TDR 811
Operating Instructions

1. Notices

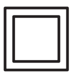
Read the entire user manual before operating the product for the first time.
This user manual is part of the product; store it at an easily accessible location.
Upon receipt of the product ensure the contents match the packing list, notify your supplier of any missing items.
If the equipment appears damaged, notify your carrier and supplier immediately, giving a detailed description of any damage, save the damaged packaging to substantiate your claim.
The TDR 811 includes, TDR, shoulder strap, screw-driver, 4 x AA batteries, protective carry bag, and operating instructions.
TDR 811P includes TDR, Mains Blocking Filter, shoulder strap, screw driver, 4 x AA batteries, protective carry bag, and operating instructions

1.1. Safety Notices

WARNING

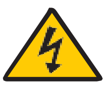
- This instrument meets the safety requirements of IEC61010-1: 1995
- For LV Mains work always use the Cat 4 600V rated accessory mains blocking filter MBF 811.
- The TDR 811 without the LV mains blocking filter is designed for use on proven secure de-energized circuits only.
- Connection to line voltages will damage the instrument and could be hazardous to the operator
- This instrument is protected against connection to telecom network voltages according to EN61326-1.
- Safety is the responsibility of the operator

1.2. International Electrical Symbols



This symbol signifies that the instrument is protected by double or reinforced insulation. Use only specified replacement parts when servicing the instrument.

This symbol indicates a WARNING, and that the operator must refer to the user manual for instructions before operating the instrument. In this manual, the symbol preceding instructions indicates that if the instructions are not followed, bodily injury, installation/sample and product damage may result.



Risk of electric shock. The voltage of the parts marked with this symbol may be dangerous. In this manual, the symbol preceding instructions indicates a risk of electric shock.

1.3. Standards

The TDR 811 has been manufactured in accordance with the following international standards:

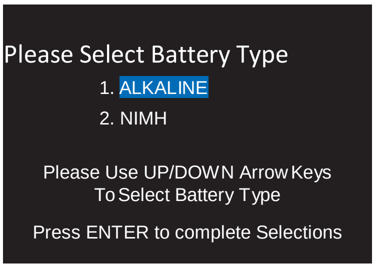
ISO 9001-2015
IEC 61010-1
EN 60950
BS/EN 61326-1
Water/ Dustproof to IP67

2. Set-Up

2.1. Keypad.

1 Commence trace / hold trace
2 Escape to exit TDR mode
3 Increase setting
4 Cursor right/Option
5 On/Off and keyboard light
6 Decrease setting
7 Cursor left/Option
8 Enter to save selected setting and select active cursor
9 Set/Sel to select options

2.2. On and Off functions



After inserting new batteries (section 4.9), press and release the On-Off switch (5). The start-up display will be shown momentarily and will be followed by the battery selection display.
This display will only be shown when the batteries are removed or re- placed. Follow the on-screen instructions to select battery type.
To turn off press and hold the On-Off switch (5) until the display closes.
At the next switched-on a new screen will appear giving choices of Measurement, Settings, and Help. The normal choice for operation is “1. Measurement”.

2.3. Key Pad Backlight

Upon switching on the TDR 811 the key pad back-light will be turned on automatically for 20 seconds. Press any key to restart the illumination. The illumination may be turned On or Off by momentarily pressing the On-Off switch (5). The function will return to automatic when the TDR 811 is switched off and restarted.

3. Settings Menu

After switch-on, select “Settings” using the UP or Down arrow (3) or (6), press “Enter” (8) to reveal the settings choices. Press “ESC” to return to the start screen to progress to Measurement operation.

Select (1) “VoP Unit”: Press the Left (7) or Right (4) key to choose % or m/us.

Select (2) “Length Unit”: Press the Left (7) or Right (4) key to choose feet or metres. The choice of feet or metres will change the VOP Unit to m/ms, or ft/ms.

Select (3) “Brightness”: Press the Left (7) or Right (4) key to choose between High, Medium and Low. The lowest setting should be used suitable for the ambient light conditions to preserve battery life.

