

The Fluke logo consists of the word "FLUKE" in a bold, black, sans-serif font, followed by a registered trademark symbol (®). It is centered within a solid orange rectangular background.

T+ and T+ PRO

Electrical Tester

Instruction Sheet

Introduction

The Fluke T+ and T+ PRO Electrical Testers (the "Tester") have the following features:

- AC and dc voltage measurement, 12 V to 600 V, with or without batteries
- LED bar voltage and hazardous voltage indicators function with or without batteries
- Vibration and beeper indicators for ac and dc voltages
- Beeper and LED continuity indication
- Backlit LCD displays measured voltage (T+ PRO only)
- Rotary field direction indicators (T+ PRO only)
- Resistance measurement up to 9.99 k Ω (T+ PRO only)
- Flashlight
- GFCI trip

Safety Information

Warning

To avoid possible electric shock or personal injury, follow these guidelines:

- Use the Tester only as specified in this instruction sheet, otherwise the protection provided by the Tester may be impaired.
- The Tester is to be used only by qualified personnel.
- Do not use the Tester if it is damaged. Inspect the case before use. Look for cracks or missing plastic. Pay particular attention to the insulation surrounding the connectors.
- Inspect the test leads for damaged insulation or exposed metal. Check the test leads for continuity. Replace damaged test leads before using the Tester.
- Do not use the Tester if it operates abnormally. Protection may be impaired. When in doubt, have the Tester serviced.
- Do not operate the Tester around explosive gas, vapor, or dust.
- Do not apply more than the rated voltage, as marked on the Tester, between terminals or between any terminal and earth ground.
- When measuring hazardous voltage, verify the Tester's operation by measuring a known voltage.
- Only the test probes and batteries are serviceable. When servicing, use only specified replacement parts.
- To determine the LEDs and beeper are working correctly, short the test leads together. The beeper sounds (if enabled) and all LEDs and display segments (T+ PRO) switch on briefly indicating correct operation.
- Comply with local and national safety requirements when working in hazardous locations.
- Use proper protective equipment, as required by local or national authorities when working in hazardous areas.
- Use caution when working above 30 V ac rms, 42 V peak, or 60 V dc. Such voltages pose a shock hazard.
- When using the probes, keep fingers away from the ends of the probe tips.
- Connect the common test lead before connecting the live test lead. When disconnecting the test leads, disconnect the live test lead first.
- Do not operate the Tester with the battery door or portions of the cover removed or loosened.
- When the batteries are depleted, self test will not function.
- When the beeper is disabled, it will not sound until the beeper is reactivated.

- For voltages above 240 V, you must only connect to a voltage source for a **MAXIMUM** of 30s and then disconnect for a **MINIMUM** of 300s.
- Perform a self test before any measurements are taken for voltage, continuity, resistance, or rotary field. See "Self Test".
- Exercise caution when performing measurements on PLC (Programmable Logical Controller) inputs. When measuring relay control voltages on PLCs, be aware that this may open or close the relay/switch.
- All appliances or equipment on the circuit being tested should be unplugged to help avoid erroneous readings.

⚠ Caution

Although the Tester may be used with depleted batteries, replace depleted batteries immediately to avoid Tester damage from battery acid leakage.

Symbols

The following symbols appear on the Tester or in this instruction sheet.

Table 1. Symbols

Symbol	Explanation	Symbol	Explanation
	WARNING - RISK OF DANGER. Consult user documentation.		WARNING. HAZARDOUS VOLTAGE. Risk of electric shock.
	Double insulated		Earth
	Certified by CSA Group to North American safety standards.		Continuity beeper
CAT III	Measurement Category III is applicable to test and measuring circuits connected to the distribution part of the building's low-voltage MAINS installation.	CAT IV	Measurement Category IV is applicable to test and measuring circuits connected at the source of the building's low-voltage MAINS installation.
	This product complies with the WEEE Directive marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste. Product Category: With reference to the equipment types in the WEEE Directive Annex I, this product is classed as category 9 "Monitoring and Control Instrumentation" product. Do not dispose of this product as unsorted municipal waste.		

Optional Accessories

Accessories are available for the T+/T+ PRO Electrical Tester. See Table 2.

Table 2. Accessories

Item Item	Number
Belt Holster	H3
Replaceable Test Probes (1 red and 1 black)	TP2

Pushbuttons

Use the pushbuttons to toggle switchable functions of the Tester on or off. The pushbuttons are shown and described in Table 3.

