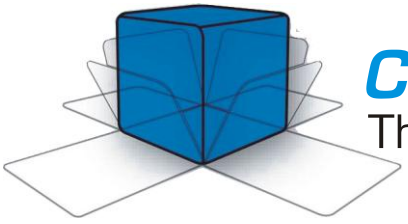
MegaPulse

IMPULSE TESTER

124uFx1.6kV PF

Instruction Manual



COMPLIANCE WEST USA

The blue box that tests. And tests.

Dear Customer:

Congratulations! Compliance West USA is proud to present you with your MegaPulse 124uFx1.6kV PF Impulse Tester. Your instrument features a groundbreaking logic-controlled circuit design and ergonomic front panel and represents the latest in high voltage impulse testing.

To fully appreciate all the features of your new instrument, we suggest that you take a few moments to review this manual. Compliance West USA stands by your instrument with a full one-year warranty. If the need arises, please don't hesitate to call on us.

Thank you for your trust and confidence.

Table of Contents

Section 1

An Introduction to Impulse Testing with the MegaPulse PF series tester

The impulse test is designed to simulate impulse surges which occur in everyday life due to nearby lightning strikes, switching transients, and other high-frequency faults on the power distribution network. Impulse testing is the fundamental method for empirical verification of the adequacy of insulation. Other methods of ensuring adequate insulation (AC or DC Dielectric Withstand testing, measurement of over-surface creep age, through-air clearance, or distance-through-insulation) are all extrapolated from the results of impulse testing. The impulse test is performed to ensure that the insulation in question will be able to function properly when subjected to similar impulse surges in the field.

Safety Precautions

The impulse withstand test can generate voltages in excess of 1600V peak at potentially lethal current levels. Currents of as little as 5mA at 120 volts can cause death; the MegaPulse can deliver currents of more than 320 Amps peak for very short time duration. The potential for serious injury or death exists and personnel should be aware when they conduct this test.

Test Personnel

Personnel require special training to conduct the impulse test. They should understand electrical fundamentals clearly, and be aware that high voltage is adept and creative at completing a path to ground. Instructions should include a warning against any metal jewelry. Operators should not allow others in the testing area, especially when tests are being conducted. Organization is to be stressed. The operator should keep the area free of unused leads and equipment.

Testing Area

The area used for conducting the impulse test should be as remote as possible from normal production line activities. Only personnel actually conducting the test should be allowed in the area, and it should be taped or roped off to preclude casual entry by other employees. In addition, the area should be marked "WARNING - HIGH VOLTAGE TESTING" or the equivalent to warn others of the nature of the testing taking place.

The bench being used should be non-conductive, and any exposed metal parts should be tied together and grounded. If a conductive surface must be used, it should be grounded. Because of sparking during an impulse test failure, it is not safe to conduct impulse testing in combustible atmospheres.

It is imperative that a good ground be provided to the MegaPulse tester. Before connecting the equipment, ensure that the building wiring provides a low-resistance ground. If the MegaPulse tester is used on a high-resistance grounding circuit, dangerous high voltages may be present to the operator. In addition, the power to the Testing Area should be provided with an easily reached shutoff switch which can be actuated by personnel outside the Area if needed.

Safety Techniques

The high voltage circuit of the MegaPulse 124uFx1.6kV PF can be shut off at any time by turning OFF the rear power switch. Always press TRIGGER to discharge the tester before turning OFF.

The MegaPulse tester is provided with a digital **VOLTAGE ADJUST** knob on the front panel. This voltage setting should always confirm by pressing the VOLTAGE ADJUST knob before start any testing.

The MegaPulse tester is provided with a **CHARGE** switch that is in the unarmed "Standby" setting when the tester is first turned ON. When the yellow **CHARGE** button is lit, the tester will not provide high voltage until the **CHARGE** Button and the **TRIGGER** Button have been pressed in order. To prevent inadvertent operation, the operator should be instructed not to press the **CHARGE** Button until the test is ready.

The MegaPulse tester has been designed for one-touch operation with the right hand. If possible, it should be set up to the left and in front of the equipment under test. The equipment under test should be connected to the MegaPulse tester and then left alone by the operator. After the operator is clear of the Tester and the equipment under test, the operator should turn the rear-panel power switch to ON, confirm or adjust the Voltage Set Point, then press the **CHARGE** Button and wait until the front meter reaches the voltage selected, then press the **TRIGGER** Button, with his right hand. This will allow the greatest separation between the operator and the test being conducted.