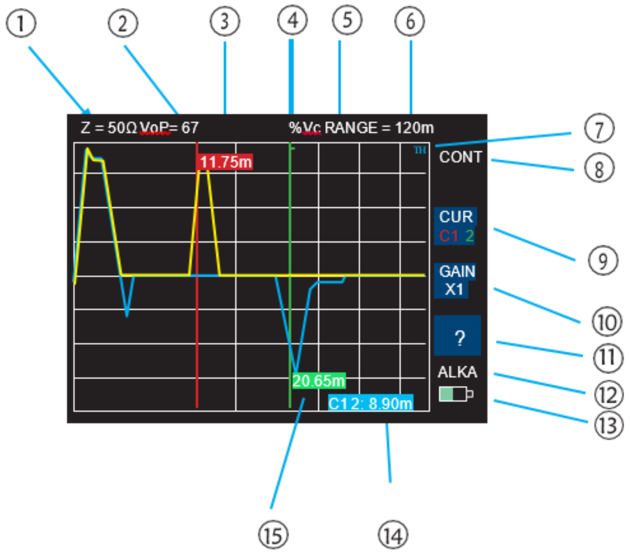
Select (4) “Auto-Shutdown”: Press the Left (7) or Right (4) key to choose between 1,3,5,10 and 15 minutes or disabled.

Select (5) “Language”: Press the Left (7) or Right (4) key to choose between languages.

4. Operation

Upon completion of the set-up procedures press "ESC" key (2) to return to main menu and press "Enter" (8) to select "1. Measurements".

4.1. Measurement display



1 Impedance value selected
2 Cursor distance Red
3 VoP value
4 Active cursor
5 VoP unit
6 Range selected
7 Trace hold
8 Scan Mode or Tone
9 Cursor option selected
10 Gain value selected
11 Fault display overlay
12 Battery type selected
13 Battery condition indicator
14 Distance between cursors
15 Cursor distance green

In the following instructions, to change settings press key "SET/SEL" (9) to highlight a parameter, press up or down arrow (3) or (6) to select required value. After measurements are completed, switching on again, all of the previously used settings will re-appear.

4.2. Setting cable parameters

Characteristic Impedance setting, shown at position (1) on screen, is selectable for 25, 50, 75, 100 or 120 ohms. To change the Characteristic Impedance, press "SET/SEL" (button 9) until **"Z"** is highlighted in yellow. Press the UP (button 3) or DOWN (button 6) keys until the chosen Impedance value is selected.For all TDRs fitted with a 600V Cat IV mains blocking filter, the filter may have an impact on the displayed trace. It may be that setting the impedance value is a matter of preference after experience on the users own network. As a rough guide, for LV power cables the actual impedance varies from 6 Ohms for some service cables to about 25 Ohms for LV mains, about 50 Ohms for 11kV and 33kV cables and about 100 Ohms for pilot cables.

Velocity of Propagation value, VOP, is selectable between 10 and 99% or an equivalent in feet or meters per micro second. To change VOP, press "SET/SEL" (button 9) until "VoP" is highlighted in yellow. Press the UP (button 3) or DOWN (button 6) keys until the chosen value is selected, shown on the display at (2) and (3).

4.3. Range selection

Always begin measurements by setting the range to a value significantly longer than the known or expected cable length. If necessary the range can be fine-tuned later. The set Range is displayed at position (5) and (6). To select the Range, press “SET/SEL” (button 9) until “RANGE” is high-lighted in yellow. Press the UP (button 3) or DOWN (button 6) keys until the range is longer than your expected cable length. The range may be adjusted down to less than the cable length after the initial view in the interest of examining reflections closer to the instrument.

4.4. Scan modes, Trace Hold Compare, and Tone generator

The TDR 811 has two scanning modes, single or continuous scan. Single scan mode “Once” allows the user to hold the trace for closer examination and disconnect from the cable being tested whilst leaving the trace displayed. To commence a trace press “START” (key 1). In continuous mode, “CONT”, the TDR fires continuous pulses.

Trace Hold function may be activated when using CONT, Continuous Mode. Press “START” (1), “TH” will be displayed in the top right of the display, and the trace will be held. At this point the user may disconnect and reconnect, for example to a different phase which then produces a second trace on screen for comparison to the first. Alternatively on a proven de-energised circuit a second operator may short out the tested phase to prove a position along the route. (This is a common application technique in street lighting applications). The held trace will be deleted if the TDR 811 is switched off, or press “START” again to leave this mode.

Tone Generator: This function is used to trace individual pilot cable pairs in a cabinet. Connect TDR 811 to the cable pair being traced and use an industry standard tone probe in the frequency range of 810 to 1100Hz to trace the pair at another cabinet. Auto shutdown is disabled whilst this function is being used.

