



Instruction Manual for model CB1 Check Box

1. Functions & accuracy

The CB1 check box provides a quick and simple method of checking the ongoing accuracy of electrical installation test instruments.

It does not replace the calibration requirements but provides a ready check on instrument accuracy helping to minimise incorrect certification and costly revisits to confirm installation compliance.

The CB1 provides ongoing accuracy checks for:

Continuity

Insulation Resistance

Earth fault loop impedance.

Accuracy

<i>Insulation Test</i>	0.5 M Ω 2.0 M Ω 200M Ω	(1%) (1%) (2%)	Voltage Rating: up to 1000V.
<i>Continuity Test</i>	0.5 Ω 1.0 Ω 2.0 Ω	1% +/- 20m Ω .	Current Rating: 1A.
<i>Loop Test</i>	additional 1 Ω switched in to the Earth Loop	1% +/- 20m Ω .	Current Rating: 25A (pulsed)

2. What is in the box?

1x CB1 unit

1x Mains Power Lead

Pair of 4mm test leads

Calibration Certificate

Check Label.

3. Set Up

The CB1 is supplied with a Calibration Certificate. The measured values given on the calibration certificate and repeated on the check label fitted in the lid are the actual resistance values for each individual CB1.

These values will vary very slightly from one check box to the next and will be very close to, but not will not exactly match the nominal test setting value. It is these values (referred to in these instructions as the check box calibration value) that will be used in comparison with the test results for your test instrument.

When using the CB1 for the first time each test instrument to be checked should be in current calibration.

In addition to allowing a quick check for confirmation that the performance of the instrument is still within the manufacturer's specification for insulation and continuity readings, the check box can, if required, also be used to monitor the performance over a period of time.

To do this, when the first set of tests for any instrument are undertaken:

A separate test record sheet should be kept for each test instrument.

Each test should be repeated 3 times to establish the initial test value for each particular instrument.

The value obtained over the three tests should be similar, within the instrument manufacturer's tolerances.

The average value over the three tests should be recorded on the instrument test record as the reference value.

This reference value can be used for future accuracy checks on the instrument to determine if the performance of the instrument is changing.

4. Continuity Testing

The CB1 includes a 'lead null' feature for the continuity test range. This facility can only be used if the test instrument being used includes the option to null the leads.

Instruments with Lead Null option

Where the null option is available on the instrument to be checked:

- The leads should be connected to the instrument in the normal way.
- One lead should then be connected to the null terminal in the continuity range.
- The other lead is then connected to the null terminal in the insulation resistance range.
- This provides a direct link between the two leads and allows them to be nulled.
- Null the leads according to the instrument manufacturer's instructions
- This removes the value of the test leads from any further measurements.

Once the leads have been nulled and providing the instrument is not switched off, there will be no need to subtract the test lead values from the measured values.

If the instrument is switched off the null process will need to be repeated.

Instruments without Lead Null option

Where there is no null option on the instrument to be checked:

- The null terminals can be used to establish the resistance of the test leads.
- With the leads connected to the instrument in the normal way.

- One lead should be connected to the null terminal in the continuity range
- The other lead is then connected to the null terminal in the insulation resistance range.
- The instrument should then be set to the lowest resistance scale and operated in the normal way.
- The value measured by the instrument will be the resistance of the test leads.
- The resistance of the test leads must be subtracted from the check values obtained for the instrument when carrying out the test described in the following 'continuity check' section.
- Once the lead resistance has been deducted the result can be compared with the check box calibration value for the instrument.

The need to null the leads or deduct the lead resistance from the measured value is essential as the CB 1 is used to check the accuracy of the instrument. The resistance of the leads may vary or the leads may be replaced during the lifetime of the instrument.

Continuity Check

Use the null feature of the CB1 to null the lead values if this is an option on the instrument to be checked.

Where the instrument does not have a null option the CB1 null terminals should be used to measure the resistance of the test leads as described above. These will need to be subtracted from the measured check values.

- The null terminal in the continuity range is also the common terminal used for the continuity measurement.
- One instrument test lead should be connected to this common terminal.
- The other instrument test lead should first be connected to the 0.5Ω terminal.
- The instrument to be checked should be set to the most appropriate scale and the continuity test carried out in the normal way.
- The value obtained should be recorded on the test instrument record sheet and compared with the calibrated value shown on the lid label and calibration certificate against the 0.5Ω setting.
- The measured value should be within the instrument tolerance value of the calibration value shown on the label.
- The same procedure should be followed using the 1Ω and 2Ω terminals, and the measured values compared with the calibrated check box values.
- If the measured values are found to be within the manufacturer's tolerance then the instrument is suitable for continued use.
- If the measured values are outside the manufacturer's tolerance then the instrument will need to be returned for calibration.

Tolerance examples:

If the instrument tolerance is 2% then the measured value should be within +/- 2% of the check box calibration label value. So if the check box calibration value is 0.500Ω the measured value should be between 0.510Ω and 0.490Ω .