The MegaPulse PF tester is designed to bleed the high voltage away after the test has concluded. In order to ensure that any voltage present in the equipment being tested has been completely bled away, the operator should not unplug the equipment under test from the MegaPulse until the front panel meter reads a safe level (40 volts or less is generally considered a safe level). Pressing the TRIGGER button before disconnecting main power (or turning the equipment off) will ensure that the internal capacitors are discharged as much as possible.

Using the MegaPulse PF Impulse Tester

The impulse test involves high voltage and caution should be exercised when using the tester. The **RETURN** lead is referenced to building ground when properly connected. However, both the **OUTPUT** and **RETURN** leads must always be treated as Hazardous whenever the power switch of the MegaPulse is in the ON position.

The MegaPulse impulse tester generates the impulse waveform only; it does not determine Passing or Failing results. It is the operator's responsibility to monitor the output waveform and determine Passing or Failing results. In monitoring the impulse waveform, consider the following points: The Impulse waveform is high voltage and high frequency (short duration). Always ensure that the measuring instrument (usually an oscilloscope with a high-voltage probe) is rated for the voltage involved, and that the frequency response of the instrument and probe are capable of measuring the output waveform of the MegaPulse Impulse Tester. A measuring instrument or probe with a low frequency response will result in erroneous readings that could be mis-read.

Note that the voltage meter may indicate that some residual voltage is present on the main storage capacitor, even when the tester is first turned ON. This is due to inherent charging of the internal capacitors.

Note that the peak amplitude of the measured output waveform is proportional to the voltage that is read on the front panel of the MegaPulse, but it will always be somewhat lower. This is because the meter on the MegaPulse is measuring the voltage on the main impulse storage capacitor. This voltage will intentionally dissipate to some extent before reaching the output leads. Therefore, it is important to measure the peak amplitude of the output waveform, and adjust the output of the MegaPulse accordingly.

Section 2

Getting Started

This section contains information for the unpacking, inspection, preparation for use and storage of your Compliance West product.

Unpacking and Inspection

Packaging

Your Tester is shipped in a special protective container that should prevent damage to the instrument during shipping. Check the shipping order against the contents of the container and report any damage or short shipment to Compliance West USA. Please save the shipping carton and packing material for the carriers inspection. Our customer support department will assist you in the repair or replacement of your instrument. Please do not return your product without first notifying us and receiving and RMA (return material authorization) number. To receive and RMA number, please contact our customer support department at (1-800-748-6224)

Product Package for 124uFx1.6kV PF

The container includes the following:

	Description	**Part Number**
124uFx1.6kV PF Tester	Megapulse Tester	
	User Manual	
	High Voltage Test Lead, Red	(Qty 2)
	High Voltage Test Lead, Black	(Qty 2)
	18 AWG AC Power Cord	70-101
TestMinder (Optional)	User Manual	
	Software CD	Megapulse TestMinder USB V1.3 or newer
	RS232 cable	60-134
	USBD box	00-USBDBOX
	USB cable	60-221

Returning the Instrument

When is necessary to return the instrument for servicing or calibration, repackage the instrument in its original container, please include all accessories and test leads. Indicate the nature of the problem or type of service needed. Also, please mark the container as "FRAGILE" to insure proper handling.

If you do not have the original packaging materials, please follow these guidelines:

- Wrap the instrument in a bubble pack or similar foam including all the included cables.
- Use a strong double-wall container that is made for shipping instrumentation.
- Use a layer of shock absorbing material 70 to 100mm (3 to 4 inch) thick around all sides of the instrument. Protect the control panel with cardboard.
- Seal the container securely.
- Mark the container as "FRAGILE" to insure proper handling.
- Please contact Compliance West USA (1-800-748-6224) to inform about the service for your instrument.

AC Line Voltage Requirements

AC line voltage requirements for your Tester are noted on the rear panel of the instrument. Do not connect the instrument to a different voltage source. The cord packaged with your MegaPulse Tester is for use in the United States. If another power cord must be used, the cord must be rated for the maximum current noted on the rear panel. It must also meet the requirements of IEC 227 or IEC 245, and mains cords that are certified or approved by any recognized national test house are regarded as meeting this requirement.