4.5. Cursors

The TDR 811 has dual cursors, Cursor 1 is Red and Cursor 2 is Green. To select the Cursor, press “SET/SEL” (button 9) until “CUR” (position 9) is high-lighted in yellow. To alternate between cursors press “Enter” (8), the cursor selected is identified by an arrow on the top of the active cursor, as shown position (14) on the display. To move the cursor use Left or Right Arrow keys (7) or (4). The length measurement is displayed on the flag attached to the cursor as shown on the display (12) and (13). The distance between cursors is shown on the display (position 11).

The correct position of a cursor at a reflection feature on the trace is at the point where the trace starts to rise or fall.

4.6. Gain

For convenience the TDR 811 switches on with the gain set to the previously used value, and can be manually changed at any time. The gain value selected is shown on the display position (7). To select the Gain, press “SET/SEL” (button 9) until “GAIN” is high-lighted in yellow. Press the UP (button 3) or DOWN (button 6) keys to choose. The common way to adjust gain is to set it such that the peak of the reflection from the far end of the cable is near the top of the screen.

5. Connecting the TDR 811 to a cable to be tested

DANGER

Working on live parts
Danger to life or risk of injury due to electric shock.
» The separation filter MBF 811 must be connected to cables up to rating CAT IV/600 V.
» Comply with the safety instructions for working with live cables as per EN 50110 or the applicable standards in your country.
» Do not use the separation filter in damp environments or wet conditions.
» For the connection, only use the provided crocodile clips with intact fuses that are designed for CAT IV/600 V.
» Ensure that during connection, implementation and monitoring of the measurement, protection is guaranteed for all system components, either by means of protection devices, an insulated cover material or by maintaining the necessary safety distances.

LV Power Cable: Read the current or applicable User Manual for Mains Separation Filter MBF 811.
Ensure your company safety procedures for test are in place, observed and acted on.
Ensure the LV Mains Blocking Filter with its fused test leads is used with TDR 811 at all times.
Connect the black clip to screen or neutral, red clip to core. Phase to phase measurements may also be made. Note: velocity factor will differ between testing phase to phase and phase to neutral.

HV Power Cable: Ensure the cable under test is proven de-energised and sanction for test is complete, depending on your company safety procedures. Connect phases not being tested to earth. Connect the black clip to the screen, the red clip to a core. Measurements may also be made between phases in a three core cable.
Always keep untested phases connected to earth.

Coaxial or Concentric Cable: Connect the red clip to the centre wire and the black clip to the shield/screen.

Shielded Cable: Connect the red clip to a wire adjacent to the shield and the black clip to the shield.

Pilot Cable Twisted Pair: Separate out one pair and connect the red and black clips to the two wires of the pair.

6. How to determine VoP

Measure a length of cable of the type to be tested, or measure the actual cable to be tested using a route tracer and measuring wheel, and for greatest accuracy account for every metre change upwards and downwards into and out of substations or street pillars. Connect the TDR 811, select a suitable range, align the cursor to the start of the rising edge of the reflected pulse. Change the VoP setting until the length shown on the cursor flag equals the measured length of the cable. The VoP shown will be the VoP for the cable. As a rough guide: 54% for PILC, 58% for XLPE, 55% for mixed, and 67% for pilot cables.

7. Fitting and changing batteries.

Disconnect the TDR 811 from any cable or network link. Turn the TDR 811 off.

- Loosen the 4 black screws and remove the battery cover.
- Replace the batteries with 4 x 1.5 Alkaline or NMH AA size batteries observing the polarities
- Refit the battery compartment cover and refit the 4 screws.
- On first switch-on after replacement, select the battery type .

8. Cleaning

Disconnect the instrument from any source of electricity

- Turn the instrument off
- Use a soft cloth lightly dampened with soapy water, wipe over the instrument, rinse the cloth in clean water squeezing out any excess water, wipe over the instrument removing any soap residue, dry instrument with a dry cloth
- Do not splash water directly on the instrument
- Do not use alcohol, solvents or hydrocarbons

9. Storage

If the instrument is not to be used for a period of more than 60 days, it is recommended that the batteries are removed and stored separately.

10. Repair and Warranty

The instrument contains static sensitive devices and is not user serviceable. If an instrument fails, or its protection has been impaired, it should not be used but sent back for repair to Baur Test Equipment Ltd..
New instruments are guaranteed against breakdown due to manufacturing or component defects for 36 months after the purchase date by the user.
Any unauthorised prior repair or adjustment to the instrument will automatically invalidate the warranty.

