

## Application Note

### Basic Instructions to Communicate with TESLA



#### Compatibility

- TESLA model: **4000**
- Firmware version: **2.1**
- TCP version: **3.1**

## Contents

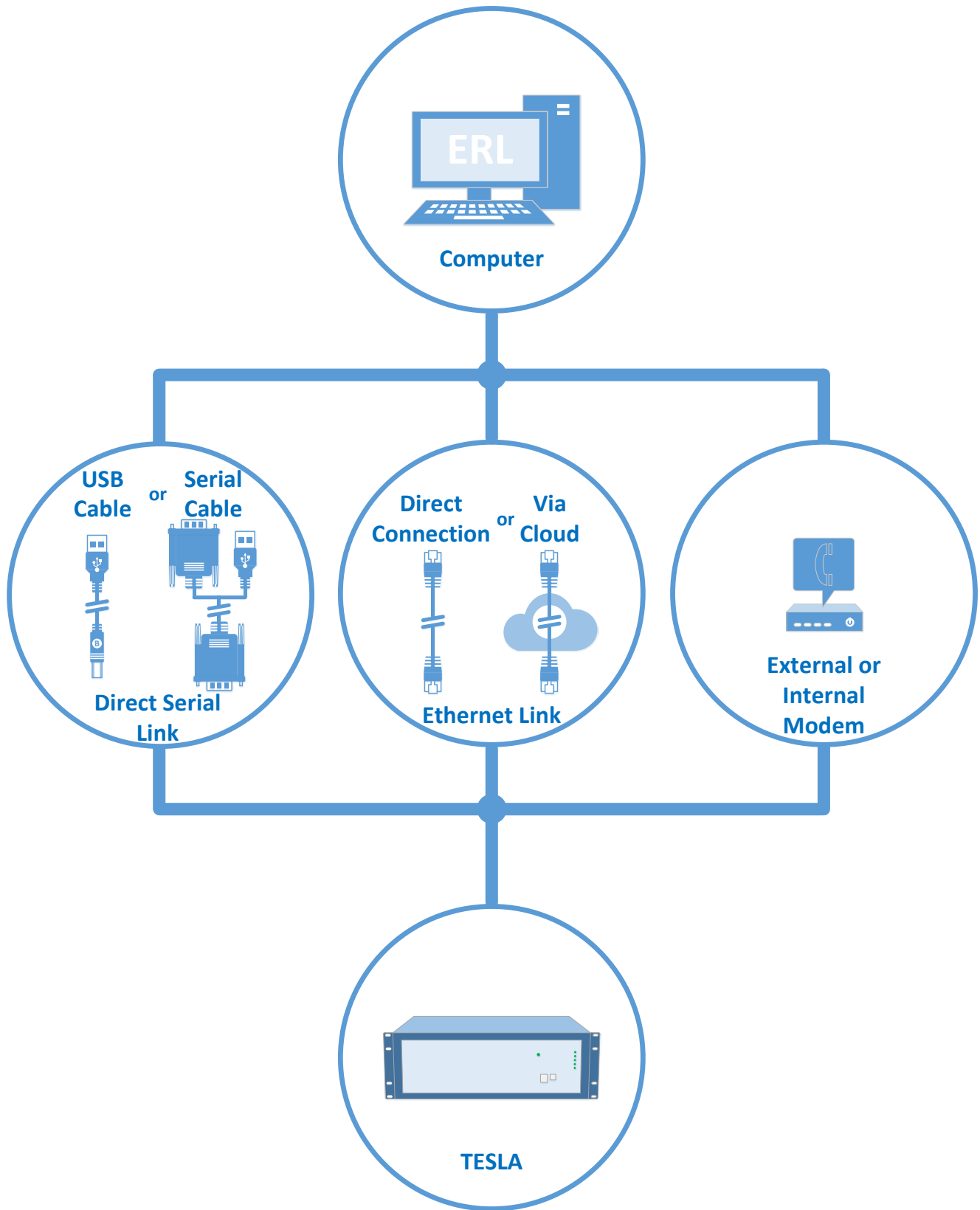
TESLA Communication Options and Ports .....	2
Ports .....	4
Front .....	4
Rear .....	5
Setting up Computer for TESLA Communication.....	6
Installing TESLA Control Panel (TCP).....	6
Installing and Configuring ERLPhase USB Driver .....	6
Configuring Null Modem Drive .....	9
Cyber Security - Role Based Access Control (RBAC) .....	15
Roles Summary.....	16
Default Accounts and Passwords .....	17
Communicating with TESLA Using TCP.....	18
Adding a new TESLA .....	18
Selecting “Communication” .....	19
Network Link (Ethernet Cable) .....	20
Direct Serial Link (USB Cable).....	22
Direct Serial Link (RS-232 cable).....	24
Modem Link .....	26
Editing “Communication” Link and Connecting to a Configured TESLA Unit.....	26
Terminal User Interface (UI) Service.....	31
Network Configuration Recovery Utility (Port 401 IP Address) .....	31
Security Configuration Restoration to Factory Defaults.....	33

## TESLA Communication Options and Ports

The TESLA recorder has multiple communication ports for local and remote access to its user interface and SCADA services.

Connect to the recorder to access its user interface and SCADA services by:

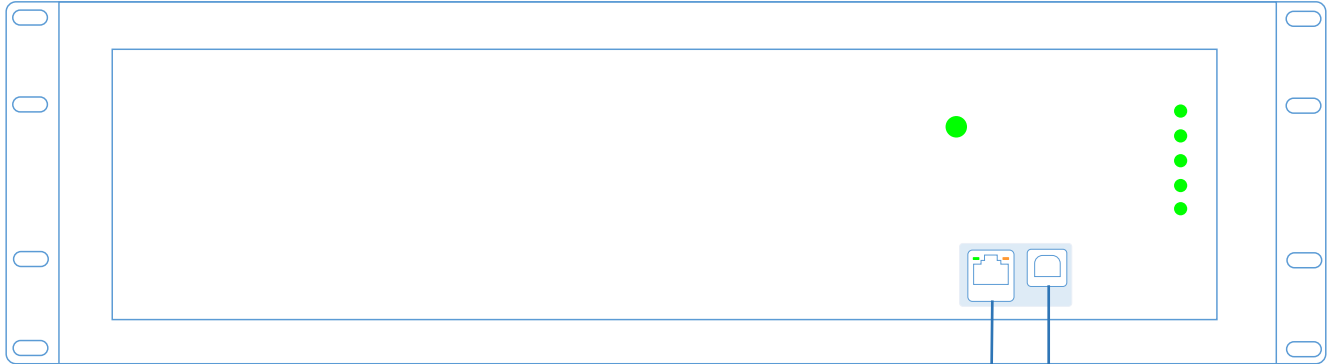
- Front USB 2.0 interface (user interface)
- Front or rear copper or optical Ethernet network link (user interface, SCADA and IEC 61850)
- Direct serial link (user interface and SCADA)
- External or internal modem link (user interface only)



## Ports

The various communication ports for local and remote access to TESLA's user interface are shown in the figures below:

### Front



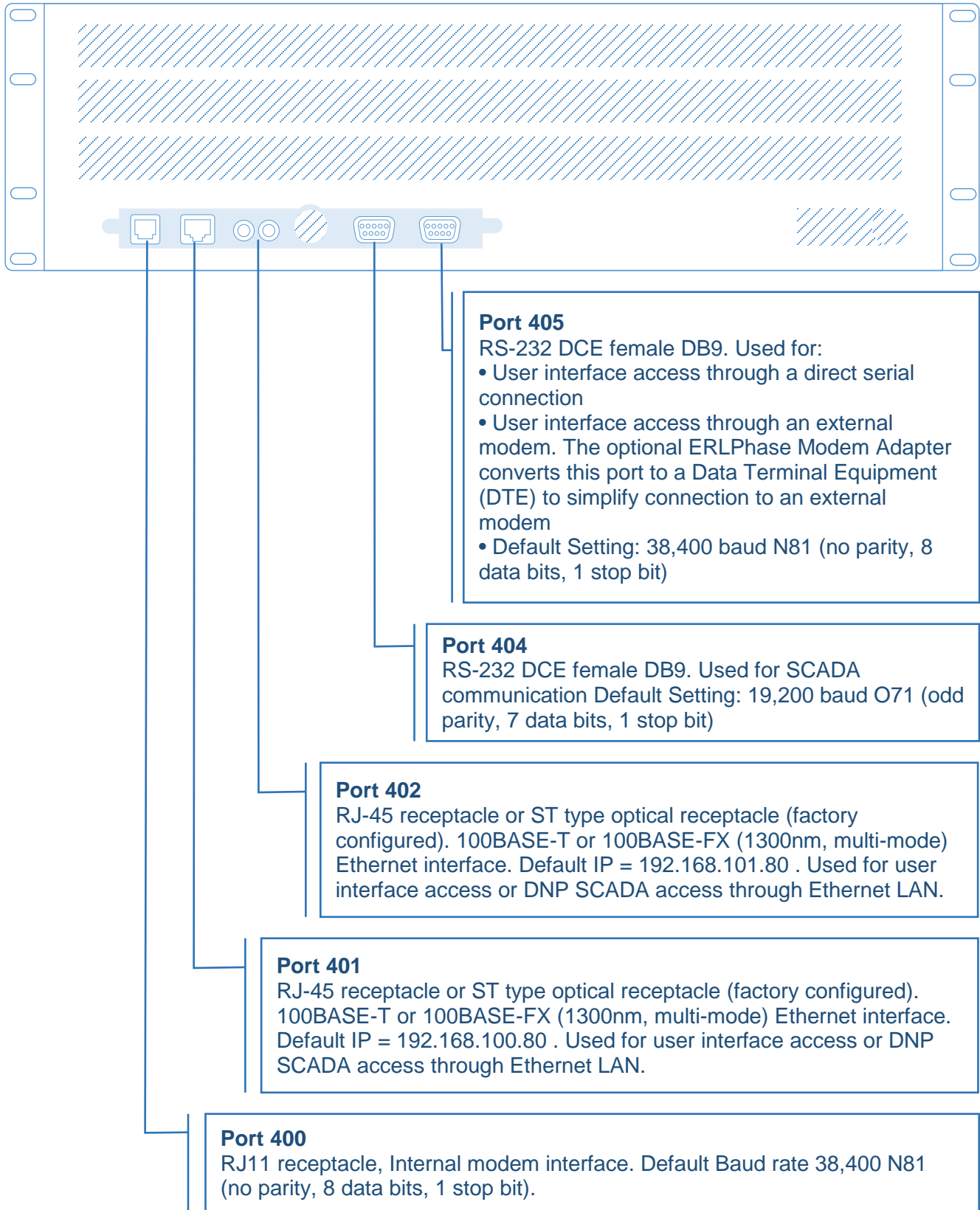
#### Port 401

RJ-45 receptacle, 100BASE-T Ethernet interface. Default IP =192.168.100.80. Used for user interface access or SCADA access through Ethernet LAN. \* An extension of rear 401 port.

#### Port 450

USB-B receptacle, High speed USB 2.0 interface. Used for user interface access. Default fixed baud rate 115,200 N81 (no parity, 8 data bits, 1 stop bit).

## Rear



## Setting up Computer for TESLA Communication

Before communicating with TESLA, the following 3 pieces of software must be installed and / or configured on your computer:

- TESLA Control Panel (installed)
- ERLPhase USB Driver (installed and configured)
- Null Modem Driver (configured)

Find this software from ERLPhase website (<http://www.erlphase.com>).

### Installing TESLA Control Panel (TCP)

[http://erlphase.com/downloads/software/TESLA\\_4000\\_Control\\_Panel\\_Installation.zip](http://erlphase.com/downloads/software/TESLA_4000_Control_Panel_Installation.zip)

Run the executable installation file “*D02791R03.10 - TESLA 4000 Control Panel Installation.exe*”.

