Intelligent monitoring system, type TEC
Installation and commissioning guide
Declaration of conformity

The manufacturer

ABB AB
Components
SE-771 80 LUDVIKA
Sweden

Hereby declares that

The product Transformer Electronic Control

by design complies with the following requirements:


Date 2008-01-30
Signed by Carl-Henrik Wigert
Title General Manager TEC

This Installation and commissioning guide has been produced to provide transformer manufacturers, and their designers and engineers, access to all the technical information required to assist them in their selection of a monitoring system. It is also intended as a TEC system information source for end-users.

The information provided in this document is intended to be general and does not cover all possible applications. Any specific application not covered should be referred directly to ABB.

ABB makes no warranty or representation and assumes no liability for the accuracy of the information in this document or for the use of such information. All information in this document is subject to change without notice.

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**Recommended practices**

ABB recommends careful consideration of the following factors when maintaining the Transformer Electronic Control:

- Before you begin maintenance work on a unit, make sure that the personnel conducting the work have read and fully understood the *Installation and Commissioning Guide* and the *Technical Guide* provided with the unit.
- To avoid damaging the unit, never exceed the operating limits stated in delivery documents and on rating plates.
- Do not alter or modify a unit without first consulting ABB.
- Follow local and international wiring regulations at all times.
- Use only factory-authorized replacement parts and procedures.

**WARNING, CAUTION, and NOTE**

**WARNING**

A WARNING provides information which, if disregarded, could result in injury or death.

**CAUTION**

A CAUTION provides information which, if disregarded, could result in damage to the equipment.

**NOTE:** A NOTE provides additional information to assist in carrying out the work described.
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5 TEC Server
   5.1 Unpacking
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   5.3 Connection between TEC and TEC Server
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1. About this manual

1.1 General

This manual describes the installation and commissioning of TEC and TEC Server.
The information in this manual is intended for service and commissioning personnel. The
reader of this manual should understand the hardware and software functionality of the TEC
system.

1.2 Terminology

The following is a list of terms associated with the TEC system with which you should be fa-
miliar. The list contains terms and abbreviations that are unique to ABB or that have a usage
or definition that is different from standard industry usage.

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEC</td>
<td>Intelligent Monitoring System.</td>
</tr>
<tr>
<td>TEC Server</td>
<td>The PC hardware containing the TEC Server web.</td>
</tr>
</tbody>
</table>

1.3 Related documentation

The table below lists all documentation related to the TEC system.

<table>
<thead>
<tr>
<th>Title</th>
<th>Document ID</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>User’s Manual TEC</td>
<td>1ZSC000857-ABL</td>
<td>This document describes the different functionalities of the TEC Server.</td>
</tr>
<tr>
<td>Server</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hard Facts</td>
<td>1ZSE 954003-003</td>
<td>Sales document that describes the basics and fundamentals of the TEC system.</td>
</tr>
<tr>
<td>User’s Manual</td>
<td>1ZSC000857-ABK</td>
<td>This document describes the different functionalities of the TEC and how operators work via the cabinet display or the web interface.</td>
</tr>
<tr>
<td>Maintenance Guide</td>
<td>1ZSC000857-ABJ</td>
<td>This document contains descriptions about the TEC embedded web interface and how to load HEX files into the TEC. This document is intended for operators.</td>
</tr>
<tr>
<td>Technical Guide</td>
<td>1ZSC000857-ABG</td>
<td>This document contains detailed technical information about the TEC system. The guide is useful for the transformer designers.</td>
</tr>
<tr>
<td>Additional information</td>
<td><a href="http://www.abb.com/electricalcomponents">www.abb.com/electricalcomponents</a></td>
<td></td>
</tr>
</tbody>
</table>
2. Hardware

2.1 Introduction

ABB recommends mounting the TEC unit and sensors on the transformer before the heat run test and to power the unit during the test. The TEC may also be powered during the other tests.

The TEC system should be updated with information from the heat run test to create a more accurate fingerprint of the transformer.

Fig. 1. TEC Basic.

Fig. 2. TEC integrated.
2.1.1 Required tools

- Regular set of screwdrivers
- Regular set of open-end wrenches (up to 24 mm)
- Regular set of socket wrenches (up to 24 mm)
- Pair of pliers, with wire cutters
- Punch (order dependent)
- Not including tools for mounting of sensors.

