

**TES**  
Transparent  
Ethernet /  
Serial  
Converter



**User  
Manual**

**Klemmsan®**

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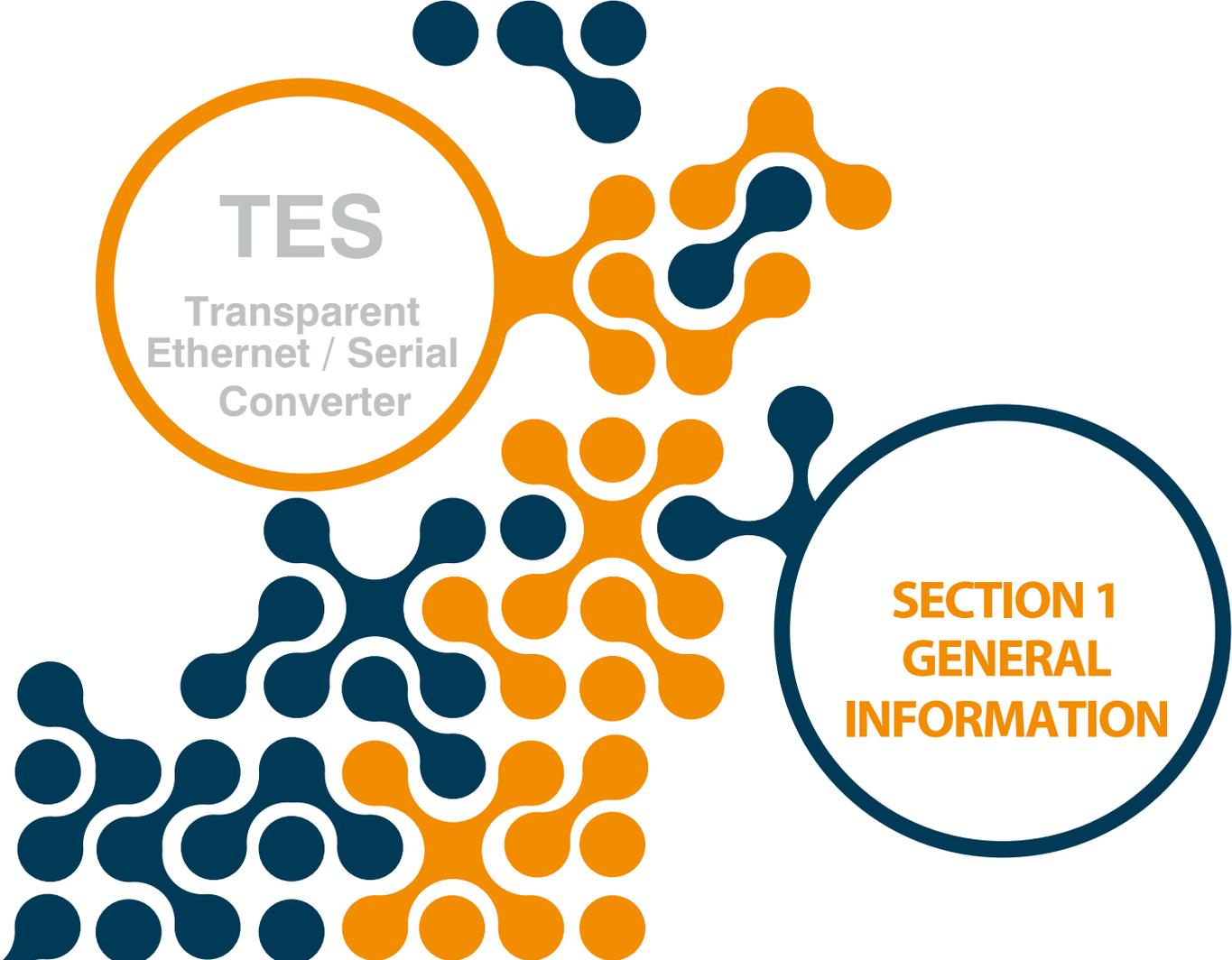
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**SECTION 1  
GENERAL  
INFORMATION**

## SECTION 1 GENERAL INFORMATION

### 1.1 Proper Use and Safety Conditions

- Installation and connections should be established in accordance with the instructions set out in the manual by authorized persons. Unless the connection is built properly, device should not be operated.
- Before wiring the device up, make sure that energy is cut off
- Use a dry cloth to remove the dust from the device/clean the device. Avoid using alcohol, thinner or a corrosive material
- Device should be engaged only after all the connections are made.
- Do not open the inside of the device. There are no parts which the users can intervene inside.
- Device should be kept away from humid, wet, vibrant and dusty environments.



The manufacturing company may not be kept responsible for unfavorable incidents that arise out of the failure to follow the above cautions.

### 1.2 General Futures

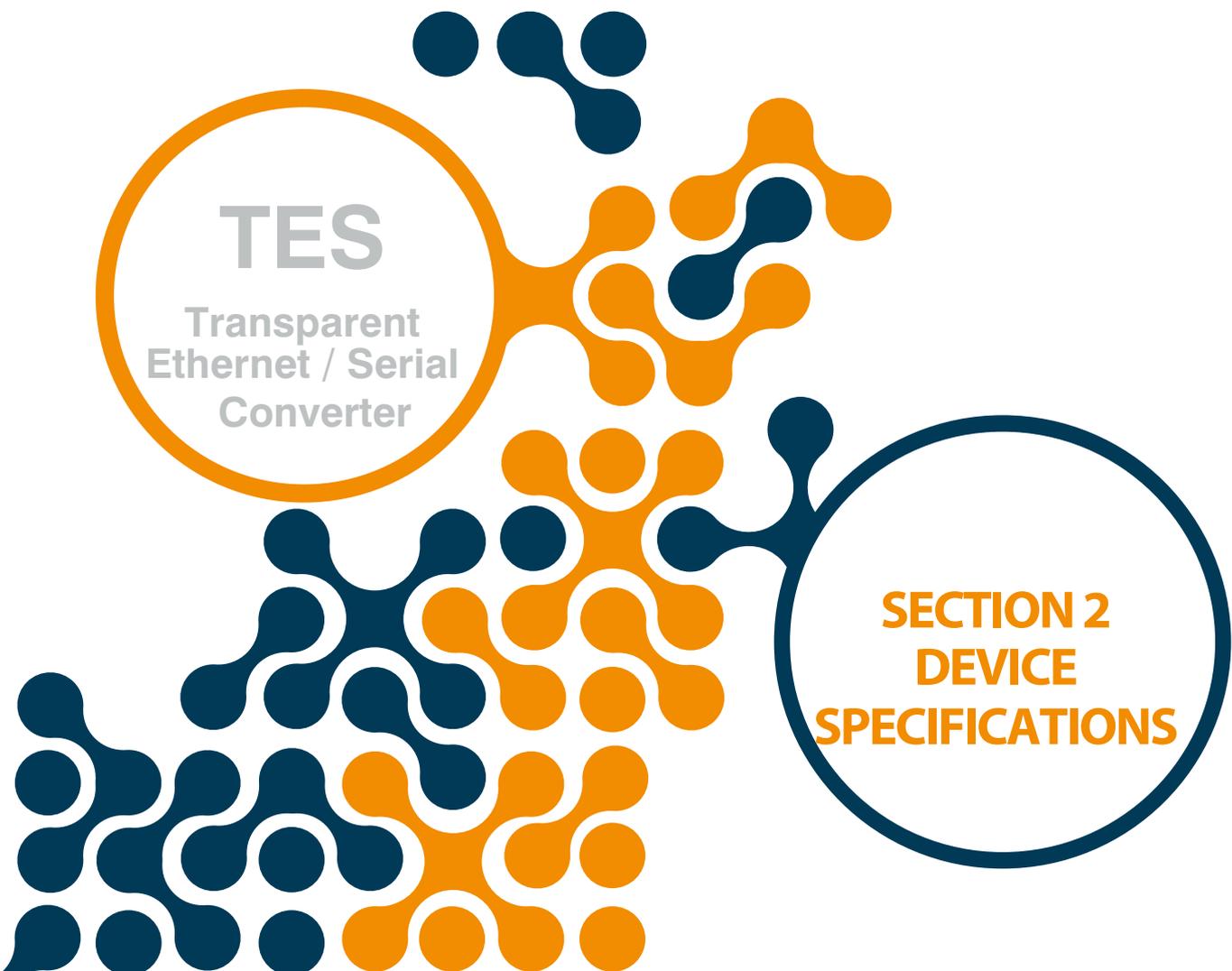
TES-4 Order No:	Explanation:
601410	TES-4 (Transparent Ethernet/Serial Converter)

TES is a transparent converter that provides bidirectional transmission with RS485 interface running on server role using TCP / IP infrastructure. In this way, it is possible to control and monitor serial devices remotely, regardless of communication protocols.

Additionally, the configuration data of the device can be read and written in USB or JSON format.