**! Choose 50 or 60 Hz, depending on your application.**

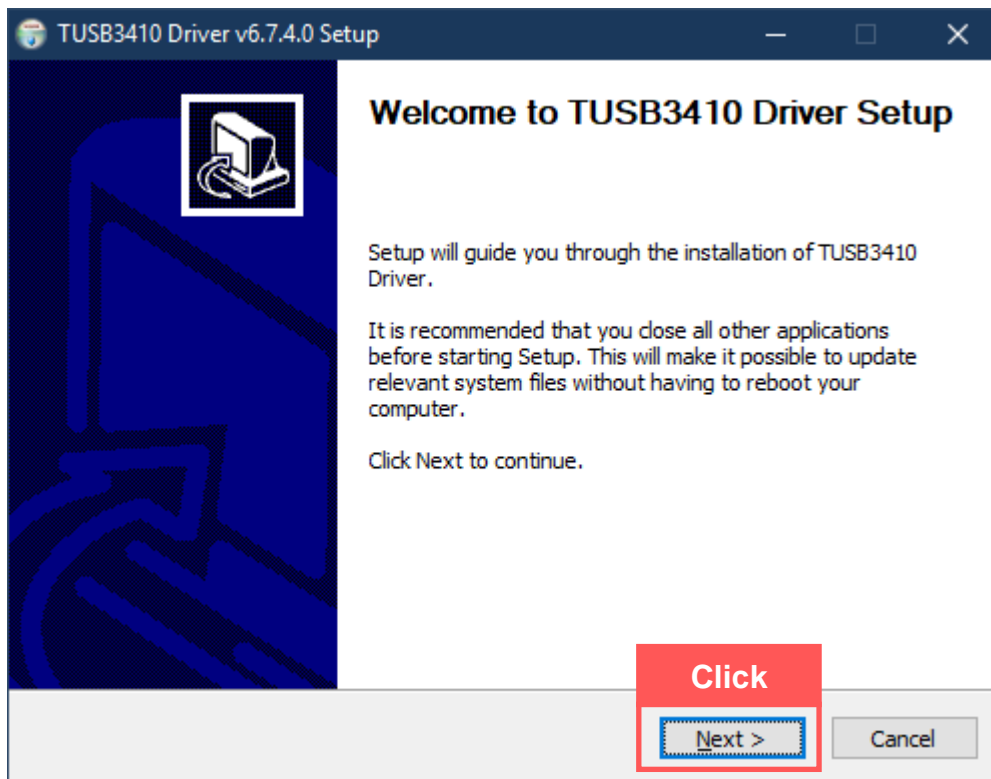
Note: Microsoft Windows security may prevent non-administrative user accounts from storing data under C:\Program Files(x86); it may be necessary to change the default record and config storage locations for the IEDs.

### Installing and Configuring ERLPhase USB Driver

[http://erlphase.com/downloads/software/ERLPhase\\_USB\\_driver.zip](http://erlphase.com/downloads/software/ERLPhase_USB_driver.zip)

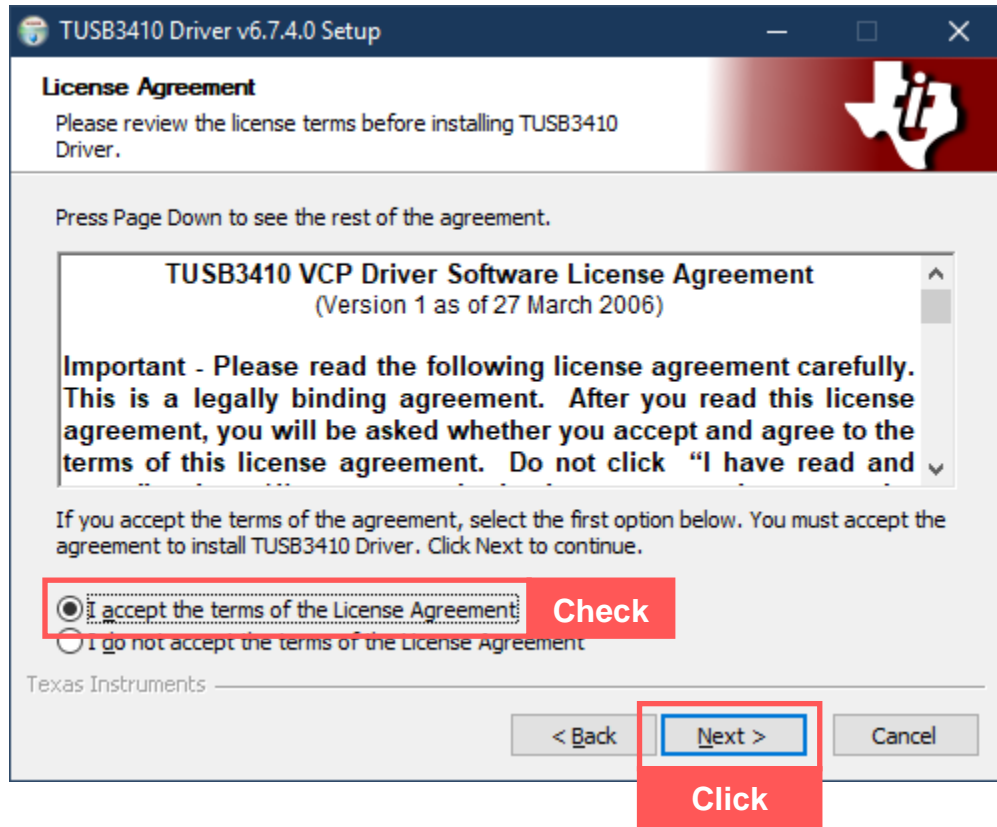
Run the executable installation file “*ERLPhase\_USB\_Driver\_Setup\_v1.exe*”.

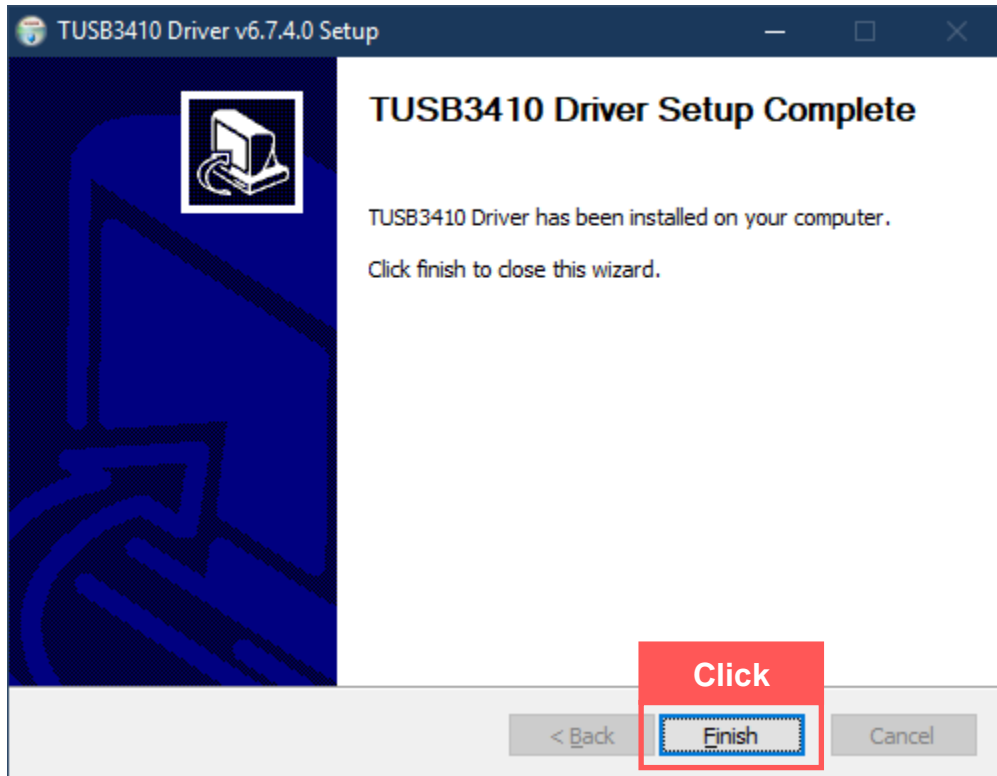
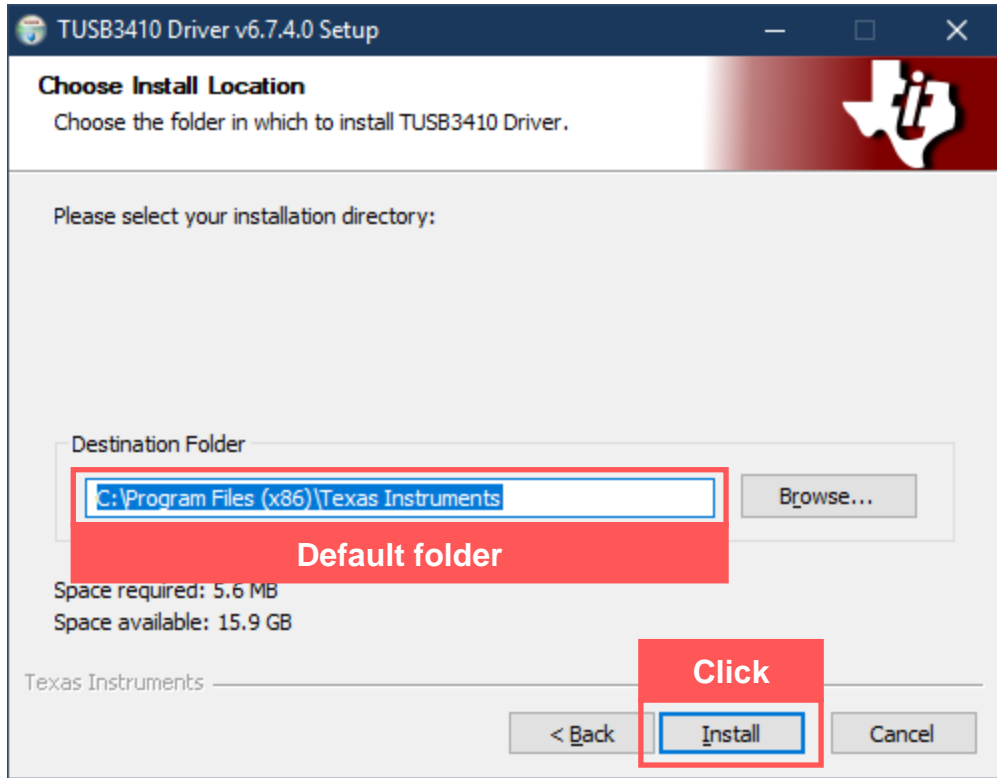
Follow the steps shown below:



If either of the following messages appears, click “Install this driver software anyway” (or “Continue anyway”):

- “Windows can’t verify the publisher” (Windows 7)
- “The software you are installing has not passed Windows logo testing to verify its compatibility with Windows XP” (Windows XP)