2.1.2 Required material

- Mounting bars for TEC – see the Technical Guide for dimensions
- Mounting screws and accessories
- Straps
- Terminals in control cabinet.

Included in the delivery, if ordered, or customer supplied:

- Sensors according to the specification.
- Cables (0.5 to 2.5 mm²)

2.1.3 Weight

TEC Basic: 35 kg

TEC Integrated: 8 kg

2.2 Receiving

The TEC system package (including accessories) is determined by the Order specification.

2.2.1 Unpacking

Check that the package is free from transport damage. Open the transport box cover. Remove the wood block support. The TEC unit is packed in ESD plastic. The unit is protected by its enclosure, so the plastic can be removed and the unit handled as a normal electronic sensor.

The enclosed accessories are packaged in a separate compartment in the transport box.

**CAUTION**

*Do not remove any boards from the TEC unit.*

2.2.2 Inspection on receipt

1. Check that the TEC unit and accessories are undamaged.

2. If transport damage is found, a damage report should be sent to the insurance company. It is also recommended that photographs be taken of the damaged components. Mark the photos with ABB’s reference number and the serial number of the TEC unit and send them to ABB for comments.

3. Check that the parts delivered and serial numbers agree with the packing list and order acknowledgement.
2.2.3 Temporary storage before assembly

If the TEC unit is not to be mounted immediately, once the delivery has been approved the unit and accessories should be kept indoors and left in their plastic enclosures.

2.3 Installation on transformer

The TEC system can be powered without all sensors connected. If so, or if a sensor is not connected correctly, the TEC will generate events. See User’s Manual for more information. The event log can aid troubleshooting.

2.3.1 Mounting

2.3.1.1 Basic

The TEC Basic unit is mounted on a mounting bar. The TEC unit should be mounted upright. Check that the absorbers are correctly lined up and properly torqued after mounting.

2.3.1.2 Integrated

The TEC Integrated unit should be mounted in the control cabinet. See the Technical Guide for more information about mounting the TEC Integrated unit.

2.3.2 Connection to terminals

The TEC system is configured according to the enclosed Specification Sheet. If drawings do not correspond to the Specification Sheet, contact the designer.

The Specification Sheet is placed on the inside of the TEC cabinet door.

It is recommended that wiring be altered only when the system is not powered.

---

### Table: Connection to terminals

<table>
<thead>
<tr>
<th>Channel</th>
<th>Terminal</th>
<th>Board</th>
<th>Sensor Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1C</td>
<td>1C</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>1C</td>
<td>1C</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>1C</td>
<td>1C</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>1C</td>
<td>1C</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>1C</td>
<td>1C</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>1C</td>
<td>1C</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>1C</td>
<td>1C</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>1C</td>
<td>1C</td>
</tr>
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<td>9</td>
<td>9</td>
<td>1C</td>
<td>1C</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>1C</td>
<td>1C</td>
</tr>
<tr>
<td>11</td>
<td>11</td>
<td>1C</td>
<td>1C</td>
</tr>
<tr>
<td>12</td>
<td>12</td>
<td>1C</td>
<td>1C</td>
</tr>
</tbody>
</table>

---

**Fig. 3. Connection to terminals.**
2.3.2.1 Power supply

**Terminal group X1**
1. Input AC or DC positive, 110-240 V
2, 3. Output AC
4. Input AC neutral or DC negative
5, 6. Output AC

**Terminal group X2**
1. Input AC or DC positive, 110-240 V
2. Input AC neutral or DC negative

**Terminal group X3**
1. Output 24 V DC positive from power supply board.
2. Output 24 V DC negative from power supply board.
3. Input 24 V DC positive from separate 24 V supply.
4. Output 24 V DC positive from X3:3.
5. Input 24 V DC negative from separate 24 V supply.
6. Output 24 V DC negative from X3:5.