Fuse Replacement

There is a user-replaceable fuse (F1) located on the rear panel of the instrument. It is located behind a door in the Power Inlet-Power Switch-Fuse Holder device. The fuse rating is noted on the rear panel. Do not attempt to replace it with a fuse of any other rating.

Use the following procedure to replace the fuse F1:

1. Turn the power switch to the OFF position.
2. Unplug the instrument from the source of supply.
3. Remove the power inlet cord from the instrument.
4. Using a small screwdriver, pry open the fuse holder door.
5. Replace the fuse with a new one of the correct rating.
6. Replace the fuse holder door and power inlet cord.

Section 3

Specifications and Controls

Megapulse D5-PF Specifications

ELECTRICAL	
Charge Voltage:	0 - 1600 V tolerance ±1% F.S.
Main Capacitance:	124 uF ±10%
Pulse duration:	Adjustable from 1mS to 20 seconds, 1mS increments
Output Impedance:	50 Ω
Voltage Control:	Digital Set point adjusted by frontal VOLTAGE knob or by PC (optional)
Polarity Control:	Positive only
Voltage Display:	4 Digit LED Display
Voltage Meter resolution:	1V
Duty Cycle:	1 pulse every 2.5 seconds
Line Voltage:	120-240VAC, 50/60Hz * (optional different line voltages available 100V, 220V)
ENVIROMENTAL	
Operating Temperature:	15-40 ºC
Relative Humidity Range:	0-90% non-condensing
GENERAL	
Dimensions:	17” wide x 17” high x 17” in deep
Weight:	68 lbs approx.

Front and Rear Panel Features

Before using your Tester, take a few minutes to become familiar with the use of its controls, indicators and connectors. The front panel features of the MegaPulse are shown in Figure 1 and described in Table 1. The rear panel features of the MegaPulse are shown in Figure 2 and described in Table 2.

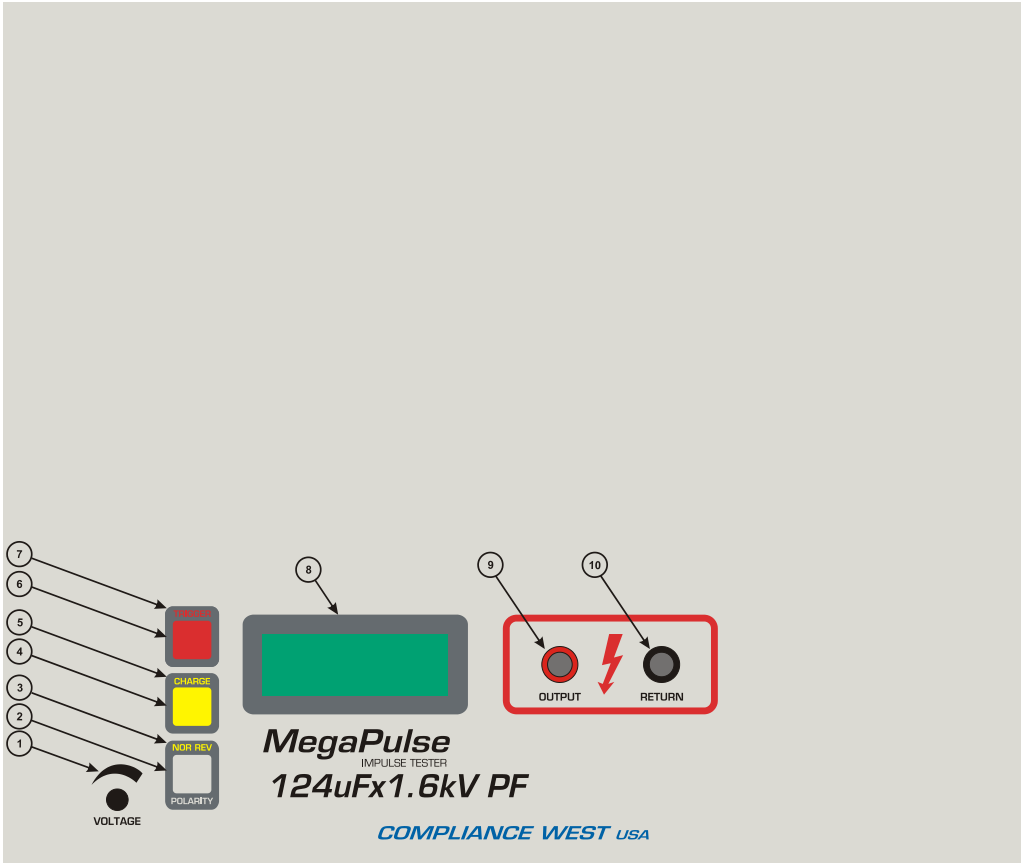


Figure 1. Controls, Indicators, Connectors – MegaPulse 124uFx1.6kV PF Front Panel

