

Installation

The TPU-2000R unit comes enclosed in a metal case. Follow the instructions and diagrams in this section to install the TPU-2000R.

Receipt of the TPU-2000R

When you receive the TPU-2000R, examine it carefully for shipping damage. If any damage or loss is evident, file a claim at once with the shipping agent and promptly notify the nearest ABB sales office.

Before installing the unit, it is suggested that the following procedures be performed:

On units equipped with an MMI

- Power up the relay. The LEDs should light and a slight clicking sound will be heard.
- Using the arrow keys, go to the Main Menu, scroll to Settings, press <E>, scroll to Unit Information, press <E>. Verify unit information against front panel nameplate.
- Press <C> to return to the Settings menu, scroll to Show Settings, press <E>. Check default settings against the tables supplied in this manual.
- After checking the default settings, press <C> twice to return to the Main menu. Scroll to Test and press <E>, at the Self Test selection, press <E>. The unit will self test.
- After performing the self test, press <C> twice to return to the Main menu. Scroll to Settings and press <E>, in the Settings menu, scroll to Change Settings and press <E>. In the Change Settings menu, scroll to Clock, and set the unit clock.
- At this point, the internal battery is now in use. If the unit is not going into service for an extended period, set the day of the month to zero (0) and the battery will not be in use. The battery will remain unused until the clock is set to a valid date.
- Press <E> to enter the correct time and return to the Change Settings menu.
- Set the PASSWORD by scrolling to Configuration and press <E>. At the Password prompt, press <E> again. Once in the Change Confi Sett menu, scroll to Relay Password and enter a password. This will be the main password for entry to the unit. Press <E> to enter the password and return to the Change Confi Sett menu. Scroll to Test Password, and enter a different password. This password allows low level entry to the Test options of the unit.

WARNING: If the password entered in the Relay Password section is lost or forgotten, the unit cannot be accessed. If this situation occurs, contact ABB Allentown immediately.

On units not equipped with an MMI, connect a PC to the RS-232 port on the front of the unit and use the ECP (External Communication Program) and follow the same process as outlined above.

Installing the TPU-2000R

The TPU-2000R is enclosed in a standard 3U (3 unit high rack), 19 x 5-inch case designed for rack mounting. Figure 4-2 shows the dimensions of the TPU-2000R. A kit for panel mounting can be ordered separately. See section 13 for details.

Dimensions are in: inches
[millimeters]