TES generally has the following features:

- Runs in the server role
- Supports bidirectional communications
- Supports 2 remote connections
- Works as a transparent converter
- Supports Ethernet 10/100 Base Tx
- Can be configured over USB and Internet
- Can be change the serial communication settings instantly
- Access to all configuration functions and information through fully open JSON Rest API
- Software update via USB



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**SECTION 2  
DEVICE  
SPECIFICATIONS**

## SECTION 2 DEVICE SPECIFICATIONS

### 2.1 Definition on Device

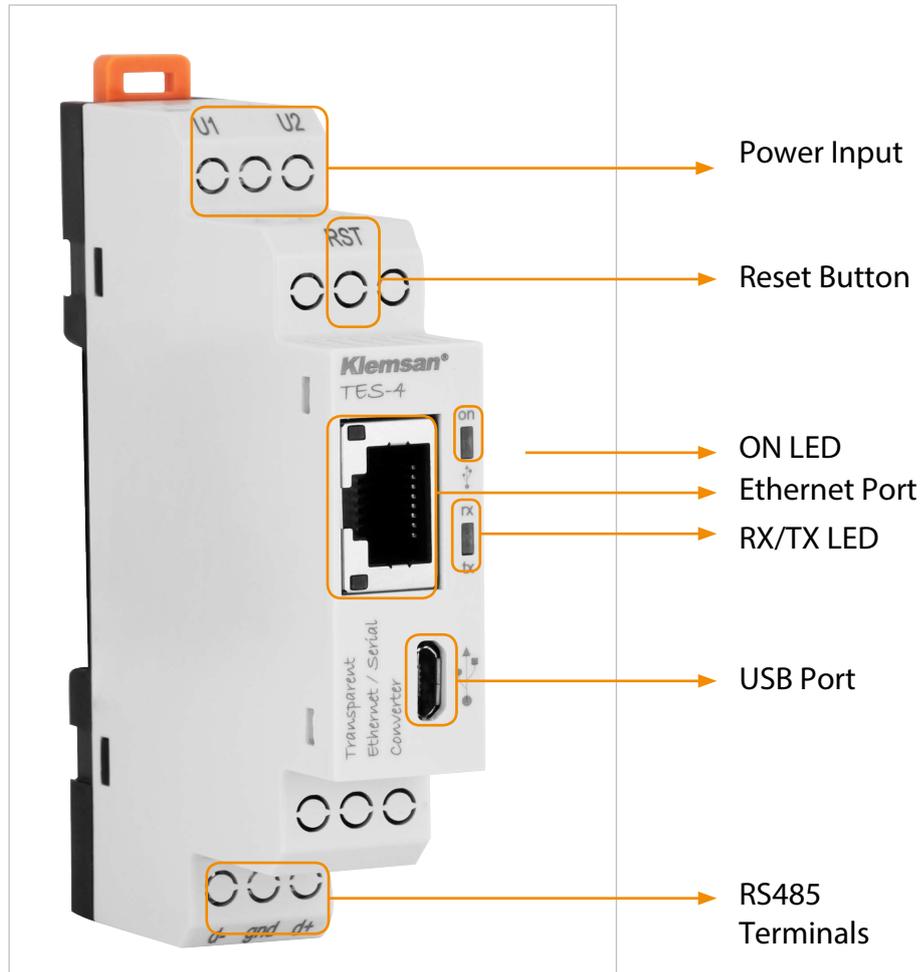


Figure 2-1 Definitions on TES-4

#### U1-U2 Input:

TES-4 is powered on from U1-U2 input. 18 ... 50V AC/DC must be applied.

#### RST Button:

Press briefly (<5sec) to restart TES. Press and hold ( $\geq$  5sec) and TES will restart by returning to the factory settings.

#### ON LED:

When the LED color is orange, that means device is powered on from only U1-U2 input. When the LED color is blue, that means Micro-USB cable is connected to TES-4.

#### RX/TX LED:

These LEDs are orange when the data is sent from the serial line or sent to the serial from the device.

### Ethernet Port:

Ethernet cable must be inserted.

### USB Port:

Micro-USB cable must be inserted to this port. Device can power on with USB port as well. If operator wants to use Gateway Master must be connected to PC over micro-usb cable. The firmware of the device can also be updated via the USB port.

### RS-485 Interface:

Connection of the serial devices are made through these terminals.

## 2.2 Configuring TES-4

There are two options when TES-4 is configured.

- 1) Using Gateway Master software over USB port. (will be explained in "Section 3")

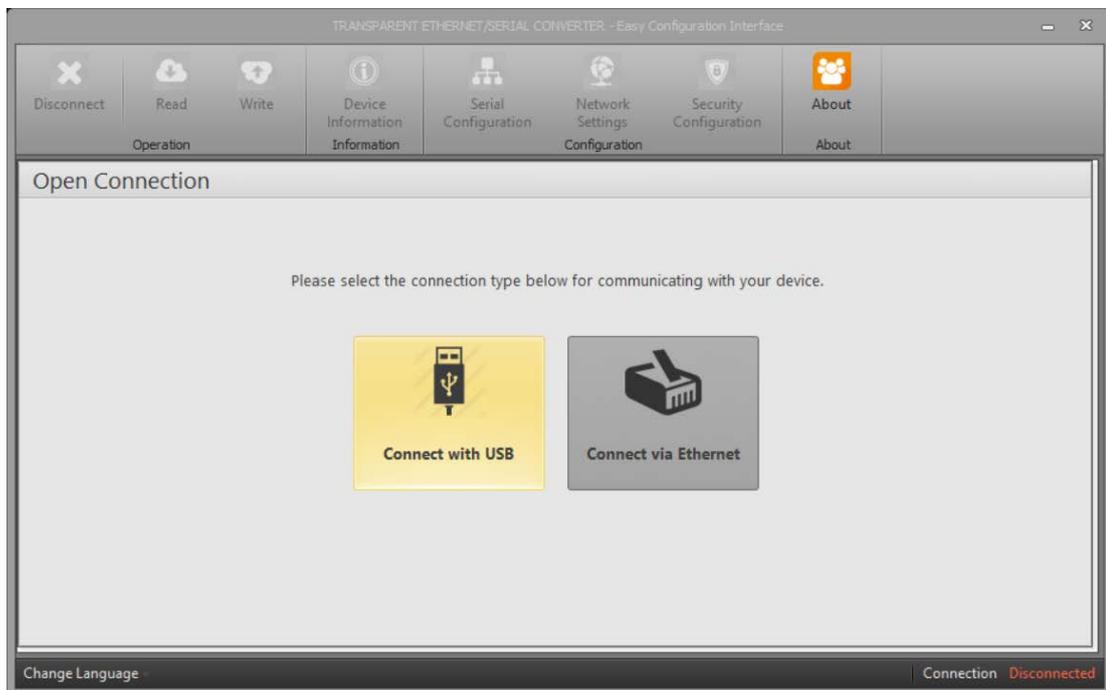


Figure 2-2 Gateway Master over USB

2) Using Gateway Master software over Ethernet. (will be explained in “Section 3”)

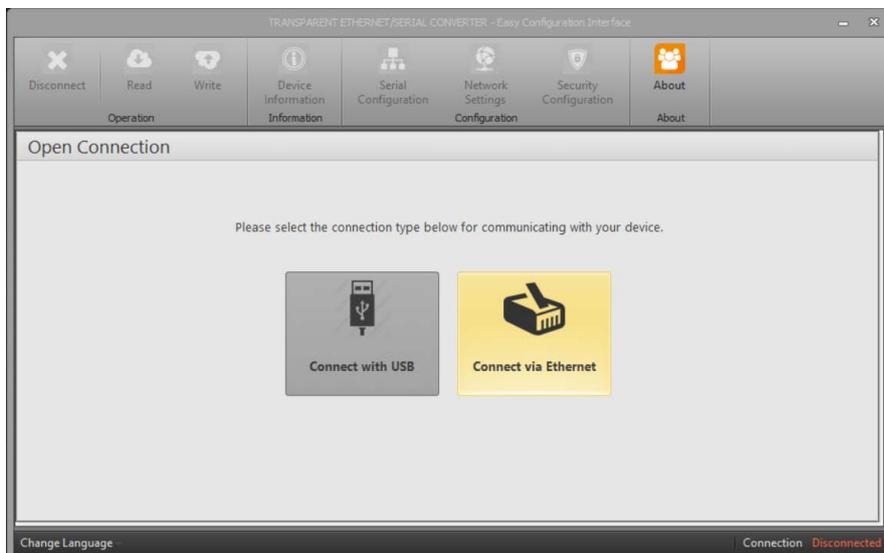


Figure 2-3 Gateway Master over Ethernet

### 2.3 Required Installation for Configuration Software

In order to configure TES-4 over USB port, required installations will be explained in this section. You can access the necessary file through our website.

#### 2.3.1 Installing Configuration Software

After downloading the Gateway Master setup file, select the desired destination for the installation of the program and click “Next” to proceed to the next step.

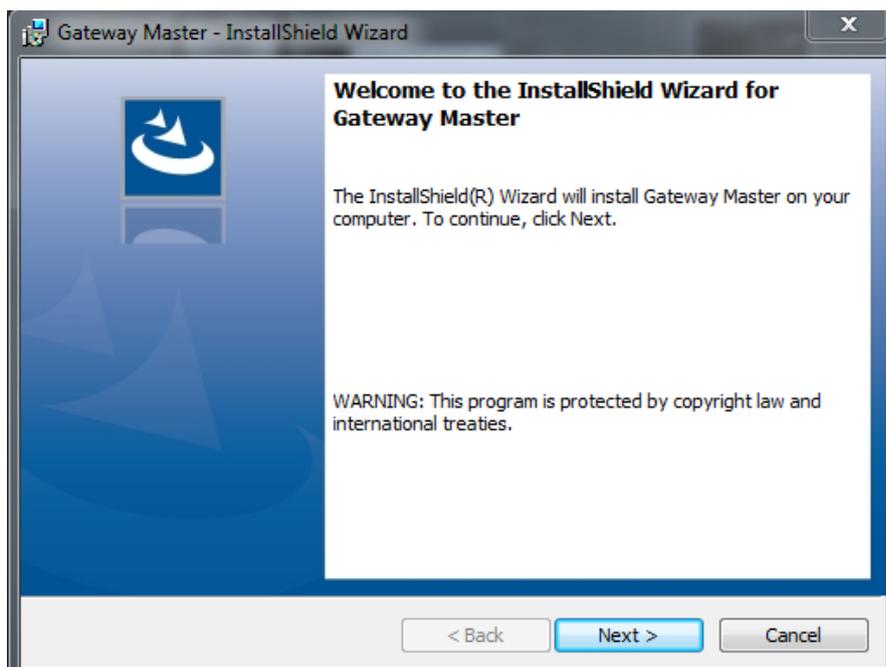


Figure 2-4 Installing Configuration Software (Step 1)