ITEM	NAME	FUNCTION
1	**VOLTAGE** Adjust Knob	Adjust the voltage set point in the tester. Press it once to adjust the most significant digits and twice for the less significant digits, then turn Clockwise to increase the output voltage before the **CHARGE** button has been pressed.
2	**POLARITY** switch	Polarity is Fixed at positive. Having this button pressed while turning the tester On, the meter will display software version.
3	**NOR REV** indicator	Indicates the state of the Output Polarity switch. **NOR** indicates Normal (Positive) position. **REV** indicates Reverse (Negative) position.
4	**CHARGE** switch	Starts the charge process of the tester capacitor. The **CHARGE** indicator will turn off after the **CHARGE** switch is pressed, and the **TRIGGER** indicator will turn on. The charge process will stop after 2 minutes if the **TRIGGER** button is not pressed.
5	**CHARGE** indicator	This Yellow indicator is lit to show that pressing the **CHARGE** switch is the next logical step in a test sequence. **CHARGE** indicator is lit when the tester is turn ON an after pressing **TRIGGER** button. **CHARGE** indicator will go out after pressing **CHARGE** button. **CHARGE** and **TRIGGER** Indicators will be blinking if the Interlock Switch is open. (Only testers with Interlock Switch Option)
6	**TRIGGER** switch	Triggers the output impulse waveform. The impulse waveform will appear across the output leads.
7	**TRIGGER** indicator	This Red indicator is lit to show that the tester can be trigger. **TRIGGER** indicator is lit for 2 minutes after the **CHARGE** button is pressed. **TRIGGER** indicator will go out after pressing **TRIGGER** button. **TRIGGER** and **CHARGE** Indicators will be blinking if the Interlock Switch is open (Only testers with Interlock Switch Option) **TRIGGER** indicator will blink at when the Voltage. This effect will remain on until the **TRIGGER** switch is pressed. (Only testers with PC Interface option)
8	**VOLTAGE** meter	Displays the output voltage set point. The voltage reading will increase from zero to the voltage set point when the CHARGE button is pressed. Note that the Voltage meter may indicate that some residual voltage is present on the main storage capacitor, even when the tester is first turned ON. This is due to inherent charging of the internal capacitors. Pressing the **TRIGGER** switch will discharge the capacitors. Note that the peak amplitude of the measured output waveform is proportional to the voltage that is read of the front panel of the MegaPulse, but it will always be somewhat lower. This is because the meter on the MegaPulse is measuring the voltage on the main impulse storage capacitor. This voltage will intentionally dissipate to some extent before reaching the output leads. The meter will start to flash at **1600V** to indicate that voltage is in the maximum limits. If unit includes PC Interface and the Keyboard is locked, the display will show OFF when a button is pressed.

ITEM	NAME	FUNCTION
9	**OUTPUT** jack	The impulse waveform appears on the **OUTPUT** jack, referenced to the **RETURN** jack.
10	**RETURN** jack	This is the return for the impulse waveform. This jack is referenced to the chassis of the MegaPulse, and is referenced to earth ground as long as the MegaPulse is properly grounded. Even though this jack is referenced to ground, it should be treated as hazardous whenever the MegaPulse is turned ON.