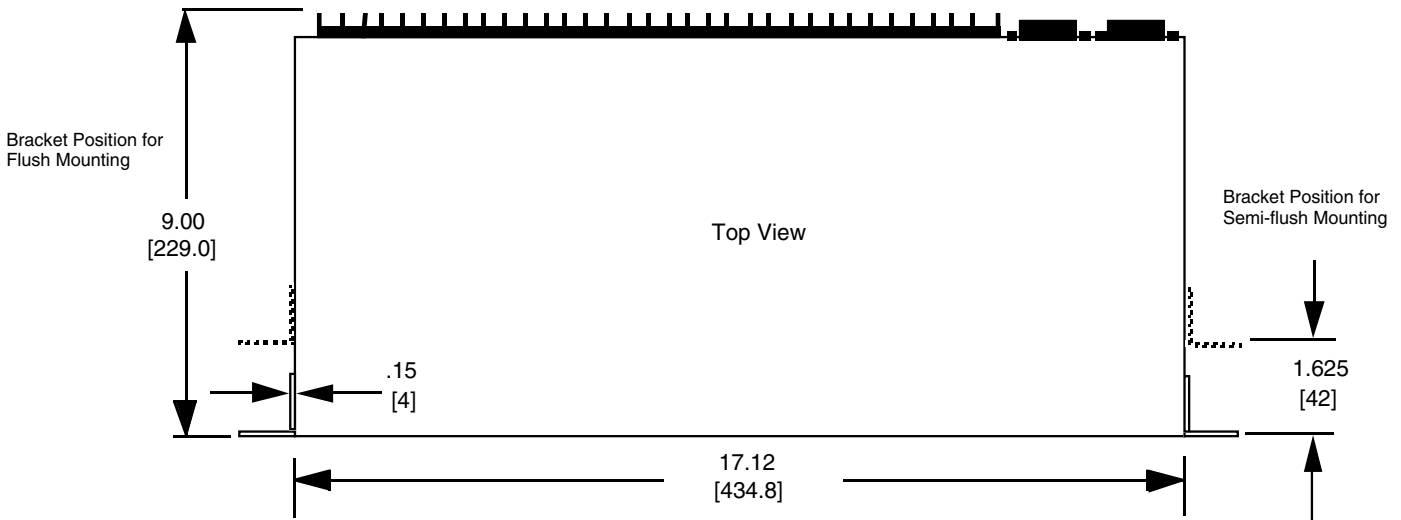
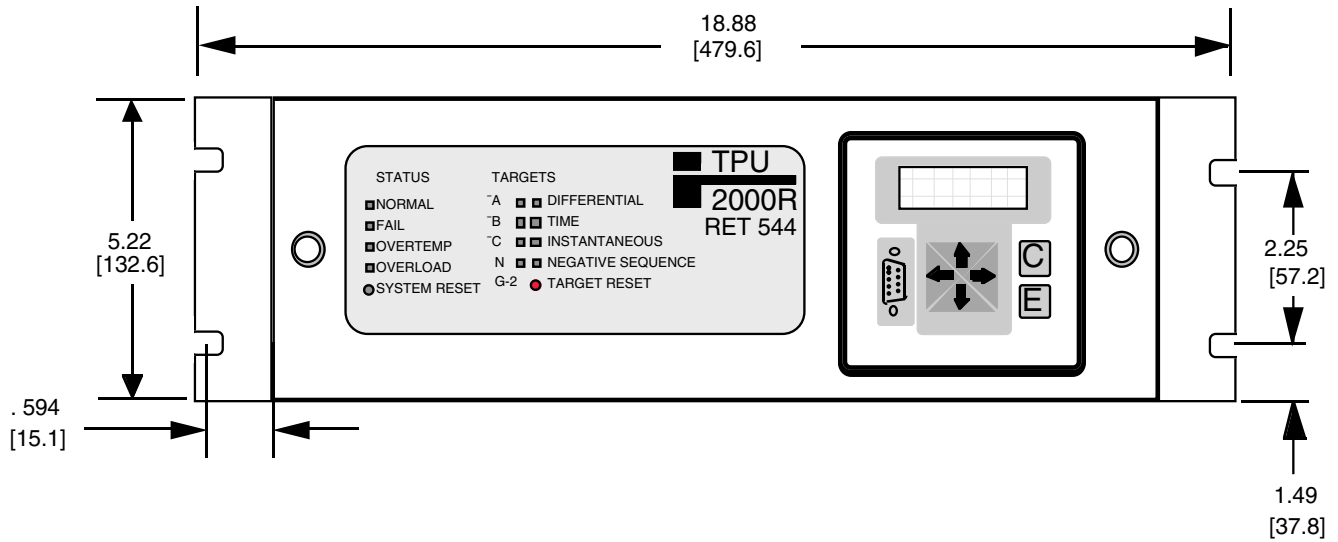


Figure 4-2. TPU-2000R Case Dimensions

Rear Terminal Block Connections

Apply only rated control voltage marked on the front panel of the unit to the positive terminal and the negative terminal. Wire the ground stud on the rear of the case to the equipment ground bus with at least #10 gauge wire. Figure 4-3 shows the rear terminal block layout and numbers.

Tables 11-1 and 11-2 lists the minimum required connections for a functioning system. Optional connections are shown on the bottom of the table. Jumper #6 is used to set the TRIP Output Contact to Normally Open or Normally Closed.

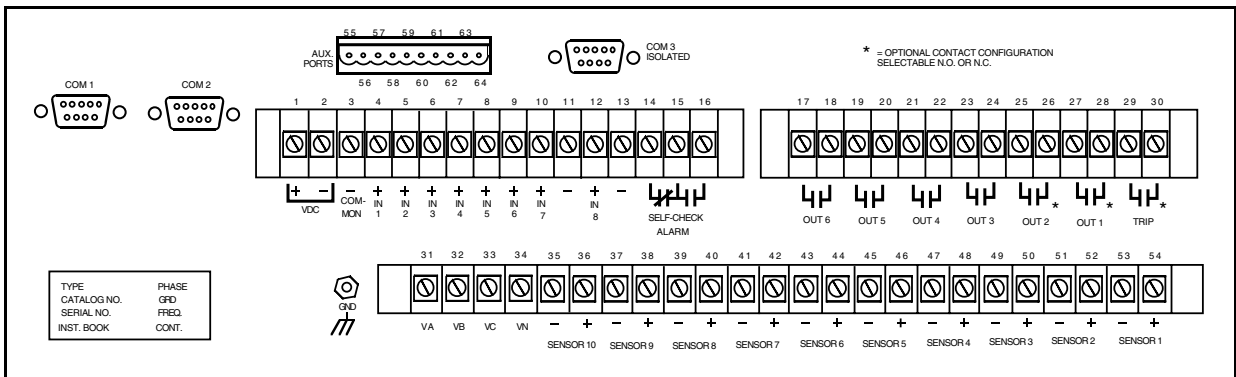


Figure 4-3. Rear Terminal Block

New Firmware Installation

WARNING: Interrupting the download process before it is completed will result in lost EEPROM data. In the event that the download is prematurely terminated, contact the factory.

