

**FLUKE®**

# **EI-162BN**

Split-Core Transformer

**Users Manual**

PN 2842250

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# ***EI-162BN Split-Core Transformer***

## ***Introduction***

The Fluke EI-162BN Split-Core Transformer (hereafter referred to as the “Transformer”) is used with an earth ground tester (hereafter referred to as the “Tester”) to make selective earth ground resistance measurements (RE) on transmission line pylons. The Transformer is designed to work with Fluke 1625 and 1623 GEO Earth Ground Testers.

This instrument is manufactured in compliance with quality assurance system DIN ISO 9001. Compliance with current applicable EMC regulations is documented by the attached **CE** sign.

## ***Unpacking***

Refer to “Accessories” while unpacking the Transformer and its accessories from the shipping carton. Keep the packing material for later transport.

Check for missing parts and inspect the unit carefully for damage, like cracks, dents or bent parts. If items are missing or any physical damage is apparent, call Fluke for assistance. Refer to “Service” for information on contacting Fluke.

## ***Packing***

Use only the original packing material to ship the Transformer.

## **Safety Regulations**

This device is only to be installed and operated by qualified personnel in compliance with the safety precautions and regulations that follow. Additionally, use of this device requires compliance with all legal and safety regulations pertaining to each specific application. Similar regulations apply to the use of accessories.

Qualified personnel are persons familiar with the setup, installation and operation of the device, are formally qualified to perform activities like training and instruction, and are authorized to switch on and off, isolate, ground, and label electric circuits and instruments/systems in accordance with safety engineering standards.

In this manual, a **⚠ Warning** identifies hazardous conditions and actions that could cause bodily harm or death. A **⚠ Caution** identifies conditions and actions that could damage the instrument or the equipment under test, cause permanent loss of data, or impair instrument performance. Disregarding warning and caution notices can lead to serious physical injury and material damage.

Fault-free and safe operation of this device requires suitable transport, storage, setting up, and assembly, as well as careful operation and maintenance.

If there is reason to believe that safe operation is no longer possible, the device must be put out of operation immediately and must be protected against accidental usage.

### **⚠⚠ Warning**






**Operating electrical devices implies that parts of the device could carry dangerous voltages. To avoid electrical shock or damage to the device:**

- **If this product is used in a manner not specified by the product specifications, the protection provided may be impaired.**
- **While a measurement is in progress, do not touch the Transformer, transmission line pylon, earth ground electrode, auxiliary electrode, or probe.**

- Assume that safe operation of the device is *not* possible if it shows visible damage.
- Assume that safe operation of the device is *not* possible if it has been exposed to unfavorable conditions (for example, storage beyond the permissible climatic limits without adaption to the ambient climate and dewing).
- Assume that safe operation of the device is *not* possible if it has been exposed to major strain during transport (for example, dropped from some height without visible external damage).

## Symbols

The following symbols are found on the Transformer or in this manual.

	Hazardous voltage. Voltage >30 V dc or ac peak might be present.
	Risk of danger. Important information. See <i>Users Manual</i> .
	Common
	Conforms to relevant European Union directives
	Earth ground

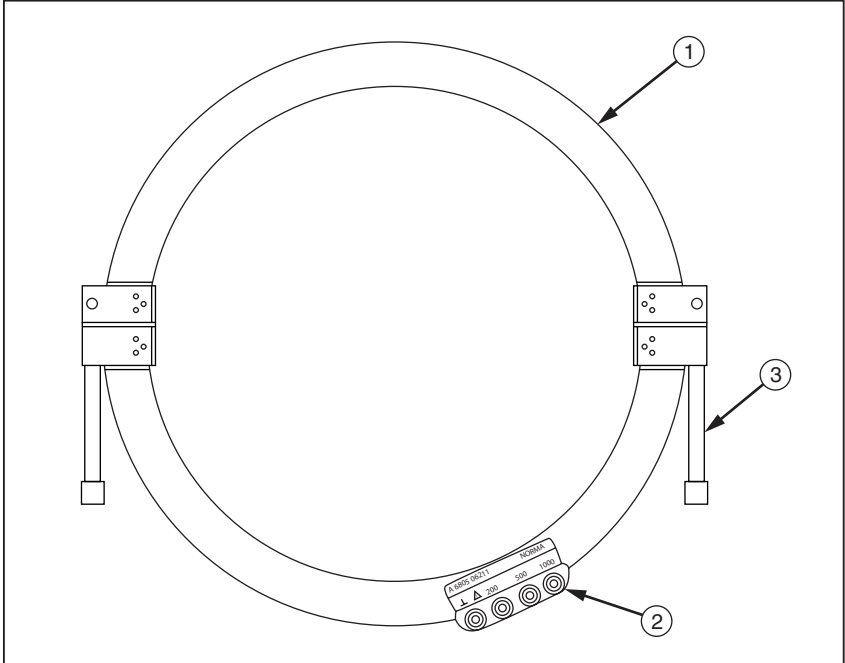
## **Accessories**

The following accessories are shipped with your Transformer:

- Two fasteners for holding Transformer halves together
- One cable bobbin with two 12-meter (40-foot) test leads for connecting the Transformer to the Tester's jack. The female red and blue leads then plug onto the male red and blue banana plugs on the sensing cable adapter used with the Fluke 1623 and 1625 for selective resistance measurements. (Sensing cable adapter, Fluke part number 2539195).
- One contact clamp for establishing an earth ground electrode connection point on the transmission line pylon. The clamp features a fastener that secures the clamp to the pylon's frame. The clamp also has a 4-mm bore hole that fits a standard banana plug, with a tightening screw for securing the plug.
- One carrying case
- Users manual

## Features

See Figure 1 and Table 1 for Transformer features and functions.



evx01.eps

**Figure 1. Features**

**Table 1. Features and Functions**

Item	Description
①	Transformer half (2) Transformer end faces have bolts that pivot to aid in separating the Transformer halves One Transformer end face has a slotted bolt hole that allows the bolt to pivot out of the end face
②	Transformation ratio connections: 1, 200, 500, and 1000
③	Fastener (2)

## **Using the Split-Core Transformer**

### **Installing Transformer around Pylon Footing**

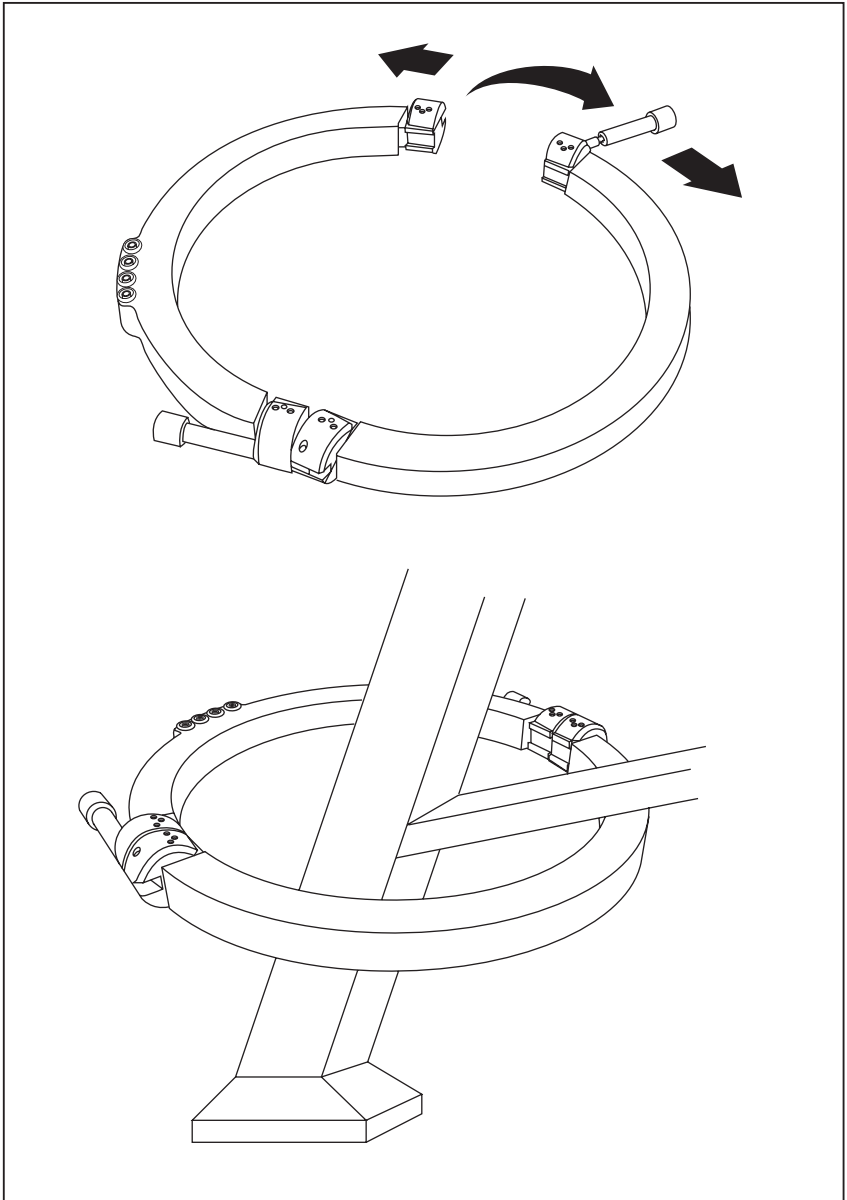
To install the Transformer around a pylon footing:

1. Loosen (or if required, remove) the fasteners. See Figure 2.  
If extra leverage is needed to loosen a fastener, insert a lever (like a small screwdriver) into the 4 mm bore hole in the fastener.
2. On the end face with the slotted bolt hole, pivot the fastener/bolt out of the way, and then separate the two halves of the Transformer. See Figure 2.
3. Install the Transformer around the pylon footing. See Figure 2.

#### **⚠ Caution**

- **Damage to the Transformer end faces can greatly impair performance. Use care when joining the end faces together.**
  - **Foreign substances on the end faces can distort measurement results. Before fastening together, ensure the end faces are clean. If required, see “Cleaning.”**
  - **Airgaps between the end faces can distort measurement results. When fastening the end faces together, ensure the fasteners are tightened firmly.**
4. Join the two halves of the Transformer so the end faces meet. On the end face with the slotted bolt hole, pivot the fastener/bolt into place. If fasteners were removed, install the fasteners. Tighten fasteners firmly. See Figure 2.

If extra leverage is needed to tighten a fastener, insert a lever (like a small screwdriver) into the 4 mm bore hole in the fastener.




**Figure 2. Installing Transformer Around Pylon**

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## Determining Transformation Ratio Connections

Before you connect the Transformer to the Tester, you need to determine a suitable transformation ratio for the minimum measuring and maximum parasitic currents expected to flow through the transmission line pylon.

The Transformer has 1000 windings, with connections at winding ratios of 1000, 500, 200 and 0 ( $\perp$ ). Depending on the combination of connections used, the Transformer can provide transformation ratios of 1:1000, 1:800, 1:500, 1:300, and 1:200.

See Table 2 to determine a suitable transformation ratio for the expected minimum measuring and maximum parasitic currents, and then see Figure 3 for the Transformer connections that will provide that ratio. These connections will be used for connecting the Transformer to the Tester's  jack.

### Note

*Be sure to adjust your earth ground tester to the selected transformation ratio.*

**Table 2. Transformation Ratios**

Current	Ratio				
	1:1000 <sup>[1]</sup>	1:800	1:500	1:300	1:200
Min. Measuring Current <sup>[2]</sup>	0.50 mA	0.40 mA	0.25 mA	0.15 mA	0.10 mA
Max. Parasitic Current <sup>[3]</sup>	3.0 A	2.4 A	1.5 A	0.9 A	0.6 A
<sup>[1]</sup> For nearly all selective earth ground resistance measurements, a ratio of 1:1000 is recommended <sup>[2]</sup> At 94, 105, 111, and 128 Hz <sup>[3]</sup> At 50, 60 and 16-2/3 Hz					



