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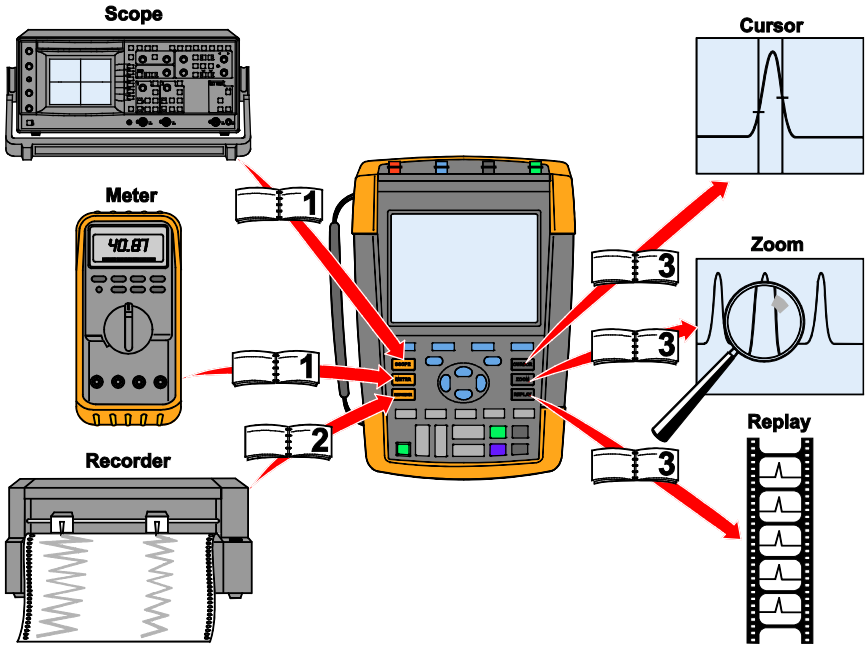
FLUKE.

# ScopeMeter® Test Tool 190 Series II

*Fluke 190-062, -102, -104, -202, -204, -502, -504*

Users Manual

May 2011, Rev.2, 1/14

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## LIMITED WARRANTY & LIMITATION OF LIABILITY

Each Fluke product is warranted to be free from defects in material and workmanship under normal use and service. The warranty period is three years for the test tool and one year for its accessories. The warranty period begins on the date of shipment. Parts, product repairs and services are warranted for 90 days. This warranty extends only to the original buyer or end-user customer of a Fluke authorized reseller, and does not apply to fuses, disposable batteries or to any product which, in Fluke's opinion, has been misused, altered, neglected or damaged by accident or abnormal conditions of operation or handling. Fluke warrants that software will operate substantially in accordance with its functional specifications for 90 days and that it has been properly recorded on non-defective media. Fluke does not warrant that software will be error free or operate without interruption.

Fluke authorized resellers shall extend this warranty on new and unused products to end-user customers only but have no authority to extend a greater or different warranty on behalf of Fluke. Warranty support is available if product is purchased through a Fluke authorized sales outlet or Buyer has paid the applicable international price. Fluke reserves the right to invoice Buyer for importation costs of repair/replacement parts when product purchased in one country is submitted for repair in another country.

Fluke's warranty obligation is limited, at Fluke's option, to refund of the purchase price, free of charge repair, or replacement of a defective product which is returned to a Fluke authorized service center within the warranty period.

To obtain warranty service, contact your nearest Fluke authorized service center or send the product, with a description of the difficulty, postage and insurance prepaid (FOB Destination), to the nearest Fluke authorized service center. Fluke assumes no risk for damage in transit. Following warranty repair, the product will be returned to Buyer, transportation prepaid (FOB Destination). If Fluke determines that the failure was caused by misuse, alteration, accident or abnormal condition of operation or handling, Fluke will provide an estimate of repair costs and obtain authorization before commencing the work. Following repair, the product will be returned to the Buyer transportation prepaid and the Buyer will be billed for the repair and return transportation charges (FOB Shipping Point).