Table 3. Pushbuttons

Pushbutton Descripti	on
	Press to turn the flashlight on, release to turn it off. The flashlight will turn off 5 seconds after release of the pushbutton. Batteries are required for this feature.
	Toggles the ohms function on or off. T+PRO only. See “Measuring Resistance (T+ PRO Only)”. Batteries are required for this feature.
	Toggles the HOLD function on or off. T+PRO only. See “HOLD”. Batteries are required for this feature.
	Turns beeper on or off. When the beeper is turned off, it will not sound until it is reactivated. Batteries are required for this feature.
	Performs Ground Fault and trips the GFCI.

Understanding the Display (T+ PRO Only)

Display indicators are shown and described in Figure 1.

Item	Descripti on
①	Low battery icon. If the battery is depleted the voltage will still be displayed by the LED stack but the beeper and vibration will not operate, continuity and resistance measurements cannot be made, and the LCD will not switch on. ⚠ Caution Replace depleted batteries immediately to avoid damage to the Tester from battery acid leakage.
②	All audible signals are disabled
③	HOLD function is selected
④	Indicates phase rotation for a right or left-hand turning field from one phase to the next in a three-phase system
⑤	Measurement units
⑥	Numeric display
⑦	AC or dc volts
⑧	Continuity test function is selected

Figure 1. Display Indicators

Beeper

When the Tester detects a voltage, the LEDs light to indicate the voltage level, the Tester vibrates, and a beeper sounds (the T+ PRO also shows the voltage on the display). The beeper tones are different depending on what is being measured:

- AC voltage - the beeper is a chirping tone
- DC voltage - the beeper is a steady tone
- Continuity - the beeper is a steady tone for resistances less than 20 k Ω

Note

If any voltage is present, the Tester automatically switches to voltage mode.

To turn the beeper on or off, press  for more than 3 seconds. Each time the beeper is activated or deactivated, the Tester emits 3 short beeps. Batteries are required for this feature.

Vibration Voltage Indication

The Tester vibrates when voltages 40 V and higher are measured. Batteries are required for vibration to function.

Automatic Operation

The Tester automatically turns on when the probes are placed across a complete circuit. The Tester selects continuity, ac or dc voltage modes based on the resistance or voltage between the probes. The tester switches off immediately after the test probes are removed from the circuit under test or after 5 seconds if  is released when the probes are not attached to a test circuit. If the HOLD function is activated, this switches off after 1 minute if a voltage is not detected.

HOLD

Press  to freeze the display reading. Press again to release HOLD. HOLD does not interfere with the voltage LED function.

Removing the Probe Tips

To remove the probe tips:

1. Grasp the probe firmly in one hand.
2. Hold the test lead jack firmly in the other hand.
3. Pull to disengage the test lead probe from the test lead jack.

LED Display Voltages

Table 4 shows the differences in the displayed voltages on the LEDs on the Canadian and USA versions of the Tester.

Table 4. LED Display Voltages

USA	Canad	a
12	12	12
24	24	24
48	48	48
120	120	120
208	208	208
240	240	240
277	277	AC
480	480	480
600	600	600

Self Test

⚠⚠ Warning

To avoid possible electric shock or personal injury:

- Perform a self test before any measurements are taken for voltage, continuity, resistance, or rotary field.
- When the batteries are depleted, self test will not function. Replace the batteries.

⚠ Caution

Although the Tester may be used with depleted batteries, replace depleted batteries immediately to avoid Tester damage from battery acid leakage.

To perform the self test, short the two probes. The self test lights all LEDs, and all LCD segments (T+ PRO). The beeper sounds (unless disabled) and the Tester switches to continuity mode. The self test will then be deactivated for 30 seconds. If the self test needs to be repeated, wait 30 seconds.

To complete the check procedure, always measure a known voltage before use. If the Tester fails self test or voltage check, it must not be used and requires service. See "Contacting Fluke".

Measuring Voltage

To measure voltage, connect the probes to the circuit under test. The voltage is indicated by the voltage LED stack and beeper (if enabled). The T+PRO will show the measurement on the LCD for voltages > 10 V; < 10

V the LCD remains blank. The AC, DC+ and DC- LEDs will only operate for voltages greater than 24 V. Refer to Figure 2.