**Terminal X11**
1-4. Not used.
5. RS485 connection A to motor relay board.
6. RS485 connection B to motor relay board.

2.3.2.2 Analog input 4-20 mA, TC130

**Terminal group X21**
1. 2. Current HV
3. 4. Current LV
5. 6. Current TV
7. 8. Optional
9. 10. Open port
11. 12. Open port
13. 14. Open port
15. 16. Open port

![Diagram of 4-20 mA sensor and 24 V power source]
Current Transducer

Position on connector
Top oil 1 3 4 2
Bottom oil 5 7 8 6
Shadow 9 11 12 10
Sun 13 15 16 14

1 Connect +24 V to “plus” side of sensor.
2 Connect “minus” side of sensor to TEC terminal (Low terminal number)
3 Connect 0 V to TEC terminal (High terminal number).
The CT must have correct number and turns.

2.3.2.3 Temperature input Pt 100, TC 140

First TC140 Board, X31

Second TC140 Board, X32

Position on connector
OLTC Temp1 1 3 4 2
OLTC Temp2 5 7 8 6
OLTC Temp3 9 11 12 10
OLTC Temp4 13 15 16 14

1 Connect +24 V to “plus” side of sensor.
2 Connect “minus” side of sensor to TEC terminal (Low terminal number)
3 Connect 0 V to TEC terminal (High terminal number).

The CT must have correct number and turns.
Connection of sensors delivered by ABB AB, Components

Ambient temperature sensor

| 1 | 2 | 3 | 4 |

Oil temperature sensor

| 1 | 2 |
| 3 | 4 |

2.3.2.4 Digital input, TC150

Terminal group X41

Each sensor is connected to one of the terminals 1-12 and one of the neutral terminals 17-24.

1 – 8 Input warning/alarm or cooler
9 – 12 Input trip sensor
13 – 16 Not used
17 – 24 Input neutral.
25 Not used.
26 Input positive DC from battery and trip relay coil.
27 – 28 Not used.
29 Input neutral from battery and trip coil.
30 Not used.

2.3.2.5 Control and output, TC 160

Terminal group X51

1 Output TEC trip, taken to X41.
2 – 3 Input voltage
4 – 6 Input tap-changer position, 4= max, 5= moving, 6= min.
7 – 9 Not used
10, 12 Output TEC warning
11, 12 Output TEC alarm
13, 1 TEC trip output
14 Connected to X51:1
2.3.2.6 Cooler relay box, TC180

**Relay box**

<table>
<thead>
<tr>
<th>24 V</th>
<th>0 V</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>Data communication</td>
<td>1</td>
</tr>
<tr>
<td>A</td>
<td>Cooler group 1 on</td>
<td>2</td>
</tr>
<tr>
<td>B</td>
<td>Cooler group 2 on</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Cooler group 3 on</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Cooler group 4 on</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Cooler group 5 on</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Cooler group 6 on</td>
<td></td>
</tr>
</tbody>
</table>

When installed, the “on lamp” should be green and the “data communication lamp” should blink yellow.

2.3.2.7 Alarm relay box, TC181 and TC182

**Relay box**

<table>
<thead>
<tr>
<th>24 V</th>
<th>0 V</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>Data communication</td>
<td>1</td>
</tr>
<tr>
<td>A</td>
<td>xxxxx</td>
<td>2</td>
</tr>
<tr>
<td>B</td>
<td>xxxxx</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>xxxxx</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>xxxxx</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>xxxxx</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>By own choice</td>
<td></td>
</tr>
</tbody>
</table>

The communication cables can be parallel wired with the communication to the cooler box. When installed the “on lamp” should be green and the “Data communication lamp” should blink yellow.

2.3.3 Cable gland

There are two systems for cable glands: Roxtec or a blank plate. For Roxtec see separate manual.

2.3.4 Change of configuration

If the system configuration is to be changed, contact ABB. A temporary sensor can be added – see the *Maintenance Guide*.

2.4 External connections

Some connections to the TEC systems must be done on site. For example, the voltage input and the relay outputs should most often be connected to the substation system. See special documentation for external systems.
2.5 Data communication setup

There are two ways to connect to the TEC web interface. With either the local interface cable or Ethernet via fiber-optics and a converter (TC 190). See Communication chapter for more information.

2.5.1 Hardware for remote data communication

For remote data communication, including within the station building, a fiber-optic connection should be used.

