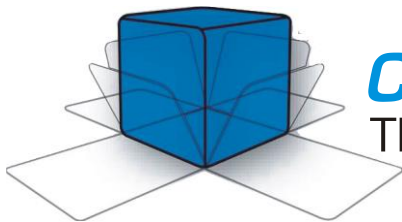


# **MegaPulse** series

## **Coupling/Decoupling Network**

Model CDN 270/8A 7KV

### **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 Coupling/Decoupling Network.*

*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.*

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# **Section 1**

## **An Introduction to Impulse Testing with the CDN 270/8 7KV**

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. 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.

- The CDN 270/8 7KV is designed to allow surge testing to be conducted on the mains line of operating equipment. The CDN is designed to EN 61000-4-5 Figure 7 and protects the attached Surge Tester outputs from line voltage, and the mains voltage generator from the Surge Tester outputs.
- The CDN 270/8 7KV does not generate surge voltages.
- Connection of a surge tester to the INPUT jacks and the appropriate mains voltage for the DUT is required.
- The mains input of the DUT is connected to the OUTPUT jacks of the CDN 270/8 7KV.
- The CDN 270/8 7KV is suitable for use with 120V/8A max or 220-270V/8A max 50/60Hz mains voltages.

### **Safety Precautions**

An impulse withstand test can generate high voltages at potentially lethal current levels. Currents of as little as 5 mA at 120 volts can cause death; and any MegaPulse model can deliver lethal current levels for a very short time duration. The potential for serious injury or death exists and personnel should be aware when they conduct this test. All inputs and outputs of the CDN 270/8 7KV should be considered hazardous. The front panel input and output jacks contain the surge pulse; the rear panel is connected to mains voltage and is to be considered hazardous as well.

### **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 dielectric withstand test should be as remote as possible from normal production line activities. Only personnel 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 connection must be provided to the CDN 270/8 7KV. 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 CDN 270/8 7KV has an ON/OFF switch on the front panel. During testing, this switch should be left in the ON position. However, when the switch is in the ON position, mains voltage exists at the Line Output jacks. The case is grounded but the correct operation of the grounding is dependent on proper connection of the building ground to the AC inlet on the rear panel of the CDN 270/8 7KV.

### Using the MegaPulse with CDN 270/8 7KV

Use of the MegaPulse Surge Tester and measurement of the resulting waveform is covered in the MegaPulse Surge Tester Manual. This Manual covers only the connection of the MegaPulse CDN 270/8 7KV to the Surge Tester and the DUT.

The MegaPulse CDN 270/8 7KV is constructed to the specifications of EN 61000-4-5. Some circuit values are not specified in this Standard and the manufacturer has chosen values for good general operation. However, special instances or test procedures unknown to the manufacturer may yield unacceptable shielding of the line generator from the output of the MegaPulse Surge Tester connected to the **INPUT** jacks of the CDN 270/8 7KV. We strongly recommend that the mains source of supply not be a device with outputs coupled to FETs or similar. Perhaps a transformer and a variac for AC sources; and a battery for DC sources would be best.

Excessive inductance in the test setup can compromise the current waveform. To minimize inductance of the test circuit, it is recommended to twist the pair of cables connected at the input and at the output.

**WARNING:** *Attaching the Megapulse to the turned ON CDN creates current in the internal circuit of the Megapulse, current creates heating in the internal component, Turn ON the CDN just for short periods of time (during Surge Testing Only) to maintain the internal components of the Megapulse suited for the surge test.*

## Section 2

### Introduction and Specifications

#### Introduction

This manual contains complete operating, maintenance and calibration instructions for the Compliance West USA CDN 270/8 7KV.

