensor cables, or staying close to them as this may affect measurement quality.

### 6.2 Operating Sequence

1. Connect the power supply to the AC mains and power supply output to the power input connector at the back side of the device.
2. Connect the ethernet ports of the device and the computer to each other using a twisted ethernet cable. (or connect them over a hub using a standard ethernet cable)



3. From the network adapter settings of the computer set up the properties same as shown at the Figure. If you are connecting the device and your computer directly with a twisted ethernet cable, switch of the wireless network of your computer.
4. Switch on the device by pressing the power On/Off button
5. Start the TESTLAB-NETWORK software from your computer. The software will automatically scan and detect all TESTBOX2010 series devices that is connected over the ethernet, start communication with them.



### 6.3 Software and Device Functions

Data acquisition device becomes functional, when used together with data acquisition software. TESTLAB-NETWORK software is described in its own user manual in detail. These descriptions includes calibration of the sensors, keeping these calibrations in a calibration database, choosing the channels that will be used in a test, plotting and monitoring the values in real time, determining the sample recording frequency, and other test setup settings. All of these are controlled by the software.

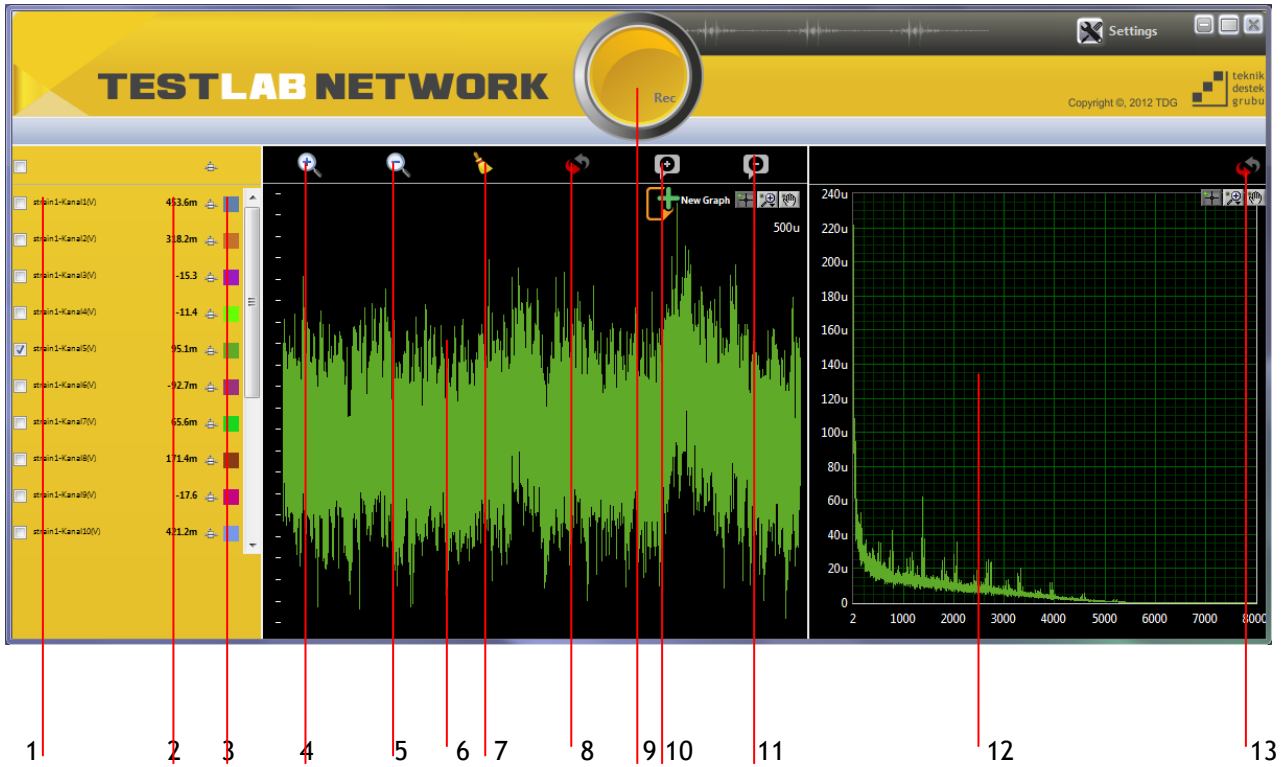
There is no special configuration which should be completed on the hardware using the software. As the device is directly compatible with accelerometers, it will enough to switch on the device and start the software.