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Since some countries or states do not allow limitation of the term of an implied warranty, or exclusion or limitation of incidental or consequential damages, the limitations and exclusions of this warranty may not apply to every buyer. If any provision of this Warranty is held invalid or unenforceable by a court of competent jurisdiction, such holding will not affect the validity or enforceability of any other provision.

Fluke Corporation, P.O. Box 9090, Everett, WA 98206-9090 USA, or

Fluke Industrial B.V., P.O. Box 90, 7600 AB, Almelo, The Netherlands

## SERVICE CENTERS

To locate an authorized service center, visit us on the World Wide Web:

**http://www.fluke.com**

or call Fluke using any of the phone numbers listed below:

+1-888-993-5853 in U.S.A. and Canada

+31-40-2675200 in Europe

+1-425-446-5500 from other countries

# *Table of Contents*

# Introduction

## ⚠ Warning

**Read "Safety Information" before using this instrument.**

The descriptions and instructions in this manual apply to all ScopeMeter® Test Tool 190 Series II versions (hereafter referred to as the instrument or as the test tool). The versions are listed below. The version 190-x04 appears in most illustrations.

Input C and Input D, and the Input C and Input D selection keys ( C and D ) are only present on the versions 190-x04.

| Version | Description |
|---|---|
| 190-062 | Two 60 MHz Scope Inputs (BNC), One Meter Input (banana jacks). |
| 190-102 | Two 100 MHz Scope Inputs (BNC), One Meter Input (banana jacks). |
| 190-104 | Four 100 MHz Scope Inputs (BNC) |
| 190-202 | Two 200 MHz Scope Inputs (BNC), One Meter Input (banana jacks). |
| 190-204 | Four 200 MHz Scope Inputs (BNC). |
| 190-502 | Two 500 MHz Scope Inputs (BNC), One Meter Input (banana jacks). |
| 190-504 | Four 500 MHz Scope Inputs (BNC). |

## *Unpacking the Test Tool Kit*

The items in Figure 1 are included in your test tool kit:

*Note*

*When new, the rechargeable Li-ion battery is not fully charged. See Chapter 7.*

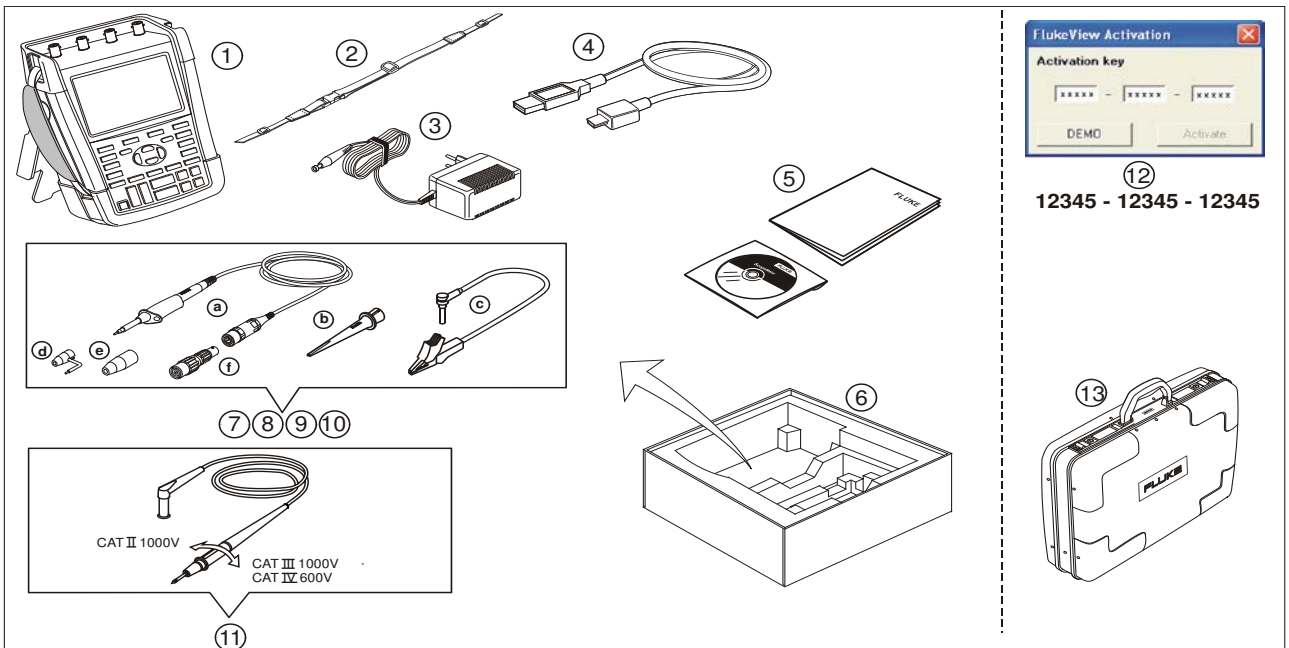



**Figure 1. Test Tool Kit**

All Fluke 190 Series II versions include the following items:

| # | Description |
|---|---|
| 1 | Test Tool including<br>– side strap<br>– battery pack BP290 (models 190-xx2) or BP291 (models 190-xx4 and 190-5xx) |
| 2 | Hang Strap (see Chapter 6 for mounting instructions) |
| 3 | Power Adapter (country dependent, may vary from what is shown in Figure 1) |
| 4 | USB interface cable for PC connection (USB-A to mini-USB-B) |
| 5 | Safety Information sheet + CD ROM with Users Manual (multi-language) and FlukeView® ScopeMeter® Software for Windows demo package (with restricted functionality) |
| 6 | Shipment box (basic version only) |

| # | Description |
|---|---|
| 7 | Voltage Probe Set (red) |
| 8 | Voltage Probe Set (blue) |
| 9 | Voltage Probe Set (gray), *not for 190-xx2* |
| 10 | Voltage Probe Set (green), *not for 190-xx2*<br>*Each set includes:*<br>a) **Fluke 190-50x:**<br>10:1 Voltage Probe, 500 MHz (red or blue or gray or green)<br>**Other models:**<br>10:1 Voltage Probe, 300 MHz (red or blue or gray or green)<br>b) Hook Clip for Probe Tip (black)<br>c) Ground Lead with Mini Alligator Clip (black)<br>d) Ground Spring for Probe Tip (black)<br>e) Insulation Sleeve (black)<br>f) **Fluke 190-50x:**<br>50 Ohm (1 W) Terminator |
| 11 | Test Leads with test pins (one red, one black), for models 190-xx2 only. |

Fluke 190-xxx /S versions include also the following items (SCC290 kit):

| # | Description |
|---|---|
| 12 | FlukeView® ScopeMeter® Software for Windows activation key (converts FlukeView® DEMO status into full operational status). |
| 13 | Hard Shell Carrying Case |

## *Safety Information: Read First*

Read all safety information before you use the product.

Specific warning and caution statements, where they apply, appear throughout the manual.

**A "Warning" identifies conditions and actions that pose hazard(s) to the user.**

**A "Caution" identifies conditions and actions that may damage the product.**

The following international symbols are used on the product and in this manual.

| | |
|---|---|
|  | Risk of Danger. Important information. See Manual. |
|  | Double Insulated |
|  | Conforms to relevant North American Safety Standards. |
|  | Conforms to relevant Australian standards. |
|  | Conforms to relevant South Korean EMC Standards. |
|  | Battery Safety Approval |
|  | Earth Ground |
|  | Recycling information. |
|  | Conforms to European Union directives |
|  | DC (Direct Current) |
|  | AC or DC (Alternating or Direct Current) |

| | |
|---|---|
|  | This product complies with the WEEE Directive (2002/96/EC) 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. Go to Fluke's website for recycling information. |
| 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. |

## ⚠ Warning

**To avoid electrical shock or fire:**

- **Use only the Fluke power supply, Model BC190 (Power Adapter).**
- **Before use, check that the selected/indicated range on the BC190 matches the local line power voltage and frequency.**
- **For the BC190/808 and BC190/820 universal Power Adapters only use line cords that comply with the local safety regulations.**

