



## **Instruction Manual**

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**Model 302 Phase and Motor Rotation Meter**



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## SAFETY RULES

**CAUTION**



**RISK OF ELECTRIC  
SHOCK**

This tester has been designed with your safety in mind. However, no design can completely protect against incorrect use. Electrical circuits can be dangerous and/or lethal when lack of caution or poor safety practices are used.

Do not carry out field measurements on either the power system grounding, during periods of forecast lightning activity, in areas that encompass the station being measured or of the power network connected to the station being measured. In the event that lightning occurs, stop all testing and isolate any temporarily installed test spikes.

Preparations for testing of power system grounding can leave personnel vulnerable to exposure caused by faults at or fed from the system under test, transferred potentials from remote test grounds, and inadvertent line energisations.

While the probability of the occurrence of one of these events is low, personnel safety will, nevertheless, be enhanced by the following:

When working near high tension systems rubber gloves and shoes should be worn.

Work on clean, dry crushed rock or an insulating blanket.

Avoid bare hand to hand contact between the tester and extended test leads.

When using the tester with test leads, ensure that they are safe and properly authorized

Disconnect the tester from any external circuit when changing the batteries.

**CAUTION**



**READ THE MANUAL**

Follow the instructions in the Manual for every measurement. Read and understand the general instructions before attempting to use this tester

## **SAFETY CHECK**

Before using the tester check the condition of the batteries. This is done by switching the tester ON.

If the BAT OK led does not light up, the battery need replacing. Battery and fuse replacement are described later in this user's manual..

When changing the battery, fuses, or removing the cover to access the internal circuitry, always disconnect the test leads.

When replacing the fuse use only the type specified, 5 x 20mm, 200mA, 250V fuse, and insert correctly into the fuse holder.

Double check the switch setting, and lead connections before making measurements.

## **DON'T TOUCH**

Don't touch exposed wiring, connections or other "Live" parts of an electrical circuit. If in doubt, check the circuit first for voltage before touching it.

Do not use cracked or broken test leads.

**THIS INSTRUMENT SHOULD ONLY BE USED BY A COMPETENT,  
SUITABLY TRAINED PERSON.**

## **REMEMBER**

**SAFETY IS NO ACCIDENT**



**CAUTION RISK OF ELECTRIC SHOCK**



**CAUTION READ THE MANUAL**

## GENERAL DESCRIPTION

This Test Instrument is a 3 Phases Presence and Rotation Indicator combined with a 3 Phases Motor Rotation Tester.

It can be utilized on a **3 Phase Powered System** (the supply side) or on a **Three Phases Unpowered Motor** (the load side) without having to worry about damage to the tester.

When utilized on a **3 Phase Powered System**, the instrument is then utilized as a 3 Phases Presence and Rotation Indicator.

When utilized on a **Three Phases Unpowered Motor**, the instrument is then utilized as a 3 Phases Motor Rotation Tester.

When utilized on a 3 Phases Powered System, this instrument is a rotary field indication instrument which display all three phases by lighting up it's corresponding Lamp. It display the rotation (clockwise or anti-clockwise) on a LED.

When utilized on a 3 Phases Unpowered Motor, it is also possible to determine the motor connections U, V, W without a live circuit to avoid subsequent damages of e.g. pumps to reversed motor rotation. It display the rotation (clockwise or anti-clockwise) on a LED.

This instrument represents the quickest and easiest way for servicing, repairing and electrical maintenance of 3 phase rotating machinery.

With this equipment, you can, before connecting Load to Supply:

- On the supply side;

- Quickly verify the presence of the three Phases on a 3 Phases Power System.

- Confirm the Phase Rotation on a Powered 3 Phase System.

- On the Motor Side (Load);

- Confirm the Phase Rotation on a unpowered 3 Phase Motor 3 Phases Alternator.

- Confirm that each winding is connected to the terminals of the Motor, when the rotation Leds light up.

## **BRIEF PRODUCT DESCRIPTION**

This 3 Phases and Motor Rotation Tester has 3 test leads which connects to the 4 mm female sockets on the tester, on the one side.

These Test leads are color coded:

L1 = Red which connects to L1 on the tester.

L2 = White(or yellow) which connects to L2 on the tester.

L3 = Blue(or black) which connects to L3 on the tester.

On the other side of the test leads are the probes, also color coded.

The tester has three neon lamps which are the Phase Presence indicators:

Neon Lamp for Individual Phase Presence Indication = L1

Neon Lamp for Individual Phase Presence Indication = L2

Neon Lamp for Individual Phase Presence Indication = L3

Please note that any of these Neon lamp will only start to light up if more than 100Vac is present between any 2 phases.

A LED to display clockwise rotary direction.