The fiber-optic cable should be connected to the TC 190 converter. The TC 190 converter should be placed indoors and requires a separate 24 V DC power supply.

The RX and TX fiber-optic cable connections must be connected correctly.

To verify the connection:
1. If the Act light is blinking the connection is correct.
2. Power the TEC.
3. Connect a crossed network cable to a computer.
4. Connect the other end of the network cable to the TC 190 converter.

This should result in the small “link light” glowing and the upper “Act light” blinking once.

If the “Act light” does not blink, switch the RX and TX fiber-optic cables. Then repeat step 4.

If the link light does not light up, there is a problem with the network connection between the TC 190 and the PC.

Fig. 4. Connection of TC190.

2.5.2 Configuration

See section 3 Communication for computer configuration.

2.6 Time synchronization installation

The time in the TEC unit should be set at installation, see the Maintenance guide. If specified, it is possible to connect run-time synchronization functions.

2.6.1 NTP

Set the NTP server IP address from the web interface, see the Maintenance guide.

If the TEC unit is to be connected to a TEC Server, use the TEC Server IP address as NTP server in the TEC unit. It is recommended, but not required, to configure the TEC Server to synchronize with a real NTP server.

2.6.2 Synchronization pulse

Connect the BNC contact to the TC 190 converter. Check that the sync diode blinks at the corresponding synchronization frequency.
3. Communication

3.1 Local web through RS232 cable

3.1.1 Overview

To set up the network for TEC, an RS232 port and a TEC special RS232 cable is needed. The cable is supplied with the TEC.

Most new laptops do not have an RS232 port. Sometimes the docking station has an RS232 port that can be used instead. In order to make them work, the power supply of the laptop needs to be connected to the docking station.

If there is no RS232 port, a USB-to-RS232 adapter can be used instead (there are many different types and their function may vary). Be sure to have the USB device installed before continuing this guide.

How to create a standard modem and SLIP connection for local web browsing on the TEC through an RS232 cable on Windows XP.

3.1.2 Create standard modem

Open the Control Panel and double-click Phone and Modem Options.

On the Modems tab click [Add].
Check the Don't detect my modem... checkbox and click [Next].

Select Standard Modem Types and 33600bps and click [Next].

Select COM port (make sure applications that use your COM port, such as PalmSync, are turned off).
When done, click [Finish].

Enter modem settings in the **Control Panel**. Select your modem and click [Properties].
Click [Change Default Preferences] on the Advanced tab.

Set [Flow control] to None.
3.1.3 Create SLIP (Internet connection)

Open Network connections / New Connection Wizard. Click [Next].

Select Connect to the Internet and click [Next].

Select Set up my connection manually and click [Next].
Select **Connect using a dial-up modem** and click [Next].

Choose your newly created **Standard modem** (make sure only one modem is selected) and click [Next].

Create a name for your SLIP connection and click [Next].
You must enter something into the **Phone number** field; just type 0 and click [Next].

Select **Anyone’s use** and click [Next].

Skip **Internet Account Information** and click [Next].
Your connection is now ready. Click [Finish].

When starting your connection the first time you must enter some settings. Select [Properties]. No user name or password should be entered. Continue on next page.
Select only your modem, make sure the number is 0, then click [Configure].

Uncheck Enable hardware flow control and click [OK].
On the **Networking** tab, choose **SLIP**. Check **Internet Protocol (TCP/IP)** and click [Properties].

Set IP to 192.168.1.1. Click [Advanced].
Uncheck **Use IP header compression**.

Click [OK] twice.

On the **Options** tab make sure **Display progress while connecting** is the only checked option.

Click [OK] and you are now ready to contact the TEC’s local web interface through your RS232 cable. Click [Dial] on your newly created connection. When connected, open your web browser and type 192.168.1.100.
3.2 Ethernet

3.2.1 Overview
To set up the network for the TEC the following is needed:
- 1 crossover network cable or
- 1 HUB or switch with 2 straight network cables.

3.2.2 TC190 – Ethernet Converter Box
Connect your TC 190 to the HUB with a straight network cable or directly to the PC with a crossover cable.
On the top (side close to power input) there are 2 LEDs:
- The left LED, green, indicates power
- The right LED is for the fiber-optic connection and flashes yellow during network activity
RJ-45:
- Green indicates a link and flashes during activity
- Yellow flashing indicates a collision while a steady glow indicates full duplex.
At the bottom:
- The left LED indicates a 100 Mbit connection when green, 10MBit when off
- Right LED, Yellow for PPS time sync.