*Note:*

*To accommodate connection to various line power sockets, the BC190/808 and BC190/820 universal Power Adapters are equipped with a male plug that must be connected to a line cord appropriate for local use. Since the adapter is isolated, the line cord does not need to be equipped with a terminal for connection to protective ground. Since line cords with a protective grounding terminal are more commonly available you might consider using these anyhow.*

## ⚠ Warning

**To avoid electrical shock or fire if a product input is connected to more than 42 V peak (30 Vrms) or 60 V dc:**

- **Use only insulated voltage probes, test leads and adapters supplied with the product, or indicated by Fluke as suitable for the Fluke 190 Series II ScopeMeter® Test Tool series.**
- **Before use, inspect voltage probes, test leads and accessories for mechanical damage and replace when damaged.**
- **Remove all probes, test leads and accessories that are not in use.**
- **Always connect the power adapter first to the ac outlet before connecting it to the product.**
- **Do not touch voltages >30 V ac rms, 42 V ac peak, or 60 V dc.**
- **Do not connect the ground spring (figure 1, item d) to voltages higher than 42 V peak (30 Vrms) from earth ground.**
- **When using the ground reference lead with any of the probes, make sure that the black isolation sleeve (Figure 1, item. 10e) is over the probe tip.**

- **Do not apply more than the rated voltage, between the terminals or between each terminal and earth ground.**
- **Do not apply input voltages above the rating of the instrument. Use caution when using 1:1 test leads because the probe tip voltage will be directly transmitted to the product.**
- **Do not use exposed metal BNC or banana plug connectors. Fluke offers cables with plastic, safety designed BNC connectors suitable for the ScopeMeter® Test Tool product, see Chapter 7 'Optional accessories'.**
- **Do not insert metal objects into connectors.**
- **Use the product only as specified, or the protection supplied by the product can be compromised.**
- **Carefully read all instructions.**
- **Do not use the product if it operates incorrectly.**
- **Do not use the product or its accessories in case of any damage.**
- **Disable the product or its accessories in case of any damage.**
- **Keep fingers behind the finger guards on the probes.**
- **Use only correct measurement category (CAT), voltage, and current rated probes, test leads, and adapters for the measurement.**
- **Do not exceed the Measurement Category (CAT) rating of the lowest rated individual component of a product, probe, or accessory.**
- **Do not use the product around explosive gas, vapor, or in damp or wet environments.**
- **Measure a known voltage first to make sure that the product operates correctly.**
- **Examine the case before you use the product. Look for cracks or missing plastic. Carefully look at the insulation around the terminals.**
- **Do not work alone.**
- **Comply with local and national safety codes. Use personal protective equipment (approved rubber gloves, face protection, and flame resistant clothes) to prevent shock and arc blast injury where hazardous live conductors are exposed.**
- **The battery door must be closed and locked before you operate the product.**

- **Do not operate the product with covers removed or the case open. Hazardous voltage exposure is possible.**
- **Remove the input signals before you clean the product.**
- **Use only specified replacement parts.**

Voltage ratings that are mentioned in the warnings are given as limits for “working voltage”. They represent V ac rms (50-60 Hz) for ac sinewave applications and as V dc for dc applications.

Measurement Category IV refers to the overhead or underground utility service of an installation.
Measurement Category III refers to distribution level and fixed installation circuits inside a building.
Measurement Category II refers to local level, which is applicable for appliances and portable equipment.

The terms ‘Isolated’ or ‘Electrically floating’ are used in this manual to indicate a measurement in which the product input BNC is connected to a voltage different from earth ground.

The isolated input connectors have no exposed metal and are fully insulated to protect against electrical shock.

The BNC jacks can independently be connected to a voltage above earth ground for isolated (electrically floating) measurements and are rated up to 1000 Vrms CAT III and 600 Vrms CAT IV above earth ground.

### *If Safety Features are Impaired*

Use of the product in a manner not specified may impair the protection provided by the equipment.

Do not use test leads if they are damaged. Examine the test leads for damaged insulation, exposed metal, or if the wear indicator shows.

Whenever it is likely that safety has been impaired, the product must be turned off and disconnected from the line power. The matter should then be referred to qualified personnel. Safety is likely to be impaired if, for example, the product fails to perform the intended measurements or shows visible damage.