# Split-Core Transformer

## Using the Split-Core Transformer

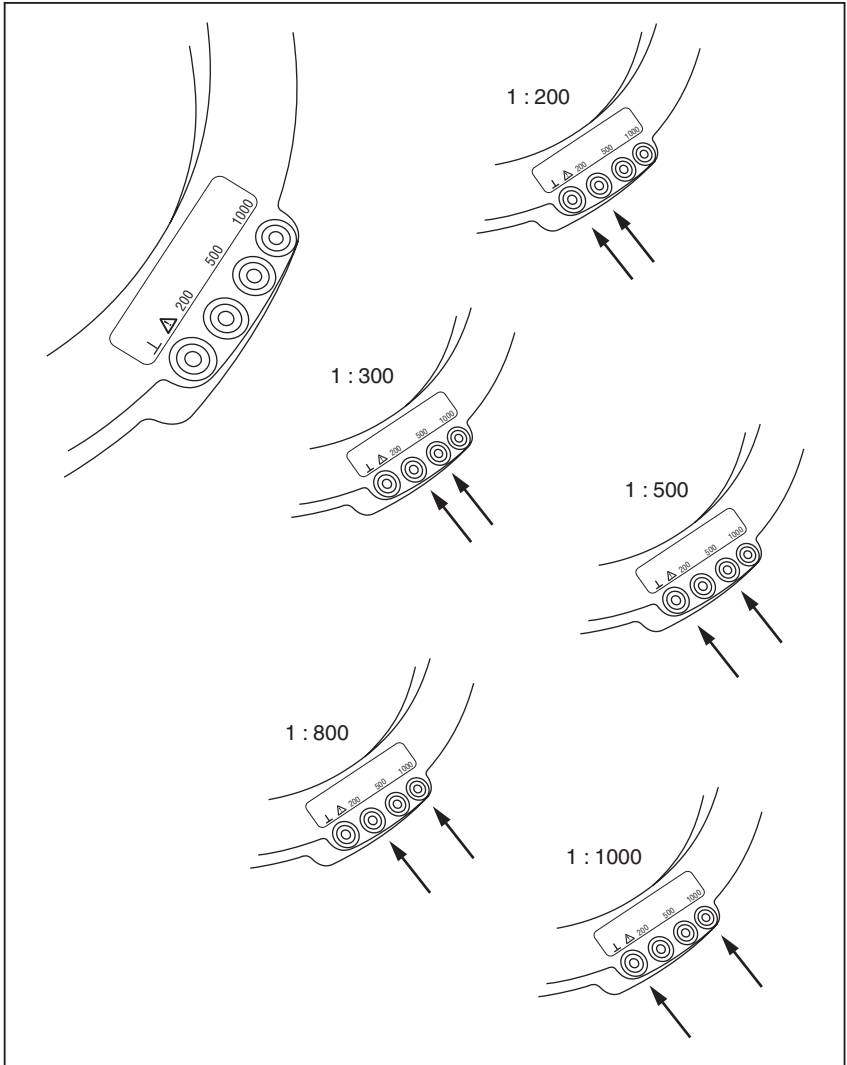


Figure 3. Transformation Ratio Connections

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## **Connecting Transformer to Earth Ground Tester**

### **⚠ Caution**

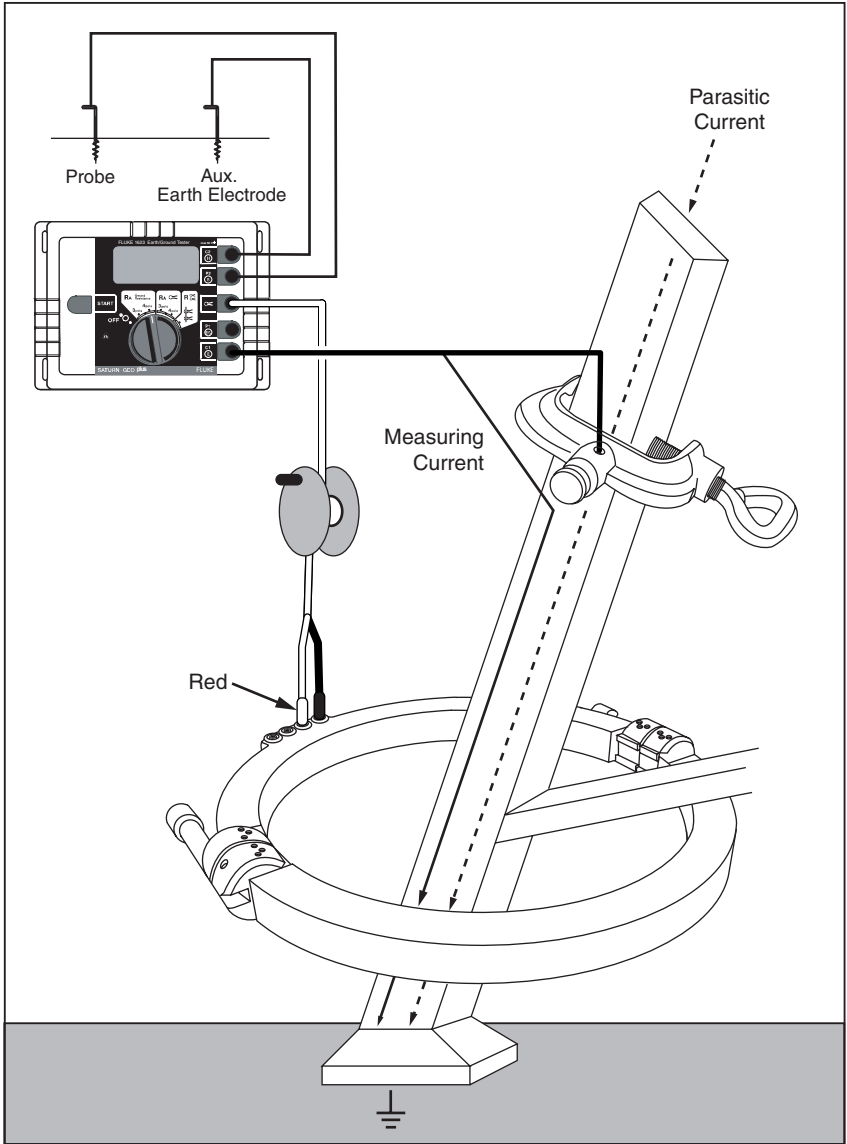
**Corrosion and paint on a pylon can impede the connection between the contact clamp and the pylon's frame. When installing the contact clamp, ensure the tip of the clamp fastener penetrates all layers of paint and corrosion.**