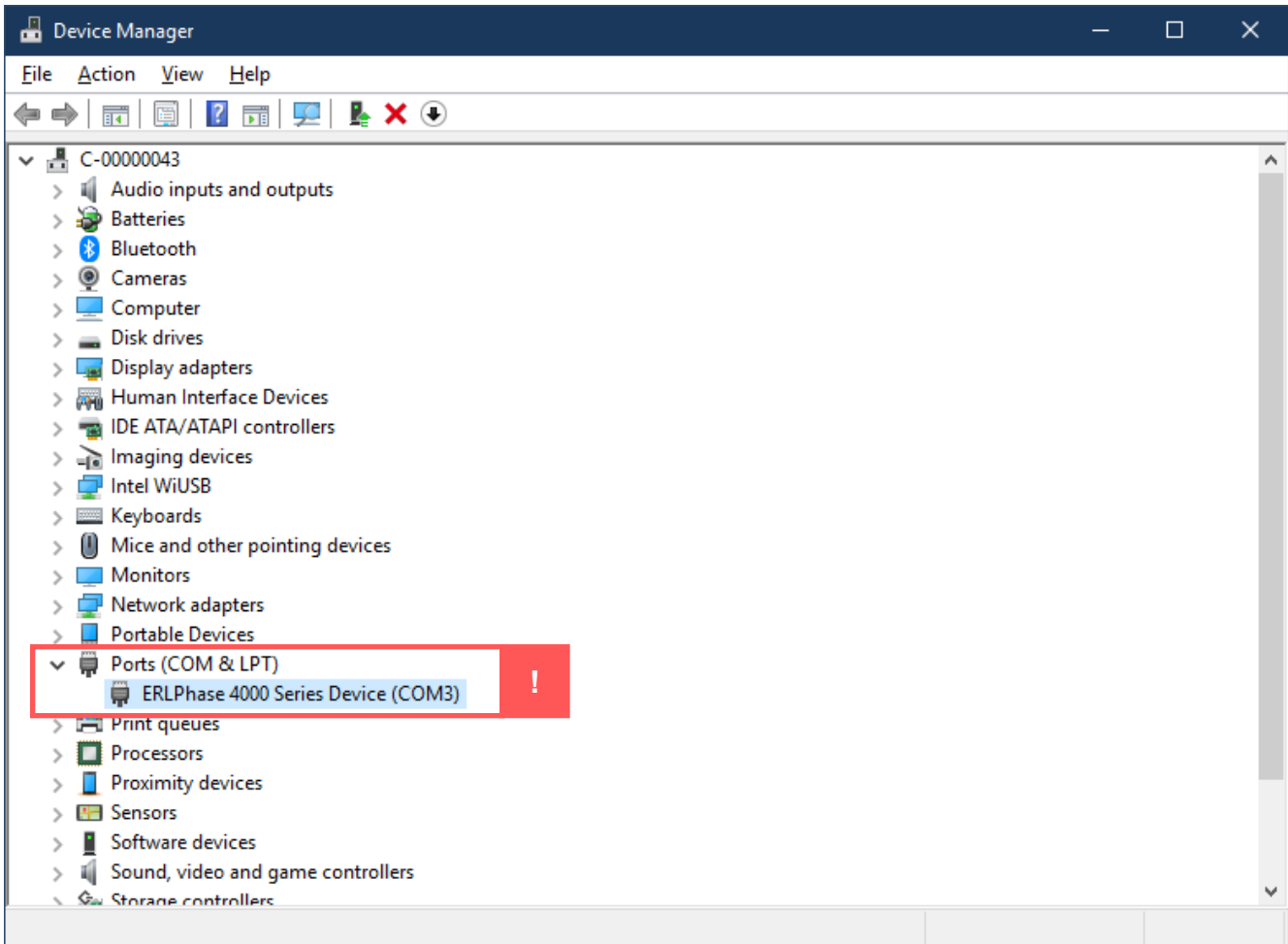




**! Connect TESLA 4000 (front USB-B Receptacle Port 450) to your computer using a USB cable.**

Microsoft “Found New Hardware” wizard may appear.

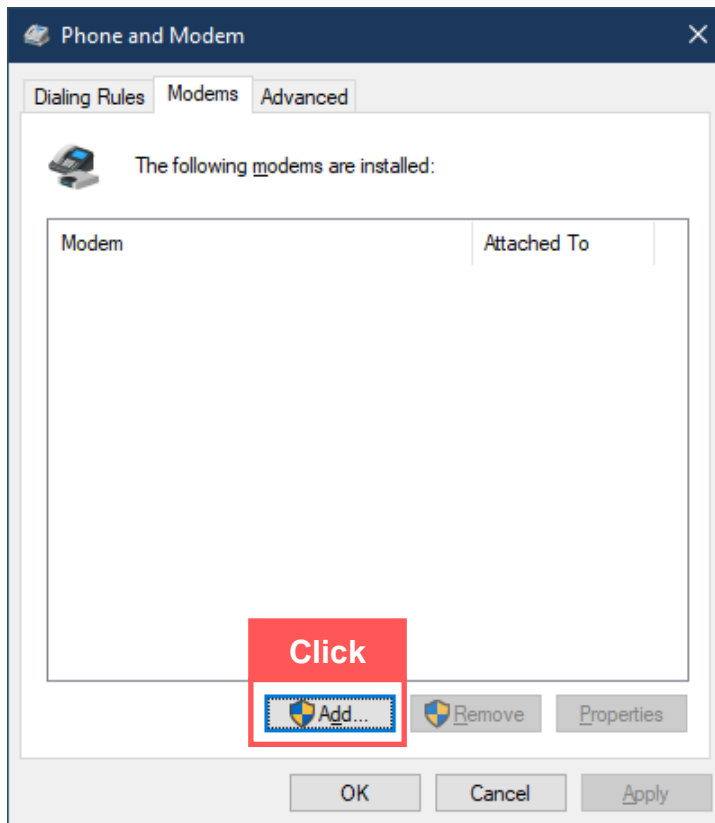
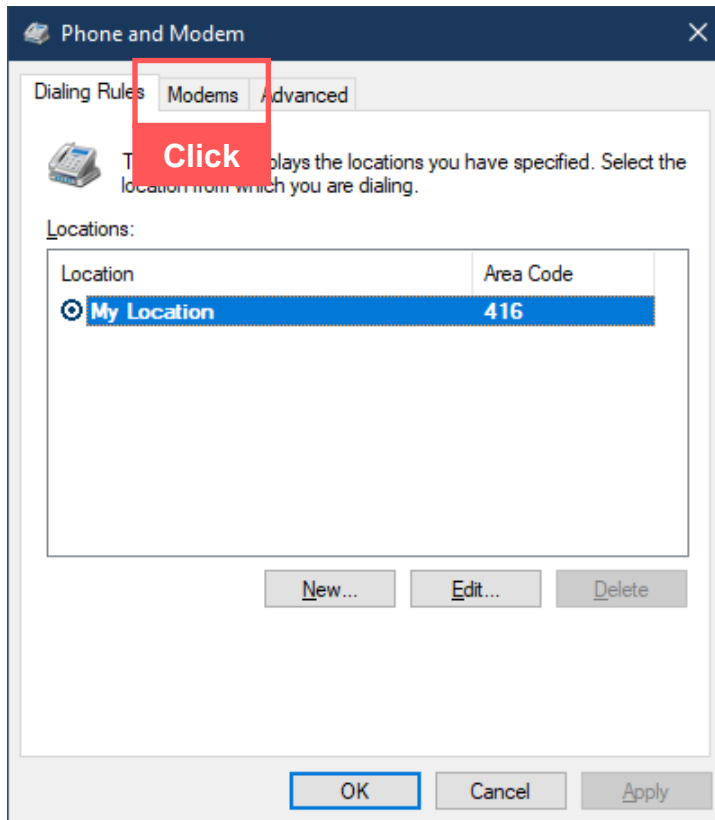
To verify the proper installation of ERLPhase USB Driver, go to MS Windows ‘**Device Manager**’ and follow the following steps:

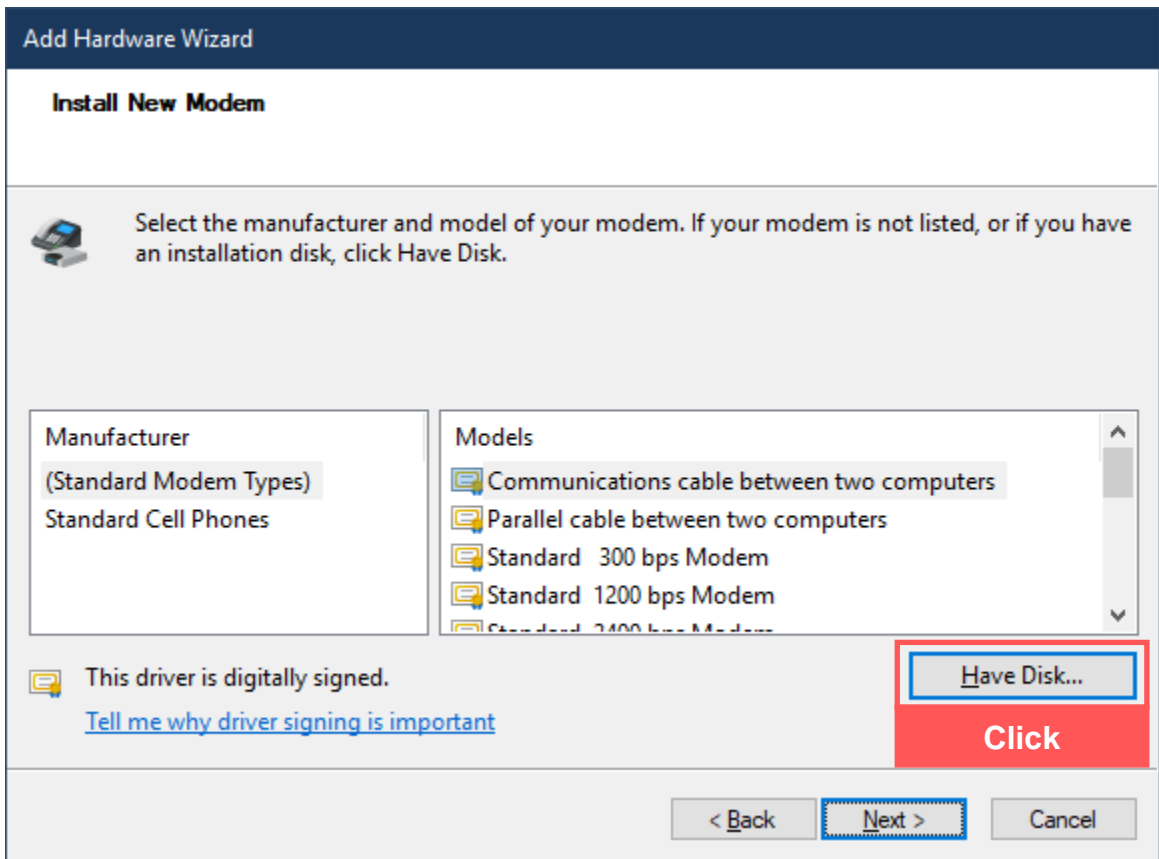
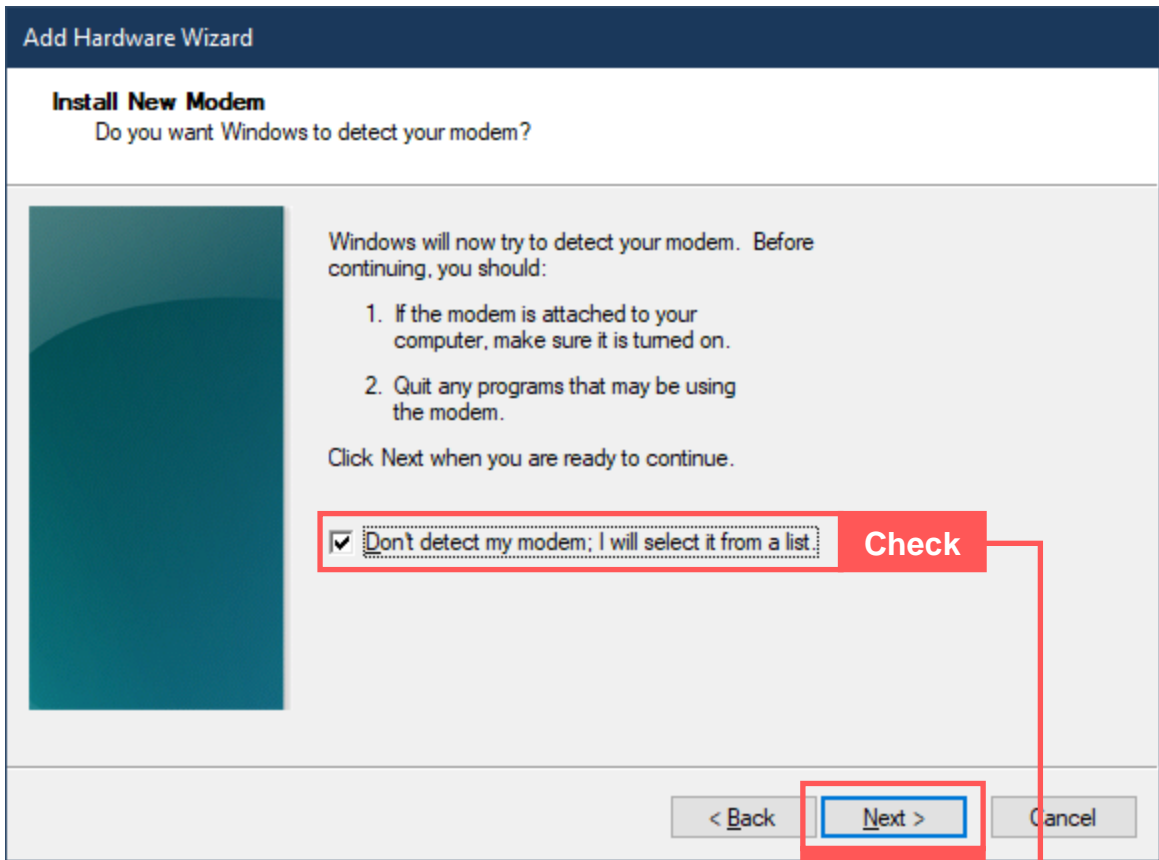


