Intelligent monitoring system, type TEC Maintenance 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 Maintenance 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.

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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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Appendix 1
Frequently Asked Questions (FAQ)

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Spare part list
1. About this manual

1.1 General

This manual describes the hardware and software functions of the Intelligent Monitoring System, type TEC. The TEC is an electronic control, monitoring, and diagnostic device.

The information in this manual is intended for operators. 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 familiar. 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>Test</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEC</td>
<td>Intelligent Monitoring System.</td>
</tr>
<tr>
<td>HEX</td>
<td>File extension for program files on the TEC system.</td>
</tr>
<tr>
<td>OPC</td>
<td>OLE for Process Control.</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>Technical guide</td>
<td>1ZSC000857-ABG</td>
<td>This guide contains detailed technical information about the TEC System. The guide is useful for the transformer designers.</td>
</tr>
<tr>
<td>Installation and Commissioning Guide</td>
<td>1ZSC000857-ABH</td>
<td>Describes installation and configuration of the TEC system.</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>Additional information</td>
<td><a href="http://www.abb.com/electricalcomponents">www.abb.com/electricalcomponents</a></td>
<td></td>
</tr>
</tbody>
</table>
2. Operation

2.1 Open the TEC Monitor embedded web

There are two ways to reach the web interface and communicate with the TEC: by connecting via the Ethernet or by connecting via the TC 122.

Configure Internet Explorer for the TEC web interface

1. Click “Tools” and “Internet Options”.
2. Click the “Security” tab and then click “Default Level” and move the slider to “Medium level”, then click [OK].
3. Click the “Privacy” tab and then click “Default Level” and move the slider to “Medium level”, then click [OK].
4. Click the “Advanced” tab and then check the checkbox named “Microsoft VM/JIT compiler for virtual machine enabled”, then click [Apply].
5. Ensure that the “Use HTTP 1.1” and “Use HTTP 1.1 through proxy connections” are checked on the “Advanced” tab.

2.1.1 Connect through Ethernet

1. Open your Internet Explorer web browser and type the TEC IP address in the URL field. The default address that is configured from start is: 192.168.1.100. For more information on how to set up the static IP address, see the Installation and Commissioning Guide, section Personal Computer.
2. The web interface should now appear in the browser.
3. If a login is required, choose the appropriate user level and enter the correct user ID and password. The different user levels are described in the Installation and Commissioning Guide, section Access levels.

2.1.2 Connect through TC122

1. Use the local interface cable to connect the TC122 card in the TEC unit to your computer’s RS232 port. See the Installation and Commissioning Guide for local web interface setup.
2. Double-click the new connection that has been created and click [Dial].
3. When the connection is established, open your web browser and type 192.168.1.100 to reach the web interface.
4. The web interface should now appear in the browser.

2.1.3 Access levels

There are three different access levels in the web interface:

Normal user
The Normal user level allows access to view all values and graphs but no maintenance pages.

Advanced user
The Advanced user level has the same privileges as the Normal user level but also permit you to clear events from the event list and view all maintenance pages except the change password side.

Maintenance user
The Maintenance user level provides access to all pages and permission to update the TEC with new settings.
3. Maintenance and service

3.1 System / software maintenance

The **Settings** pages can be reached from the **Maintenance** dropdown menu.

The **Settings** pages are protected with a user name and a password.

The dropdown menu provides access to the following features:

- **Sensor**
  - Sensor scaling
  - Add a sensor

- **Tap-changer**
  - Confirm service on tap-changer

- **Cooler groups**
  - Settings
  - Confirm service on cooler groups

- **Events**
  - Set event levels
  - Event list

- **TEC**
  - Set IP address
  - Set cabinet display
  - Set time in TEC
  - Change password
  - Set parameters

- **Reports**
  - Status report
  - Configuration report

- **Links**
  - External links

- **Help**
  - About
3.1.1 Sensors

The Sensors menu has two different submenus, called Sensor scaling and Add a sensor.

3.1.1.1 Sensor scaling

This page makes it possible to set the scaling and offset for sensors required for TEC functionalities. To open the scaling window, click Sensor scaling in the Sensors menu.

1. Select the sensors you wish to change the scaling and/or offset for by checking the checkbox to the left of the desired rows. The textboxes on the rows you checked become editable.