To download new software to the TPU-2000R:

- If desired, save all settings to a disk as described in Section 12.
- On your computer's hard drive, create a directory called C:\FPI.
- Copy files from the FPI diskette (FPI.exe) and the SAF diskette (*filename.abs*) to the C:\FPI drive. Remember the filename from the SAF diskette as it will be needed later.
- Connect the TPU-2000R to the computer via the serial port on the front panel of the unit with a null modem cable.
- Ensure that the communications settings of the computer com port and the settings of the TPU-2000R are both set to 9600, 8, N, 1.
- At the C:\FPI prompt, type FPI
- At the Monitor Type ? prompt, select the appropriate monitor (color or black and white) and press <CR>.
- After the ABB description screen, the Communication Options screen appears. Use the spacebar to change the com settings or accept the default settings by scrolling through the screen with the <CR> key.
- If all com settings are correct, the Successful Connection To... screen appears. Press <CR> to continue. The next screen to appear will be the Main Menu. If com settings are not compatible or some other problem exists, the Communication Status screen appears. Reset the com settings and recheck connections and press <CR>.
- The only option necessary for downloading the software update is the **Update Unit Software** selection. Using the arrow keys, scroll to the Update Unit Software selection and press <CR>.
- At the warning message screen, select continue with unit software update.
- At the Load New Firmware Data screen, type *filename.abs* (*filename* is the name of the file) copied from the SAF disk) and press <CR>. This will highlight the default action, [READ FROM DISK]. Press <CR> again. Downloading should take about 20 minutes to complete.
- During download, the TARGET LEDs on the front panel will blink intermittently and in sequence starting with ØA with the following notes:

<u>Computer display</u>	<u>LED</u>	<u>MMI (If present)</u>
Monitor Has Been Entered	ØA blinks	TPU2000R Monitor
Flash Erase	ØB blinks	Flash Memory Erase in Progress
Flash Programming	ØC blinks	Flash Memory Download in Progress

- The message "Successfully Completed Downloading! Hit Any Key To Return To Main Menu" will appear. Hitting the <CR> key will cause the systems to reboot and the message "Please Wait While System Reboots" will appear.
- After the system has rebooted, the Main Menu will reappear. Scroll down to the Quit Program selection and press <CR>.
- Restore settings to the relay as described in Section 12.

Built-In Testing

The TPU-2000R continuously checks itself for proper functioning.

Self-Test Status

The TPU-2000R provides continuous self-testing of its power supply voltages, memory elements, digital signal processor and its program execution. In the event of a system failure, the protective functions are disabled and the Self-Check Alarm contacts are actuated. Except for a “processor stalled” condition, review the PASS/FAIL status of these self-test elements by using the man-machine interface (MMI). Normal status is indicated by a green TPU STATUS light (LED) and system failure is indicated by a red TPU STATUS light (or by the green TPU STATUS light not being lit in the case of a loss of control power). If the green light is flashing, refer to the Operations Menu in Section 9.

Self-Test Failures are recorded as a number in the Operations Record. The binary bit pattern of this number indicates the Self-Test Failure or Editor Access Status involved. The 1’s in the bit pattern indicate where a failure has occurred. Count from the right of the bit pattern (starting with zero) to the position where a “1” occurs. Compare that bit position # with Table 4-1 to reveal the failure. See the following examples for further explanation.

If the self-test fails, the TPU-2000R is no longer providing protection. Replace the unit as soon as possible.