A LED to display counter clockwise.

A LED to display and confirm operation and battery OK status.

A Push Button to switch the instrument ON.

## **OPERATING INSTRUCTIONS**

### **Determination of the rotary field direction and phase presence**

On a 3 Phase System, the sequence of the 3 phases determine the rotation of a 3 phase motor connected to that system.

The correct 3 Phase Sequence L1, L2, L3 results in a clockwise rotation of the connected motor.

Connect the Test Leads to the sockets of the Instrument, respecting the correct color. Red to L1, White(or yellow) to L2, Blue(or black) to L3.

Clip the test probes to the three mains phases, L1, L2, L3

When connecting to a voltage superior to 100V AC, the corresponding neon lamp will start to glow, indicating the presence of the voltage on it's corresponding lead (L1, L2, L3 lamps).

Press the TEST button to turn the instrument "ON".  
The green LED indicates that the instrument is ON and is busy testing. The battery is OK when the green LED is ON.

Should the Green LED not come on while depressing the TEST button, replace the battery (see Battery Replacement).

If the LED (Right arrow) L1-L2-L3 is illuminated, clockwise rotary field is present.

If the LED (Left arrow) L2-L1-L3 is illuminated, a counter clockwise rotary field is present.

Please note that; the phase control is displayed even if the neutral conductor N is connected instead of L1, L2, or L3.

Also refer to table (as indicated on the back of instrument)

**Determination of motor connections and rotation of motor**

Connect test leads to instrument and to the motor connections.

These are also Color Coded;

U = Red which connects to L1 on the tester.

V = White(or yellow) which connects to L2 on the tester.

W = Blue(or black) which connects to L3 on the tester.

Press button On. The green LED indicates that the instrument is ready for testing.

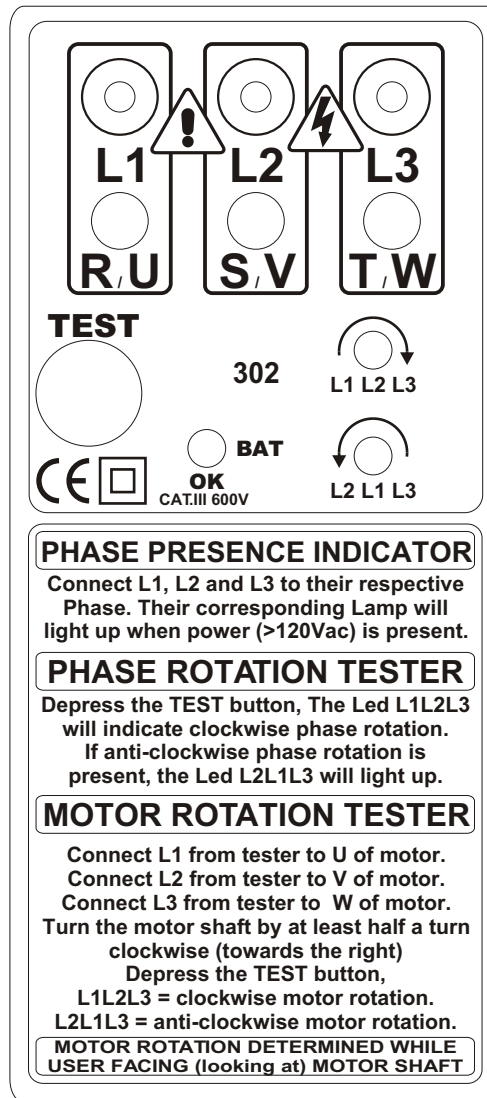
Turn the motor shaft by at least half rotation towards the right. Look at the Leds while doing that.

It is important to ensure that the user looks from the front side onto the driving shaft and the front side of the tester at the same time, so that motor rotation can be confirmed.

**The red LED (Right arrow) L1-L2-L3 indicates clockwise motor rotation if the lines are connected as follows: L1 to U, L2 to V, L3 to W.**

**The red LED (Left arrow) L2-L1-L3 indicates counter- clockwise motor rotation if the lines are connected as follows: L1 to V, L2 to U, L3 to W.**

## FRONT PANEL LAYOUT





## **PRINCIPLE OF HOW IT WORK**

The tester has two separate circuits:

The first circuit is the 3 Phase presence indicator, which is shown by the neon lamps and the second circuit is the three phase sequence indicator by LEDs.

A low battery, with a Power On indicator circuitry is also present.

3 Phase Presence Indication circuit:

This circuit uses neon lamps to indicate if a phase is present.

These neon lamps are connected in series with a limiting resistor.

Neon lamps will light up when the voltage across any two phases is more than 100Vac.