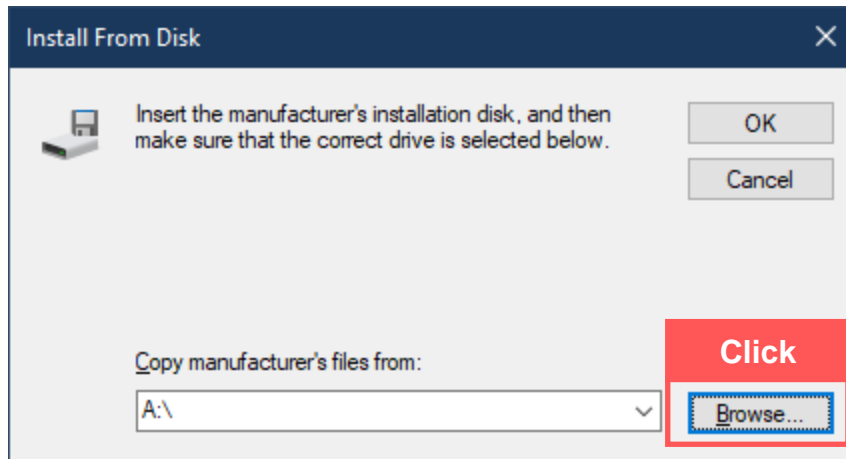
## Configuring Null Modem Drive

**! Connect TESLA 4000 (front USB-B Receptacle Port 450) to your computer using a USB cable.**

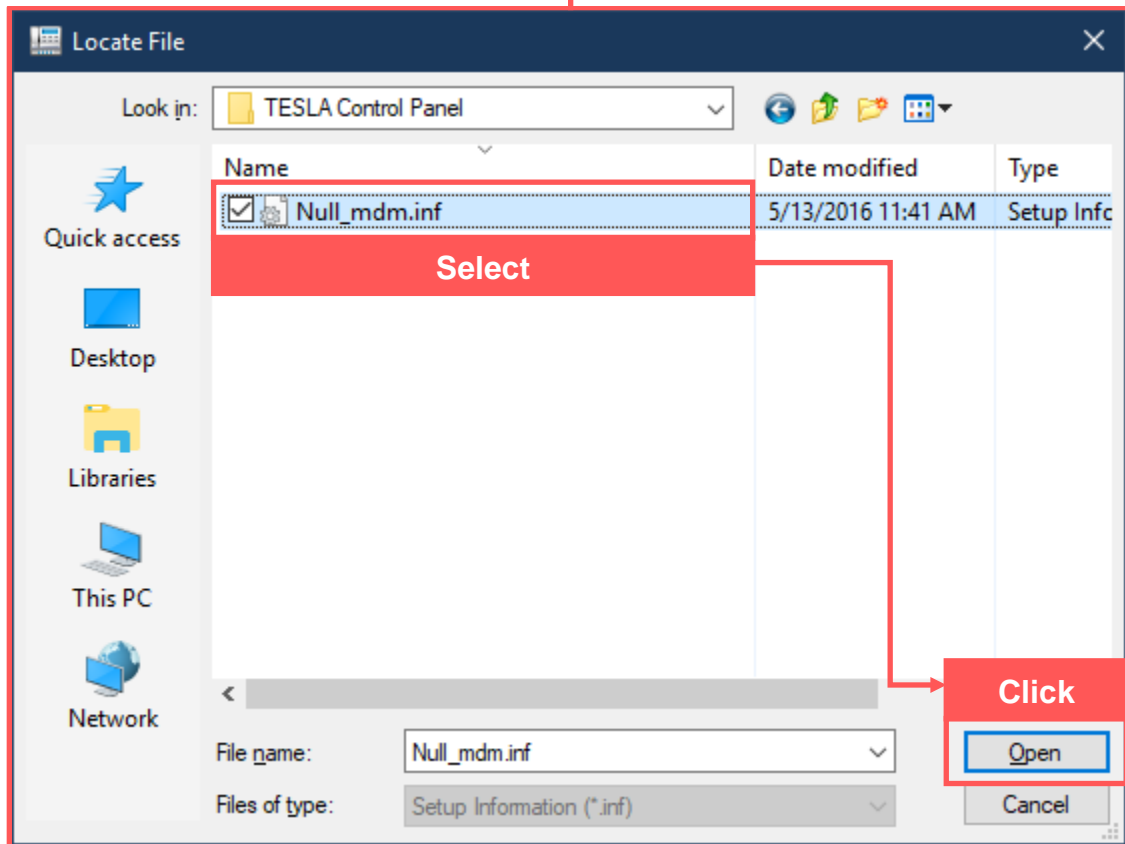
Go to MS Windows ‘**Phone and Modem**’ and follow the following steps:

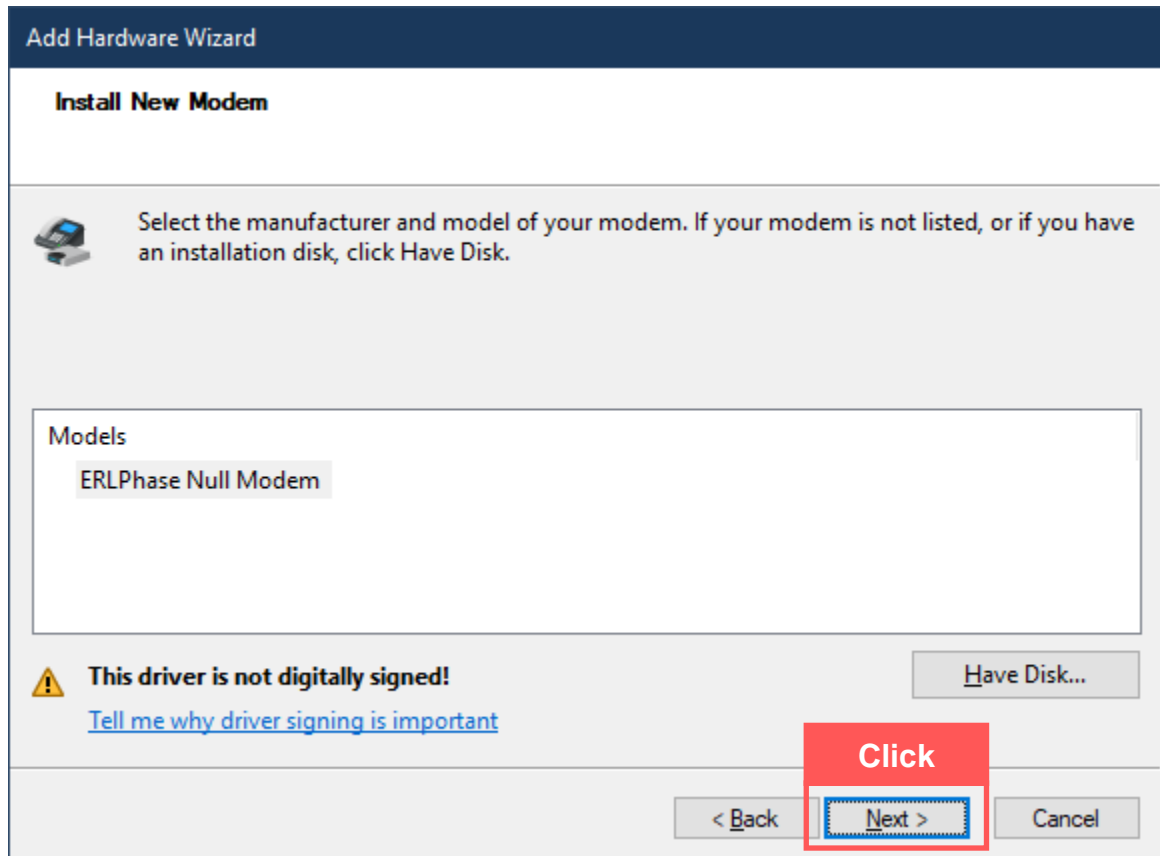
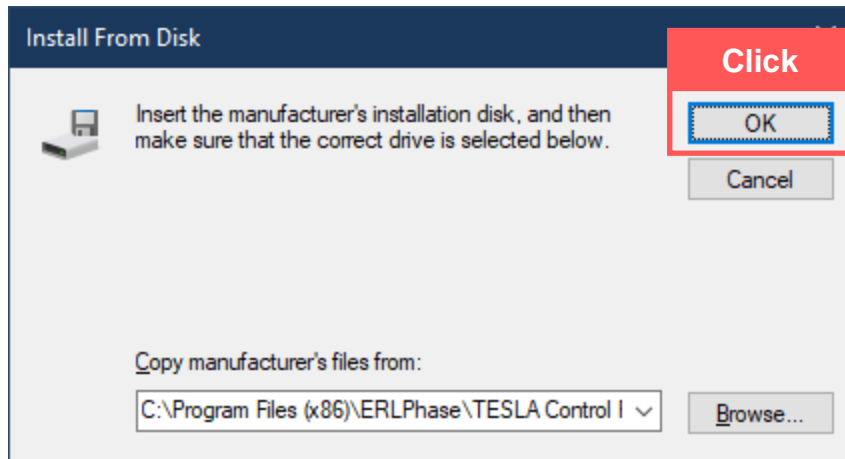


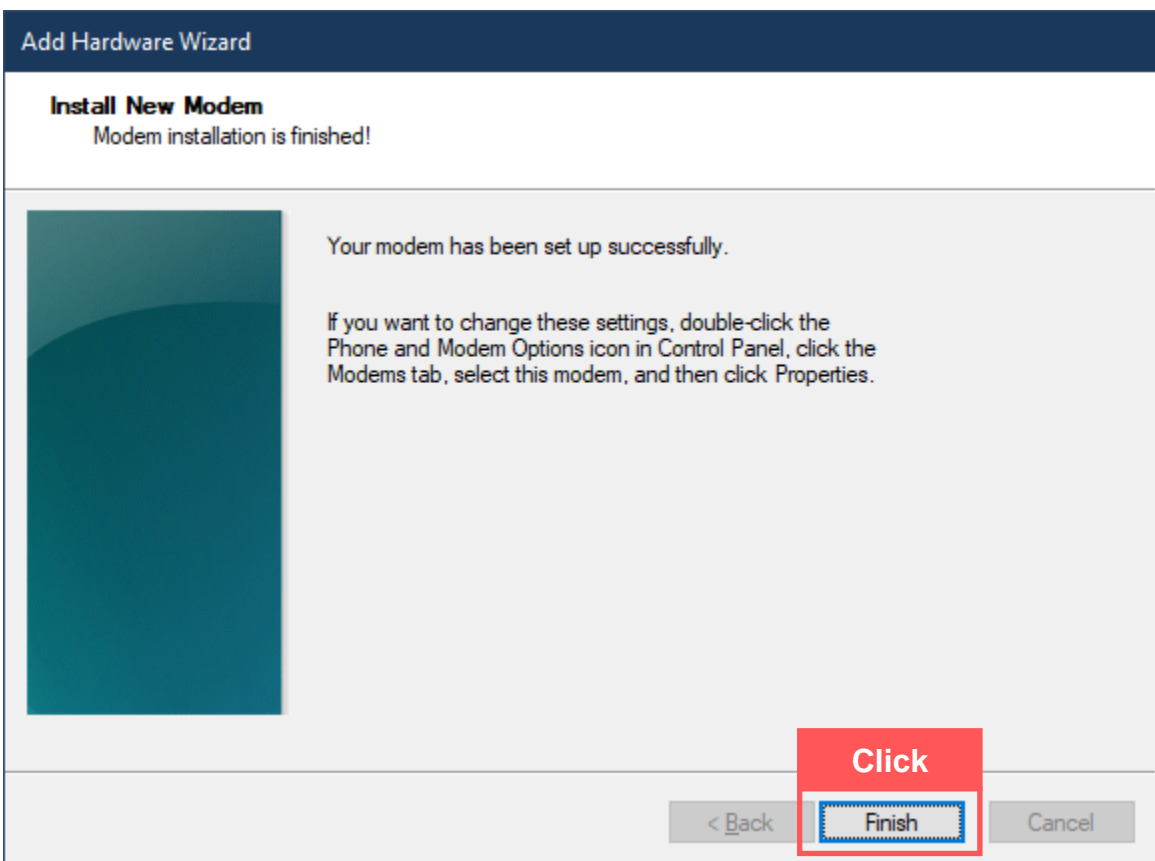
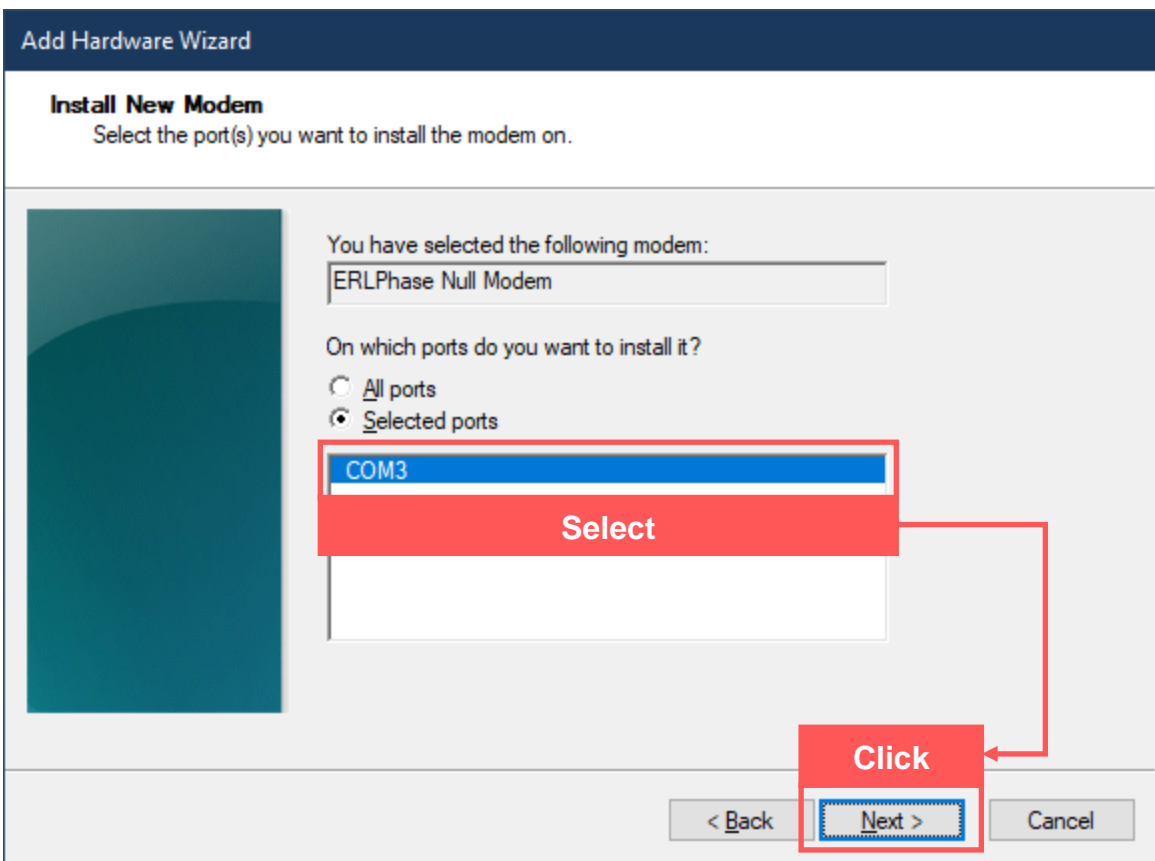


