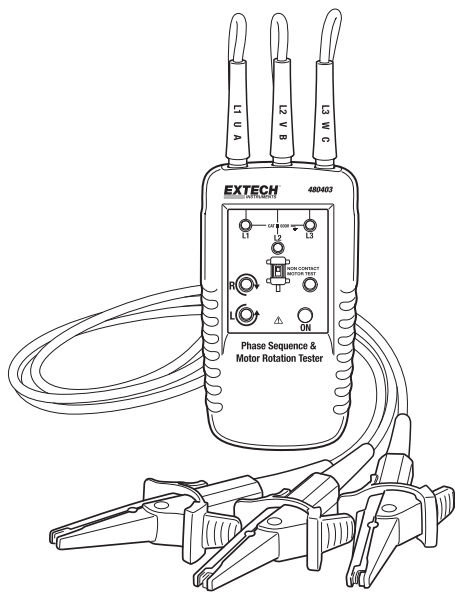


User's Guide

**EXTECH**<sup>®</sup>  
INSTRUMENTS  
A FLIR COMPANY

## Phase Sequence and Motor Rotation Tester

Model 480403



## ***Introduction***

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Congratulations on your purchase of the Extech Model 408403 Motor and Phase Rotation Indicator. This handheld instrument detects the rotational field of three-phase systems and determines motor-rotation direction. Color-coded test leads are provided for connecting to the system or motor under test. This meter is shipped fully tested and calibrated and, with proper use, will provide years of reliable service.

## ***Safety***

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### **International Safety Symbols**



Caution ! Refer to the explanation in this Manual



Caution ! Risk of electric shock



Earth (Ground)



Double Insulation or Reinforced insulation



AC, Alternating Current or Voltage



DC, Direct Current or Voltage

### **Safety Procedures**

To avoid possible electric shock or fire, observe the following:

- Read the following information carefully before using or servicing the instrument.
- Adhere to local and national safety codes.
- Individual protective equipment must be used to prevent shock and injury.
- Use of instrument in a manner not specified by the manufacturer may impair safety features/protection provided by the equipment.
- Avoid working alone.

- Inspect the test leads for damaged insulation or exposed metal. Check test lead continuity. Damaged leads must be replaced. Do not use the meter if it appears damaged.
- Use care when working above 30V ac rms, 42V ac peak and 60V dc. Such voltages pose a shock hazard.
- When using the probes, keep fingers away from probe contacts. Keep fingers behind the finger guards on the probes.
- Measurements can be adversely affected by impedances of additional operating circuits connected in parallel or by transient currents.
- Verify operation prior to measuring hazardous voltages (voltages above 30V ac rms, 42V ac peak and 60V dc).
- Do not use the meter with any of the parts removed.
- Do not use the meter near explosive gas, vapor, or dust.
- Do not use the meter in a wet environment.

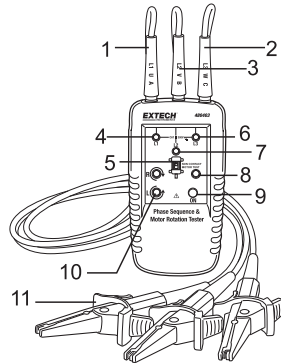
## **Warranty**

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**EXTECH INSTRUMENTS CORPORATION** (a FLIR company) warrants this instrument to be free of defects in parts and workmanship for **one year** from date of shipment (a six month limited warranty applies to sensors and cables). If it should become necessary to return the instrument for service during or beyond the warranty period, contact the Customer Service Department at (781) 890-7440 ext. 210 for authorization or visit our website [www.extech.com](http://www.extech.com) for contact information. A Return Authorization (RA) number must be issued before any product is returned to Extech. The sender is responsible for shipping charges, freight, insurance and proper packaging to prevent damage in transit. This warranty does not apply to defects resulting from action of the user such as misuse, improper wiring, operation outside of specification, improper maintenance or repair, or unauthorized modification. Extech specifically disclaims any implied warranties or merchantability or fitness for a specific purpose and will not be liable for any direct, indirect, incidental or consequential damages. Extech's total liability is limited to repair or replacement of the product. The warranty set forth above is inclusive and no other warranty, whether written or oral, is expressed or implied.

