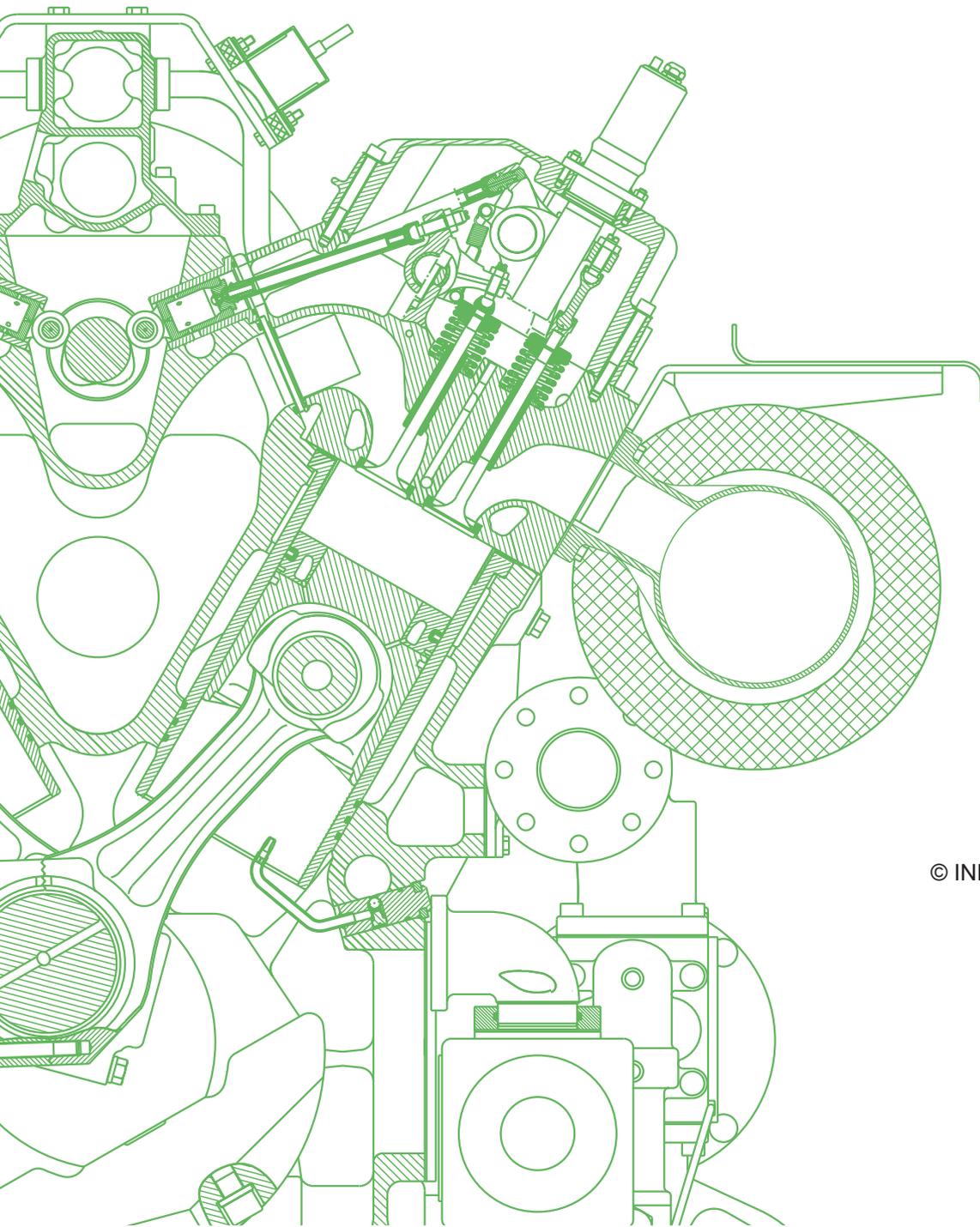




# TA 1400-0151

Technical Instruction

## Testing ignition equipment using the FLUKE 123 DSO



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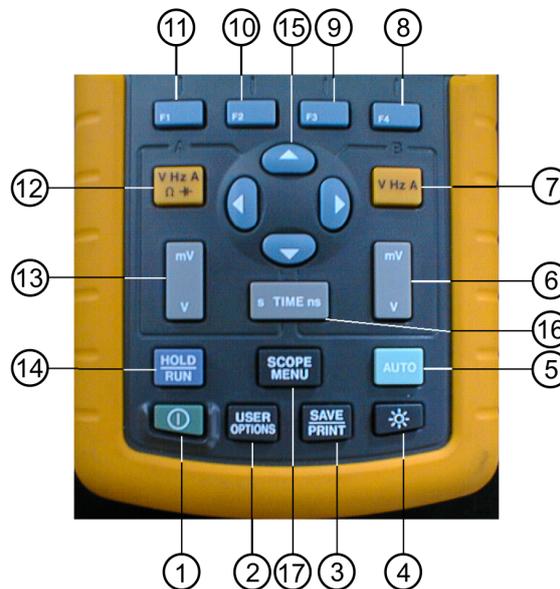
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**UNCONTROLLED WHEN PRINTED OR TRANSMITTED ELECTRONICALLY**

This Technical Instruction describes the operation and adjustment of the Fluke 123 digital storage oscilloscope for measuring the ignition voltage requirements of spark plugs and the high-voltage side of ignition coils. The Fluke 123 is suitable for carrying out measurements on all engines sold by INNIO Jenbacher GmbH & Co OG.



## 1 Activating setup and carrying out measurements

### 1.1 Activating setup:

If the device has already been set up for spark plug voltage measurement, activate setup as follows (refer to section 2 for initial setting):

You can select one of four **settings** depending on the application:

| Setup | Setting           | Application  |
|-------|-------------------|--|
| 1     | 5 kV/div          | Spark plug - new                                       |
| 2     | 5 kV/div, smooth  | Smoothed, spark plug - new                             |
| 3     | 10 kV/div         | Spark plugs – older, ignition coil – high-voltage side |
| 4     | 10 kV/div, smooth | Smoothed, spark plugs – older                          |

#### Procedure

1. Switch on the device: ON/OFF button bottom left (1)
2. Call up the setup menu: press the SAVE/PRINT key (3) to activate the menu, select "Setups" and "Recall" by moving the cursor keys (15) to the right and down and press the ENTER key (F4) to confirm.
3. Select the Setup number: Press the cursor-keys to select the desired Setup number (frame left dark) and press ENTER (F4) to confirm.
4. When you have completed all the measurements, press the ON/OFF button to switch off the device.