- The CDN 270/8 7KV does not produce a surge by itself; it only integrates the surge delivered to its **INPUT** jacks with the line voltage applied to the power receptacle on its rear panel and delivers the resulting waveform to its **OUTPUT** jacks.
- Its primary function is to protect the mains voltage generator from the output of the Surge Tester; and to protect the output of the Surge Tester from mains voltage.
- Certain circumstances could allow a substantial portion of the surge voltage to appear to the mains voltage generator. We recommend that a mains voltage generator operating with FETs not be used with the CDN 270/8 7KV for this reason, as it's conceivable that damage could result.
- The CDN 270/8 7KV was constructed to the specifications of EN 61000-4-5 for 1 phase line test as shown below.
- Your MegaPulse CDN 270/8 7KV is warranted for a period of one year upon shipment of the instrument to the original purchaser.

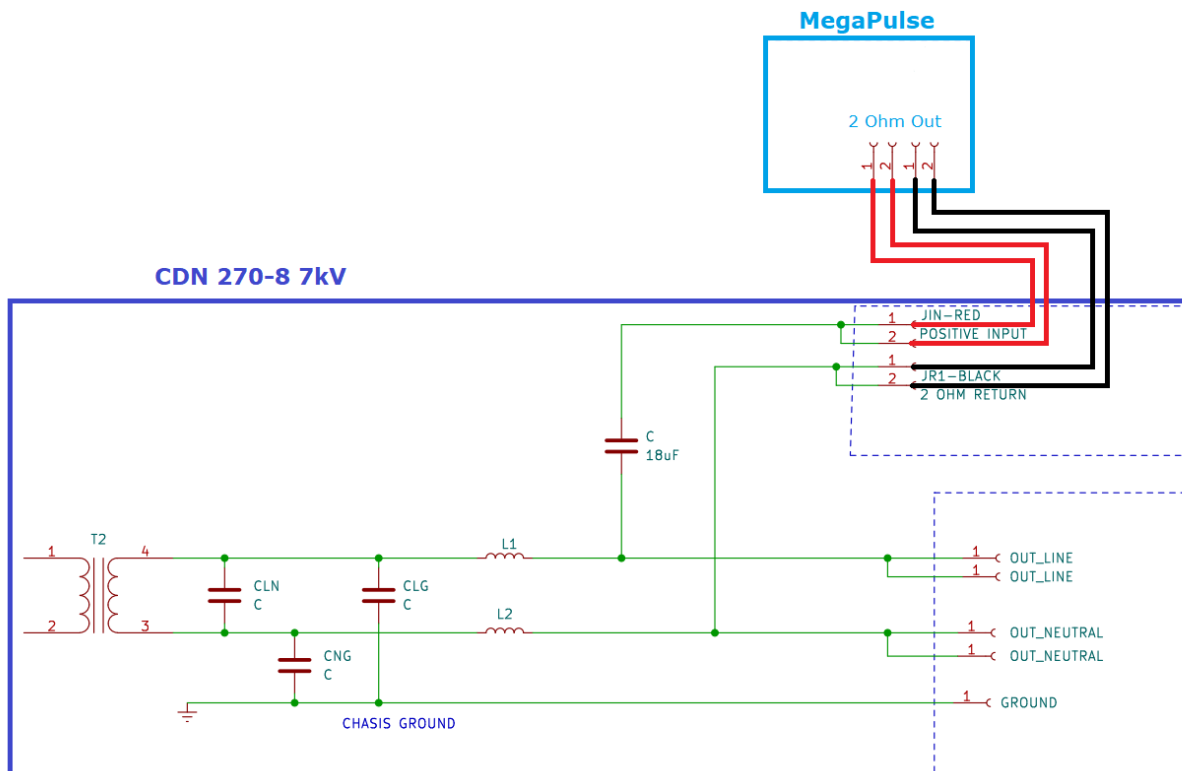
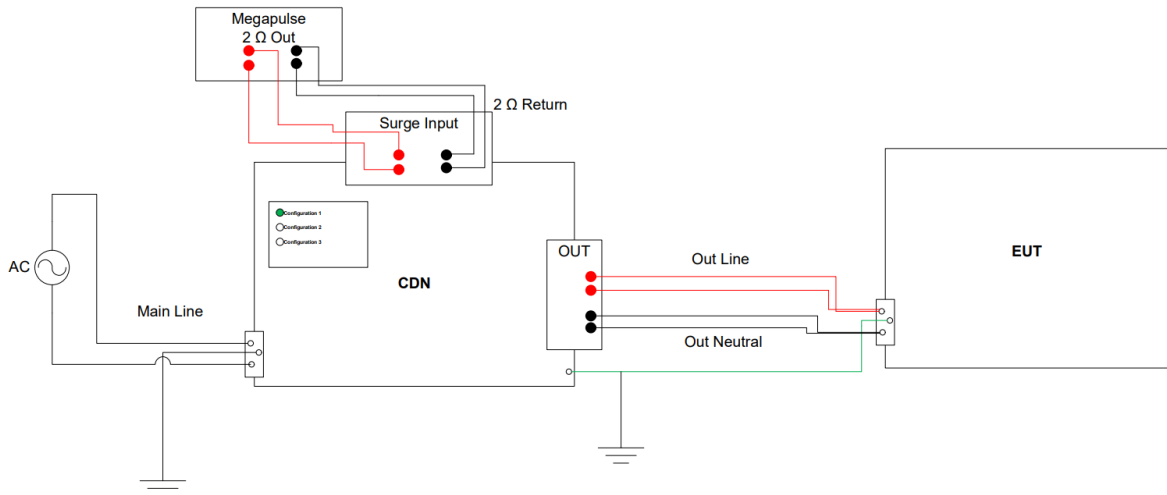
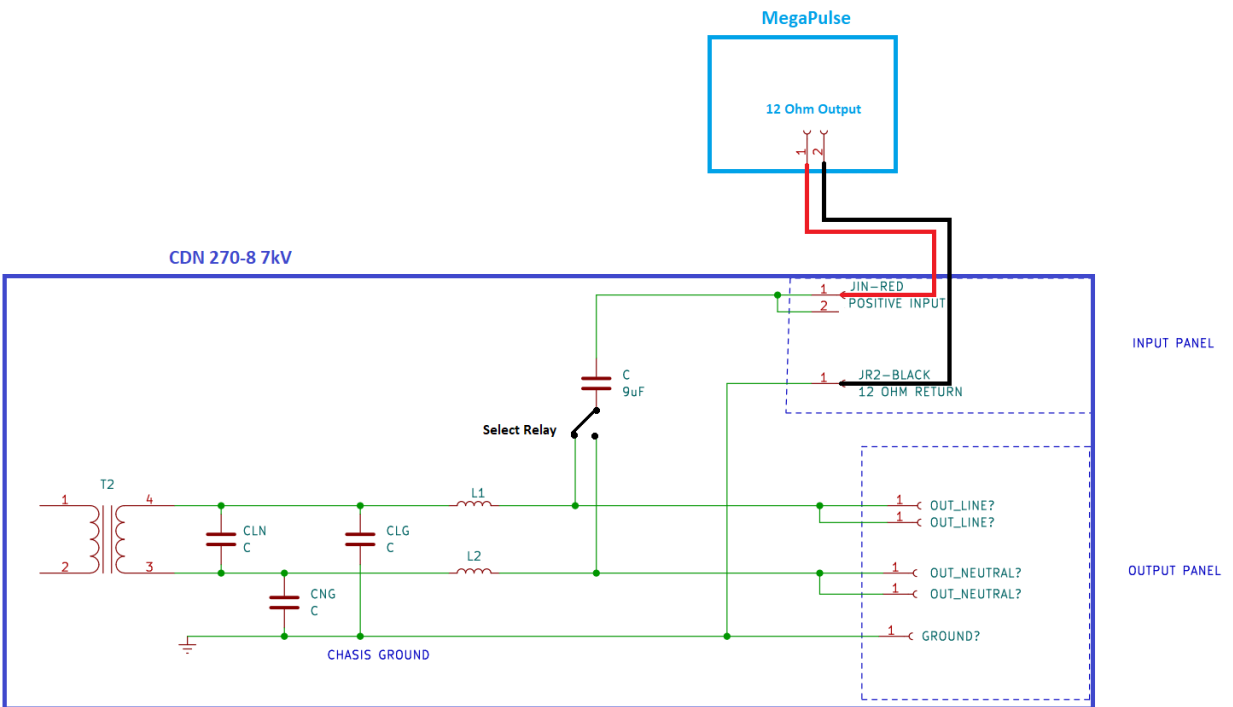