2. Change the scale factor and/or offset as desired by entering appropriate values in the textboxes on the rows checked in the previous step.

3. When done with the configuration, click [Execute] to set the new values.

The sensors (rows) that have been successfully updated will be highlighted in green. Sensors that failed to update, due to invalid input, will be highlighted in red.
CAUTION

Changing the scaling on the HV and LV currents and top oil measurement can trigger the TEC trip-signal if the scale factor or offset is incorrect.

Pt-100 sensors are calibrated on delivery and need no further calibration, they have Scale factor 1 and Offset 0. However, if a Pt-100 sensor is not perfectly situated (for instance due to retrofit on an old transformer), changing the Offset can help to achieve a more accurate temperature.

3.1.1.2 Add or remove extra signals (only for TEC Basic and TEC Integrated)

To open the Add or remove extra signals window, click Add a sensor in the Sensors menu.

1. Enable the desired signals by checking the checkboxes to the left of the desired rows. The textboxes on the rows you checked become editable.

2. Configure the signals as desired by entering appropriate values in the textboxes on the rows checked in the previous step. To remove a signal, enter 0 for board and channel.

3. When done with the configuration click [Execute] to commit the changes.

If the TEC has updated the values successfully the row will be highlighted in green. If the update fails, the rows which failed to update are highlighted in red.
Add or remove extra signals

<table>
<thead>
<tr>
<th>Edit</th>
<th>Description</th>
<th>Board</th>
<th>Channel</th>
<th>Scale factor</th>
<th>Offset</th>
<th>Warning</th>
<th>Alarm</th>
<th>Rise event when</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Edit 1</td>
<td>f</td>
<td>f</td>
<td>f</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Above</td>
</tr>
<tr>
<td>2</td>
<td>Edit 2</td>
<td>f</td>
<td>f</td>
<td>f</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Above</td>
</tr>
<tr>
<td>3</td>
<td>Edit 3</td>
<td>f</td>
<td>f</td>
<td>f</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Above</td>
</tr>
<tr>
<td>4</td>
<td>Edit 4</td>
<td>f</td>
<td>f</td>
<td>f</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Above</td>
</tr>
<tr>
<td>5</td>
<td>Edit 5</td>
<td>f</td>
<td>f</td>
<td>f</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Above</td>
</tr>
<tr>
<td>6</td>
<td>Edit 6</td>
<td>f</td>
<td>f</td>
<td>f</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Above</td>
</tr>
<tr>
<td>7</td>
<td>Edit 7</td>
<td>f</td>
<td>f</td>
<td>f</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Above</td>
</tr>
<tr>
<td>8</td>
<td>Edit 8</td>
<td>f</td>
<td>f</td>
<td>f</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Above</td>
</tr>
<tr>
<td>9</td>
<td>Extra slot</td>
<td>f</td>
<td>f</td>
<td>f</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Above</td>
</tr>
<tr>
<td>10</td>
<td>Extra slot</td>
<td>f</td>
<td>f</td>
<td>f</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Above</td>
</tr>
<tr>
<td>11</td>
<td>Extra slot</td>
<td>f</td>
<td>f</td>
<td>f</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Above</td>
</tr>
<tr>
<td>12</td>
<td>Extra slot</td>
<td>f</td>
<td>f</td>
<td>f</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Above</td>
</tr>
</tbody>
</table>

Click for new sensor.

New sensor connected to board and channel.

Sensor scaling. Scale factor and offset for new sensor.

Warning and alarm level for new sensor. The real value should be placed here. "-" means no warning/alarm.

If the warning and alarm event shall be raised when the value is above or below event level.

Board

The extra slots are filled from left to right, with extra TC130, extra TC140 and TC150.

Channel

TC130 4-20 mA signals are connected to terminal X21...n. Each TC130 board has 8 channels and the first channel is connected to terminal X2n no.: 1, 2.

TC140 Pt100 sensors are connected directly to the front of the TC140 board, to terminal X31...n. Each board contains 4 channels starting with the first channel at the top of the board.

See Technical Guide for more information.
3.1.2 Tap-changer

To open the Tap-changer window, click Confirm service on tap-changer in the Tap-changer menu. This menu option is only available if the TEC has contact wear functionality.