Table 1. Controls, Indicators, Connectors – MegaPulse 124uFx1.6kV PF Front Panel

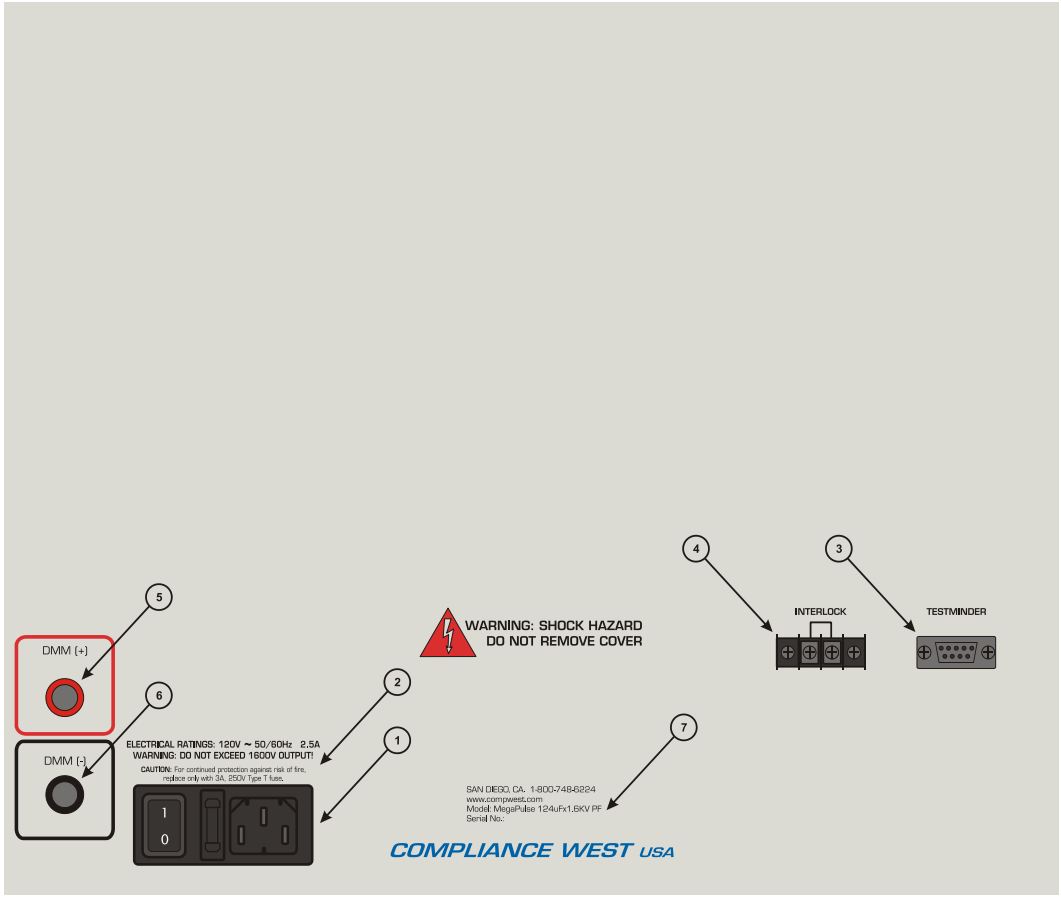


Figure 2. Controls, Indicators, Connectors – MegaPulse 124uFx1.6kV PF Rear Panel

ITEM NO.	NAME	FUNCTION
1	Appliance Inlet / Fuse holder / Power Switch	Use supplied cordset to connect the MegaPulse 124uFx1.6kV PF tester to an appropriate source of supply. Fuse holder provides access for Fuse replacement, and the Power Switch is used to turn the tester ON and OFF.
2	Fuse replacement warning / Rating of power supply	Specifies replacement fuse and required supply voltage.
3	RS-232 Interface (Optional)	Allow the communication between the tester and computer interface; a RS-232 to USB is available.
4	Interlock Switch	Emergency Stop Close: Enables the tester buttons for operation. Open: Stops any process in the tester and disables the buttons. The **TRIGGER** and **CHARGE** Indicators will be blinking
5	DMM(+)	Connector for Digital multi meter (+), internal circuit can be configured to read the load resistance or 10:1 voltage divider of the output waveform.
6	DMM(-)	Connector for Digital multi meter (-), internal circuit can be configured to read the load resistance or 10:1 voltage divider of the output waveform.
7	Product Information	Product model and serial number

Table 2. Control, Indicators, Connectors – MegaPulse 124uFx1.6kV PF Rear Panel

Section 4

Initial Checkout Procedure

The following procedure will verify that the MegaPulse 124uFx1.6kV PF tester is working correctly. We recommend that this procedure be conducted periodically to ensure proper operation of the tester. The following items are needed to conduct this procedure: A measuring instrument to monitor the output waveform. Always ensure that the measuring instrument (usually an oscilloscope with a high-voltage probe) is rated for the voltage involved, and that the frequency response of the instrument and probe are capable of measuring the output waveform of the MegaPulse 124uFx1.6kV PF tester. A measuring instrument or probe with a low frequency response will result in erroneous readings that could be mis-read.