3.2.3 Personal computer
Set up the IP address on your computer.

3.2.3.1 Windows XP
1. Locate the network settings. In Windows XP it is usually located under “Start”, “Settings”, “Control Panel”, “Network Connections”, the right-click “Local Area Connection”.
2. Check “Internet Protocol (TCP/IP)” and click [Properties].
3. Check the “Use the following IP address” button
4. Enter IP address: 192.168.1.2
5. Enter Subnet mask: 255.255.255.0
6. Enter Default gateway: 192.168.1.1
7. Click [OK].

3.2.3.2 Windows Vista
1. Locate the network settings. In Windows Vista it is usually located under “Start button”, “Control Panel”, “Network and Internet”, “Network and Sharing Center”, “Manage Network Connections”, then right-click “Local Area Connection” and click [Properties].
Continue with steps 3-7 above.
3.3.1 Industrial ED-20 Modem/Router setup

1. First install the ED-20 tool on your computer.

2. Use a normal RS232 cable and connect the PC to the ED-20’s “RS-232 CH2”. Make sure the ED-20 connection is set to Serial. Under Tools and Serial COM settings choose the COM port you are using.

3. Click [Read Config].
4. Click **Modem Settings**.

5. Check that the boxes appear as below (will only work for Dial-up).

6. Click **Network Settings**. Login can be configured to suit any security policy, but it is advised to at least use “PAP” as authentication and choose a username and password, i.e. Admin and tec.

PPP Network interface must have a different C-sub net than the Ethernet interface. In this suggestion we have used 0 in the PPP subnet and 1 in the Ethernet, mainly because we use the default Ethernet settings in TEC that are 192.168.1.100. But it can be chosen to fit your other Ethernet devices in the station. Default gateway in the TEC must be the same IP address as in the ED-20’s “Local IP Address” under “Ethernet Interface”.

Remember to click Write Config and Reboot after you are done with the configuration. Restart TEC and all Westermo equipment to ensure full cooperation between all devices.
3.3.2 Industrial ED-200 Modem/Router setup

ED-200 comes preconfigured with IP address 192.168.2.200.

1. Set the IP address on your computer according to section 3.2.3, but use IP address 192.168.2.210 and default gateway 192.168.2.1.

   Log in to Westermo at http://192.168.2.200 and use
   
   Username: admin
   Password: westermo

2. The start page should look as below:

   ![Start page](image)

   Logged in as admin Host: ED200 (192.168.2.200)

   ED-200

   Welcome admin!

   You are currently connected to ED200 (192.168.2.200).
   Below you will find a brief summary of the unit.

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mac address</td>
<td>09:07:01:35:2A</td>
</tr>
<tr>
<td>IP address</td>
<td>192.168.2.200</td>
</tr>
<tr>
<td>Netmask</td>
<td>255.255.255.0</td>
</tr>
<tr>
<td>Gateway address</td>
<td>192.168.2.1</td>
</tr>
<tr>
<td>Firmware Version</td>
<td>1.03</td>
</tr>
<tr>
<td>Database Version</td>
<td>default 1.1</td>
</tr>
<tr>
<td>Serial Number</td>
<td>430</td>
</tr>
<tr>
<td>Type</td>
<td>ED-200</td>
</tr>
<tr>
<td>Hostname</td>
<td>ED200</td>
</tr>
<tr>
<td>Location</td>
<td>Westermo</td>
</tr>
<tr>
<td>SNMP</td>
<td>disabled</td>
</tr>
</tbody>
</table>

3. Click “Configuration, and then click “Serial”. The following values should be shown:

   Interface: RS232
   Data Rate: 57600
   Flow Control: rts/cts
4. Click “Connection”.