**Confirm service made on tap-changer**

Sends a signal to the TEC that the contacts have been serviced. The TEC sets the date for the next service to a maximum of 7 years from the current date. The number of operations to the next service is calculated from the average wear since the last contact replacement.

**Confirm replacement of contacts made on tap-changer**

A signal is sent to the TEC confirming that the main and transition contacts have been replaced. The contact wear calculation is reset.

**Confirm replacement of fixed contacts made on tap-changer (only for UZ, UBB)**

Sends a signal to the TEC confirming that the fixed contacts have been replaced. The TEC resets the fixed contact wear calculation.

To confirm desired service or replacement of contacts on the tap-changer, click [OK].
3.1.3 Cooler groups

There are two entries in the Cooler groups menu: Settings and Confirm service on cooler groups.

3.1.3.1 Settings

Open the window by selecting Settings in the Cooler groups menu.
Change settings for cooler groups

1. Change the number of cooler groups to be automatically and/or traditionally controlled by the TEC.
2. If one or more cooler groups are to be controlled automatically, the textboxes for the start temperatures of the first and last cooler groups need to be filled in.
3. To update the table with the latest inserted values, click the [Update page] button.
4. If one or more cooler groups are to be controlled individually, the textboxes in the table for the start/stop temperatures of the cooler group need to be filled in.
5. To set the changed configuration in the TEC, click the [Execute] button.

Manual start of cooler groups (forced on)

In the top right corner of the cooler group setting page, all the cooler groups of the transformer will be displayed. With each cooler group icon, there is a button that can be used to manually start and stop cooler groups. This can be useful for testing of cooler groups functionality during maintenance, and it may also be used in advance to cool down the transformer before a planned overloading.

For each cooler group, the icon displays the current status of the cooler group (if it is running or if there are any warnings or alarms). If the cooler group has been started manually, a lock symbol will be shown in the upper left corner of the icon, to indicate that the cooler group has been locked in running mode. When the cooler group is manually stopped, the lock will disappear. The lock symbol serves as a reminder of manually started cooling groups, and will be shown on all pages where the cooling group symbols appear.

The button beneath each cooler group can have three different texts:

- **Start** - The cooler group is not running and can be started manually.
- **Stop** - The cooler group has been manually started and can be stopped.
- **Auto** - The cooler group is running due to automatic cooling control. It can therefore neither be started nor stopped, so the button is deactivated.

### Start a cooler group

1. Click [Start] for the cooler group to be started.
2. The page will freeze until the cooling group has been successfully started. Note that this may take some time.

**NOTE:** Manually started cooler groups will run until they are stopped manually.
Stop a cooler group

1. Click [Stop] for the cooler group to be stopped.
2. The page will freeze until the cooling group has been successfully started. Note that this may take some time.

**NOTE:** If automatic cooling control is used, the number of coolers needed at the moment will always be kept running. Therefore, manually stopping a cooling group does not jeopardize the transformer cooling.

### 3.1.3.2 Confirm service on cooler groups

Open the window by selecting the *Confirm service on cooler groups* item in the Cooler groups menu.

1. Select the cooler group to be given a new service date from the dropdown menu.
2. Confirm that service on cooler groups has been made by clicking the [Execute] button.

If the confirmation was accepted, the counter for *Time in operation since last service* is reset. In the main site for coolers, you will find *Time in operation since last service*. 

![Confirm service made on a cooler group](image)
3.1.4 Events

The Events menu has two entries: Set event levels and Event list.

**Event type warning**
This event type is the first indication of abnormal or increasing values measured by the TEC. Immediate action from the operator might not be needed.

**Event type alarm**
One or more values have reached the alarm limit. Immediate action from the operator is required.

**Event type trip**
One or more values have reached the trip limit. The trip output is activated.

3.1.4.1 Set event levels

In the Set event levels page it is possible to set event levels for warnings and alarms for different sensors.

Open the window by selecting the Set event levels entry in the Events menu.

1. Select the sensor to change in the edit column.
2. Change the Warning or Alarm level.
3. Click [Execute] and the TEC will be updated with the new levels. Note that, for security reasons, the Trip levels cannot be changed from the web interface.

3.1.4.2 Event list

This is a list of all events that have been generated. If the user is logged in as advanced or maintenance user, the events can be acknowledged. For more information, see User's Manual.
3.1.5 TEC

There are four configuration pages for the TEC system: Set IP address, Configure cabinet display, Set time in TEC, and Change password.