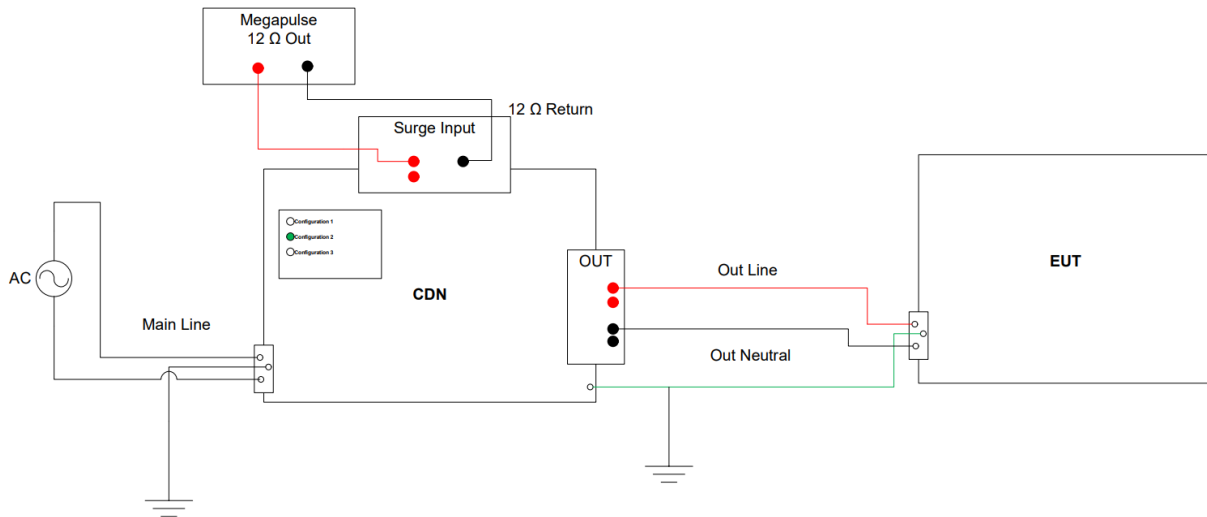
Figure 1. Line To Line Coupling Using Megapulse Surge Tester 2 Ohm Output



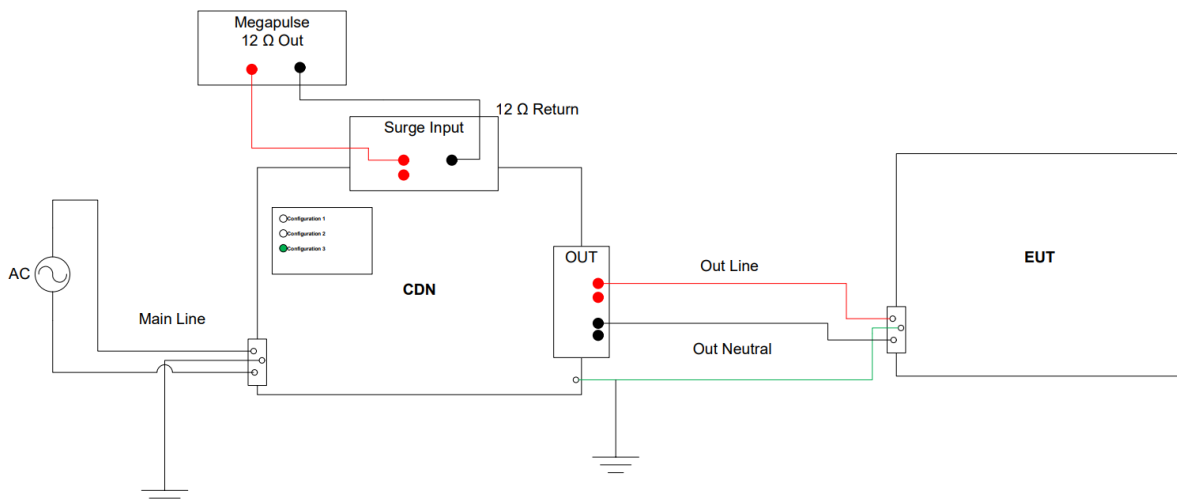
**Figure 2. Configuration 1 Line to Line Testing Connections Using Megapulse Surge Tester 2 Ohm Output**