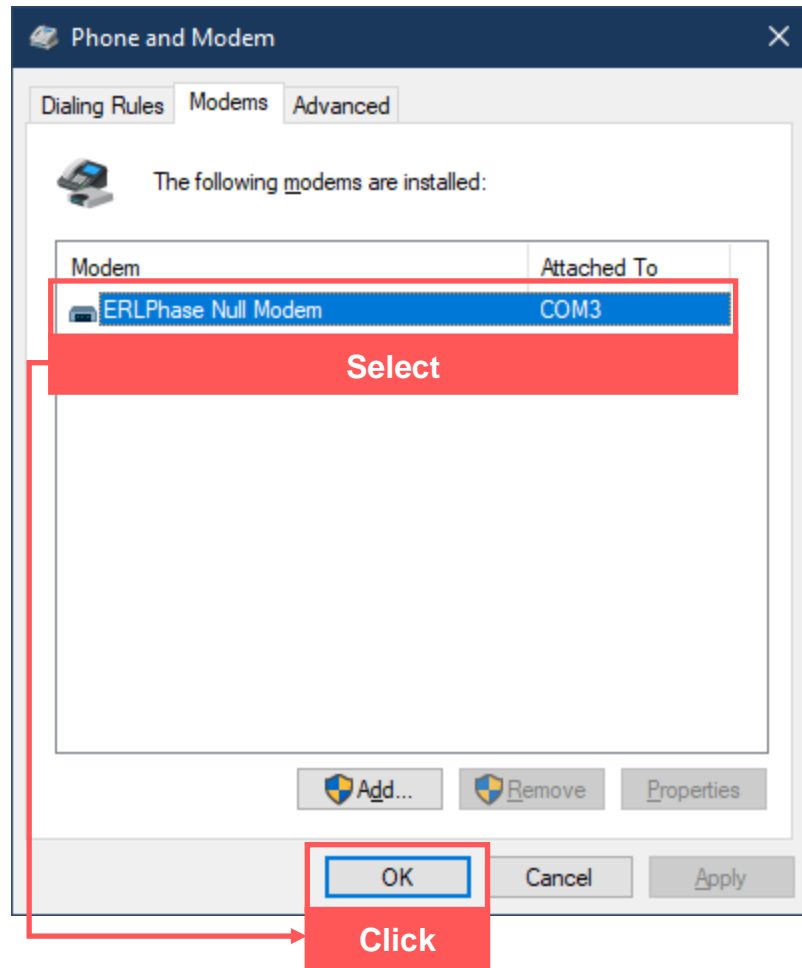


! Default location:  
*C:\Program Files (x86)\ERLPhase\TESLA Control Panel*









**! If 'Direct Serial Link' communication is to be used with an RS-232 cable, while connected to TESLA, please repeat the process presented above selecting the respective COM port for this connection.**

## Cyber Security - Role Based Access Control (RBAC)

TESLA uses an accounts system, associated with hard-coded roles, for user authentication and authorization. The account system is used for all types of interactive user services. The account system is stored locally on IED.

## Roles Summary

Role Name	Description	Standard
VIEWER	Can view parameters and browse menus	Pre-defined User Roles defined in IEC62351-8
OPERATOR	Can read parameters and perform control operations	
ENGINEER	Can read and change parameters, change configuration (other than 'Security') and settings, full access to files	
INSTALLER	Can view parameters, change configuration (other than 'Security') and settings	
SECADM	Can read and change 'Security' configuration	
SECAUD	Can read and download audit trail log	
MAINTENANCE	Can perform TESLA 4000 maintenance functions	TESLA 4000 Default User Roles
UPDATE	Can perform TESLA 4000 firmware update	
RCDREADER	Can access TESLA 4000 record storage	
COOPGROUP	Designated for the inter-TESLA COOP mode communication	
RBCS	Designated for RecordBase Central Station (RBCS) access to TESLA 4000 record storage and RBCS related communication configuration	



## Default Accounts and Passwords

Account (User Name)	Password	Assigned Roles	
view	view	VIEWER	OPERATOR
change	change	VIEWER ENGINEER	OPERATOR
service	service	VIEWER ENGINEER MAINTENANCE	OPERATOR UPDATE
update	Update@2015	UPDATE	
maintenance	Maintenance@2015	MAINTENANCE	
coop	Coop@2015	COOPGROUP	
rbc	Rbcs@2015	RBCS	
secadmin	Secadmin@2015	SECADM	
secaudit	Secaudit@2015	SECAUD	
lecFtp	ERLPhase2010	INSTALLER	

**! The view, change and service default user accounts provide users with privilege levels equivalent to the TESLA 4000 firmware versions prior to v2.0.**

## Communicating with TESLA Using TCP

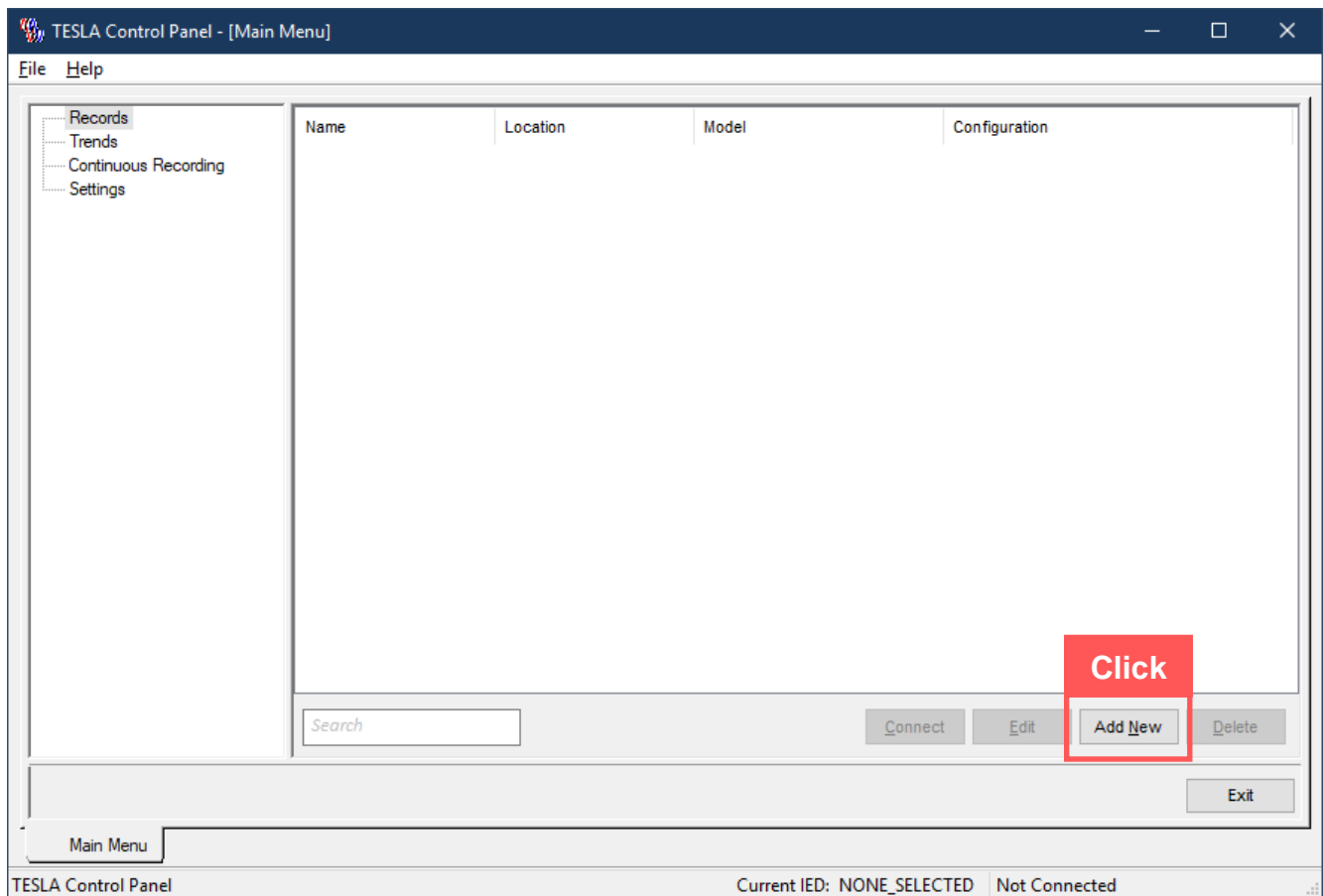
Run the TESLA Control Panel



### Adding a new TESLA

Follow the steps shown below:

**! Connect to TESLA via either a 'Network Link', 'Direct Serial Link' or 'Modem Link'. Please see instructions below.**



**Add New IED ...**

**IED Definition**

IED Name:

Comments:

Location:

IED Serial Number:

Model: TESLA

Configuration: TESLA 3000/4000 - 36 Channels

PMU Module:

---

**Communication**

**Network Link**

First IP Address (Port 401)

Second IP Address (Port 402)

Use SOCKS5 Proxy

Server IP:

Port Number:

---

**Direct Serial Link**

Serial Link: COM3: ERLPhase Null Modem

Baud Rate: 38400

---

**Modem Link**

Modem: No Modems Available

Phone Number:

---

**Connect Through IED:**

Port (Network, Serial and modem):   Use default Port

---

**Folder placement**

Recordings Folder:

Configs Folder:

Select the  
 “Communication” link!  
 Please see instructions  
 below.