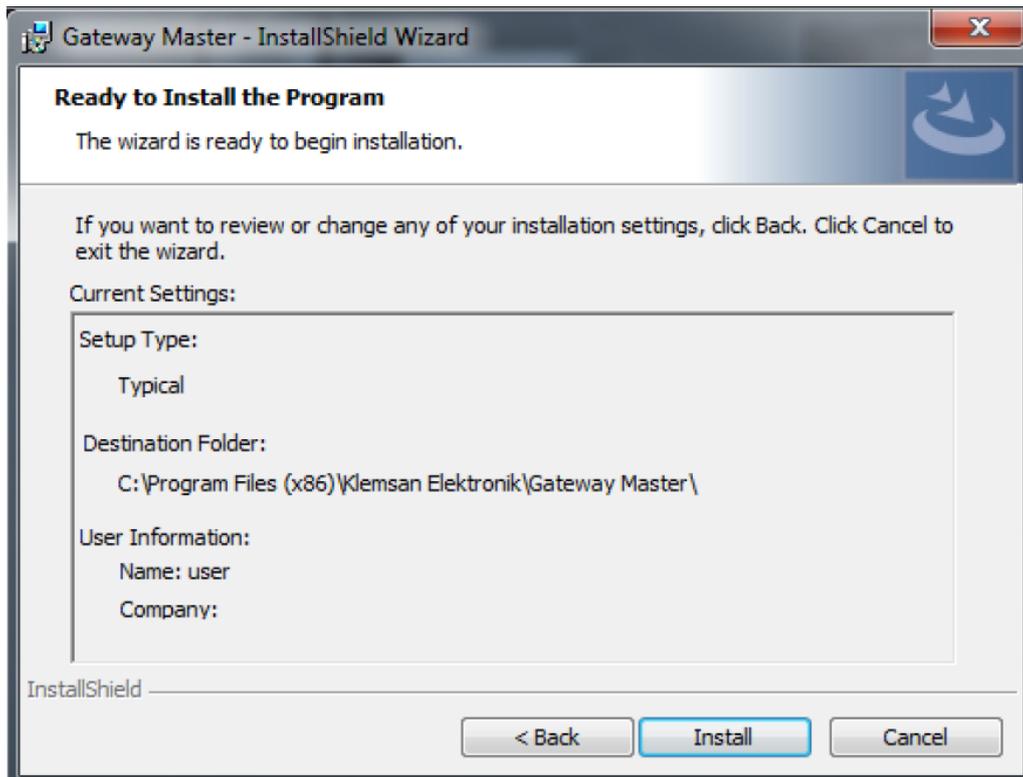


Figure 2-5 Installing Configuration Software (Step 2)

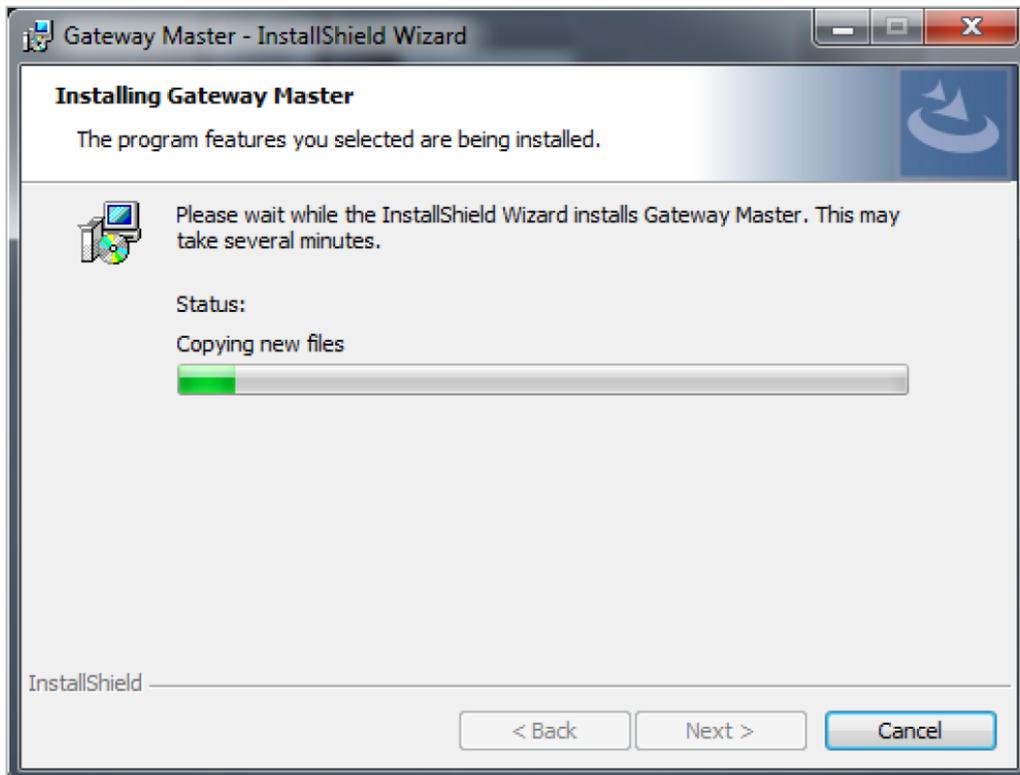


Figure 2-6 Installing Configuration Software (Step 3)

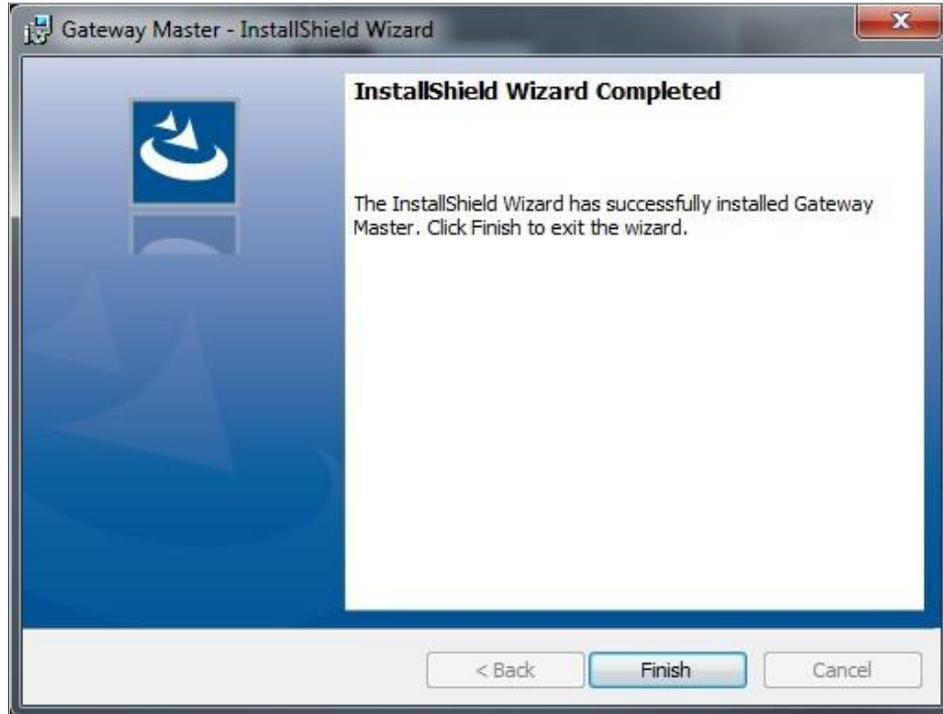


Figure 2-7 Installing Configuration Software (Step 4)

Setup wizard will show a list summarizing the content to be installed. Click the "Next" button again and start setup. When setup is completed, finish the setup by the word "Finish".

After click "Finish" button, USB Driver setup screen shown. The following screens will appear after the program installation for TES USB Driver installation. You can install the driver by following the steps.



Figure 2-8 Driver Setup (Step 1)



Figure 2-9 Driver Setup (Step 2)

When the installation is finished, click “Finish” to complete the installation and the Gateway Master is ready to use.

- The micro-USB cable must be connected between the computer where the configuration program is installed and the device.
- After that configuration software must be run. Configuration software can be accessed by the shortcut created from the Windows Start menu or by the shortcut created on the desktop.