**Figure 3. Line to Ground Coupling Using Surge Tester 12 Ohm Output**



**Figure 4. Configuration 2 Line to Ground Testing Using Surge Tester 12 Ohm Output**



**Figure 5. Configuration 3 Neutral to Ground Testing Using Surge Tester 12 Ohm Output**



## **Section 3**

### **Operation**

This section describes how to set up and make measurements with your CDN 270/8 7KV. We recommend that you read the entire section carefully so that you can use all the features of your Tester.

#### **Setting up the CDN 270/8 7KV**

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. The container should include the following:

- The Compliance West CDN 270/8 7KV
- Four high-voltage test leads for Megapulse Interconnection, 2 Red and 2 Black.
- One green return lead.
- 14 AWG Line Power Cord.
- This Instruction Manual.

If reshipment of the instrument is necessary, please use the original shipping container. If the original shipping container is not available, be sure that adequate protection is provided to prevent damage during shipment. We recommend that the instrument be surrounded by at least two inches of shock-absorbing material on all sides of the container.

Remove the CDN 270/8 7KV from its container and place it on a test bench.

#### **AC Line Voltage Requirements**

The CDN 270/8 7KV Requires 60W to operate the internal circuitry in addition to the DUT Line requirements Supply. The AC line voltage requirements for the DUT are to be checked. The AC line voltage requirements for the DUT are to be applied to the rear panel AC inlet of the CDN 270/8 7KV. The CDN 270/8 7KV is designed for supplying single phase line voltage up to 270V, 50/60 Hz at a current draw of up to 8 amps. If the DUT requires mains voltages or currents outside these parameters, do not use the CDN 270/8 7KV.

#### **Selection of a Suitable Power Cord**

The cord packaged with your CDN 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.

## Front/Rear Panel Features

Before using your Tester, take a few minutes to become familiar with the use of its connectors. The front and rear panel features of the CDN are shown Below.