## Selecting “Communication”

**! Ensure chosen “Communication” link matches to the physical communication medium connected to TESLA.**

## Network Link (Ethernet Cable)

Follow the steps shown below:

**! Connect TESLA 4000 (front Ethernet port 401, or rear Ethernet port 401 or 402) to your computer using an Ethernet cable. For this example, port 401 is used.**

**! For a straight connection from your PC to the TESLA using an Ethernet cable, ensure your PC's IP address is in the same network as TESLA's.**

The screenshot shows the 'Add New IED' dialog box with the following configuration:

- IED Definition:**
  - IED Name: [Empty]
  - Comments: [Empty]
  - Location: [Empty]
  - IED Serial Number: [Empty]
  - Model: TESLA
  - Configuration: TESLA 3000/4000 - 36 Channels
  - PMU Module:
- Communication:**
  - Network Link
    - First IP Address (Port 401): 192 . 168 . 100 . 80
    - Second IP Address (Port 402): . . .
    - Use SOCKS5 Proxy
      - Server IP: [Empty]
      - Port Number: 0
  - Direct Serial Link
    - Serial Link: COM3: ERLPhase Null Modem
    - Baud Rate: 38400
  - Modem Link
    - Modem: No Modems Available
    - Phone Number: [Empty]
  - Connect Through IED: [Empty]
- Port (Network, Serial and modem): [Empty]  Use default Port
- Buttons: Add New Modem/Serial Link, **Get Information From TESLA**

- Folder placement:**
- Recordings Folder: [Empty] Browse ...
- Configs Folder: [Empty] Browse ...
- Buttons: Save IED definition, Cancel

Red annotations and a flowchart on the right side of the dialog box indicate the following steps:

- Select (points to the IED Name field)
- Select (points to the IED Serial Number field)
- Select (points to the First IP Address (Port 401) field)
- Default IP address  
Port 401: 192.168.100.80  
Port 402: 192.168.101.80
- Click (points to the 'Get Information From TESLA' button)

**Enter Account Name and Password**

Please enter an account name and password to logon to the IED.

Account Name:

Password:

For this example, the following default account is used for logon  
 Account Name: view  
 Password: view

**Enter the credentials of a user account.**

**Click**

**Add New IED ...**

**IED Definition**

IED Name:

Comments:

Location:

IED Serial Number:

Model:

Configuration:

PMU Module:

**Communication**

Network Link

First IP Address (Port 401)

Second IP Address (Port 402)

Use SOCKS5 Proxy

Server IP:

Port Number:

Direct Serial Link

Serial Link:

Baud Rate:

Modem Link

Modem:

Phone Number:

Connect Through IED:

Port (Network, Serial and modem):   Use default Port

**Folder placement**

Recordings Folder:

Configs Folder:

**!**

TCP connects to TESLA and retrieves information from the unit to populate "Add New IED" screen.

"IED Name", "Comments" and "Location" can be edit as per user's application.

**Click**

## Direct Serial Link (USB Cable)

Follow the steps shown below:

**! Ensure proper installation and configuration of the USB Driver and configuration of the Null Modem. Please refer to “[Computer setting up for TESLA Communication](#)” section.**

**! Connect TESLA 4000 (front USB port 450) to your computer using a USB cable.**

The image shows a screenshot of the 'Add New IED' dialog box with several red annotations and arrows pointing to specific configuration steps:

- Select**: Points to the 'Direct Serial Link' radio button.
- Select**: Points to the 'Serial Link' dropdown menu, which is set to 'COM3: ERLPhase Null Modem'. A text box next to it says 'Configured COM port associated with USB connection'.
- Select**: Points to the 'Baud Rate' dropdown menu, which is set to '115200'. A text box next to it says 'Default Baud Rate: 115200'.
- Click**: Points to the 'Get Information From TESLA' button.

The dialog box itself contains the following sections:

- IED Definition**: Fields for IED Name, Comments, Location, IED Serial Number, Model (TESLA), Configuration (TESLA 3000/4000 - 36 Channels), and PMU Module (checkbox).
- Communication**:
  - Radio buttons for Network Link, First IP Address (Port 401), and Second IP Address (Port 402).
  - Use SOCKS5 Proxy checkbox and Server IP field.
  - Port Number field (0).
  - Radio button for Direct Serial Link (selected), with Serial Link dropdown (COM3: ERLPhase Null Modem) and Baud Rate dropdown (115200).
  - Radio button for Modem Link, with Modem dropdown (No Modems Available) and Phone Number field.
  - Radio button for Connect Through IED.
  - Port (Network, Serial and modem) field and Use default Port checkbox.
  - Add New Modem/Serial Link button.
  - Get Information From TESLA button.
- Folder placement**: Fields for Recordings Folder and Configs Folder, each with a Browse... button.
- Buttons for Save IED definition and Cancel.

**Enter Account Name and Password**

Please enter an account name and password to logon to the IED.

Account Name:

Password:

For this example, the following default account is used for logon  
 Account Name: view  
 Password: view

**Enter the credentials of a user account.**

**Click**

**Add New IED ...**

**IED Definition**

IED Name:

Comments:

Location:

IED Serial Number:

Model:

Configuration:

PMU Module:

**Communication**

Network Link     First IP Address (Port 401)   

Second IP Address (Port 402)   

Use SOCKS5 Proxy  
 Server IP:

Port Number:

Direct Serial Link    Serial Link:

Baud Rate:

Modem Link    Modem:

Phone Number:

Connect Through IED:

Port (Network, Serial and modem):   Use default Port

**Folder placement**

Recordings Folder:

Configs Folder:

**!**

TCP connects to TESLA and retrieves information from the unit to populate "Add New IED" screen.

"IED Name", "Comments" and "Location" can be edit as per user's application.

**Click**

## Direct Serial Link (RS-232 cable)

Follow the steps shown below:

**! Ensure proper configuration of Null Modem. Please refer to “[Setting up Computer for TESLA Communication](#)” section.**

**! Connect TESLA 4000 (rear serial port 405) to your computer using an RS-232 cable.**

The screenshot shows the 'Add New IED' dialog box with the following configuration steps highlighted in red:

- Select**: The 'Direct Serial Link' radio button is selected.
- Select**: The 'Serial Link' dropdown menu is set to 'COM4: ERLPhase Null Modem #2'. A text box next to it contains 'Configured COM port associated with Serial connection'.
- Select**: The 'Baud Rate' dropdown menu is set to '38400'. A text box next to it contains 'Default Baud Rate: 38400'.
- Click**: The 'Get Information From TESLA' button is clicked.

The dialog box contains the following fields and options:

- IED Definition**: IED Name, Comments, Location, IED Serial Number, Model (TESLA), Configuration (TESLA 3000/4000 - 36 Channels), PMU Module (checkbox).
- Communication**:
  - Network Link: First IP Address (Port 401), Second IP Address (Port 402), Use SOCKS5 Proxy, Server IP, Port Number.
  - Direct Serial Link: Serial Link (COM4: ERLPhase Null Modem #2), Baud Rate (38400).
  - Modem Link: Modem (No Modems Available), Phone Number.
  - Connect Through IED: (dropdown menu).
  - Port (Network, Serial and modem): (input field), Use default Port (checkbox).
- Folder placement**: Recordings Folder, Configs Folder, Browse ... buttons.
- Buttons: Add New Modem/Serial Link, Get Information From TESLA, Save IED definition, Cancel.



**Enter Account Name and Password**

Please enter an account name and password to logon to the IED.

Account Name:

Password:

For this example, the following default account is used for logon  
 Account Name: view  
 Password: view

**Enter the credentials of a user account.**

**Click**

**Add New IED ...**

**IED Definition**

IED Name:

Comments:

Location:

IED Serial Number:

Model:

Configuration:

PMU Module:

**Communication**

Network Link  First IP Address (Port 401)

Second IP Address (Port 402)

Use SOCKS5 Proxy

Server IP:

Port Number:

Direct Serial Link Serial Link:

Baud Rate:

Modem Link Modem:

Phone Number:

Connect Through IED:

Port (Network, Serial and modem):   Use default Port

**Folder placement**

Recordings Folder:

Configs Folder:

**!**

TCP connects to TESLA and retrieves information from the unit to populate "Add New IED" screen.

"IED Name", "Comments" and "Location" can be edit as per user's application.

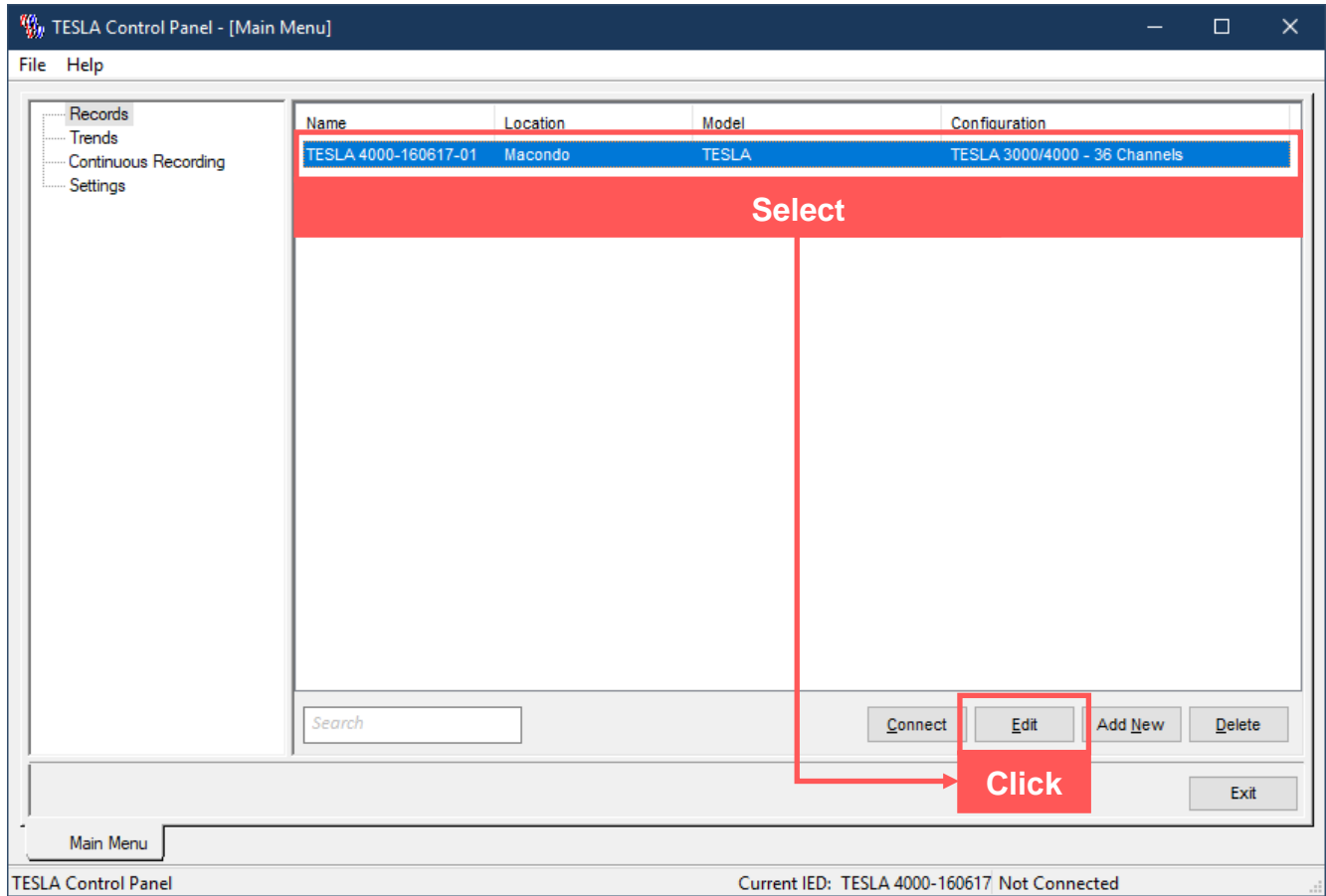
**Click**

## Modem Link

! Please follow the same instructions presented in the “[Network Link](#)” or “[Direct Serial Link](#)” sections.

## Editing “Communication” Link and Connecting to a Configured TESLA Unit

Follow the steps shown below:



Edit IED ...