1. Install the contact clamp to the pylon and tighten the clamp fastener. The contact clamp can now be used as the connection point for the Tester's earth ground electrode test lead. See Figure 4.
2. Install a test lead from the Tester's earth ground electrode jack to the contact clamp. Plug the test lead into the bore hole in the clamp and tighten the tightening screw. See Figure 4.

For Fluke 1625 / 1623 GEO Earth/Ground Testers, the earth ground electrode jack is labeled **C1** or **E**.

3. Install the 12-m (40-ft) test leads from the Tester's  jack to the Transformer's transformation ratio connections. To determine which transformation ratio connections to use, see "Determining Transformation Ratio Connections."
4. In accordance with the Tester's users manual, install test leads from Tester to the probe and auxiliary earth electrode, and then perform your earth ground resistance measurement (RE).

**Split-Core Transformer**  
*Using the Split-Core Transformer*



**Figure 4. Test Measurement Setup**

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## **Maintenance**

Only trained and qualified staff should perform maintenance on this instrument.

In all repair and reconditioning work, ensure the Transformer's design parameters are not modified to the detriment of safety, that only authorized parts are used, and that parts are reassembled to their factory-issued configuration.

## **Cleaning**

### **⚠ Caution**

**To prevent damage to the Transformer when cleaning:**

- **Do not use strong cleaning detergents or solvents (like trichloroethylene).**
- **Do not allow liquid to get inside the instrument.**
- **Do not use sharp tools to clean the end faces.**

If your Transformer requires cleaning, wipe it with a cloth lightly dampened with a mild rinsing agent.

## **Corrosion Prevention**

To help prevent corrosion to the Transformer end faces, the cleavage planes should be lightly oiled.

## **Specifications**

*Note*

*Fluke reserves the right to modify specifications without notice for the purpose of product improvement.*

### **General**

#### **Temperature Range**

Working Temperature ..... -10 °C to +50 °C (+14 °F to +122 °F)

Storage Temperature ..... -30 °C to +60 °C (-22 °F to +140 °F)

#### **Dimensions**

Outer diameter ..... 377 mm (15 in)

Inner diameter ..... 310 mm (12 in)

Depth ..... 30 mm (1.25 in)

#### **Weight**

Split-core transformer ..... 4.9 kg (11 lb)

Total (with accessories and packaging) ..... 7.7 kg (17 lb)

**Transformation Ratios** ..... 1 : 1000

1 : 800

1 : 500

1 : 300

1 : 200

### **Technical Data for Selective Earth Resistance Measurements**

**Insulation voltage** ..... 2 kV (core against secondary winding)

**Max. current through split-core transformer** ..... 3 A (primary current, transformation ratio 1:1000)

#### **Additional Error for Selective Earth Resistance Measurements**

Primary current >2.5 mA ..... ±2 % (transformation ratio 1:1000)

Primary current <2.5 mA ..... ±5 % (transformation ratio 1:1000)

## **Service**

If your Transformer is operated and handled properly, it should not require servicing. However, if you suspect that the Transformer has failed, review this manual to ensure you are operating it correctly. If it still fails to operate properly, pack securely using the original packing material (if available) and forward, postage paid, to the nearest Fluke Service Center. Include a brief description of the problem. Fluke assumes *no* responsibility for damage in transit.

To locate an authorized service center, call Fluke using the phone numbers listed below:

USA: 1-888-99-FLUKE (1-888-993-5853)  
Canada: 1-800-36-FLUKE (1-800-363-5853)  
Europe: +31-402-675-200  
Japan: +81-3-3434-0181  
Singapore: +65-738-5655  
Anywhere in the world: +1-425-446-5500

You may visit us on the World Wide Web at <http://www.fluke.com>.

To register your product, visit <http://register.fluke.com>.

## **Storage**

When your Transformer is not going to be used, store it in the carrying case provided.