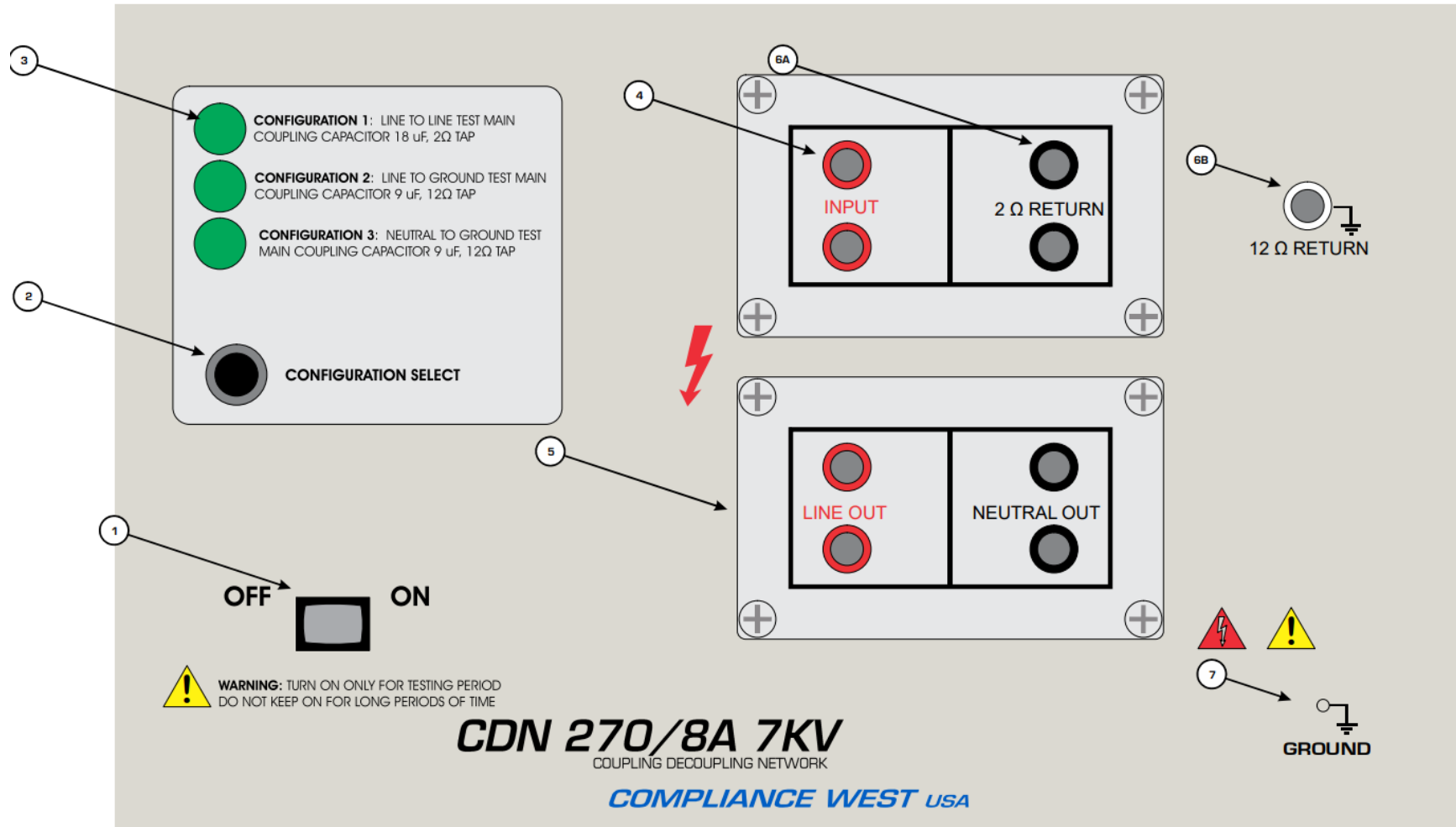
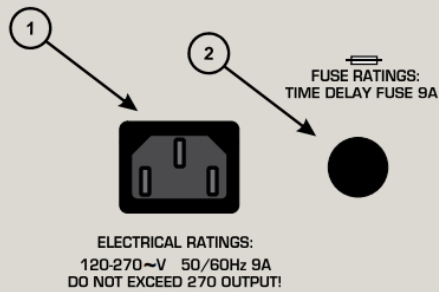