If the instrument tolerance is 2% +/- $20m\Omega$ then the measured value should be within +/- 2% and +/- $20m\Omega$ of the check box calibration value. So if the check box calibration value is 0.500Ω the measured value should be between 0.530Ω and 0.470Ω .

5. Insulation Resistance Checks

There is no requirement to null the test leads for insulation resistance test checks. The CB1 can be used to check insulation resistance testers across the voltage range. This enables the test instrument to be checked on the 250V, 500V and 1000V settings.

- The null terminal for the insulation resistance values is also the common terminal used for the insulation resistance checks.
- One test lead for the instrument to be tested is connected to this terminal.
- The other instrument lead is connected to the $0.5M\Omega$ terminal.
- The appropriate resistance scale and test voltage are selected on the instrument being checked.
- The insulation resistance tester is then operated in the normal way.
- The measured value obtained is recorded on the test instrument record sheet and compared to the check box calibration value for the 0.5Ω setting.
- The same procedure is followed for the $2M\Omega$ and $200M\Omega$ values.
- These same tests may then be repeated for each test voltage if required.
- If the measured values are found to be within the manufacturer's tolerance then the instrument is suitable for continued use.
- If the measured values are outside the manufacturer's tolerance then the instrument will need to be returned for calibration.

6. Earth Fault Loop Impedance Checks

The CB1 provides a facility to check the accuracy of earth fault loop impedance testers.

The socket outlet and the loop impedance switch in the CB1 provide tests of:
the CB1 'local' earth fault loop impedance and
the CB1 earth fault loop with the additional 1Ω included.

The CB1 does introduce some additional resistance into the earth fault loop. As a result the 'local loop' value from the CB1 socket outlet will be slightly higher than the loop

value measured when plugging the earth loop tester directly into the actual supply socket, bypassing the check box.

Remember:

RCD protected circuits should not be used to supply the CB1 where the instrument to be checked does not have a 'no-trip' test option.

As the CB1 will be used to check the accuracy of the instrument it is strongly advised that:

Both plugs (13A and IEC) used to connect the CB1 to the supply and the 13A instrument plug into the CB1 socket are each inserted and removed several times before undertaking the accuracy check. This process will help to reduce any additional resistance which may be caused by tarnishing of the pins or socket tubes.

Site Check

The CB1 provides a fast check option for the earth fault loop impedance tester. This enables the instrument to be checked on site to confirm the accuracy of the instrument measurement. This site check consists of a measurement of the CB1 local loop and then the same measurement with the 1Ω resistance added. This will identify whether the instrument is accurately measuring the 1Ω increase. This check may be carried out at any suitable socket outlet.

- The CB1 should be plugged into a suitable power socket and set to the 'local loop' setting.
- The earth fault loop impedance tester is then plugged into the CB1 socket outlet and the test carried out in the usual way. The measured value is recorded.
- The CB1 loop impedance switch is then moved to the "off" position for a period of 5 seconds.
- After 5 seconds the CB1 loop impedance switch is moved to the $+1\Omega$ position.
- The earth fault loop impedance test is then carried out in the usual way. The measured value is recorded on the instrument record sheet.

Comparing the 'local loop' reading and the '+1.0 Ω ' reading should show an increase of the calibrated value for the 1Ω setting, within the manufacturer's tolerance.

Ongoing accuracy check

To give a more exact indication of the instrument accuracy it is strongly recommended that the same dedicated power outlet is used each time for the checks. This will allow the instrument to be compared with the following values:

- actual local loop value
- CB1 'local loop' value at that socket
- CB1 'local loop + 1 Ω ' value

This process will give a reference against three Reference Values and provide a more precise indication of the instrument accuracy.

The earth fault loop impedance tester is used to

1. Test and record the actual loop impedance from the dedicated socket outlet.
2. Test and record the CB1 'local loop' value
3. Test and record the CB1 'local loop' + 1 Ω value

Each of the above tests is repeated three times and the average value recorded as the Reference Value for each test.

The Reference values obtained for tests 1, 2 and 3 above (socket loop, local loop and local loop +1 Ω) then provide three reference points with which to compare the instrument accuracy.

- The earth fault loop impedance tester is used to test the earth fault loop impedance at the dedicated socket and the value recorded on the instrument record sheet.
- The CB1 should be plugged into the dedicated power socket and set to the 'local loop' setting.
- The earth fault loop impedance tester is then plugged into the CB1 socket outlet and the test carried out in the usual way. The measured value is recorded on the instrument record sheet
- The CB1 loop impedance switch is then moved to the "off" position for a period of 5 seconds.

After 5 seconds the CB1 loop impedance switch is moved to the +1 Ω position.

- The earth fault loop impedance test is then carried out in the usual way. The measured value is recorded on the instrument record sheet.
- The measured values obtained for each of the three tests are then compared with the reference values on the Record Sheet. The results should be within the manufacturer's tolerance of the reference Value.

If the results show the instrument is accurately measuring the values, within the instrument manufacturer's tolerance then the instrument is suitable for continued use. If the results are outside the permitted range then the instrument should be returned for calibration.

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