## 1.2 Carrying out and assessing the measurement

Once the desired setup (1.1) has been activated, the device is ready for use and can be used for the selected measurement by connecting the BNC adapter and BNC measurement cable (screened ignition system) or high-voltage clip (unscreened ignition system) to channel A. The "VPK" value, read off from the top left of the screen, corresponds to the ignition voltage and must be entered in the form for ignition-voltages in the operational logbook.

The ignition voltage measurement must always be carried out with the machine running at rated load, as the measured value is dependant on the power output.

**Tip:** When the battery is recharged, measurements can be carried out for up to four hours.

The battery symbol at the bottom of the display shows the charge condition: with a full charge it is completely dark, becoming lighter as the charge is lost.

More detailed instructions on how to interpret the voltage curves are given in TI 1400-0111. The shape of the voltage curve in particular often gives an advance indication of impending problems relating to the whole ignition system and especially in relation to the spark plugs.

When interpreting the shape of the mean value curve, you should bear in mind that averaging causes the single voltage curve to change.

Since the ignition voltage is a statistical event, the measured voltage fluctuates by 2 kV to 4 kV, even under normal operating conditions.

The smoothed voltage measurement (Setup 2 and 4) can be used to obtain a constant value. However, it is important to note that the mean ignition voltages lie approximately 2 to 3 kV below the peak ignition voltages. The spark plugs must be replaced or re-adjusted at the appropriate lower voltages. The smoothed voltage curve appears on the screen and the current peak voltage (and not the mean voltage) is shown at the top left of the display. When the ignition voltage is very variable (as is the case with type 6 engines) smoothed voltage measurements are strongly recommended as they are easier to read. Smoothed voltages must be used for the purpose of recording.