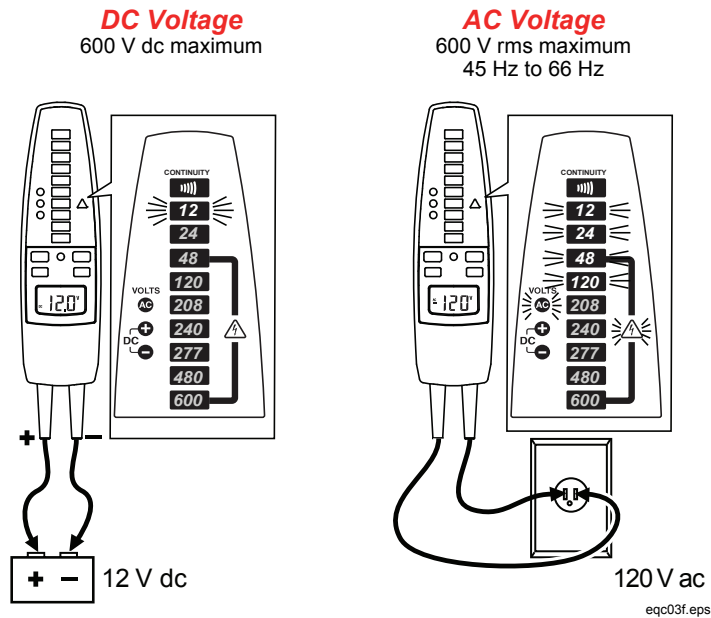


Figure 2. Measuring Voltage

Note

Maximum measurable voltage is 600 V ac or dc. This will be indicated on the LED and LCD (T+ PRO).

Testing for Continuity

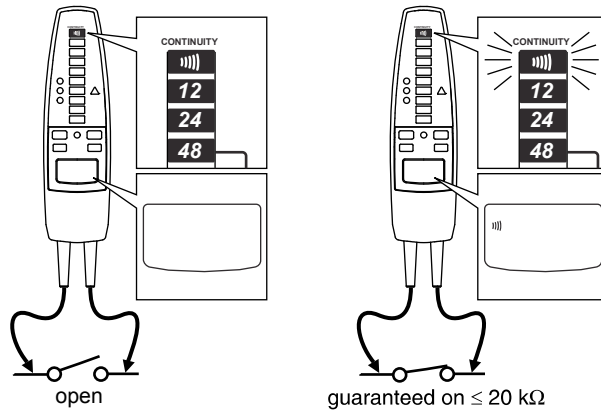


Warning

To avoid electrical shock:

- Make sure the power to the circuit is turned off and all capacitors are discharged.
- If the beeper is disabled, the Tester will not beep and only  will light. On the T+ PRO, the display will also show .

To measure continuity, turn off circuit power and connect the probes to the circuit under test. Continuity (a resistance less than 20 k Ω) is indicated by the beeper and a lighted . If the beeper is disabled, it will not sound during this test. The T+PRO shows  on the LCD. If the resistance is greater than 20 k Ω , the beeper will not sound and  will not light. Refer to Figure 3.



eqc02f.emf

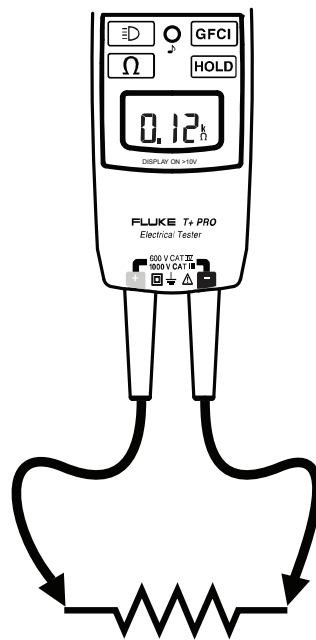
Figure 3. Continuity Test

Measuring Resistance (T+ PRO Only)

⚠⚠ Warning

To avoid electrical shock when measuring resistance in a circuit, make sure the power to the circuit is turned off and all capacitors are discharged.

To measure resistance, turn off the circuit power, press Ω , and place the test probes across the resistance under test. For resistances less than 9.99 k Ω , the T+PRO display shows the resistance value. For greater resistances, the display shows OL. See Figure 4.



eqc04f.eps

Figure 4. Measuring Resistance

GFCI Test

⚠⚠ Warning

To avoid electrical shock, do not touch any exposed metalwork during the test.

This test will switch off the power to the circuit.