IED Definition

IED Name: TESLA 4000-160617-01

Comments:

Location: Macondo

IED Serial Number: TESLA-4000-160617-01

Model: TESLA

Configuration: TESLA 3000/4000 - 36 Channels

PMU Module:

Communication

Network Link

First IP Address (Port 401) 192 . 168 . 100 . 80

Second IP Address (Port 402) 192 . 168 . 17 . 250

Use SOCKS5 Proxy

Server IP: . . .

Port Number: 0

Direct Serial Link

Serial Link: COM3: ERLPhase Null Modem

Baud Rate: 38400

Modem Link

Modem: No Modems Available

Phone Number:

Connect Through IED:

Port (Network, Serial and modem): 7631  Use default Port

Add New Modem/Serial Link Get Information From TESLA

Folder placement

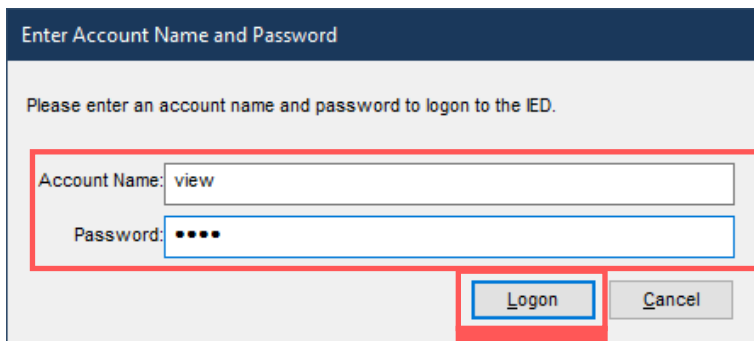
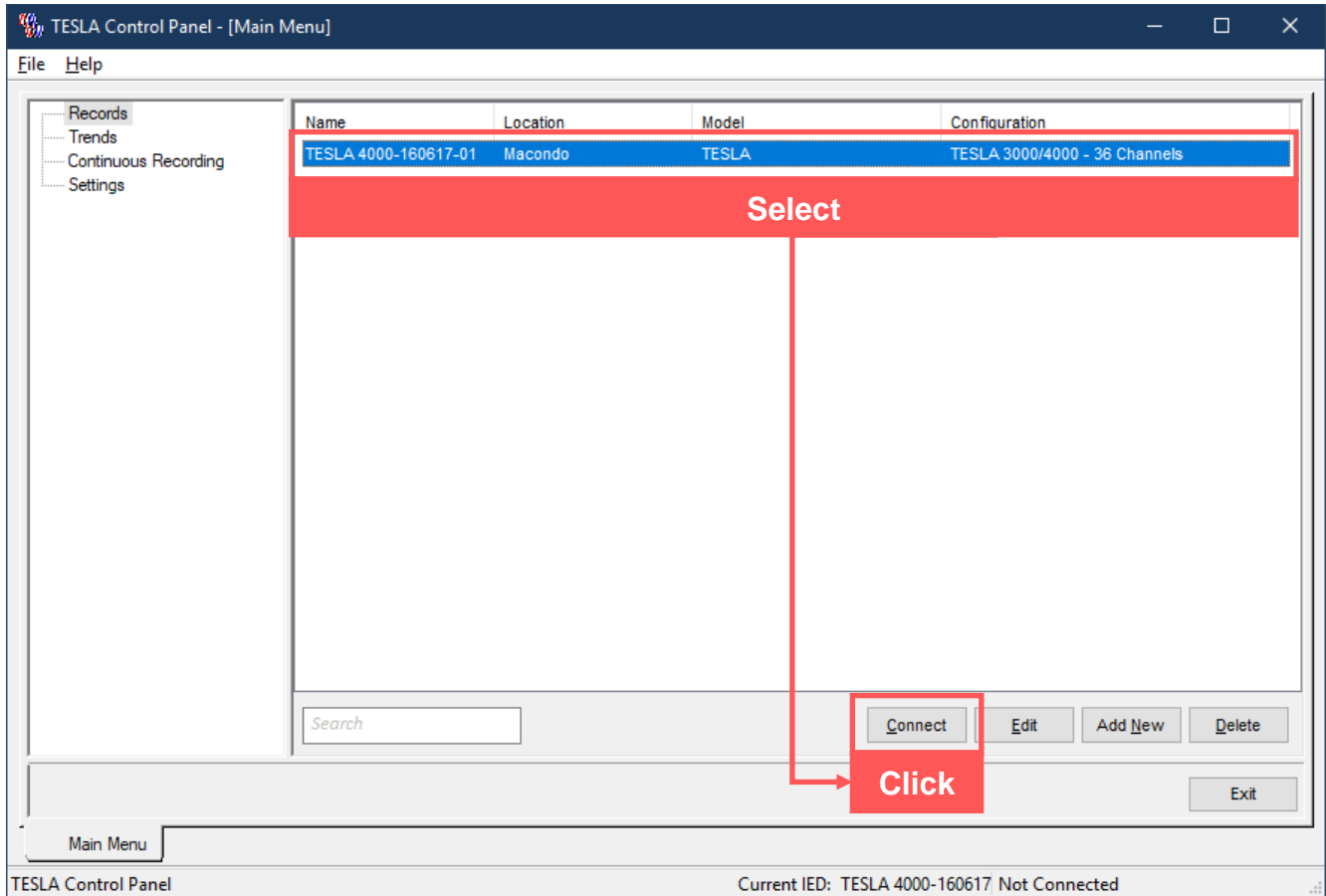
Recordings Folder: C:\Users\aooliveira\Documents\ERLPhase\TESLA Control Par Browse ...

Configs Folder: C:\Users\aooliveira\Documents\ERLPhase\TESLA Control Par Browse ...

Save IED definition Cancel

Select the  
"Communication" link as  
per physical  
communication medium

Click



For this example, the following default account is used for logon  
Account Name: view  
Password: view

Enter the credentials of a user account.

Click

Change Password Reminder

It is recommended you change your password.

New Password:  Password does not match complexity rules

Verify New Password:

OK Cancel

!

A password change reminder is prompted to change the default password of "view" account. Strongly recommended.

Click

If changing default password is not required.

**! Since the default passwords of the default accounts are public, we strongly recommend changing them before putting TESLA in service.**

Change Password Reminder

It is recommended you change your password.

New Password:  ●●●●

Verify New Password:  ●●●●

OK Cancel

Enter

Type in the new password and confirm it typing in a second time

Click

TESLA Control Panel - [Main Menu]

File Help

- Identification
- Records
  - Configuration
- Trends
  - Configuration
  - Continuous Recording
  - Events
  - Metering
  - Communication
  - Time
  - Settings

Name	Location	Model	Configuration
TESLA 4000-160617-01	Macondo	TESLA	TESLA 3000/4000 - 36 Channels

Search

Disconnect Edit Add New Delete

Exit

Main Menu

TESLA Control Panel Current IED: TESLA 4000-160617 Connected

! Menu as per the roles associated to the account used to log in

! Connected

## Terminal User Interface (UI) Service

The Terminal User Interface (UI) is used for restoring the security configuration to factory default and for retrieving the network configuration. It is accessed using a terminal emulation software such as HyperTerminal, TeraTerm and is only available on the front USB port 450.

**! Please refer to “[Setting up Computer for TESLA Communication](#)” sections for details on configuring the USB connection.**

## Network Configuration Recovery Utility (Port 401 IP Address)

This utility allows for viewing of the Port 401 IP Address, Network Mask and TCP port.

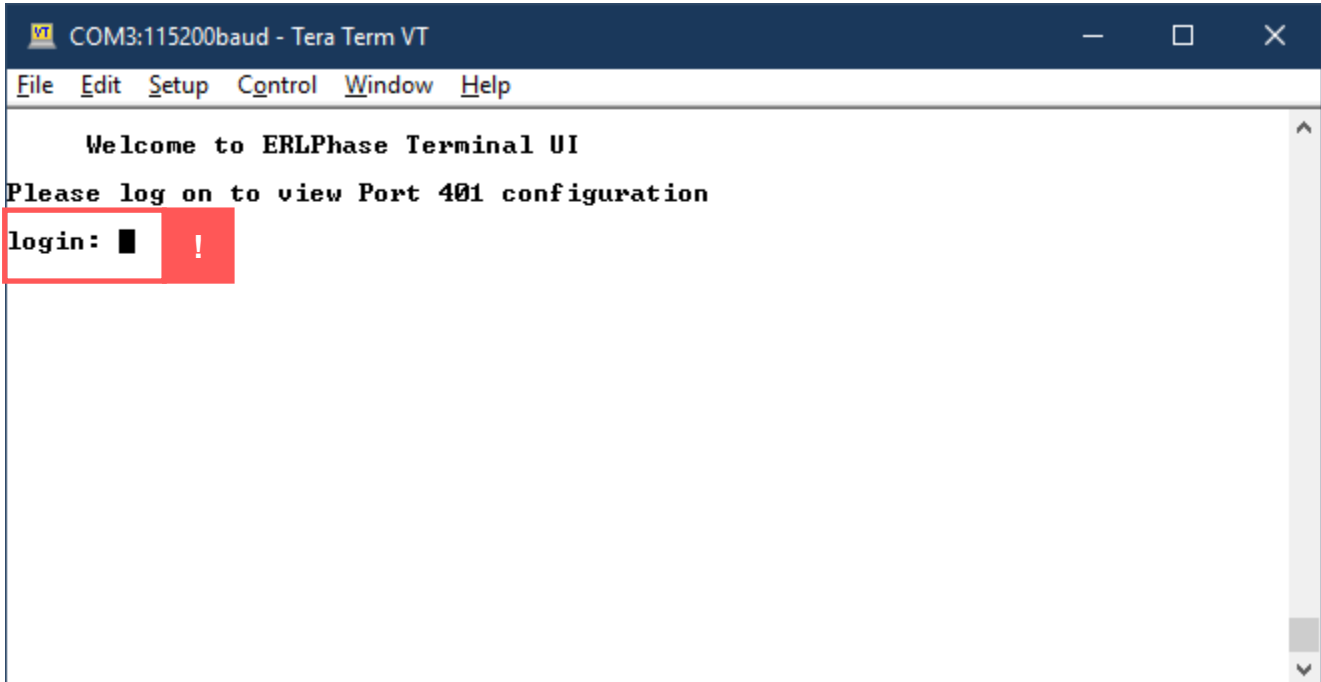
Follow the steps shown below:

**! Connect TESLA 4000 (front USB-B Receptacle Port 450) to your computer using a USB cable.**

**! Establish a Terminal Emulator connection selecting the COM port associated to the USB connection. (default baud rate of 115200).**

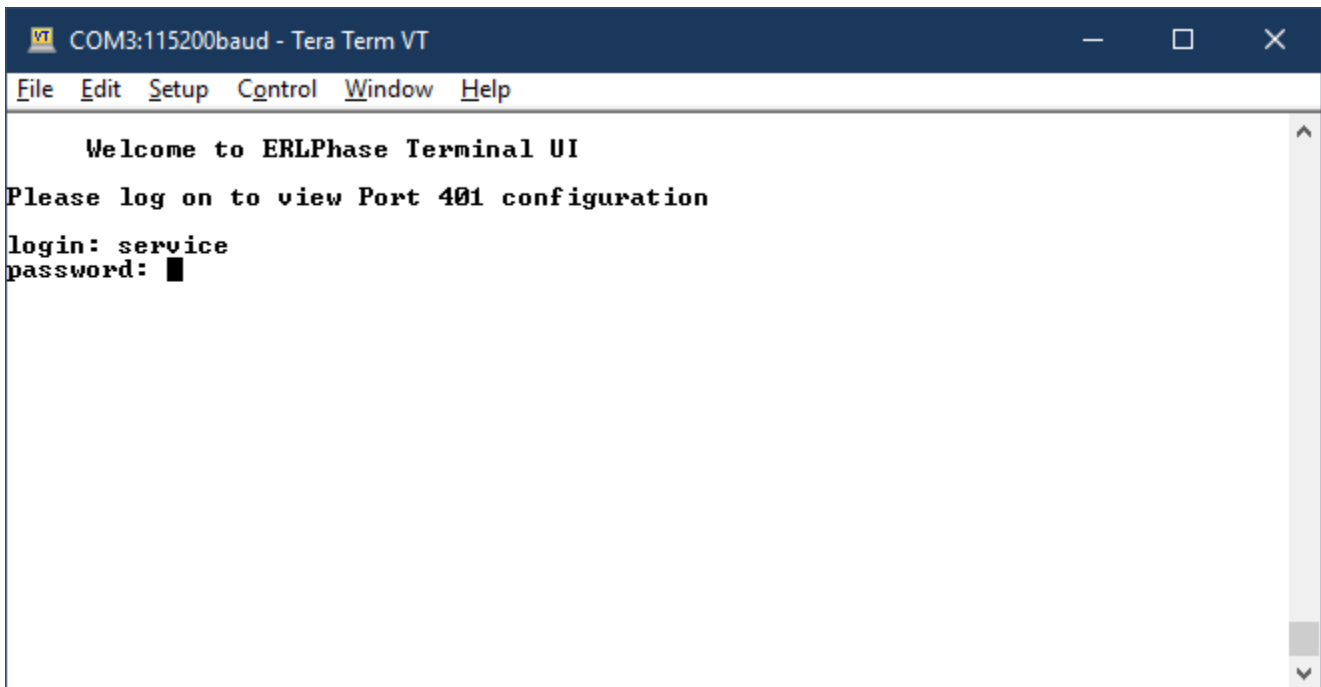


Enter a '?' character and "Enter" to launch the network recovery utility.