For analog modem TDW-33.

| **Dial In/Out:** | Dial In  
| Connect at power (PWR) on: | No  
| DCD control: | No  
| Idle time | B  

If you wish to use a Leased Line instead please click the button --> **LeasedLine**  

For GSM modem GDW-11.

| **Dial In/Out:** | Dial In  
| Connect at power (PWR) on: | No  
| DCD control: | Yes  
| Idle time | B  

If you wish to use a Leased Line instead please click the button --> **LeasedLine**

5. Click “Modem Settings”.

For analog modem TDW-33.

| **Escape sequence** |  
| **Escape delay** |  
| **Modem Init** |  
| Init Command: | AT  
| Init Answer: | OK  

**Modem Hangup**

| Hangup Command: | ATH  
| Hangup Answer: | OK  

**Modem Connect (Dial Out)**

| Connect (Dial Out) Command: | ATIS-0  
| Connect (Dial Out) Answer: | CONNECT  
| Connect (Dial Out) Timeout: |  
| Connect (Dial Out) Retries: |  

**Modem Connect (Dial In)**

| Connect (Dial In) Command: | RING  
| Connect (Dial In) Answer: | ATA  

For GSM modem GDW-11.

| **Escape sequence** |  
| **Escape delay** |  
| **Modem Init** |  
| Init Command: | AT  
| Init Answer: | OK  

**Modem Hangup**

| Hangup Command: | ATH  

**Modem Connect (Dial Out)**

| Connect (Dial Out) Command: | ATIS-0  
| Connect (Dial Out) Answer: | CONNECT  
| Connect (Dial Out) Timeout: |  
| Connect (Dial Out) Retries: |  

**Modem Connect (Dial In)**

| Connect (Dial In) Command: | RING  
| Connect (Dial In) Answer: | ATA  

**Modem Connect (Dial Out)**

| Connect (Dial Out) Command: | ATIS-0  
| Connect (Dial Out) Answer: | CONNECT  
| Connect (Dial Out) Timeout: |  
| Connect (Dial Out) Retries: |  

**Modem Connect (Dial In)**

| Connect (Dial In) Command: | RING  
| Connect (Dial In) Answer: | ATA  

6. Click “PPP”. Choose the desired IP address that you will get when you call your equipment.

**NOTE:** As default, the router have 3 IP addresses: one on the inside (Network IP) 192.168.2.200 and two on the outside (PPP) 169.254.200.100 and 101.

The (PPP) addresses can not be in the same C-sub range as the one you have on your local network, named “Network IP”. Set the PPP address to 192.168.0.100 and 101 and the Network IP address to 192.168.1.200 (where 0 and 1 must be different).

**PPP | Settings**

- **Local PPP IP Address**: 169.254.200.100
- **Remote PPP IP Address**: 169.254.200.101
- **PPP Authentication Type**: PAP
- **PPP Username**: Admin
- **PPP Password**: Sec

Click [Enable Authentication] and select [PAP]. See recommended settings below:

**PPP | Settings**

- **Local PPP IP Address**: 192.168.0.100
- **Remote PPP IP Address**: 192.168.0.101
- **PPP Authentication Type**: PAP
- **PPP Username**: Admin
- **PPP Password**: Sec

Make sure to press [Apply] after change on every page.

7. End configuration by clicking [Network] (IP) and change the C-subnet from 2 to 1 (192.168.x.1, where x is the C-subnet. TEC is always shipped with 192.168.1.100). It should look like below:

**NETWORK (IP) | Settings**

- **MAC**: 00:07:7C:91:35:3A
- **IP**: 192.168.1.1
- **Netmask**: 255.255.255.0
- **Gateway**: 192.96.1.1

Click [Apply]
When you click on [Apply] the router will change to its new IP-address, so in order to click on “Restart” to save the changes you must first change your computers IP-address to 192.168.1.210, also change Default Gateway to 192.168.1.1. Then you can connect to router on its new IP-address 192.168.1.200 and click on “Restart”

It is recommended to change the password. This can be done under “User Administration”. Be sure to write the password down for future use.

USER | Configuration

User Password

westermo

Apply
4. Commissioning

4.1 Introduction

ABB has tested each delivered unit. The specified internal wiring and software configuration have been verified.

4.2 Reference list

- TEC connection plate
- Transformer circuit diagram

4.3 Setup

1. Connect all sensors to the TEC Unit.
2. Connect the PC. By either network converter or local web port.
3. If needed, disconnect external equipment dependent on the TEC.
4. Set correct time in TEC. See the *Maintenance guide*.