CAUTION

High voltage generated by the MegaPulse tester is exposed during this test. A risk of shock exists. Exercise care when using the MegaPulse tester.

1. Connect the tester to a proper source of supply using the included 18 AWG power supply cord.
2. Plug the Output and Return test leads into the jacks on the front panel.
3. Connect the ends of the test leads to an appropriate load (1Kohm – 2.5Kohm). Connect a measuring instrument (typically a high speed Digital multimeter with a 10Meg input impedance capable to measure at least 160V) at the DMM (+) and DMM (-) ports at the rear panel. Note that the **RETURN** lead is referenced to the chassis ground of the tester.
4. Turn the Tester on.
5. Push the voltage knob and adjust the desired test voltage, or send the voltage with the PC.
6. Set the desired pulse duration with the PC, maximum time is 20 seconds.
7. Read and confirm the load resistance using the DMM and then change the output relay state with the PC.
8. Push the yellow **CHARGE** button, then press **TRIGGER** when it reaches the desired voltage.
9. Capture the waveform on the DMM. Note that the peak voltage will be slightly lower than the meter; this is caused by the voltage divider between the output impedance 50ohms and the load.
10. Turn the rear-panel power switch OFF.

Section 5

Technical Assistance

Technical Assistance from Compliance West USA is available:

Phone: (800) 748-6224
Hours: 8:30 AM - 4:30 PM Pacific Time.
Also available on our web site at: **www.compwest.com**

Contact:

Compliance West USA
650 Gateway Center Way, Suite D
San Diego, CA., 92102
United States of America.

Phone: (619) 878-9696
FAX: (619) 794-0404

Section 6

Maintenance and Calibration

WARNING

MAINTENANCE AND CALIBRATION INSTRUCTIONS ARE FOR QUALIFIED PERSONNEL ONLY. TO AVOID ELECTRIC SHOCK, DO NOT PERFORM ANY SERVICING OTHER THAN THE CONTAINED IN THE OPERATING INSTRUCTIONS.

Introduction

This section of the manual contains maintenance information for the MegaPulse 124uFx1.6kV PF impulse tester. A 1-year calibration cycle is recommended to maintain the specifications of the factory. The test equipment required for the performance test is a digital oscilloscope, high voltage oscilloscope probe, digital meter and a high voltage probe.

Service Information

The MegaPulse tester is warranted to the original purchaser for a period of 1 year. This warranty does not cover problems due to misuse or neglect. Malfunctions which occur within the limits of the warranty will be corrected at no charge. Mail the instrument post paid to the manufacturer. Dated proof of purchase is required for all in-warranty repairs. The manufacturer is also available for calibration and / or repair of instruments that are beyond their warranty period. Contact the manufacturer for a cost quotation. Ship the instrument and your remittance according to the instructions given by the manufacturer.

General Maintenance

To avoid contaminating the PWB with oil from your fingers, handle it by the edges or wear gloves. If the PWB becomes contaminated, refer to the cleaning procedures given later in this section.

WARNING

Dangerous voltages exist when energized. Exercise extreme care when working on an energized circuit.

Cleaning

Clean the front panel and case with a mild solution of detergent and a damp sponge. Clean dust from the PWB with clean, dry, low pressure (<20 psi)

CAUTION

Do not use aromatic hydrocarbons or chlorinated solvents for cleaning. These solutions will react with the plastic materials used in the instrument.

Calibration Information

The Calibration Procedure should be performed annually and any time the instrument has been repaired. The calibration procedure should be performed at an ambient temperature of 23°C ±5°C (73.4°F ±9°F). The procedure consists on internal components tolerance verification and calibrating the meter reading to agree with the capacitor bank. The Calibration procedure must be performed by qualified personnel, for more information contact Compliance West USA.

Voltage Stop Disable / Keyboard Enable by Keyboard.

If the MegaPulse 124uFx1.6kV PF tester includes TestMinder option and has the Voltage Stop by the PC command activated, it is possible to disable it using the next keyboard sequence:

Note: Disabling Voltage Stop enables the keyboard.

Turn OFF the MegaPulse P tester.

Hold in the **TRIGGER** and **NOR-REV** buttons.

Turn ON the MegaPulse P tester.

Wait until the display shows **rESE**.

Release the **TRIGGER** and **NOR-REV** buttons.