## 2 Setup instructions for ignition voltage measurements (Fluke 123)

The following procedure can be used if the Fluke 123 has not yet been set up for ignition voltage measurement or has to be reset for some other reason.

This description gives the stored values which have to be changed. All other parameters are left at their original setting, after being reset

### 2.1 Basic setting (5 kV/div – Setup 1)

#### 2.1.1 Initialising the device by resetting

If the setting procedures has to be started again from scratch, it is advisable to put the device in a defined initial state. This applies especially when the device is new or when problems arise which can only be solved by a complete reset.

#### Reset Fluke 123



**If the device is initialised with a reset, the current setting will be irretrievably lost but the screen and setup memory will remain unchanged.**

#### Procedure

1. Switch off the device:
2. Hold down the brightness key (4) and switch on the equipment (1). If the device has been reset correctly you will hear two short tones.
3. Release the brightness key.

If this procedure fails to have the desired effect because your version of the Fluke 123 is more recent, please refer to the enclosed Fluke instructions for details of initialisation.

### 2.1.2 Selecting basic settings via SCOPE/MENU

#### Procedure

1. Press the SCOPE/MENU key and select "Scope Options ..." by pressing the F1 key.
2. Move to the right and down with the cursor keys (15) and under "Waveform Mode" select "Normal" and press the ENTER key (F4) to confirm.
3. Press the SCOPE/MENU key and select "Probes ..." by pressing the F2 key.
4. Next, press ENTER (F4) to select "Probe on A" and select 1000:1 and again press ENTER (F4) to confirm. Select 1:1 if 1000:1 is not available, as 1 V actually corresponds to the 1 kV where measurements are carried out using the HV pincers or where integrated ignition coils are being measured.
5. Press the SCOPE/MENU key and select "Trigger" by pressing the F3 key.
6. Under "Screen update:" select "on Trig." with the cursor keys (15) and press ENTER (F4) to confirm. Press the ENTER key again to exit the menu.

### 2.1.3 Settings for channel A

Only one measurement channel (A) is required for the ignition voltage measurement. The parameters must be set as follows:

#### Procedure

1. Activate the "Input A, Measurements" submenu by pressing the V,Hz,A,  $\Omega$ , key (12) and with the cursor keys (15), move twice to the right and three times down, to select "Peak" and press ENTER (F4) to confirm.
2. The "Peak" menu now appears, from which you select "Peak Min PK" by pressing the cursor keys and confirm by pressing ENTER (F4).
3. Set the voltage resolution to 5 kV/div by pressing the mV/V key. Use 5 V/div if the selection was made under Probes 1:1.
4. Set the time resolution to 100  $\mu$ s/div by pressing the s/TIME/ns key (16).
5. Positioning the zero line: in the main menu press the "Move A" key (F1) to set the zero line to 1 division (approx. 7 mm) below the top edge.

### 2.1.4 Setting the trigger level

#### Procedure

1. Set the level: In the main menu select "Trigger/Slope" by pressing the F3 key.
2. Use the cursor keys to set the trigger level 2 divisions below the zero line of channel A.

If there are problems with the triggering during measurement (such as an unsteady trace), these can usually be solved by correcting the trigger level.

### 2.1.5 Selecting additional settings via USER/OPTIONS

#### Procedure

1. Press the "User/Options" key.

2. Select "Date adjust." with the cursor keys (15) and press ENTER (F4) to confirm.
3. Set the year, month and day using the cursor keys, select DD/MM/YY as the date format and press ENTER (F4) to confirm.
4. Press the "User/Options" key.
5. Select "Time adjust." with the cursor keys (15) and press ENTER (F4) to confirm.
6. Select the values with the cursor keys (15) and press ENTER (F4) to confirm.

#### 2.1.6 Saving the setting (5 kV/div – Setup 1)

The setup performed above will now be saved and can be activated again at any time as described in section 1.1.