The transformer cabinet requires power for some parts of the test.

4.4 Commissioning Test

4.4.1 Power

Test of TEC power supply and start sequence.

If only the primary power supply is connected:
1. Disconnect power supply. TEC unit will shut down.
2. Reconnect power supply. TEC unit should start.

If secondary power is connected:
1. Disconnect primary power. This should not affect the TEC.
2. Reconnect primary power.
3. Disconnect secondary power. This should not affect the TEC.
4. Disconnect both power supplies. TEC unit will shut down.
5. Reconnect both power supplies. TEC unit should start.

4.4.2 Analog inputs

Test for software configuration and wiring of analog inputs.

For all analog values:
1. Check that no sensor errors are active.
2. Check values that can be compared with external equipment. Current and gas values, for example.
3. Check that all displayed values are realistic.

4.4.3 Cooler groups

A test of cooler control wiring.
1. Use the Maintenance menu to start each group separately.
2. Check that the correct group starts.
3. Reset the manually started groups.

4.4.4 Digital inputs
A test of software configuration and wiring for digital inputs.
1. Activate the device at its source.
2. Check that all enabled events are written to the event log.

4.4.5 TEC relay outputs
A test of the TEC relay output configuration and wiring.
If an alarm box is presented on the screen:
- Short-circuit each desired output with the common terminal (11) for output simulation.
If the relay contacts of the TC 160 board are used for external devices:
- Short-circuit the desired relay for output simulation.
If the trip output from the TEC unit is used:
- Short-circuit terminal X41:26 and 29 (numbers are for TEC Basic). This corresponds to a trip signal from the TEC unit.
Check that X51:1 (TEC Basic) is set to the correct state. Default open for units delivered from ABB AB, Components. Change to closed to activate trip functionality.

4.4.6 Tap-changer position
A test of the correct indication of tap-changer position. (If the position indication is enabled.)
1. Check that the displayed tap-changer position corresponds to the actual position.
2. Change tap-changer position and check the new position in the TEC unit.

4.4.7 CAN bus
A test of communication with the CAN bus sensor.
1. Check that no sensor errors are active.
2. Check that all displayed values are realistic.

4.4.8 Network
A test of the network settings. If remote access should be activated, connect to the TEC unit from a network PC.

4.4.9 Optional event level test
A test to simulate event situations.
It simulates transformer conditions by simulating the corresponding inputs.
Some values, such as hot-spots, are generated from more than one sensor.

4.4.10 End of test
Reset all non-pending events.

**NOTE:** Before insulation test, disconnect the card edge connectors for each board. The varistors on each input limit the voltage.
5 TEC Server

5.1 Unpacking

Unpack the computer with its cables (keyboard, mouse, monitor and other optionals). Check the packing list for box contents.

5.2 Hardware installation

Connect all external devices to the computer (keyboard, mouse, monitor). Connect the Ethernet cable between the computer’s outlet (LAN1) to appropriate device such as a switch, hub, Ethernet outlet or TC 190 (when connecting directly to TC 190, a crossover cable must be used). If you have the comport-board (optional for RS485 communication), connect the cable to the comport-board’s outlet on the backside of the computer. Finally connect the power cable to the electrical outlet. Note that the computer has two built-in power supplies and both need to be connected for redundancy.

5.3 Connection between TEC and TEC Server

- Every TEC can be addressed through the RS232 interface and a laptop, by the use of a special cable provided by ABB.
- One TEC Server application server can handle up to 9 TECs.
- More than one TEC can be used and connected to the ED-20 router solution by the use of an Ethernet switch 10/100 or better.
5.4 Software configuration

After the computer has booted up you will see a login screen. Login according to:
Username: TEC Maintenance user
Password: tec

"TEC Maintenance user" belongs to the computer Administrator group. The server is delivered with the default IP-address 192.168.1.10 and the TEC with 192.168.1.100. Both can be changed for other IP-addresses.

The server is delivered with Central European Time Zone. To set date and time zone double-click on the Windows clock in the lower right corner. Finish by clicking [OK].

Perform the “First time configuration” according to the TEC Server - User’s Manual.
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