Table 4-1. Operations Record Value Information

Bit Position	Self-Test Failure	Editor Access Status
0	CPU RAM	INTERRUPT LOGGING
1	CPU EPROM	REMOTE EDIT DISABLE = 1
2	CPU NVRAM	LOCAL EDIT DISABLED = 1
3	CPU EEPROM	FRONT MMI EDIT ACTIVE
4	NOT USED	FRONT COMM PORT EDIT ACTIVE
5	NOT USED	REAR COMM PORT EDIT ACTIVE
6	NOT USED	REAR AUX COMM PORT EDIT ACTIVE
7	NOT USED	REAL TIME CLOCK EDITED
8	DSP ROM	PROGRAMMABLE I/O EDITED
9	DSP INTERNAL RAM	PRIMARY SET EDITED
10	DSP EXTERNAL RAM	ALTERNATE1 SETTINGS EDITED
11	DSP ANALOG/DIGITAL CONVETER	ALTERNATE2 SETTINGS EDITED
12	DSP +/-5 V POWER SUPPLY	CONFIGURATION SETTINGS EDITED
13	DSP +/-15 V POWER SUPPLY	COUNTER SETTINGS EDITED
14	DSP STALL or +5 V POWER SUPPLY	ALARM SETTINGS EDITED
15	DSP TO CPU COMMUNICATIONS	COMMUNICATIONS SETTINGS EDITED

Example of a Self-Test Failure

Value : 256 has a binary bit pattern of 0000000100000000 (bit order 15.....0)

The 1 is in bit position 8 as you count from the right. This bit position correlates to DSP ROM failure.

Example of an Editor Access

Value : 145 has a binary bit pattern of 0000000010010001 (bit order 15.....0)

The 1's in this bit pattern have the following bit positions and corresponding Editor Access Status:

Bit 0 : Interrupt logging bit (Ignore this bit because it will always be set in this example.)

Bit 4 : Front communications port initiated the editor access and change.

Bit 7 : Real-time clock settings were changed.

TPU-2000R Settings Tables Diagnostics

Three copies of each settings table are stored in nonvolatile memory, preventing data loss during control power cycling. When you finish editing any settings table, the changed table's data is transferred from a temporary edit buffer into three separate locations in nonvolatile memory.

A background diagnostics task continuously runs a checksum on each copy of the settings tables to verify data consistency. If an invalid copy is detected, the diagnostic task attempts self-correction by transferring a valid copy to the invalid copy location. If this is unsuccessful, the task marks the copy as unusable and switches to the next available copy.

When the TPU-2000R detects that all three copies of a settings table are not valid, the diagnostic task adds a self-diagnostic error in the Operations Record, drops the self-check alarm, and disables all protective functions. In addition, the Self Test display under the MMI Test Menu shows the current status (PASS or FAIL) for all memory devices.

Man-Machine Interface (MMI)

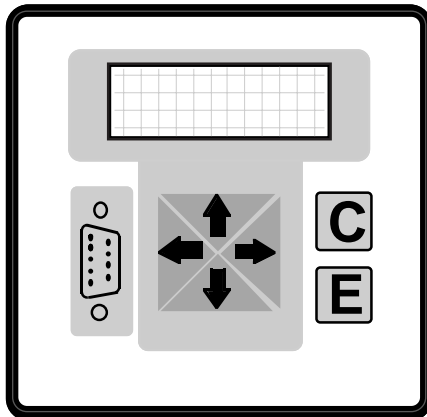


Figure 5-1. MMI Access Panel

The man-machine interface (MMI) on the front panel consists of a four-line liquid crystal display (LCD) with twenty characters per line, six push-buttons (keys) and thirteen LED targets. Press the Enter <E> key to access the Main Menu. Use the up and down arrow keys to move through the various menus and to change the character value when you enter the alphanumeric password. Use the Enter <E> key to select the desired menu or desired value when you change settings.

Use the left and right arrow keys to decrease and increase, respectively, setting values or record numbers. You can also use them to move from left to right within the password string. Hold down or repeatedly press the arrow keys to change the setting value.

Use the clear <C> key to return to the previous menu. You can also use the <C> key to:

- reset LED targets and the LCD after a fault (push <C> once)
- scroll through all metered values (push <C> twice)
- reset the peak demand values (push <C> three times)

Perform a system reset by simultaneously pressing the <C>, <E> and up arrow keys. This resets the microprocessor and re-initiates the software program. During a system reset, no stored information or settings are lost.