Set IP address
Sets the IP address for the TEC unit, OPC server, and the NTP server.

Configure TEC display
Sets the language, values, and transformer name to be displayed on the TEC display.

Set time in TEC
Sets the time in the TEC to the computer time.

Change password
Changes the password for the different access levels.

3.1.5.1 Set IP address

By default, the TEC system IP address is configured to 192.168.1.100. Depending on network configuration, this may need to be changed. If, for example, more than one TEC system is used in the same network, at least one of the IP addresses needs to be changed.

To open the window, click Set IP address in the TEC menu.

1. Enter the changes.
2. Click [Execute] to set the changes in the TEC.
3. Click [OK] or [Cancel] in the confirmation question box.

NOTE: If the TEC IP address is changed, you need to restart Internet Explorer and enter the new IP address in the URL field.

Set IP-addresses
3.1.5.2 Configure TEC

To open the window, click Configure TEC display in the TEC menu.

1. Change the transformer name to be displayed in the top right corner of the screen.
2. Select values to be displayed in TEC display.
3. Select language to be used in TEC display.
4. Click [Execute] to set the changes in the TEC.

3.1.5.3 Set time in TEC

To open the window, click Set time in TEC in the TEC menu. The time in the PC and the TEC are displayed. Click the [Synchronize] button to set the time in the TEC system to the same as in PC.

Synchronize TEC time

<table>
<thead>
<tr>
<th>Source</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer</td>
<td>25 april 2018</td>
<td>13:37:18</td>
</tr>
<tr>
<td>TEC</td>
<td>25 april 2018</td>
<td>13:37:17</td>
</tr>
</tbody>
</table>

Synchronize
3.1.5.4 Change password

To open the window, select Change password in the TEC menu. The page is password protected; a user name and password for the Maintenance level are required.

Normal user
Provides access to the main page, graphs, forecasts, sensor values, and the event list. Password protection on this level can be removed.
1. Check the checkbox to enable password protection.
2. Change user name and password.
3. Click [Execute] to update the TEC with the new user name and password.

Advanced user
Enables access to all maintenance pages but not the change password page or the reset events function in the event list.
1. Change user name and password.
2. Click [Execute] to update the TEC with the new user name and password.

Maintenance user
Provides access to all available pages and allows changes to be made to the TEC settings.
1. Change user name and password
2. Click [Execute] to update the TEC with the new user name and password.

Change user name and password

<table>
<thead>
<tr>
<th>Change password for normal user</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enable password on all sides</td>
</tr>
<tr>
<td>Username: View</td>
</tr>
<tr>
<td>Password:</td>
</tr>
<tr>
<td>Execute</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Change password for advanced user</th>
</tr>
</thead>
<tbody>
<tr>
<td>User name: tac</td>
</tr>
<tr>
<td>Password:</td>
</tr>
<tr>
<td>Execute</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Change password for maintenance user</th>
</tr>
</thead>
<tbody>
<tr>
<td>User name: Admin</td>
</tr>
<tr>
<td>Password:</td>
</tr>
<tr>
<td>Execute</td>
</tr>
</tbody>
</table>

 tec_0715
3.1.6 Reports

The Reports menu has two entries: Status report and Configuration report.

3.1.6.1 Status report

The status report includes:

- TEC / Transformer name
- IP address on the network.
- Current event status.
- Current sensor values.

1. Opens the print dialog.
2. Save the status report to a text file on your local computer.
3. Closes the window.
3.1.6.2 Configuration report

The configuration report includes these settings:

- Order number and revision
- Version number for all software in TEC Basic
- IP addresses configured in TEC
- Board, channel, scale factors, event levels for the analog sensors
- Board, channel, scale factors, event levels for all digital sensors

1. Opens the printer dialog to print the displayed window.
2. Save the status report to a text file on your local computer.
3. Closes the window.
4. Saves all current TEC settings to a loadable HEX file on the client computer. For information on how to load the “Settings.HEX” file, see chapter 3.3.

3.1.7 Links

Use this menu to create or edit external links. External links can be other TEC units, web-servers, webcams or nearly any device with built-in webinterface.

There are 3 different entries:

- Menu type links
- Graphical type links
- Not used links

There can be a total of 10 links in menu type and/or graphical type.