To test a GFCI receptacle, do the following:

1. Insert the Tester probes into the GFCI receptacle under test.
2. Connect probes to the phase (hot) and ground (PE-protective earth) of the GFCI receptacle.
3. Press **[GFCI]** for 1 second. The DC+ and DC- LEDs will alternately switch on and off and, if activated, the beeper will sound indicating that a test is in progress. The test may last up to 7 seconds.
4. Keep the probes connected while the LEDs are switching on and off. If the GFCI trips, power to the circuit will be interrupted and the Tester will stop indicating voltage. If the GFCI does not trip after approximately 7 seconds, the GFCI test stops, indicated by no switching of the DC+ and DC- LEDs but the tester will continue to indicate the presence of voltage.

When testing and verifying GFCI circuits or components, do the following:

- Consult the GFCI manufacturer's installation instructions to determine that the GFCI is installed in accordance with its specifications.
- Check for correct wiring of receptacles and all remotely-connected receptacles on branch circuits.
- Operate the pushbutton on the GFCI receptacle installed in the circuit. The GFCI must trip. If it does not, the GFCI receptacle is not operating properly. DO NOT use the circuit. Consult an electrician or properly certified personnel.

If the GFCI does trip, retest the receptacle as explained above.

If the Tester fails to trip the GFCI, consider either of the following:

- The GFCI is fully functional but a wiring problem exists within the installation or receptacle.
- The GFCI is faulty and the installation wiring is correct.

Consult an electrician to check the wiring and GFCI.

Note

- *After a GFCI test, further GFCI tests will be inhibited for 0.5 seconds.*
- *It is not possible to switch the beeper off during a GFCI test.*

⚠⚠ Warning

To avoid possible electric shock or personal injury, follow these guidelines:

- **When testing GFCIs installed in 2-wire systems, (systems where no ground wire is available at the receptacle) the Tester may give a false indication that the GFCI is not functioning properly. If this occurs, recheck the operation of the GFCI using the test and reset button.**

- The GFCI button test function should demonstrate proper operations. However, if there is cause to verify proper operation of the GFCI receptacle in a 2-wire system, apply one test probe of the Tester to the energized input of the GFCI receptacle while applying the alternates test probe to a known external neutral or ground reference location external to the GFCI receptacle. Operate the GFCI button on the Tester as described in the Instruction Sheet to verify the GFCI receptacle is operating properly.

Rotary Field Direction (T+ PRO Only)

This test shows the direction of a rotary field in a three-phase system when measured phase to phase. The LCD indicates phase rotation for a right or left-hand turning field from one phase to the next in a three-phase system.

Note

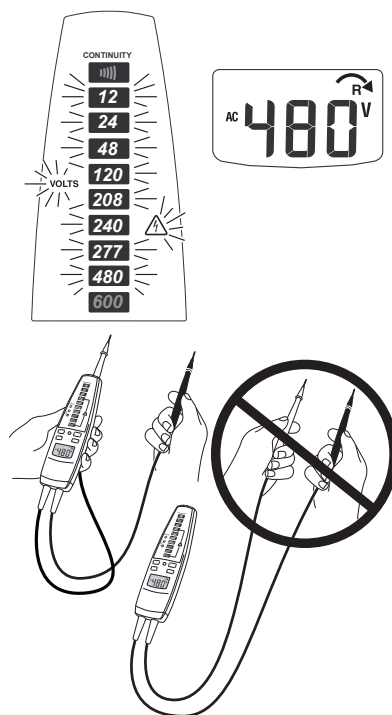
If measuring from phase to neutral at a panel or single-phase outlet, the Tester may indicate ↺ or ↻. However, this is not a valid reading. A valid reading can only come from a phase to phase circuit. The rotary field function is specified for use on line (mains) systems only.

To perform a rotary field direction test, see Figure 5:

1. Attach one probe to the center probe holder on the back of the Tester and grip the main body with one hand.
2. Attach both probes to the test points. If the red lead is 120 degrees ahead of the black lead, ↻ is displayed. If the red lead lags the black lead by 120 degrees, ↺ is displayed. In both situations the voltage is shown on the display. If a phase rotation measurement is not possible, no arrows will light but the voltage appears on the display.

Note

You can verify the rotary field direction by reversing the two probes and watching for an indication of a change in the field direction.



eqc05f.emf

Figure 5. Rotary Field Measurement

Maintenance

⚠ Caution

Do not use abrasives or solvents on the Tester.

Clean the case with a damp cloth and mild detergent.