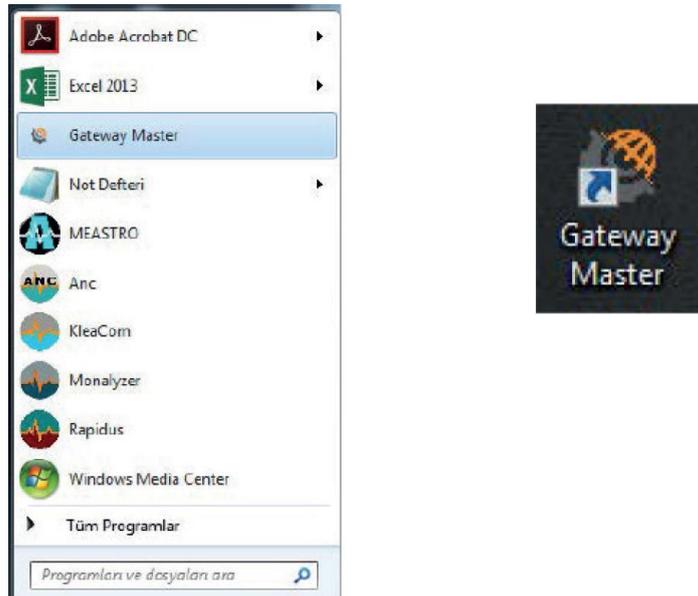
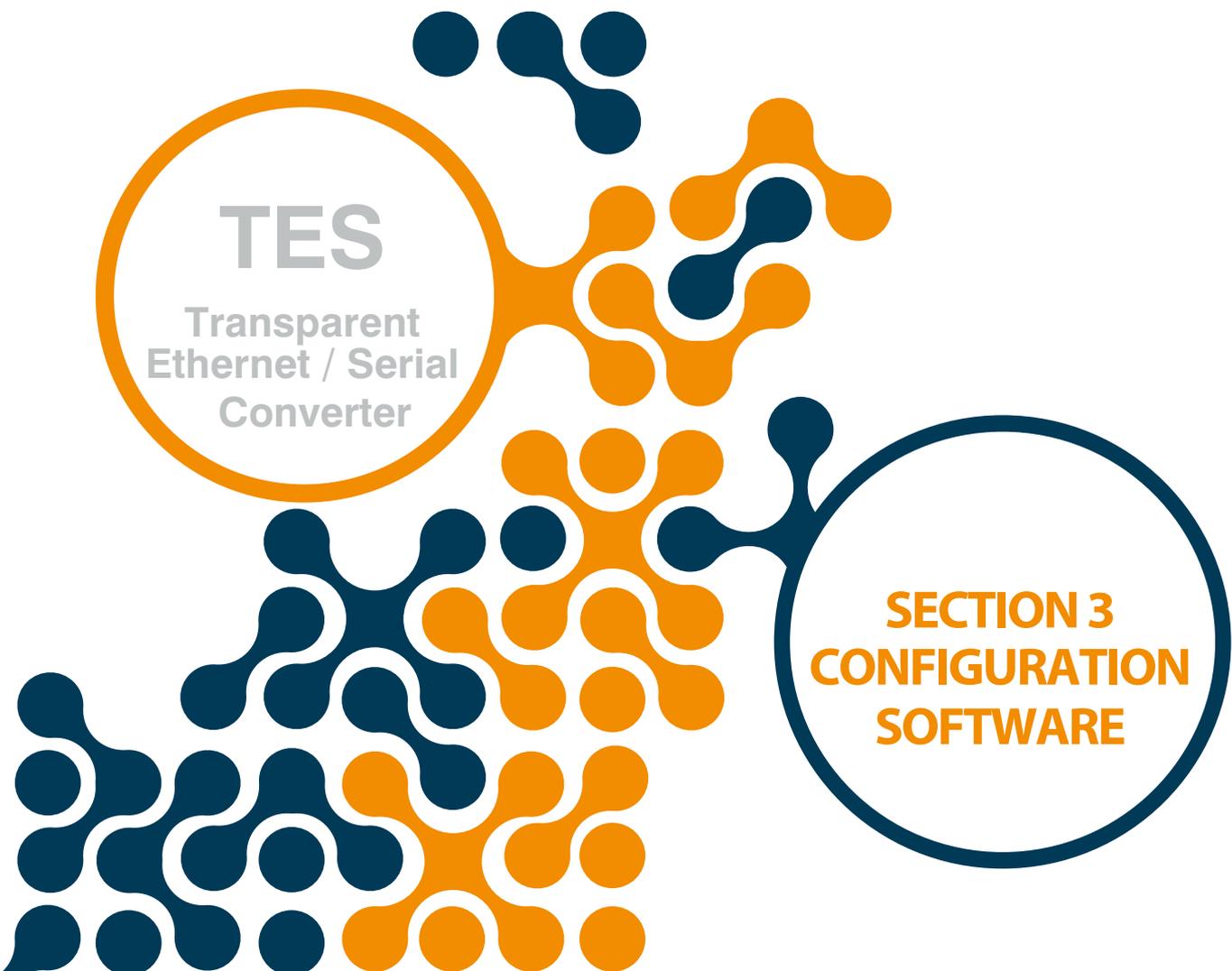


Figure 2-10 Shortcut of the Configuration Program



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**SECTION 3  
CONFIGURATION  
SOFTWARE**

## SECTION 3 CONFIGURATION SOFTWARE

After the steps in “Section 2” are completed successfully;

- TES must be connected to the PC via Micro-USB cable.
- After that configuration software must be run. Configuration software can be accessed by the shortcut created from the Windows Start menu or by the shortcut created on the desktop.

### 3.1 Connection Settings

#### 3.1.1 Connection Via USB

It is used to configure TES-4, to access product and production informations and to update the device firmware. The device can be powered via the USB port.

Under normal operating conditions, the device connection will be recognized by the computer as a virtual COM port. In this way, users can easily send JSON Rest API queries to TES-4 through their own software without provided configuration program.

If the USB interface is used for firmware update, the updating files provided by Klemsan must be used.

If the TES is connected to the PC via the USB cable, the virtual COM port which TES will be listed in the software as shown in Figure 3-2. If the correct port does not appear on the list, the list can be by updated clicking the “Refresh” button.

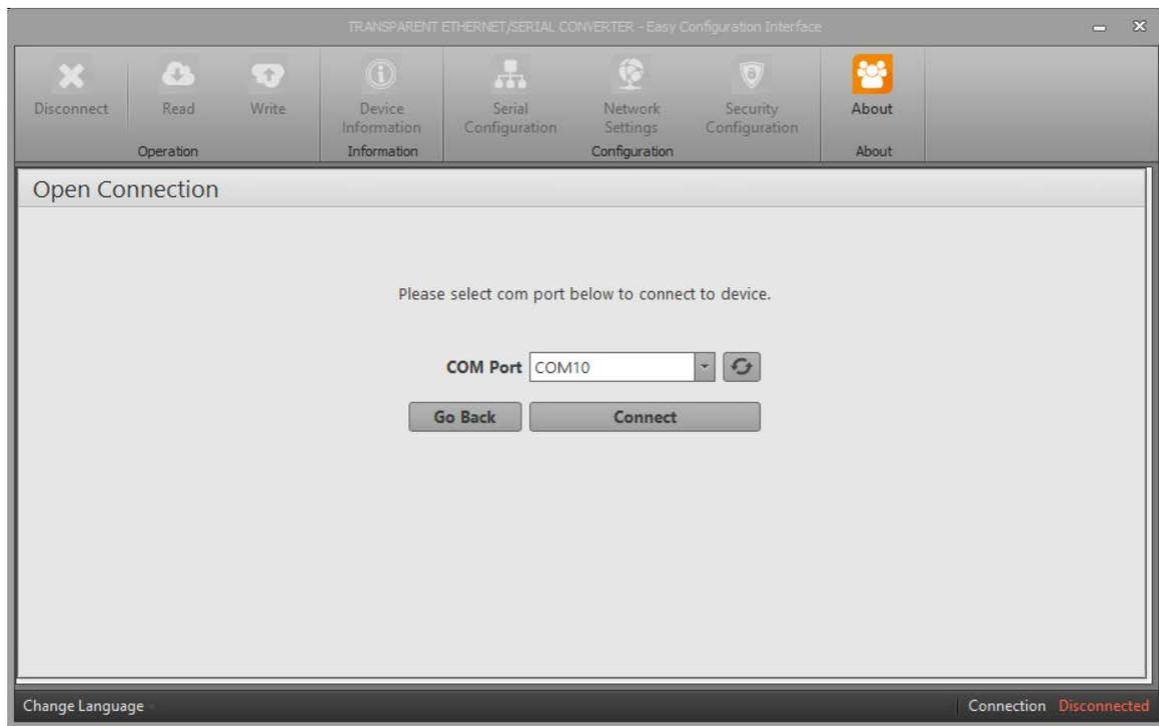


Figure 3-1 Virtual Com Port that TES is connected

**NOTE:** If the virtual serial port to which TES connects is not known, it can be selected as shown in Figure 3-2. After the correct port is selected, software connection to device is ensured by pressing “Connect” button.

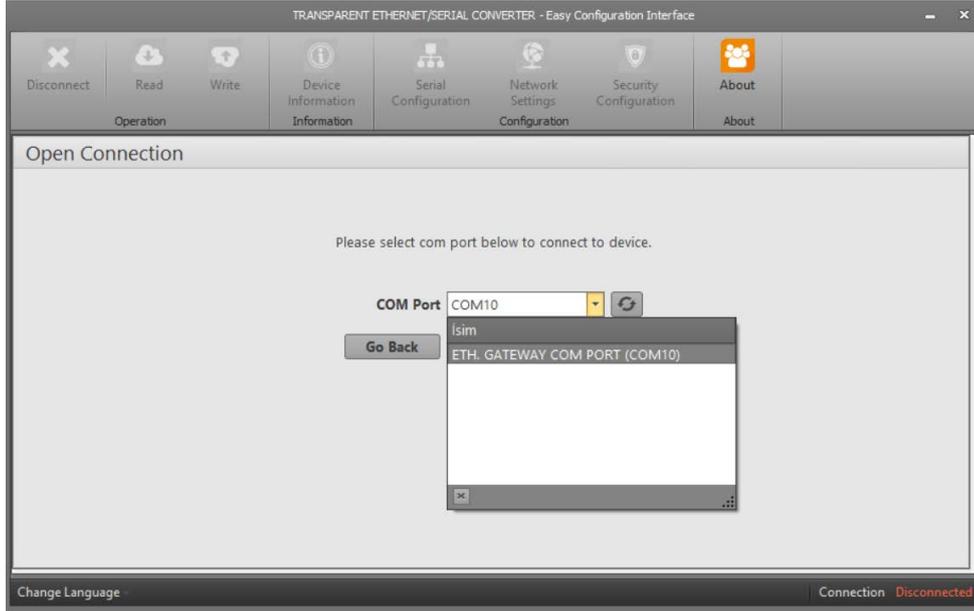


Figure 3-2 COM Port Selection

*NOTE: After the connection, “Device Information”, “Serial Configuration”, “Network Settings”, “Gateway Configuration”, “About”, “Disconnect”, “Read” and “Write” tabs will be enabled and they will be visible on the tabs concerning up-to-date configuration settings of the connected device. TES must not be disconnected from the USB without clicking the “Disconnect” button. “Security Configuration” will be enabled when connected via ethernet.*