Figure 6. Controls, Indicators, Connectors – CDN 270/8 7KV Front Panel

ITEM	NAME	FUNCTION
1	<b>ON/OFF Switch</b>	Used to control the mains voltage. When this switch is ON, the line voltage connected to the rear panel of the CDN 270/8 7KV is present at the LINE OUTPUTS. When this switch is OFF, the line voltage is not present at the LINE OUTPUTS. Note: Do not leave the CDN 270/8 7KV in the test setup with the switch OFF while testing other than power line circuits. The pulse output to the DUT is compromised by the CDN 270/8 7KV.
2	<b>CONFIGURATION SELECT BUTTON</b>	Select the internal configuration of the CDN 270/8 7KV, Press and Hold for 1 second to change internal tester configuration, see section 2 of this manual for more information of each configuration.
3	<b>CONFIGURATION INDICATORS</b>	Indicates the configuration of the CDN 270/8 7KV
4	<b>IMPULSE POSITIVE INPUT</b>	Connect the MegaPulse Surge Tester outputs here. Observe output polarity. Use both connectors for 2 Ohm outputs, one connector for 12Ω output.
5	<b>LINE OUTPUT</b>	Connect to the line input of the DUT. Observe Mains Voltage and Current requirements when connecting line voltage to the rear panel of the CDN 270/8 7KV. The RED jack has the hot side of the line, and the BLACK jack has the neutral, use two connectors when using Line to Line testing (2 ohm Tap of the Megapulse).
6A	<b>2 Ω RETURN</b>	Line to Line testing Megapulse return connector, connect <b>ONLY</b> to the 2 Ohm Output taps of the Megapulse.
6B	<b>12 Ω RETURN</b>	Line to Ground testing Megapulse return connector, connect <b>ONLY</b> to the 12 Ohm Output tap of the Megapulse.
7	<b>GROUND</b>	Connect to the chassis of the DUT. This is directly connected to the grounding pin on the AC Inlet Receptacle on the rear panel of the CDN 270/8 7KV.

**Table 1. Controls, Indicators, Connectors – CDN 270/8 7KV Front Panel**

 **WARNING: SHOCK HAZARD DO NOT REMOVE COVER** 



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www.compwest.com  
Model: CDN 270-8 7KV  
Serial No.:

**COMPLIANCE WEST USA**

**Figure 7. Controls, Indicators, Connectors – CDN 270/8 7KV Rear Panel**

ITEM	NAME	FUNCTION
1	<b>CDN INPUT POWER LINE</b>	AC Main test source, use this receptacle to connect the EUT source voltage.
2	<b>FUSE HOLDER</b>	Main Line fuse, replace only with ratings indicated in the unit.

**Table 2. Controls, Indicators, Connectors – CDN 270/8 7KV Rear Panel**

## Testing

This section describes how the CDN 270/8 7KV is used to conduct a test. Care must be taken as voltage is present on the Output Jacks whenever the Front Panel switch is ON.

1. Connect the CDN 270/8 7KV to a proper source of supply for the DUT using the included 14 AWG power supply cord. **Note:** Because of the possibility of damage, we do not recommend using a FET coupled voltage generator.
2. Depending on configuration.  
Line to Line Testing: Connect the 2 Ohm Outputs from Megapulse to Surge Inputs of the CDN, Connect 2 Ohm Return connectors from Megapulse to 2 Ohm Return inputs in the CDN.  
Line To Ground Testing: Connect the 12 Ohm Output from the Megapulse to one of the 2 Surge Input of the CDN, Connect the 12 Ohm Return to the 12 Ohm Return Input in the CDN.  
See Section 2 for more information.
3. Connect the Line Output test leads from the CDN 270/8 7KV to the AC power inlet of the DUT.
4. Connect the Return test lead to the chassis of the DUT.
5. Turn On the CDN, Select the proper configuration using the configuration button in the CDN.
6. Use the MegaPulse Surge Tester as usual to apply a pulse to the DUT.
7. Turn Off the CDN once testing is finish, **If the Megapulse is connected to the CDN don't keep the CDN turned ON for long periods of time.**

## **Section 4**

### **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](http://www.compwest.com)**

**Contact:**

Compliance West USA  
650 Gateway Center Way Suite D  
San Diego, CA 92102 USA.

**Phone:** (619) 878-9696

**FAX:** (858) 481-8527

## **Section 5**

### **Maintenance and Calibration**

#### **WARNING**

**THESE SERVICE INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID ELECTRIC SHOCK, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN THE OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO.**

#### **Introduction**

This section of the manual contains maintenance information for the MegaPulse series impulse tester. This maintenance information is divided into service information, general maintenance, a performance test, and a calibration procedure. The performance test is recommended as an acceptance test when the instrument is first received, and later as a preventative maintenance tool to verify proper instrument operation. The test equipment required for the performance test is a MegaPulse Surge Tester, an oscilloscope, a 0.1 $\Omega$  current shunt and a high voltage probe. The calibration consists of ensuring that the output of the CDN is within the specification of IEC 1180 for the voltage waveform generated by the MegaPulse Surge Tester connected to the Impulse Inputs.