Replacing the Batteries

Perform a self test to determine the charge state of the batteries on T+ Testers. The self test will not work with dead batteries. On T+ PRO Testers, the low battery icon () on the LCD indicates that the batteries need to be replaced.

⚠⚠ Warning

To avoid possible electric shock or personal injury:

- **Disconnect test leads from any electrical source before opening the battery compartment.**
- **Do not operate the Tester with the battery door or portions of the cover removed or loosened.**

1. Turn the Tester over and use a flat-head screwdriver to loosen the battery door screw and remove the door.
2. Replace the batteries with two new AAA alkaline batteries.
3. Reattach the battery compartment door and reinstall the screw.

Specifications

Temperature:	Operating: -10 °C to +55 °C (14 °F to 131 °F) Storage: -30 °C to +60 °C (-22 °F to +140 °F)
Relative Humidity:	0 °C to 30 °C (32 °F to 86 °F) 90 % 30 °C to 40 °C (86 °F to 104 °F) 75 % 40 °C to 50 °C (104 °F to 122 °F): 45 %
Altitude:	Operating: 2,000 m Storage: 10,000 m
Battery Type/Life:	AAA (2); 40 hours
Shock, Vibration:	Sinusoidal vibration per MIL-PRF-28800F for a Class 2 instrument
Safety:	ANSI/ISA S82.02.01, CSA C22.2-1010.1, IEC 61010-1 to 1000 V CAT III/600 V CAT IV; Pollution Degree II
AC Bandwidth:	45 Hz to 66 Hz
Maximum Input Voltage Between Terminal and Earth Ground:	Maximum working voltage 1000 V ac or dc. Maximum measurable voltage 600 V ac or dc. This will be displayed on the LED and the LCD (T+ PRO).
Duty Cycle:	Indefinitely for voltages up to 240 V. For voltages between 240 V to 600 V the duty cycle is 30 seconds on / 300 seconds off. For voltages above 240 V the Tester must connect to a voltage source only for a MAXIMUM of 30 seconds and then disconnect for a MINIMUM of 300 seconds.
Voltage Hazard LED:	LEDs turn on @ voltages > 30 V ac/dc ± 35 %

T+/T+PRO English Instruction Sheet

Page 16

LEDs: LEDs turn on @ between 70 % and 100 % of the indicated voltage on the LED, except for the 12 V LED which turns on @ between 50 % and 100 %.

EMC Compliance: EN61326-1:2005 Class B emissions and immunity in field strengths between 1 V/m and 3 V/m add 8 % of range.

Accuracy:

AC voltage: $\pm (3 \% \text{ rdg.} + 2 \text{ digits})$
DC voltage: $\pm (2 \% \text{ rdg} + 2 \text{ digits})$
Resistance: $\pm (5 \% \text{ rdg} + 3 \text{ digits})$
LCD Resolution: 0.1 V for voltages < 50 V, 1 V for voltages $\geq 50 \text{ V}$,
0.01 k Ω at resistance measurement

GFCI Test

Current: 100 V to 150 V @ 6 mA to 9 mA ac
150 V to 240 V < 12 mA

Standard Input

Test Current: < 5 mA
Size (HxWxL): 1.3 in x 2.15 in x 7.6 in
Weight: 9.9 oz

LIMITED WARRANTY & LIMITATION OF LIABILITY

This Fluke product will be free from defects in material and workmanship for two years from the date of purchase. This warranty does not cover fuses, disposable batteries, or damage from accident, neglect, misuse, alteration, contamination, or abnormal conditions of operation or handling. Resellers are not authorized to extend any other warranty on Fluke's behalf. To obtain service during the warranty period, contact your nearest Fluke authorized service center to obtain return authorization information, then send your defective Tester to that Service Center with a description of the problem. Replace depleted batteries immediately to avoid Tester damage from battery leakage.

THIS WARRANTY IS YOUR ONLY REMEDY. NO OTHER WARRANTIES, SUCH AS FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSED OR IMPLIED. FLUKE IS NOT LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, ARISING FROM ANY CAUSE OR THEORY. Since some states or countries do not allow the exclusion or limitation of an implied warranty or of incidental or consequential damages, this limitation of liability may not apply to you.

Fluke Corporation
P.O. Box 9090
Everett WA
98206-9090

Fluke Europe B.V.
P.O. Box 1186
5602 B.D. Eindhoven
The Netherlands

11/99