Edit links not used. Drag and drop the edited links to the relevant type. Right-click to change the icon under Graphical type links. Click [Execute] to finish editing.
3.2 System / hardware maintenance

3.2.1 Change a circuit board

**WARNING**

Before starting any work at the TEC, the power must be disconnected.

1. Disconnect the power from the TEC.
2. Attach the ESD bracelet to a ground and yourself.
3. Remove connected cables from the board.
4. Remove the old board.
5. Insert the new board and tighten the screws.
6. Connect cables to the board.
7. Detach the ESD bracelet.
8. Connect the power to the TEC.

3.2.2 Change the configuration on the thermostat (only for TEC Basic)

1. Remove the two screws on the left and right sides of the display.
2. Remove the contact to the display and remove the display panel.
3. Use a screwdriver to reconfigure the thermostat to the desired temperature.
4. Attach the display contact and the display panel with the screws.

3.2.3 Change lamps in the TEC cabinet (only for TEC Basic)

The lamps are 24 V, 10 W lamps with BA15s socket.

1. Press the door contact to break the power to the lamps.
2. Replace the lamp, connected by a bayonet socket.

3.2.4 Sensor failure

If a sensor fails, an Alarm or Sensor Error will appear, depending on which sensor has failed. The Alarm or Sensor Error is presented in the Event list where it can be reset, when the failing sensor has been corrected or replaced.

3.2.4.1 Current sensor

If a current sensor signal is under 3 mA or above 20 mA a Sensor Error event is generated. An Alarm is generated if both the HV and the LV sensors are lost.

In a two-winding transformer, the “lost” current is calculated from a sensor other than the failing sensor. For other types, or if both sensors are faulty, the current is set to 0, which influences other functions, such as hot-spot and load calculations.

3.2.4.2 Other 4-20 mA sensors

If the signal is under 3.5 mA or above 22 mA a Sensor Error event is generated.
3.2.4.3 Pt100

If the temperature is lower than −50°C or higher than 150°C, the last valid temperature is kept. If the temperature exceeds a sensor's measurable range for one minute, a warning is generated. If both the top and bottom oil temperature sensors have failed, an alarm is generated.

If the top sensor fails, the TEC can use the bottom sensor to calculate an approximate value of the top sensor. The opposite is also true if the bottom sensor should fail. For the sun/shade temperature, a failing sensor is replaced by the other. If both sensors are faulty, their last values are used in calculations.

3.3 Load files into the TEC with TcFeeder

3.3.1 Introduction

The TcFeeder software is used to load the TEC system software and its configuration parameters. This guide describes how to configure and operate the TcFeeder software. It is intended for application engineers and commissioning personnel who need to load/start the TEC system. It does not need any installation; simply copy the application to the hard drive. The TcFeeder application can be found on the Sales Support Portal.

**System requirements for TcFeeder**

| Operating system       | Microsoft Windows 2000/XP or higher with .NET framework 2.0 or higher installed |

3.3.2 Equipment

Communication with the TEC is performed via the included serial cable, 1ZSC000654. It is wired as shown in Fig. 1. The cable must be connected between the computer's serial port, e.g., COM1 on the PC, and the TEC System main board (TC122).

The TEC end of the cable has a separate ground connection which should be connected to the TEC cabinet ground.

**NOTE:** The ground connection should be connected before the serial cable.

![Fig. 1. Cables.](image)

3.3.3 Operation

Note that the display on the TEC cabinet will display "Communication Error" while the TEC is in BOOT loader mode. This is because the BOOT loader does not contain any display driver routines.
3.3.3.1 TcFeeder user interface

Fig. 2 shows the TcFeeder user interface. Detailed information about the different parts and how to configure and operate the TcFeeder is found in the following sections.

![User interface](image)

Fig. 2. User interface.

3.3.3.2 User mode

There are two user modes available in the TcFeeder, **Standard** and **Advanced**. This document only describes the **Standard** mode, which shall be used during commissioning etc. **Advanced** mode is only intended for internal use. Default user mode is **Standard**.

![User menu](image)

Fig. 3. User menu.

3.3.3.3 File types

The file type that is used for the TEC system is the HEX type. Three main files are used to get the system up and running: the Application, Parameter and the Filesystem files. These files can be merged into a single file or loaded separately.