11. Specifications

Ranges	VoP dependent, metres: 7, 15, 30, 60, 120, 250, 500, 1000, 2000, 3000, 6000.
Cursors	Selectable dual cursors with a distance measurement between cursors
Accuracy	1% of selected range*
Resolution	Approx. 1% of range
Sensitivity	Min 3 pixel return at 4km on 0,6mm Æ , PE , TP Velocity Factor. Adjustable from 10% to 99% or equivalent in ft/ meters per micro second
Output Pulse	5 volts peak to peak into open circuit
Output Impedance	25, 50, 75, 100 & 120 ohms
Output pulse	3 ns to 3 us, Automatic per range.
Scan Rate	2 scans/s or scan held
Tone Generator	810 – 1100Hz
Battery Life	7 hours typical use
Power Supply	6 volts, 4 x 1.5 AA Alkaline cells or NMH rechargeable cells
Power Down	1, 2, 3, 5, 10 and 15 minutes or disabled
Display	328 x256 QVGA
Voltage protection	250 volts AC Operating
Temp	-10º to +50ºC
Storage Temp	-20º to +70ºC
Dimensions	220 x 98 x 58 mm / 8.7x3.8x2.3 inches Weight 0.5 Kg / 1pouind 2 ounces
Safety I	EC 61010-1 EN 60950
EMC	BS/EN 61326-1
Protection Class	IP67

* Measurement accuracy of +/-1% assumes the instrument setting for VoP of the cable under test to be accurately set, homogeneity of the VoP along the cable length, and accurate cursor positioning.
cable length.

12. QUICK START GUIDE TDR 811 and MBF 811

The purpose of the Quick Start Guide is a reminder of functionality and does not replace training nor reading the full manuals for TDR 811 and MBF 811.

OBSERVE AND ACT ON YOUR COMPANY SAFETY RULES AND PROCEDURES

Quick start guide does not cover safety issues, consult your qualified approved trainer or company safety representative for guidance.

1 Practice makes perfect. Get familiar and practice on a spare cable, perhaps on a drum.

2 Plug in MBF 811 to the top of TDR 811. Only MBF 811 will fit TDR 811. Always use MBF 811 if there is any risk that the test cable may become live.

3 Connect the crocodile clips to the cable under test, either phase to phase or phase to neutral.

4 Switch on TDR 811 (button 5), if required quick-push this button again to switch off the back-light.

5 Press Enter (button 8) to select “Measurement”

6 A TDR trace with the previously used Impedance, Range, and VP settings will appear. These parameters are shown at the top of the screen.

7 If required, press “SET/SEL” (button 9) until “VoP” is highlighted in yellow.

7.1 Press the UP (button 3) or DOWN (button 6) keys until the VoP value is at your calibrated level.

7.2 If in doubt use 54 for PILC, 60 for XLPE, 67 for pilot cables.

8 If required, press “SET/SEL” (button 9) until “RANGE” is highlighted in yellow.

8.1 Press the UP (button 3) or DOWN (button 6) keys until the range is longer than your expected cable length.

9 At this time the image on screen represents your cable under test

9.1 Depending on the network complexity the far end or a fault may or may not be obvious.

10 To measure distance to an obvious feature, press the LEFT or RIGHT keys (buttons 7 or 4) to move the cursor.

11 For a proven de-energised cable, the far end could be shorted and opened while looking at the screen to enable accurate cursor position, or two live phases may be compared when performing phase to N measurements.

To Compare Traces

12 Obtain a trace as directed above (Steps 1 to 7), using Continuous mode “CONT”.

13 Press and hold “Start” until “TH” is displayed (Trace Hold) in the top right hand corner of the graphic. You will see a yellow trace with a blue second trace overlaid.

14 Depending on the test, either short the far end or move the red crocodile clip to another phase. If the two traces now differ the cursor may be adjusted to the point of separation.

Other points:

15 This TDR features either single shot mode “ONCE” (to save battery), or continuous “CONT” mode for automatic repeated screen refresh. If in single shot mode, press “START” to refresh the screen as required.

16 Use “SET/SEL” (button 9) to highlight “CONT” or “ONCE” and then change using arrow keys.

17 This TDR has two cursors, the default is display is for one.

18 Use “SET/SEL” (button 9) to highlight “CUR” to select cursors

19 The “GAIN” level may be altered as might be preferred in a similar way to Range and VOP.

20 The Impedance “Z” may be altered by preference to obtain a cleaner trace.