#### **Voltage Waveform Tolerances**

Waveform definitions from IEC 1180 are as follows:

T= time from 30% to 90% of peak voltage

Rise Time = 1.67 x T

Duration Time = time from virtual origin to 50% of peak voltage on trailing edge

Waveform tolerances from IEC 1180 using the definitions above:

Voltage: Peak voltage  $\pm 3\%$

Rise Time:  $\pm 30\%$ .

Duration:  $\pm 20\%$ .

#### **Current Waveform Tolerances**

Waveform definitions from IEC 1180 are as follows:

T=time from 10% to 90% of peak current

Rise Time = 1.25 x T

Duration Time = time from virtual origin to 50% of peak current on trailing edge

Waveform Tolerances from IEC 1180 using the definitions above:

Current: Peak current  $\pm 10\%$

Rise Time:  $\pm 30\%$

Duration Time:  $\pm 20\%$

## Service Information

The CDN 270/8 7KV 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 prepaid to the manufacturer. Dated proof of purchase is required for all in-warranty repairs.

The manufacturer is also available for 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

### Calibration Access

There are no adjustments inside the CDN 270/8 7KV. If the CDN 270/8 7KV fails calibration, it must be returned to the manufacturer for repair.

### Interior Access

Use the following procedures to gain access to the calibration adjustments of your instrument.

1. Set Line Power switch to OFF.
2. Disconnect the power cord from the rear of the instrument.
3. Remove the four screws securing the top to the rest of the CDN 270/8 7KV.
4. Grasp the top cover and slide it back until it is free of its channel.

#### *NOTE*

*With the power cord replaced, the instrument is operational for service.*

#### **WARNING**

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

5. To reassemble, reverse steps 1-4 above.

## Cleaning

#### **CAUTION**

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

Clean the front panel and case with a mild solution of detergent and a damp sponge.



## Performance and Calibration Test

The performance test evaluates the performance of your instrument to ensure that it is working properly. This test is recommended for incoming inspection, as a preventative maintenance check, and to verify proper operation during the calibration procedure. It is not necessary to disassemble the instrument to conduct these tests. If the instrument fails any part of the performance test, repair is indicated.

Allow the instrument to stabilize and perform the test at an ambient temperature of  $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$  ( $73^{\circ}\text{F} \pm 9^{\circ}\text{F}$ ).

1. Connect the CDN to a proper source of supply using the included 14 AWG power supply cord.
2. Do not plug the Output test leads from the reference MegaPulse Surge Tester into the Impulse Inputs of the CDN 270/8 7KV.
3. Connect a suitable high voltage scope probe (Tektronix P6015A or equivalent) to the Outputs of the MegaPulse Surge Tester.
4. Perform a Surge Test and capture the waveform of the Surge Tester for comparison to the output of the CDN 270/8 7KV later in this procedure.
5. Plug the Output test leads from the reference MegaPulse Surge Tester into the Impulse Inputs of the CDN 270/8 7KV.
6. Connect the high voltage probe to the Line Outputs of the CDN 270/8 7KV. Turn the MegaPulse Surge Tester on. Leave the CDN 270/8 7KV off.
7. Conduct a Surge Test. Compare the output of the CDN 270/8 7KV to the output of the Surge Tester and ensure it is within Tolerance for the Voltage waveform as noted above.
8. Repeat the entire test sequence above using a  $0.1\Omega$  current shunt to determine the current (short circuit) waveform of the MegaPulse Surge Tester and the CDN 270/8 7KV, and compare them to ensure they are in tolerance as noted above.