## Meter Description

1. L1 test Lead input to meter
2. L3 test lead input to meter
3. L2 test lead input to meter
4. L1 status LED
5. Orientation symbol for non-contact testing
6. L3 status LED
7. L2 status LED
8. Power ON status LED
9. ON button
10. Left/Right Clockwise/Counter-Clockwise status LEDs
11. Test lead alligator clips



## Operation

### Determine Phase Rotation Direction

1. Connect the supplied color-coded test leads to the meter's test lead input jacks at the top of the meter.
2. Connect the test probes to the three mains phases for the system under test.
3. Press the ON/OFF button to turn the meter on.
4. L1, L2, and L3 indicators will illuminate for each phase connected, respectively.
5. The clockwise and counter-clockwise arrows with the left/right 'L' or 'R' icons display the phase rotation direction (phase sequence) of mains as connected.
6. To understand the status of a test, based on the condition of the meter's front panel LEDs, refer to the table printed on the meter:

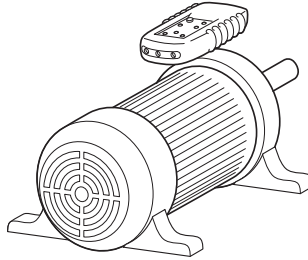
**Note:** The rotational indicator LEDs illuminate even if one of the test probes is connected to a neutral or ground conductor instead of one of the mains phases.

### Check Motor Turn Direction (contact method)

1. Connect the supplied color-coded test leads to the meter's test lead input jacks at the top of the meter.
2. Connect the test (alligator) probes to the three motor connections (L1 to U, L2 to V, and L3 to W).
3. Press the ON/OFF button. The green ON indicator shows that the instrument is ready for testing.
4. Turn the motor shaft half of a revolution towards the right.
5. The clockwise and counter-clockwise arrows with the left/right 'L' or 'R' icons display the orientation of the motor.

### Check Motor Turn Direction (non-contact method)

1. Disconnect the test leads from the meter and from any other devices under test.
2. Hold the meter close (one inch or closer) to the motor, parallel to the length of the motor shaft.
3. The bottom of the meter should face the drive shaft and the back of the meter should be flush with the motor (refer to diagram at right).



Note: There is an orientation symbol on the meter to assist.

4. Press the ON/OFF button. The green ON indicator shows that the instrument is ready for testing.
5. The orientation of the motor is represented by the clockwise and counter-clockwise arrows with the left/right 'L' or 'R' icons display. Face the rear of the motor (meter will appear upside down) when reading the status of the display LEDs.

Note: The meter will not operate with motors controlled by frequency converters.

### **Magnetic Field Detection**

1. Hold the meter in the area under test.
2. A magnetic field is present if either the clockwise or the counter-clockwise LED illuminates.

### ***Battery replacement***

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The meter uses a 9V battery (supplied) as a power source. If the green LED does not light when the ON/OFF button is pressed, replace the battery.

1. Place the meter on a clean, flat, non-abrasive surface.
2. Loosen the rear bottom Phillips head screw to access the battery compartment.
3. Lift the battery access door and replace the 9V battery observing polarity.
4. Place the battery carefully in the compartment without crimping the black and red battery connecting wire.
5. Close the access door and secure the screw.

### ***Calibration and Repair Services***

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**Extech offers repair and calibration services** for the products we sell. Extech also provides NIST certification for most products. Call the Customer Care Department for information on calibration services available for this product. Extech recommends that annual calibrations be performed to verify meter performance and accuracy.



#### **Support line (781) 890-7440**

Technical Support: Extension 200; E-mail: [support@extech.com](mailto:support@extech.com)

Repair & Returns: Extension 210; E-mail: [repair@extech.com](mailto:repair@extech.com)

#### **Product specifications subject to change without notice**

For the latest version of this User Guide, Software updates, and other up-to-the-minute product information, visit our website: [www.extech.com](http://www.extech.com)  
Extech Instruments Corporation, 285 Bear Hill Road, Waltham, MA 02451

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## **Specifications**

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### **Environmental Specifications**

Operating Temperature	32 to 104°F (0 to 40°C)
Operating Humidity	15 to 85% relative humidity
Operating altitude	2000m
Pollution Degree 2	
Approvals	DIN / VDE 0411 IEC 61010 DIN / VDE 0413-7

### **Mechanical Specifications**

Dimensions (130 x 69 x 32mm)	(H x W x D): 5.1 x 2.7 x 1.3"
Weight	4.6 oz. (130g)

### **Safety Specifications**

Electrical Safety Approvals	IEC 61010/EN61010, IEC 61557-7/EN 61557-7
Maximum Operating Voltage (Ume)	600 V
Protection Levels	CAT III 600V

### **Electrical Specifications**

Battery type	9V battery
Current Consumption	20mA max.
Battery life	One (1) year minimum
Nominal Voltage	40 to 600 VAC
Frequency Range (fn)	2 to 400Hz
Nominal Test current (in per phase)	< 3.5mA