## *Safe Use of Li-ion battery pack*

The battery pack Fluke model BP290 (26 Wh)/BP291 (52 Wh) has been tested in accordance with the UN Manual of Tests and Criteria Part III Subsection 38.3 (ST/SG/AC.10/11/Rev.3) – more commonly known as the UN T1..T8 – tests, and have been found to comply with the stated criteria. The battery pack has been tested acc.

to EN/IEC62133. As a result they can be shipped unrestricted internationally by any means.

***Recommendations to safe storage of battery pack.***

- Do not store battery packs near heat or fire. Do not store in sunlight.
- Do not remove a battery pack from its original packaging until required for use.
- When possible, remove the battery pack from the equipment when not in use.
- Fully charge the battery pack before storing it for an extended period to avoid a defect.
- After extended periods of storage, it may be necessary to charge and discharge the battery packs several times to obtain maximum performance.
- Keep the battery pack out of the reach of children and animals.
- Seek medical advise if a battery or part of it has been swallowed.

***Recommendations to safe use of the battery pack.***

- The battery pack needs to be charged before use. Use only Fluke approved power adapters to charge the battery pack. Refer to Fluke's safety instructions and Users Manual for proper charging instructions.
- Do not leave a battery on prolonged charge when not in use.
- The battery pack gives the best performance when operated at normal room temperature 20 °C ± 5 °C (68 °F ± 9 °F).
- Do not put battery packs near heat or fire. Do not put in sunlight.
- Do not subject battery packs to severe impacts such as mechanical shock.
- Keep the battery pack clean and dry. Clean dirty connectors with a dry, clean cloth
- Do not use any charger other than that specifically provided for use with this equipment.
- Do not use any battery which is not designed or recommended by Fluke for use with the Product.
- Take careful notice of correct placement of the battery in the product or the External Battery Charger.
- Do not short-circuit a battery pack. Do not keep battery packs in a place where the terminals can be shorted by metal objects (e.g. coins, paperclips, pens or other).
- Never use a battery pack or charger showing visible damage.
- Batteries contain hazardous chemicals that can cause burns or explode. If exposure to chemicals occurs, clean with water and get medical aid. Repair the product before use if the battery leaks.

- Alteration of battery pack: there shall be no attempt to open, modify, reform or repair a battery pack, which appears to be malfunctioning, or which has been physically damaged.
- Do not disassemble or crush battery packs
- Use the battery only in the application for which it is intended.
- Retain the original product information for future reference.

***Recommendations to safe transport of battery packs***

- The battery pack must adequately be protected against short-circuit or damage during transport.
- Always consult the IATA guidelines describing safe air transport of Li-ion batteries. Refer also to the section in the beginning of this paragraph on safe use of the battery pack.
- Check-in luggage: battery packs are only allowed when installed in the Product.
- Hand carried luggage: a number of battery packs as required for normal and individual use is allowed.
- Always consult national/local guidelines that are applicable for shipment by mail or other transporters.
- A maximum of 3 battery packs may be shipped by mail. The package must be marked as follows:

  PACKAGE CONTAINS LITHIUM-ION BATTERIES (NO LITHIUM METAL).

***Recommendations to safe disposal of a battery pack.***

- A failed battery pack shall be properly disposed of in accordance with local regulations.
- Dispose of properly: do not dispose of the battery as unsorted municipal waste. Go to Fluke's website for recycling information.
- Dispose in discharged condition and cover the battery terminals with isolation tape.

# Chapter 1
# Using the Scope and Meter

## About this Chapter

This chapter provides a step-by-step introduction to the scope and meter functions of the test tool. The introduction does not cover all of the capabilities of the functions but gives basic examples to show how to use the menus and perform basic operations.

## Powering the Test Tool

Follow the procedure (steps 1 through 3) in Figure 2 to power the test tool from a standard ac outlet.
See Chapter 6 for instructions on using battery power.

Turn the test tool on with the on/off key.

The test tool powers up in its last setup configuration.

The menus to adjust date, time and information language are switched on automatically when the test tool is powered on for the first time. See Figure 2.