The following displays and menus are available through the MMI:

- Continuous Display—the enabled settings table and all currents
- Post-Fault Display—fault currents for last fault until targets are reset
- With optional VT inputs installed, Continuous Display and Post-Fault Display show currents and voltages

MMI Displays

Metering Display (Continuous) (with optional VT inputs)

la2: 500 KVan: 13.00
lb2: 500 KVbn: 13.00
lc2: 500 KVcn: 13.00
In2: 0 Prim Set ↵

Metering Display (Continuous) (without optional VT inputs)

la1: 2	la2: 2
lb1: 2	lb2: 2
lc1: 2	lc2: 2
In1: 0	Ig2: 2 ↵

Main Menu

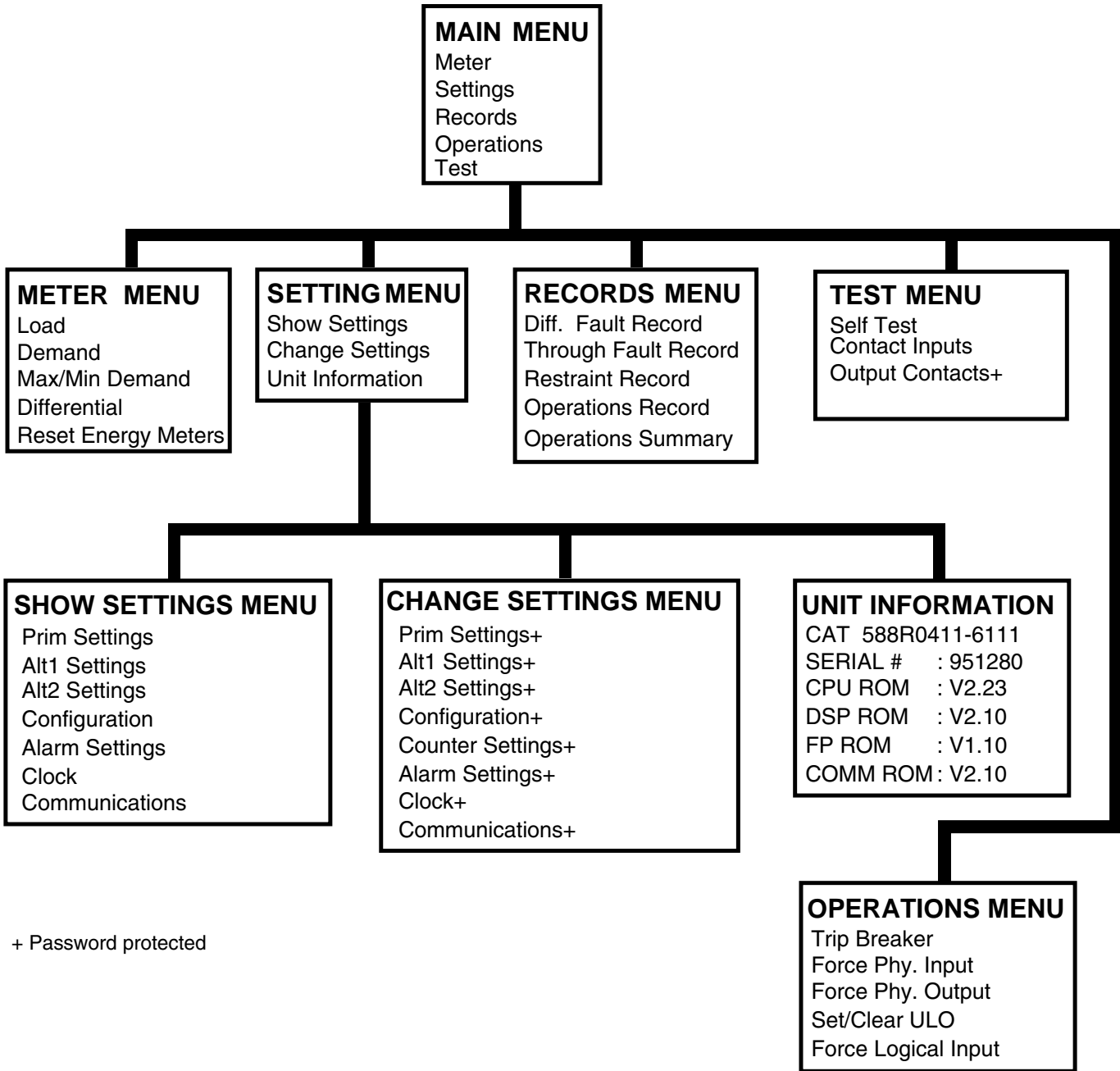
MAIN MENU	
Meter	
Settings	
Records	↵

Display After a Fault Interruption

Diff Fault Rec 1
Fault # 7
Active Set Prim
Date 17 Aug 1995 ↵

Man-Machine Interface Menus

Below is an outline of the menus available through the man-machine interface.



+ Password protected

Figure 5-2. Man-Machine Interface Menus