### 3.1.1.1 Network Setting

In this tab, the network settings of TES are made:

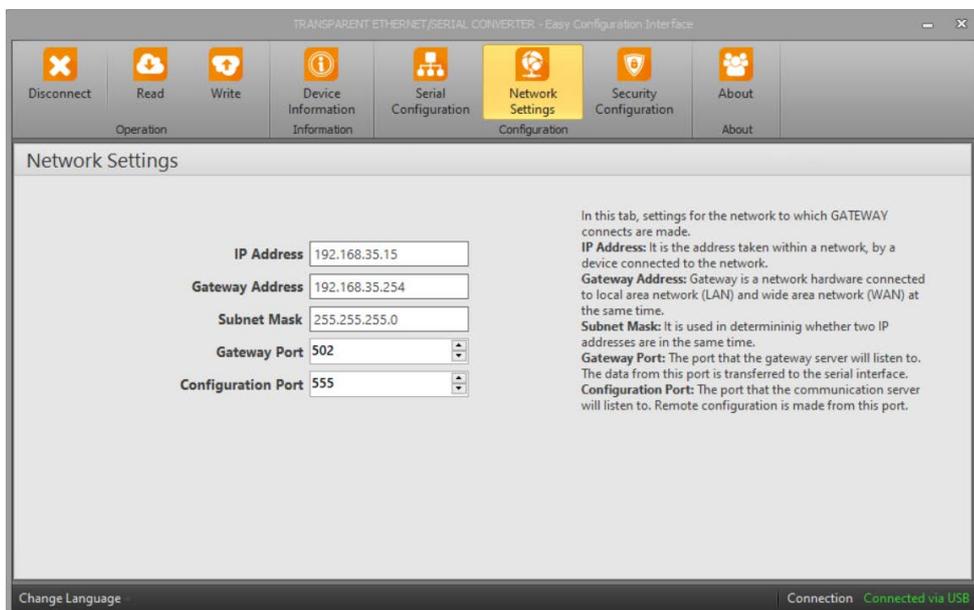


Figure 3-3 Network Settings

TES-4 can work in server role in TCP connection and it works in transparent type in this role.

**Server Role:**

TES-4 runs two servers at different ports for communication and gateway in the server role. Supports 1 communication connection(configuration, reading information) and 1 gateway connection.

**Server Role Settings:** The way TES-4 works on the server role can be customized with the following parameters:

**IP Adress:**

It is the address taken within a network, by a device connected to the network. It is a form of logical addressing but not physical addressing. With the provision that they are in different networks, there can be many devices with the same IP address . IP addresses can be changed by the user. In IPv4 standard, IP addresses are represented by 4 bytes. They are shown in the order of decimal numbers as follows:

**Example:**

192.168.35.15

**Gateway Address:**

Gateway is a network hardware connected to the local area network (LAN) and wide area network (WAN) at the same time. There are different IP addresses in the local area network and wide area network. Gateway address is the IP address of the gateway in the local area network. Data packages forwarded to this IP address are handled in the gateway and transferred to the wide area network.

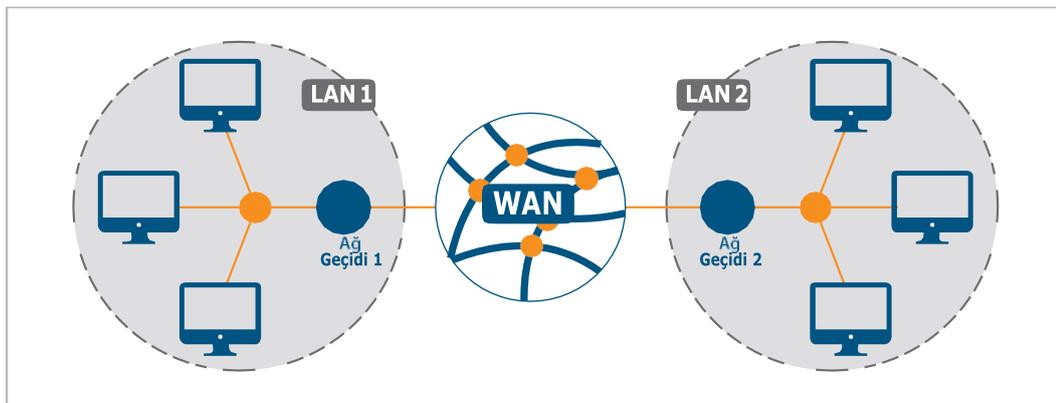


Figure 3-4 Operating Principle of The Gateway

**Subnet Mask:**

It is used in determining whether two IP addresses are in the same network or not. Values compatible with the network to which the converter connects should be entered in the appropriate fields. Default network settings of TES are as follows:

**Table 3-1 Default Network Settings of TES**

<b>IP Address</b>	192.168.35.15
<b>Gateway Address</b>	192.168.35.254
<b>Subnet Mask</b>	255.255.255.0
<b>Gateway Port</b>	502
<b>Configuration Port</b>	555

**Gateway Port:**

This is the port the gateway server will listen on. It can have a value between 1-65535. The default value is 502.

**Configuration Port:**

This is the port the communication server will listen on. It can have a value between 1-65535. The default value is 555.

### 3.1.1.2 Serial Configuration

For the correct data transfer, TES-4 serial parameters must be compatible with the devices on the serial line to which it is connected.

Serial communication can be set to permanent or instantaneous.

- To permanently set, the parameters must be saved after the parameters have been changed and the serial communication settings will be retained until the device is reset to the factory settings. Configurable via USB or TCP.
- There is no need to save for the momentarily changed serial settings to be active and the device is maintained for the period of time without power. Can only be configured over TCP.

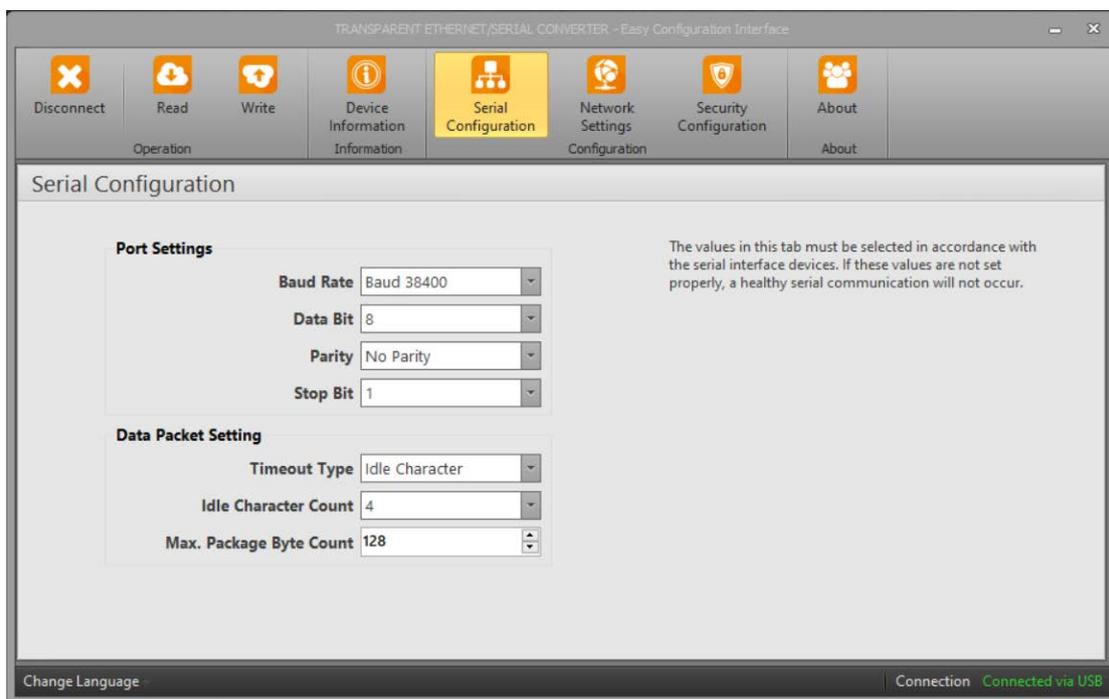


Figure 3-5 Serial Port Settings

#### 3.1.1.2.1 Port Settings

##### **Baud Rate:**

TES supports 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200 baud rates. (Default value:38400)

##### **Data Bit:**

7 and 8 data bit are supported. (Default value:8)

##### **Parity:**

Odd, even and no parity options are supported. (Default value: No parity)

##### **Stop Bit:**

1 and 2 stop bits are supported. (Default Value:1)



### 3.1.1.2.2 Data Packet Settings

TES-4 operates in transparent type and supports 1 gateway connection (connection to which queries will be send to the serial line).

The query direction is insigniycant. It transmits the remote incoming data to the serial line and the data from the serial line to the remote connection.

In this way, any device with RS-485 connection becomes able to communicate over the internet.

#### **Timeout Type:**

The timeout type can be set to either “number of characters” or “time”.