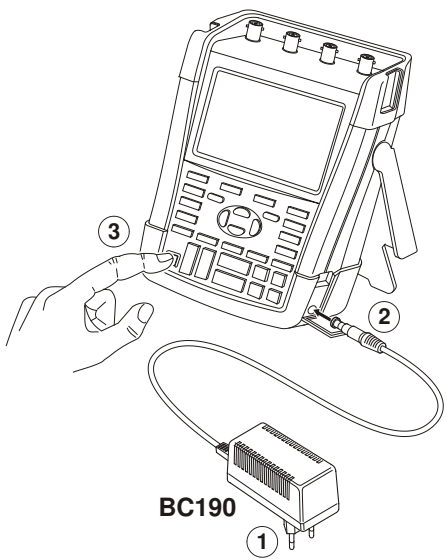



**Figure 2. Powering the Test Tool**

## *Resetting the Test Tool*

If you want to reset the test tool to the factory settings, do the following:

| | | |
|---|---|---|
| **1** |  | Turn the test tool off. |
| **2** |  | Press and hold the **USER** key. |
| **3** |  | Press and release. |

The test tool turns on, and you should hear a double beep, indicating the reset was successful.

| | | |
|---|---|---|
| **4** |  | Release the **USER** key. |

Now look at the display; you will see a screen that looks like Figure 3.

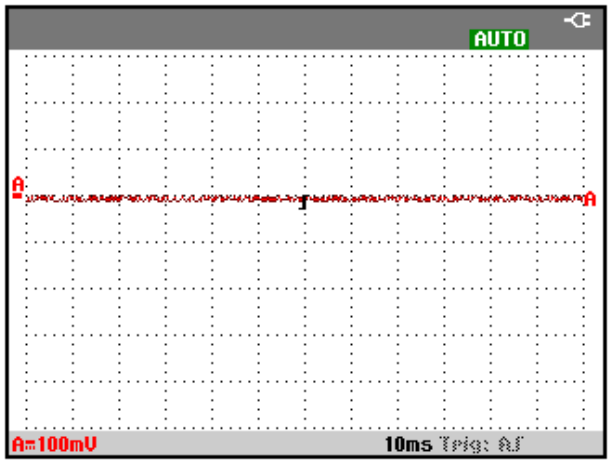



**Figure 3. The Screen After Reset**

## *Navigating a Menu*

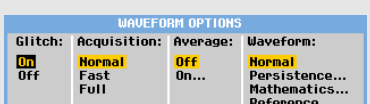
The following example shows how to use the test tool's menus to select a function. Sequently follow steps 1 through 3 to open the scope menu and to choose an item.

**1** SCOPE

Press the **SCOPE** key to display the labels that define the present use for the four blue function keys at the bottom of the screen.


**2** F4

Open the Waveform Options menu. This menu is displayed at the bottom of the screen. Actual settings are shown on a yellow background. The setting on a black background can be changed upon operation of the blue arrow keys and confirmed with the ENTER key. See Figure 4.



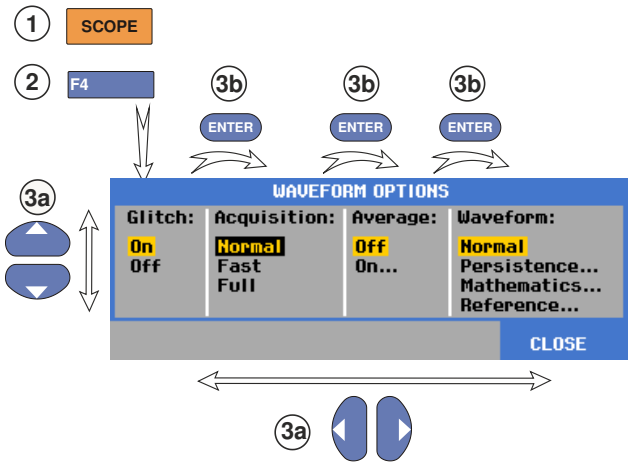




**Figure 4. Basic Navigation**

**3a** ENTER

Use the blue arrow keys to highlight the item.

**3b**

Press the blue **ENTER** key to accept the selection. The next option will be selected. After the last option the menu will be closed.