3 Phase sequence indicator circuit:

This circuit has an analog and a digital part. The analog signals are amplified (so that motor rotation with very low signals can be performed), then compared to a set of references. These results are digitally compared to give the results on the indicating LEDs.

Switch-ON and low Battery detector:

At switch ON, the battery voltage is measured and compared. If the battery voltage is below the threshold, the LED will not light up, thus replacing the battery indication.

## **PREPARATION FOR USE**

### **Fuses:**

In doubt, check the fuses using a ohm meter.

Please note that this instrument will not indicate anything, should the fuses be blown.

### **Test Leads:**

Check the test leads for defects or cracks. Replace if cracked or damaged. Only replace with the same type

### **Cleaning:**

Clean the instrument case with an anti-static cleaner and wipe with dry cloth.

## **REPLACING THE BATTERIES**

Prior to battery replacement always disconnect the instrument from the circuit to which it's connected.

Remove the test leads from the instrument.

Remove the back cover to access the battery compartment.

Remove the bad battery from the battery compartment and dispose properly of that battery (see your local disposal facilities related to disposal of batteries).

Only replace with a new battery of the following type:

9 V, IEC 6 LR61.

Re-insert the (battery) back cover onto the instrument and tighten the screws.

## **FUSES REPLACEMENT**

Unscrew the back cover and replace the faulty fuse(s) with the same type, then screw the cover back into place correctly

## SPECIFICATIONS

### ELECTRICAL

#### Determination of the Phase Presence

Nominal Voltage for Phase Presence Indication (the voltage required for the neon lamps L1, L2, L3 to lit up) ... From 100Vac to 600Vac.

Frequency Range ..... From 10Hz to 400Hz.

#### Determination of the Phases Rotary Field Direction:

Direction (the voltage required to have the direction LEDs L1-L2-L3 or L2-L1-L3 to indicates) ..... From 1 to 600Vac.

Frequency Range ..... From 2Hz to 400Hz.

#### Determination of Motor Connections (requires > 1/2 turn)

Direction (the voltage required to have the direction LEDs L1-L2-L3 or L2-L1-L3 to indicates) ..... From 1 to 600Vac.

Frequency Range ..... From 2Hz to 400Hz.

#### Protection

Over Load ..... 550V (between all terminals)

Over Voltage ..... Class III - 600V towards Ground.

Fuses..... 5 x 20mm, 200mA, 250V fuse

#### General

Battery ..... 9V, IEC 6LR61

Current Consumption ..... Max 18 mA.

### MECHANICAL

Size ..... 151 x 72 x 35 mm

Material ..... Poly carbonate/ABS

Weight (less carrying case) ..... 180g (with batteries)

Display ..... Neon Lamps and LEDs

### ENVIRONMENTAL

Operating temperature Range: -15 C to + 55 C

Storage Temperature: -20 C to + 70 C

Information and specifications are subject to change without notice.

For the most current product information please visit [www.bkprecision.com](http://www.bkprecision.com)

## **LIMITED ONE-YEAR WARRANTY**

B&K Precision warrants to the original purchaser that its products and the component parts thereof, will be free from defects in workmanship and materials for a period of one year from date of purchase from an authorized B&K Precision distributor.

B&K Precision will, without charge, repair or replace, at its option, defective product or component parts. Returned product must be accompanied by proof of the purchase date in the form of a sales receipt.

To obtain warranty coverage in the U.S.A., this product must be registered by completing the warranty registration form on within fifteen (15) days of purchase.

**Exclusions: This warranty does not apply in the event of misuse or abuse of the product or as a result of unauthorized alterations or repairs. The warranty is void if the serial number is altered, defaced or removed.**

B&K Precision shall not be liable for any consequential damages, including without limitation damages resulting from loss of use. Some states do not allow limitations of incidental or consequential damages. So the above limitation or exclusion may not apply to you.

This warranty gives you specific rights and you may have other rights, which vary from state-to-state.

## SERVICE INFORMATION

**Warranty Service:** Please return the product in the original packaging with proof of purchase to the address below. Clearly state in writing the performance problem and return any leads, probes, connectors and accessories that you are using with the device.

**Non-Warranty Service:** Return the product in the original packaging to the address below. Clearly state in writing the performance problem and return any leads, probes, connectors and accessories that you are using with the device. Customers not on open account must include payment in the form of a money order or credit card. For the most current repair charges please visit [www.calcert.com/service/repair](#) and click on [service/repair](#).

Return all merchandise to B&K Precision with pre-paid shipping. The flat-rate repair charge for Non-Warranty Service **does not** include return shipping. Return shipping to locations in North American is included for Warranty Service only. For overnight shipments and non-North American shipping fees please contact

**Include with the returned instrument your complete return shipping address, contact name, phone number and description of problem.**