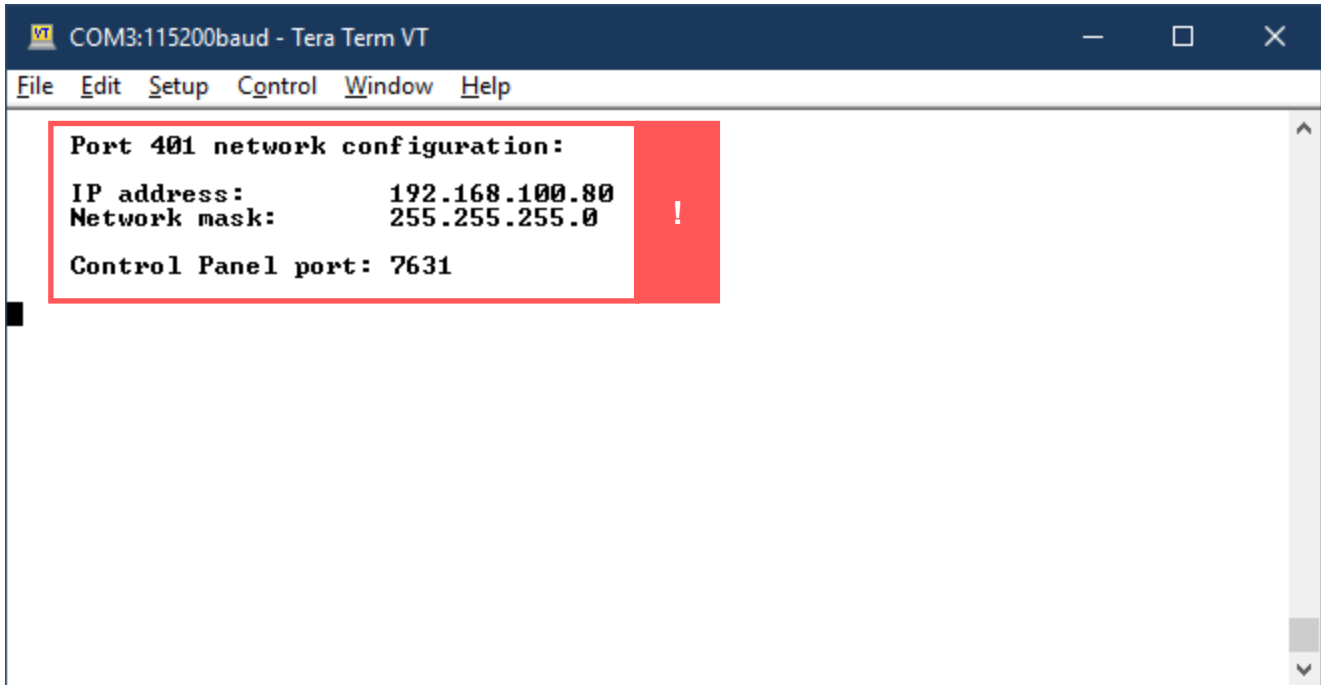
Log in using "service" account or any other account with similar roles.

**! Please refer to "[Cyber Security - Role Based Access Control \(RBAC\)](#)" sections for details on roles, default accounts and passwords.**



"Enter".





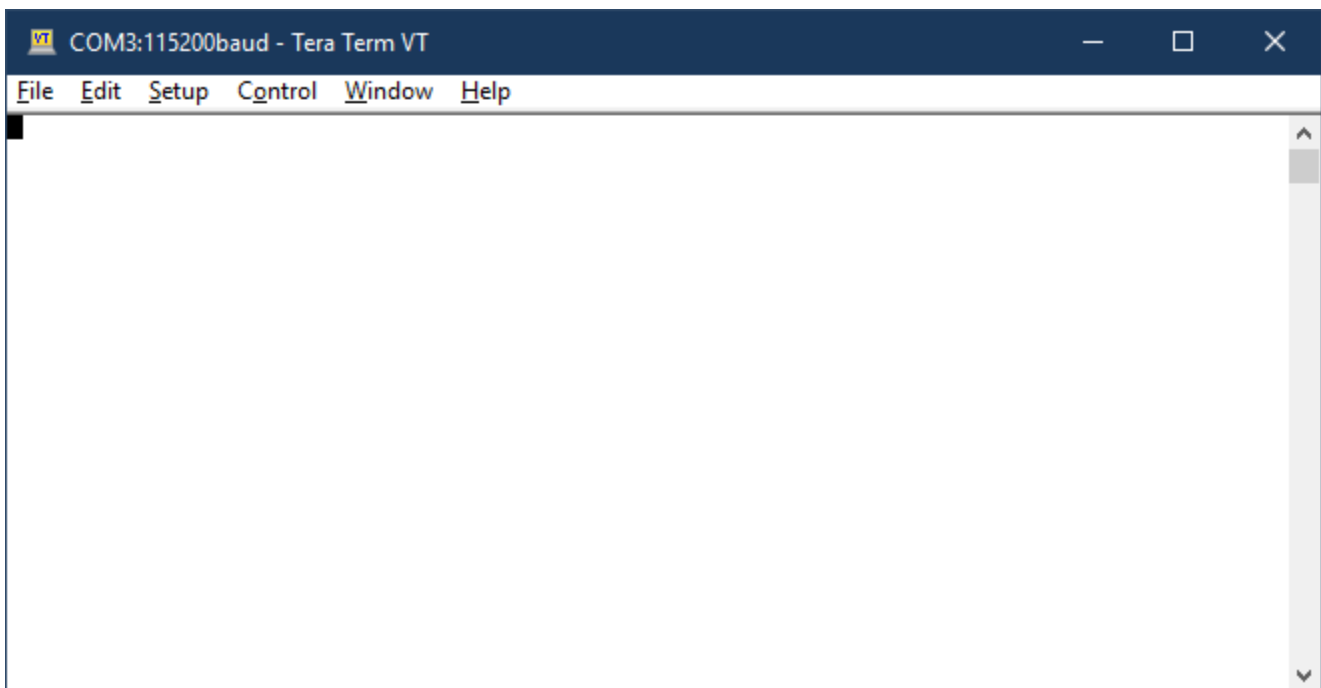
## Security Configuration Restoration to Factory Defaults

This utility enables security to be configured back to factory defaults.

Follow the steps shown below:

**! Connect TESLA 4000 (front USB-B Receptacle Port 450) to your computer using a USB cable.**

**! Establish a Terminal Emulator connection selecting the COM port associated to the USB connection. (default Baud Rate of 115200).**



Enter a '#' character to launch the utility which returns security configuration to factory defaults.

```
COM3:115200baud - Tera Term VT
File Edit Setup Control Window Help

Welcome to ERLPhase Security UI
This UI restores IED's security configuration to factory defaults.
Restoration process is protected by the Challenge-Response method.
Please contact ERLPhase customer support to generate Response
for the Challenge shown below.

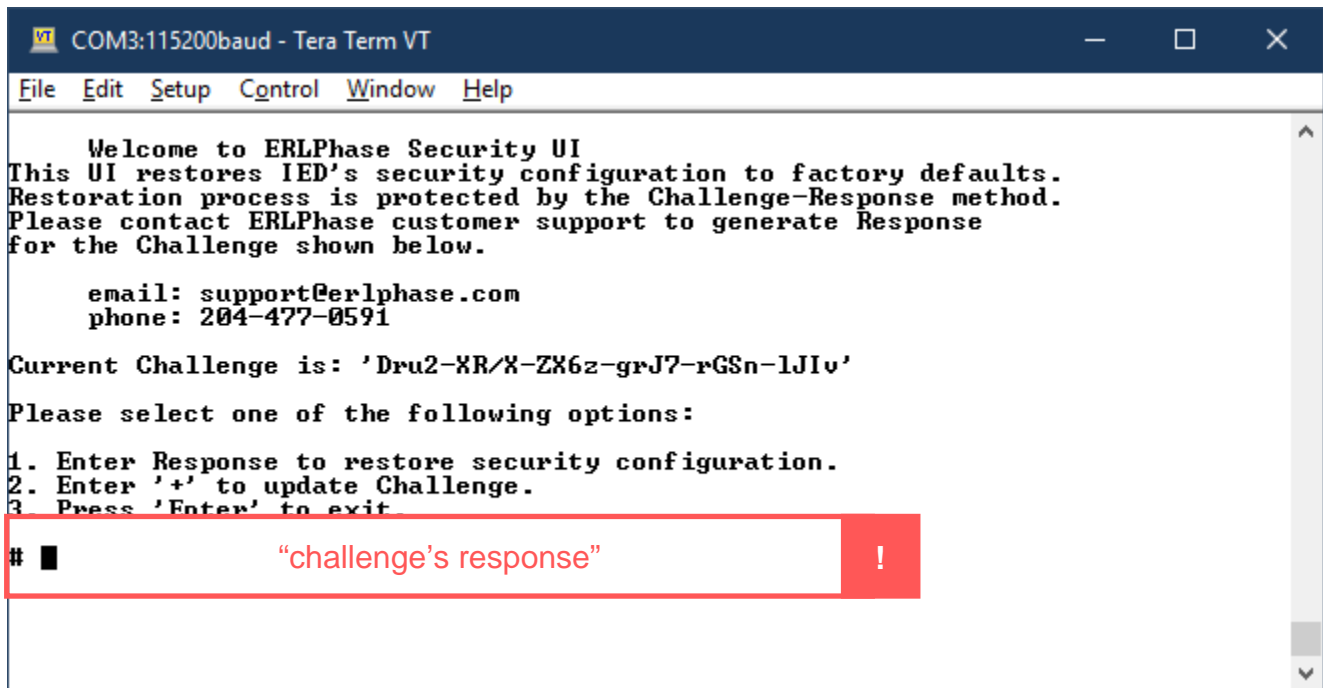
email: support@erlphase.com
phone: 204-477-0591

Current Challenge is: 'Dru2-XR/X-ZX6z-grJ7-rGSn-lJIv'
Please select one of the following options:
1. Enter Response to restore security configuration.
2. Enter '+' to update Challenge.
3. Press 'Enter' to exit.
# █
```

Email challenge string to ERLPhase to receive the challenge's response

```
! Email: support@erlphase.com
```

After receiving the challenge's response from ERLPhase, copy it from the message, paste it and then click "Enter".



```
COM3:115200baud - Tera Term VT
File Edit Setup Control Window Help

Welcome to ERLPhase Security UI
This UI restores IED's security configuration to factory defaults.
Restoration process is protected by the Challenge-Response method.
Please contact ERLPhase customer support to generate Response
for the Challenge shown below.

email: support@erlphase.com
phone: 204-477-0591

Current Challenge is: 'Dru2-XR/X-ZX6z-grJ7-rGSn-lJIv'

Please select one of the following options:
1. Enter Response to restore security configuration.
2. Enter '+' to update Challenge.
3. Press 'Enter' to exit

# █ "challenge's response" !
```

**!** Since the challenge strings are all created the same from the factory, we strongly recommend changing it before putting TESLA in service.



For further details, please check TESLA manual.  
[http://erlphase.com/downloads/manuals/TESLA\\_4000\\_manual.pdf](http://erlphase.com/downloads/manuals/TESLA_4000_manual.pdf)

If you need any further assistance,  
please contact

ERLPhase Customer Service at **+1 204-477-0591**

Or

[support@erlphase.com](mailto:support@erlphase.com)