#### **Idle Character Count:**

If the number of characters to wait after the last incoming character is passed, the data is forwarded to the remote connection. It may vary depending on the protocol to be used.

#### **Duration:**

Sets the duration of the time to wait after the last character. The time calculation to be entered in the device settings is explained in the following example.

#### **Maximum Package Byte Count:**

When the data length from the serial line reaches the maximum packet length, the data is routed to the remote connection without waiting. It may vary depending on the protocol to be used. For example, this value must be entered as 256 for Modbus.

**Example:** Assume that the TES is used with serial devices that have Modbus protocol and the serial settings are as follows:

Start Bit:1

Baud Rate: 1200bit/sn

Data Bit: 8

Parity: 2 (Even)

Stop Bit:1

Total number of characters is calculated as  $8+2+2 = 12$

Baud Rate 1200, it means 1200 bits of data are sent per second. Since the total number of characters is 12, the time to be set is calculated as 12-bit data  $12/1200 = 10\text{ms}$ .

### 3.1.1.3 Device Information - Firmware Updates

This tab contains product and production informations.

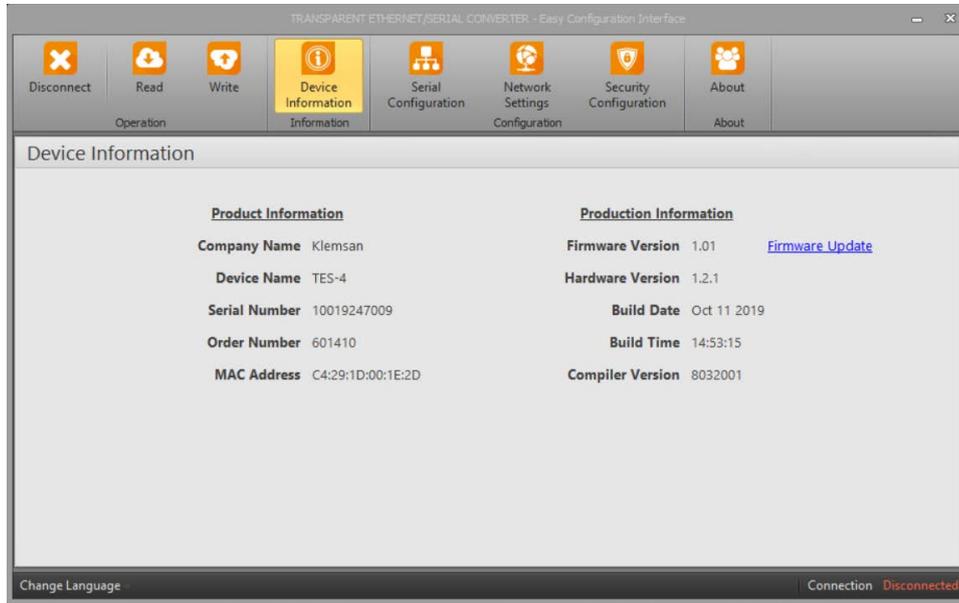


Figure 3-6 Device Information

In addition, the firmware version can be updated with the "Firmware Update" option under this tab. You can contact our technical support team to update the software.

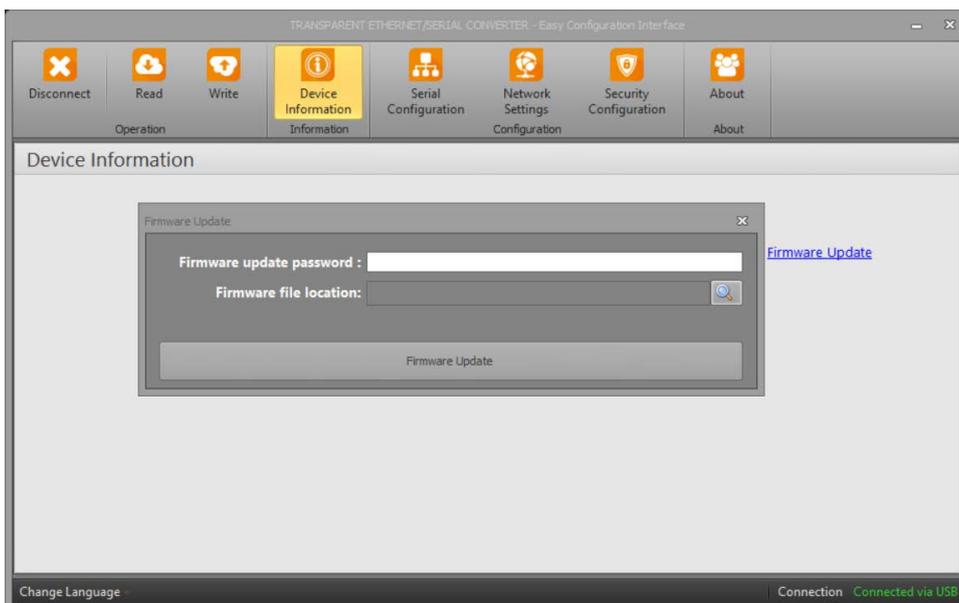


Figure 3-7 Firmware Update

### 3.1.1.4 Security Configuration

Under this tab, the required password when connecting via ethernet can be changed .

For the reason that TES is a device that can be accessed from the Internet, it is important to change the default password for security. Desired password must be written both on the “Password” and “Password(Again)” areas.

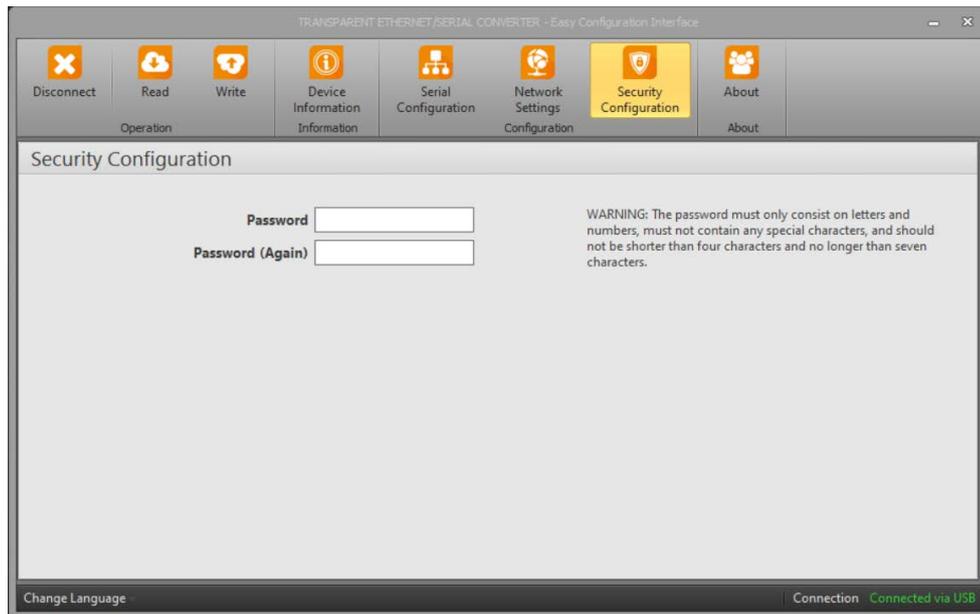


Figure 3-8 Security Settings

After the desired configurations are made, settings can be saved by pressing the “Write” button.

### 3.1.2 Connection via Ethernet

In this tab, you can connect via the Internet using the Gateway Master software. When the program starts; click "Connect via Ethernet" to enter the access information.

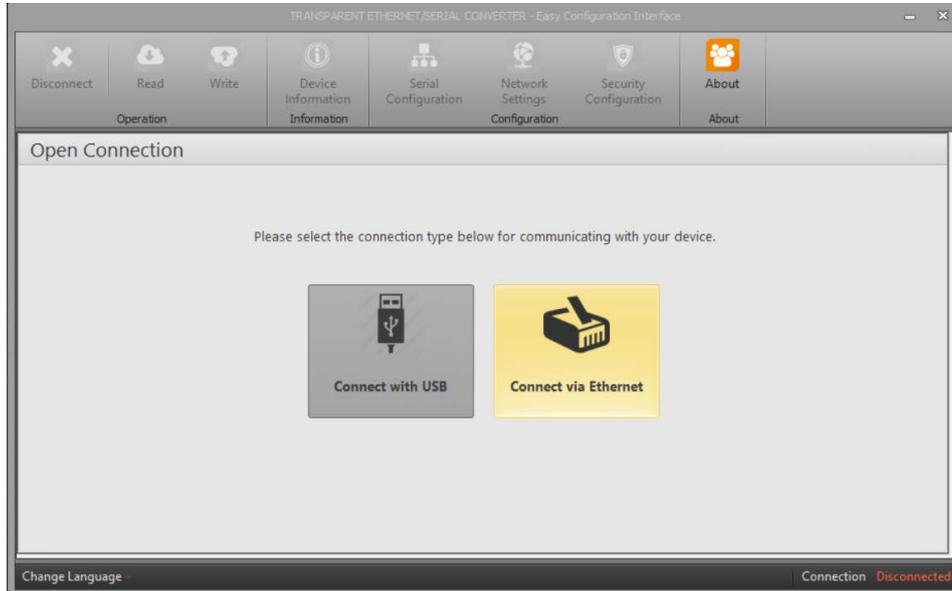


Figure 3-9 Connection via Ethernet

Factory settings shown below:

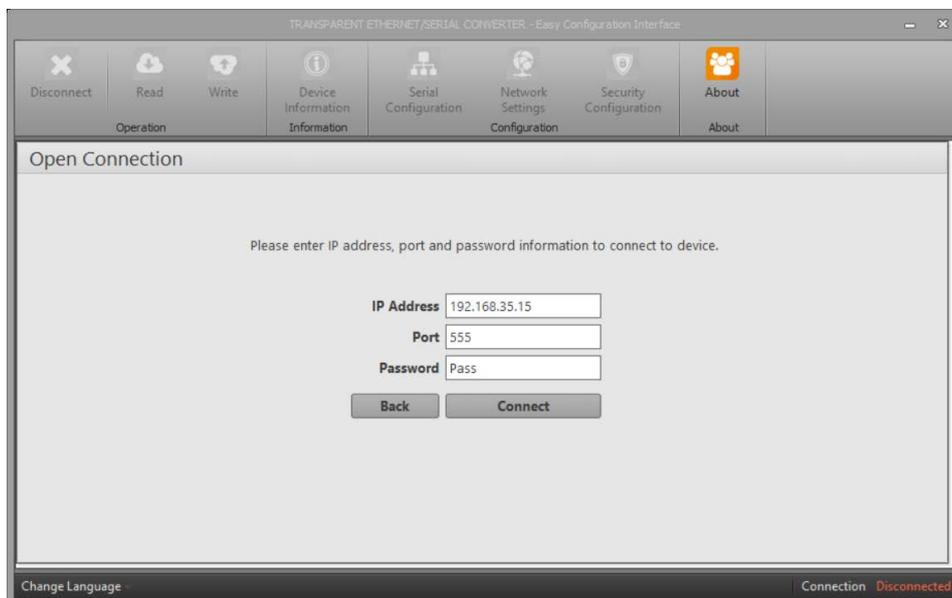
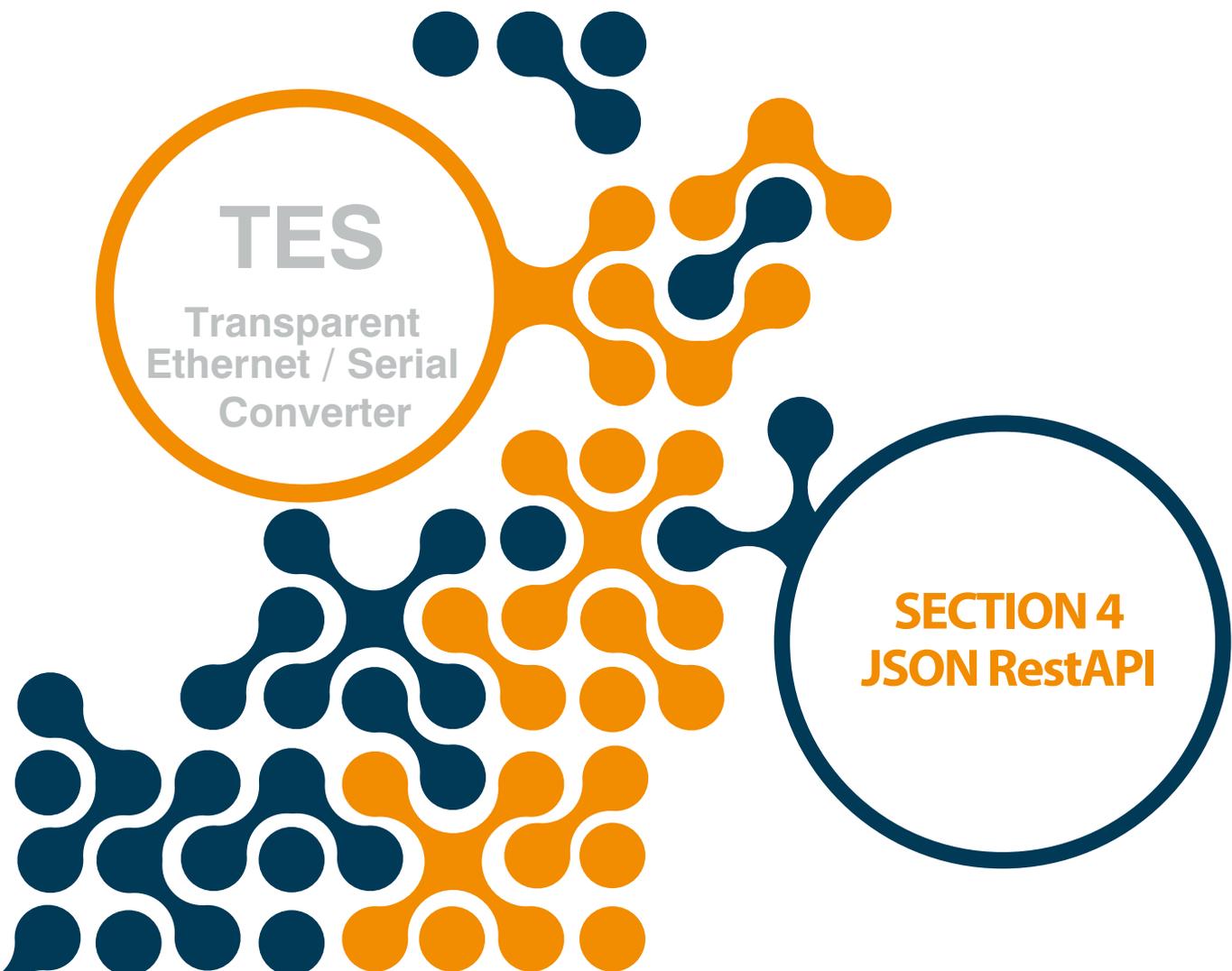


Figure 3-10 Connection via Ethernet

**NOT:**The "port" value is the configuration port value as it is connected to the device via the user interface program.

After the desired configurations are made, the settings can be saved by pressing the "Write" button.



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**SECTION 4**  
**JSON RestAPI**

## SECTION 4 JSON RestAPI

TES has the interface to read device information, read / write configuration data, and read / delete recording data, regardless of any program.

Using standard HTTP methods (GET, PUT, POST), the desired data can be read or written in JSON format.

### 4.1 General Communication Settings

This section describes the general communication parameters. The device communicates with two different interfaces.

These interfaces are remote connection and USB. Unless otherwise specified, all parameters in the document can be used for remote connection and communication via USB.

**Authentication:**

"Basic" authentication algorithm ensures communication security. The user name is always "user". The user password is the password specified in the configuration.

**Required HTTP Header Fields and Values**

**HTTP Method:** GET | POST | PUT | DELETE

**HTTP Version:** HTTP/1.1 | HTTP/2

**Server (Only valid on remote connection): Host:**  
AAA.BBB.CCC.DDD:PPP (IPAddress:PortNumber)

**URL:** The required data will be described in the following pages of the document depending on the subjects.

**Content Type:** Content-Type: application/json

**Authentication (Only valid on remote connection): Authorization:** Basic xxxxxxxxxxxxxx

- "Query Successful" Answer:

The answer is that the query is correct.

Code 200: OK.

- "Query Inaccurate" Answer:

The answer is that the query is wrong.

**Code 400 Bad Request:** This error will be returned if a non-valid request, incorrect content type, unsupported http method, non-valid json parameter is sent.

**Code 401 Unauthorized:** This error will be returned if an incorrect user name / password has been entered.

**Code 404 Not Found:** This error will be returned if the requested resource cannot be found.

## 4.2 Serial Configuration

The functions for reading and writing serial communication data are given in this section.

- URL

/settings/serial

- Method:

GET | PUT

- Data Parameters

Baudrate: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200

Parameter: 7E1, 7E2, 7O1, 7O2, 8N1, 8N2, 8E1, 8E2, 8O1, 8O2

Receive Complete Type: idle, time

Idle Char Num : 1, 2, 4, 8, 16, 32, 64, 128

maxPacketLength : 0 – 256

Timeout Duration: 1000 - 10000 msec

```
{
  "baudrate": 38400,
  "parameter": "8N1",
  "receiveCompleteType": "idle",
  "serialIdleChar": 4,
  "maxPacketLength": 128
}

{
  "baudrate": 38400,
  "parameter": "8N1",
  "receiveCompleteType": "time",
  "duration": 1000,
  "maxPacketLength": 128
}
```

### 4.3 Instant Serial Configuration

This section describes the functions that enable the instant serial communication data to be read and written.

- URL

/runtime/serial

- Method:

GET | PUT

- Data

Parameters

Baudrate: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200

Parameter: 7E1, 7E2, 7O1, 7O2, 8N1, 8N2, 8E1, 8E2, 8O1, 8O2

Receive Complete Type: idle, time

Idle Char Num : 1, 2, 4, 8, 16, 32, 64, 128

maxPacketLength : 0 - 256

Timeout Duration: 1000 - 10000 msec

```
{
  "baudrate": 38400,
  "parameter": "8N1",
  "receiveCompleteType": "idle",
  "serialIdleChar": 4,
  "maxPacketLength": 128
}

{
  "baudrate": 38400,
  "parameter": "8N1",
  "receiveCompleteType": "time",
  "duration": 1000,
  "maxPacketLength": 128
}
```

## 4.4 Network Settings

This section describes the functions that enable the serial communication data to be read and written.

- URL

/settings/  
network

- Method:

GET | PUT

- Data Parameters

Baudrate: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200

Gateway Address: AAA.BBB.CCC.DDD

Subnet Mask: EEE.FFF.GGG.HHH

Source IP: III.JJJ.KKK.LLLL

Gateway Port: 0 - 65536

Communication Port: 0 – 65536

```
{  
  "gatewayAddress": "192.168.35.254",  
  "subnetMask": "255.255.255.0",  
  "sourceIP": "192.168.35.15",  
  "gatewayPort": 502,  
  "communicationPort": 555  
}
```

## 4.5 Security Configuration

This section describes the functions that enable the data about security to be read and written.