##### Procedure

1. Press the SAVE/PRINT key (3) to activate the save menu.
2. Select "Setups:" and "Save." with the cursor keys (15) and press ENTER (F4) to confirm.
3. Select "1" with the cursor keys (15) and press ENTER (F4) to confirm. The current setup is now stored in the setup 1 memory (5 kV/div).

## 2.2 Setting up the average value (5 kV/div – Setup 2)

#### 2.2.1 Selecting "Smooth" via SCOPE/MENU

##### Procedure

1. Activate Setup 1 as described in section 1.1.
2. Press the SCOPE/MENU key and select "Scope Options ..." by pressing the F1 key.
3. Move to the right and down with the cursor keys (15) and under "Waveform Mode" select "Smooth" and press the ENTER key (F4) to confirm.

#### 2.2.2 Saving the setting (5 kV/div, smooth – Setup 2)

The setup performed above will now be saved and can be activated again at any time as described in section 1.1.

##### Procedure

1. Press the SAVE/PRINT key (3) to activate the save menu.
2. Select "Setups:" and "Save." with the cursor keys (15) and press ENTER (F4) to confirm.
3. Select "2" with the cursor keys (15) and press ENTER (F4) to confirm. The current setup is now stored in the setup 2 memory (5 kV/div, smooth).

## 2.3 Saving (10 kV/div – Setup 3)

#### 2.3.1 Basic setting (10 kV/div – Setup 3)

##### Procedure

1. Activate Setup 1 as described in section 1.1.
2. Press the SCOPE/MENU key and select "Scope Options ..." by pressing the F1 key.

3. Move to the right and down with the cursor keys (15) and under "Waveform Mode" select "Normal" and press the ENTER key (F4) to confirm.
4. Set to 10 kV/div by pressing the mV/V key for channel A (13). 10 V/div must now be used if the selection was made under Probes 1:1.

**2.3.2 Saving the setting (10 kV/div – Setup 3)**

The setup performed above will now be saved and can be activated again at any time as described in section 1.1.

**Procedure**

1. Press the SAVE/PRINT key (3) to activate the save menu.
2. Select "Setups:" and "Save." with the cursor keys (15) and press ENTER (F4) to confirm.
3. Select "3" with the cursor keys (15) and press ENTER (F4) to confirm. The current setup is now stored in the setup 3 memory (10 kV/div).

**2.4 Setting up the average value (10 kV/div, smooth – Setup 4)**

**2.4.1 Selecting "Smooth" via SCOPE/MENU**

**Procedure**

1. Activate Setup 1 as described in section 1.1.
2. Press the SCOPE/MENU key and select "Scope Options" by pressing the F1 key.
3. Move to the right and down with the cursor keys (15) and under "Waveform Mode" select "Smooth" and press the ENTER key (F4) to confirm.
4. Set to 10 kV/div by pressing the mV/V key for channel A (13). Use 10 V/div if the selection was made under Probes 1:1.

**2.4.2 Saving the setting (10 kV/div, smooth – Setup 4)**

The setup performed above will now be saved and can be activated again at any time as described in section 1.1.

**Procedure**

1. Press the SAVE/PRINT key (3) to activate the save menu.
2. Select "Setups:" and "Save." with the cursor keys (15) and press ENTER (F4) to confirm.
3. Select "4" with the cursor keys (15) and press ENTER (F4) to confirm. The current setting is now saved in the setup 4 memory (10 kV/div, smooth).

**3 Revision code**

**Revision history**

| Index | Date       | Description / Revision summary                | Expert Auditor                    |
|-------|------------|---|-----------------------------------|
| 2     | 30.04.2019 | GE durch INNIO ersetzt / GE replaced by INNIO | <b>Opoku</b><br><i>Pichler R.</i> |

**Revision history**

|   |            |  |                                  |
|---|------------|--|----------------------------------|
| 1 | 26.05.2010 | Umstellung auf CMS / Change to Content Management System<br>ersetzt / replaced Index: <b>b</b> | <b>Schartner</b><br><i>Giese</i> |
|---|------------|--|----------------------------------|