File descriptions:

- **Application**: Contains the system software and calculations.
- **Parameters**: Configuration file that includes all transformer and TEC specific data.
- **Filesystem**: Contains the embedded web interface and language translations for web and display.
3.3.4 Load the TEC system

Follow these instructions to load a HEX file into the TEC system.

Check that the cables are connected according to chapter 3.3.2 Equipment. Make sure that the contact at the TEC end is properly inserted and the ground cable is connected.

1. Start TcFeeder
2. Select the COM port connected to the TEC system.
3. Select the HEX file to be loaded. Use the dropdown list or click the browse button to open the browse dialog.

![Fig. 4. Select communication port.](image)

![Fig. 5. Browse for hex file.](image)
4. Click the [Send file] button to load the chosen file into the TEC system. The progress bar indicates how much of the file has been uploaded to the TEC system.

Fig. 6. Successful load completed.

3.3.5 Start the TEC system

1. When the upload is finished, the [Start System] button will be enabled. Click this button to start the system. When the system is started, the [Start System] button will be disabled again.

2. The TEC System is running when the green light on TC122 is lit and you can view values in the display. TcFeeder can be closed, File->Exit or click the x in the top right corner.

Fig. 7. Start system.
3.3.6 Error messages

When using TcFeeder, a couple of error messages might appear. Some of these messages are described in this chapter.

For some common errors the system will try to recover automatically and make another try. If the result of an operation is failed, it is possible to view the actions the system has performed by selecting [User/Advanced]. Each action/action result starts with a timestamp, and all information before the next timestamp belongs to it.

If no connection with the board can be established you will see some error messages in the advanced window, i.e. Open failed or Communication error, see the checklist below:

For some unexpected errors there will be no further attempt to fulfill the request, just some error information will be given.

If you get the error message “Open failed”:
1. Check that no other program is using the same port.
2. Check that you have chosen the right port in the TcFeeder.
3. Try again.

If you get the error message “Communication error”:
1. Check that the TEC is connected to power.
2. Check that the cable is connected to the correct serial port on the PC and that the contact at the TEC end is properly connected.
3. Check that you have chosen the right port in the TcFeeder.
4. Try again.

If no connection with the board can be established you will see some error messages in the advanced window, i.e. Open failed or Communication error, see the checklist below:

For some unexpected errors there will be no further attempt to fulfill the request, just some error information will be given.

If you get the error message “Open failed”:
1. Check that no other program is using the same port.
2. Check that you have chosen the right port in the TcFeeder.
3. Try again.

If you get the error message “Communication error”:
1. Check that the TEC is connected to power.
2. Check that the cable is connected to the correct serial port on the PC and that the contact at the TEC end is properly connected.
3. Check that you have chosen the right port in the TcFeeder.
4. Try again.
Appendix 1
Frequently Asked Questions (FAQ)

TEC main screen is not displayed

The TEC main screen is not displayed when entering the TEC Cabinet IP address in the Internet Explorer address field. What could be causing the problem and what should I do?

1. Check that the correct IP addresses are used, for both the TEC cabinet and the PC.
2. Make sure the network cable is connected.
3. Check that the TEC cabinet is up and running.

TEC maintenance -> Settings screen is not displayed

TEC maintenance -> Settings screen is not displayed after entering user id and password. What could be causing the problem and what should I do?

1. Check that the user name and password are correct.
2. Check that the Internet Explorer security settings are correct. See Installation and Commissioning Guide, section 2.
## Appendix 2
### Spare part list

<table>
<thead>
<tr>
<th>Number</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>5886 061-A</td>
<td>Power supply board (TC110)</td>
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<tr>
<td>5886 072-A</td>
<td>Processor board (TC122)</td>
</tr>
<tr>
<td>5886 063-A</td>
<td>Analog input 4 - 20 mA board (TC130)</td>
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<td>5886 064-A</td>
<td>Temperature input Pt100 board (TC140)</td>
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<td>Digital input board (TC150)</td>
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<td>5886 066-A</td>
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<td>Cabinet lamp 24 V, 10 W</td>
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<tr>
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<td>4899 9286-1</td>
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</tr>
<tr>
<td>12SC000607</td>
<td>Lower absorber</td>
</tr>
</tbody>
</table>
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