- URL

/settings/security

- Method:

GET | PUT

- Data Parameters

password: up to 12  
characters.

```
{  
  "password": "Pass"  
}
```

## 4.6 All Configurations

This section describes the functions that enable the all data to be read and written.

- URL

/settings

- Method:

GET | PUT

- Data Parameters

**serial:** The parameters are described in detail in "Serial Communication Settings" section.

**network:** The parameters are described in detail in "Network Settings" section.

**security:** The parameters are described in detail in "Security Settings" section.

```
{
  "serial":
  {
    "baudrate":9600,
    "parameter":"8N1",
    "receiveCompleteType":"time",
    "duration":2000,
    "maxPacketLength":256
  },
  "network":
  {
    "gatewayAddress":"192.168.35.254",
    "subnetMask":"255.255.255.0",
    "sourceIP":"192.168.35.15",
    "gatewayPort":502,"communicationPort":555
  },
  "security"
  {
    "password":"Pass"
  }
}
```

## 4.7 Product Information Functions

This section describes the functions that enable the product information data to be read.

- URL

/info

- Method:

GET |

- Data Parameters

**product:** Contains product information

**production:** Contains production information.

```
{  
  "product":  
  {  
    "mac": "C4:29:1D:12:34:56",  
    "companyName": "Klemsan",  
    "deviceName": "TES-4",  
    "serialNumber": "123456",  
    "orderNumber": "601410"  
  },  
  "production":  
  {  
    "firmwareVer": "1.00",  
    "pcbVer": "1.2.1",  
    "buildDate": "Apr 11 2019",  
    "buildTime": "16:34:17",  
    "compilerVer": "8032001"  
  }  
}
```

## 4.8 All Data

This section describes the functions that enable the product all data to be read.

- URL

/

- Metod:

GET |

- Data Parameters

settings: This is where the data about the settings comes from.

info: This is the section where product and production information data comes from.

```
{
  "settings": {
    "serial": {
      "baudrate": 38400,
      "parameter": "8N1",
      "receiveCompleteType":
      "idle", "serialIdleChar": 4,
      "maxPacketLength": 128
    },
    "network": {
      "gatewayAddress":
      "192.168.35.254", "subnetMask":
      "255.255.0.0",
      "sourceIP": "192.168.35.15",
      "gatewayPort": 502,
      "communicationPort": 555
    },
    "security": {
      "password": "Pass"
    }
  },
  "info": {
    "product": {
      "mac": "C4:29:1D:12:34:56",
      "companyName":
      "Klemsan", "deviceName":
      "TES-4",
      "serialNumber": "123456",
      "orderNumber": "601445"
    },
    "production": {
      "firmwareVer": "1.00",
      "pcbVer": "1.2.1",
      "buildDate": "Apr 11
      2019", "buildTime":
      "16:10:39",
      "compilerVer": 8022002
    }
  }
}
```

## 4.9 Command Function

This is the section where the command functions are explained.

- URL

/ command

- Method:

POST

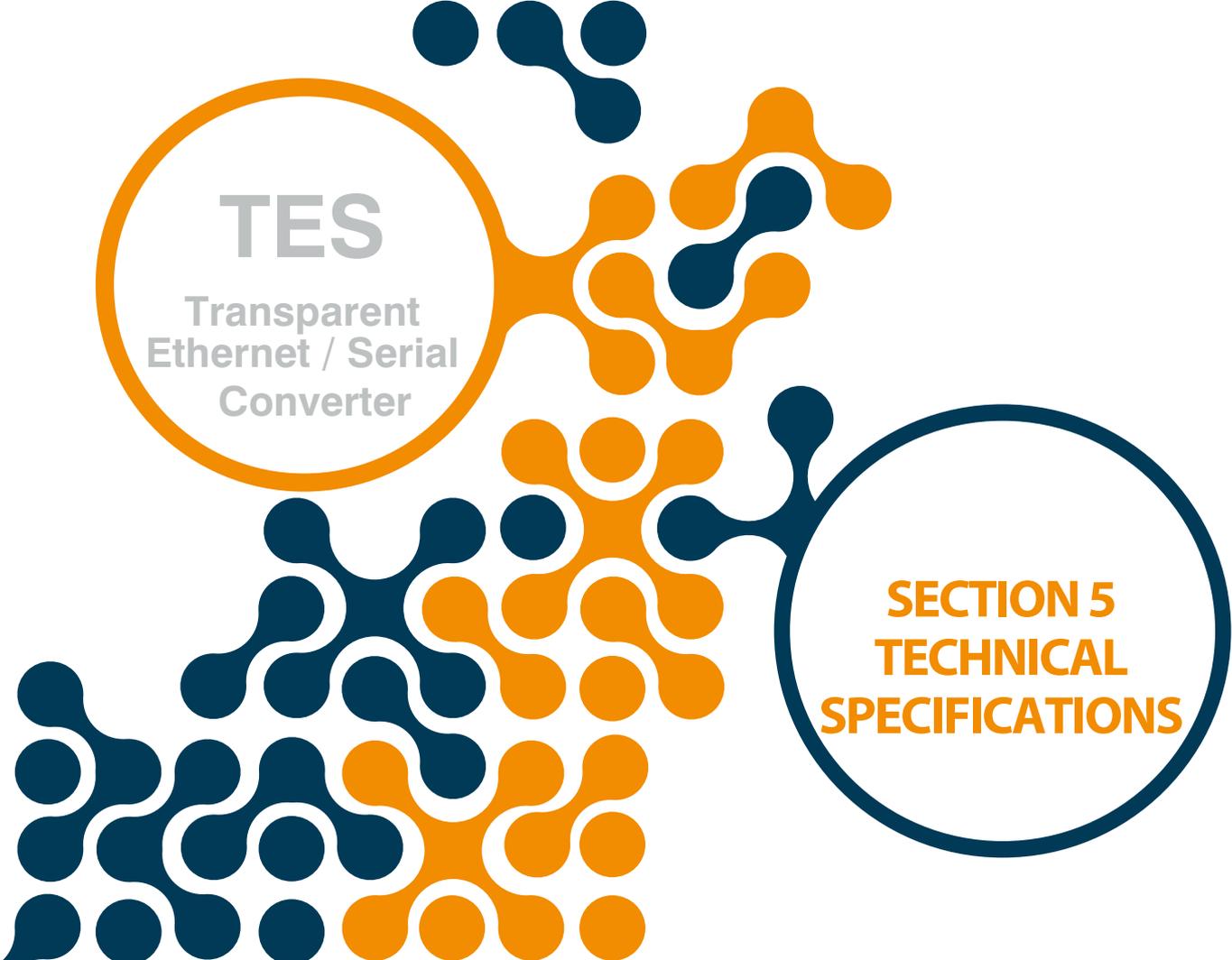
- Data Parameters

command: "save-config" (Allows the modified configuration to be stored in non-erasable memory)

command: "restart" (Restart the device)

command: "return-config-to-default" (Allows the device to be reset to factory defaults)

```
{  
  
  "command": "save-config"  
  
}  
{  
  
  "command": "restart "  
  
}  
{  
  
  "command": "return-config-to-default "  
  
}
```



**TES**  
Transparent  
Ethernet / Serial  
Converter

**SECTION 5  
TECHNICAL  
SPECIFICATIONS**

## SECTION 5 TECHNICAL SPECIFICATIONS

### Power Supply

Voltage..... U1-U2 input, 18-50V AC/DC or USB port  
Consumption.....<1.2W and <2.2VA  
Operating Temperature..... -10...60 °C  
Isolation..... 1.5kV RMS

### Serial Communication

Supports up to 64 Devices  
Baudrate..... 300 ... 115200  
Stop Bit..... 1,2  
Parity Bit Configuration..... No, Even, Odd  
Data..... 7 and 8 Bits

### Ethernet

10/100 Base-TX

### Configuration

USB  
JSON RestAPI

### Supported Roles

Server Role

### Operation Types

Transparent

### USB

Configurable via  
USB Micro USB  
Interface Software  
update

## Dimensions

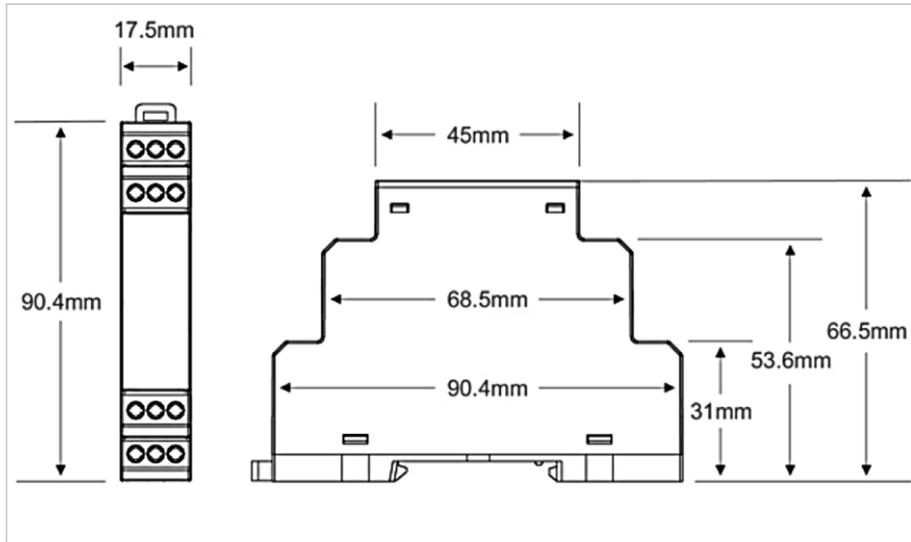


Figure 5-1 Dimensions