Anti-aliasing filters are integrated in the device and in action immediately after the device is switched on.

The basic operations of the software are described in its own manual in detail and presented below as a summary. When the user starts the software as an administrator, the software will detect the devices connected to it over ethernet, and following a short scanning screen, the screenshot seen in the below Figure will appear on the monitor automatically.

The command buttons existing on this screen are listed below, and described in the software user manual in detail.

The sensor inputs are located at the outside of the enclosure top cover and at the sides of the case, on purpose, in order to provide the device to be left with its top cover closed on the field, so that the device can record data without being affected by the outdoor conditions.



- 1) Device and channel names are listed with the units.
- 2) Analyzed values of the input channels are listed. (RMS, Max, Min, PtP, DC)
- 3) Colors of data series on the graphics can be chosen by this small box.
- 4) Zooms in the graphic.
- 5) Zooms out the graphic.
- 6) Plots the channel data.
- 7) Clears the graph.
- 8) Automatically offsets the data series so that they can be monitored on the same plot. (Re-offsets when pressed again)
- 9) Opens the recording window.
- 10) Auto-zeroes the current channel value.
- 11) Cancels the auto-zero of the channel value.
- 12) Plots the Fast Fourier Transform of the channel data.
- 13) Re-calculates the FFT.

## 6.4 Operation of more than one TESTBOX2010 Series Devices

This device can be used synchronously with other TESTBOX2010 series devices as well as individual usage. The important points are listed below, when the user prefers to use device in a synchronous mode with other devices:

1. 2 ways are possible to connect more than one device: With connecting the synchronization cable and without connecting the synchronization cable
2. When the synchronization cable is not connected the software can synchronize the data incoming from more than on device with a coarse amount of error. Software can log from all devices at the same time.
3. When the synchronization cable is connected, the devices work in a fully simultaneous and synchronous way. For this connect the synchronization cable which is delivered by the devices, in between them. With cable SYNC-IN connector of one device must be connected to the SYNC-OUT of the other one. A daisy chain must be established in this way.
4. TESTLAB-NETWORK software must be started after all the devices are connected to PC or TESTBOX-RECORDER over ethernet or USB.
5. All channels are named on the data acquisition software by first the device name and secondly the channel number. Any channel data can be monitored in this way.
6. In order to change the channel settings for a selected device, first be sure that this device is selected on devices list of the main screen.
7. According to the special different characteristics of the devices, some properties existing for a device may not exist for another one. Other irrelevant settings will be inactive.



## 6.5 TESTBOX-RECORDER Unit- Stand Alone Data Logging

It is possible to record data to a USB flash drive with TESTBOX2010 series devices. In order to do this, mount a USB memory stick to the USB connector on the panel and press the “REC” button on the panel. The red “Record” led will light when the recording starts without any problems.

After recording to a USB flash drive, you can connect the flash drive to a computer and convert the data using the conversion software provided in the installation CD to convert the data to a common format.

## 7. MAINTENANCE

As TEKNİK DESTEK GRUBU, TESTBOX2010 series devices are manufactured in ex-proof enclosures combined with IP67 protection class connectors, they do not require a special periodical maintenance. However, in case they are used in highly dirty and oiled environments, oil and dirt can be deposited on the sensor input connectors. As the device is designed for 24-bit high, precise measurement capability it is recommended to clean this undesired oily parts with a contact spray application from time to time.



## 8. CALIBRATION

This device is factory calibrated at TEKNİK DESTEK GRUBU manufacturing laboratory during manufacturing before delivery. This calibration includes offset and gain calibration. The calibration correction parameters are input in the software and the calibration certificate is printed.

In 2 years warranty period this device will not require any further calibration under normal circumstances. However if the user has any doubt about the measurement values during this period and has an intention to verify the calibration, the factory calibration will be performed without any extra charge, in the case the user delivers the device to the TEKNİK DESTEK GRUBU manufacturing laboratory.

This device is recommended to be re-calibrated in 5 year periods. The first periodic calibration after first 5 years will be performed without any extra charge, in the case the user delivers the device to the TEKNİK DESTEK GRUBU manufacturing laboratory.