TECHNICAL INFORMATION

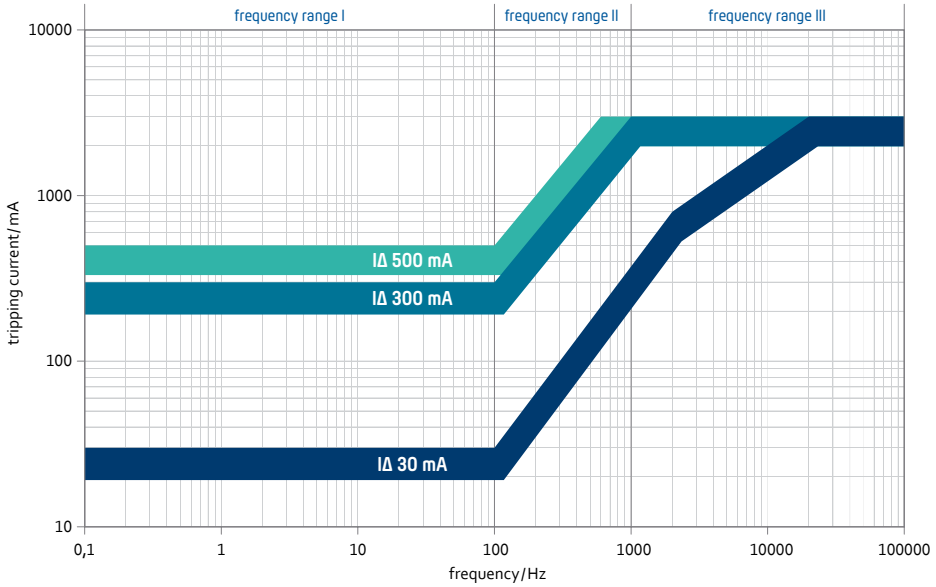
Frequently asked questions about the DRCA 1

1. In general terms: what are the differences in the measuring methods used by the RCCB devices and the display of the DRCA 1 measuring unit?

The measuring method is not comparable because the DRCA 1 employs a simple transformer principle, while type B RCCBs have to work significantly harder, since they also measure DC residual currents. In principle, however, both measure the same thing: the RMS value over the entire frequency range.

2. What are the tripping tolerances of the DFS 4 B, DFS 4 B+ and DFL 8 (in each case in the same series)?

The tolerances are within the tripping frequency levels printed on the label. These can be accessed in the DRCA 1 software via the frequency analysis. The following examples show a DFS 4 B SK at 30 mA:



B SK tripping frequency level

DRCA 1 frequency analysis

3. By today's standards, how accurate is the DRCA 1 compared to the real tripping case for RCCB devices?

Based on the switch evaluation, the deviation in the DRCA 1 is approx. 10–15% for continuously flowing currents, while the accuracy of the current measurement itself is better.

There is a difference between the 'ideal' tripping value calculated by the software and that of the switch. However, the following principle has become evident in recent years: if the software gives values of around 60–70%, it will not be possible to achieve 'clean' operation. Tripping will occur.

Leakage currents are not always constant and may change over time. The displays of the DRCA 1 should be within the green region. Otherwise, a switch that is burdened with leakage currents will trip faster than one that is not. The DRCA 1 is intended as a guide and is ideally suited to this use.

4. If inrush current spikes occur, does this delay the tripping time of your devices?

Type B residual current circuit-breakers have increased resistance against surge current and lightning. This means, for instance, that they will not trip in response to a half sine wave of up to 500 A that is caused by the mains frequency but is below all permitted tripping times.

5. Why does one device behave differently to what is specifically indicated by the DRCA 1 in the case of inrush current spikes?

It may be the case that a device trips even though the inrush current spike measured by the DRCA 1 is below the tripping threshold, or that a device does not trip even though the spike is above the indicated threshold.

The aim of the DRCA 1 is to help evaluate currents. In order to conduct a frequency analysis in the range from 10 Hz to 100 kHz, at least two periods of the frequency in question are required. To measure a value at 10 Hz (the period length in the frequency range under consideration is at its longest here), a signal must first be recorded over 200 ms and then converted into the frequency display etc.

Example: A residual current flows in pulses at 100 mA and for a duration of 20 ms. The DRCA 1 records a 200 ms window and displays the mean value, i.e. a current of 10 mA. However, a 30 mA device would have tripped.
The trigger menu is provided for such cases. Here, the signal profiles can be recorded in a targeted manner based on a desired threshold value within the time range in order to record any inrush current spikes. The frequency analysis is intended for continuously flowing residual currents and only provides meaningful results within this context.

6. Is filtering carried out in the various windows of the DRCA 1 display screens or are tolerances already taken into consideration (as in question 2)?

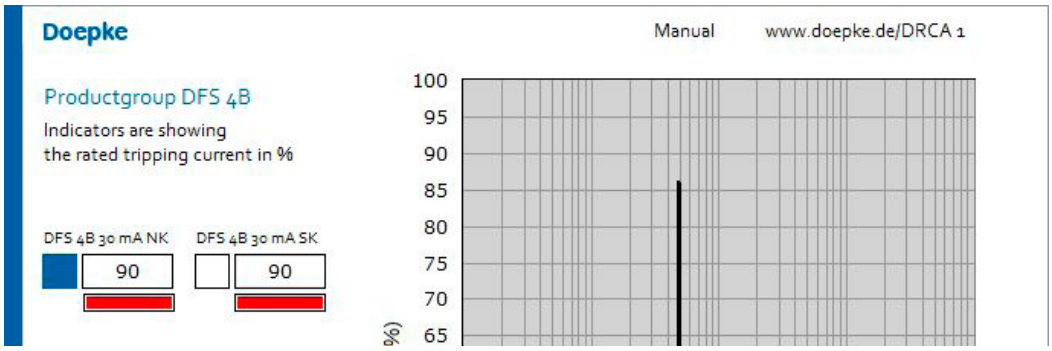
Pre-filtering is carried out so that no frequencies > 100 kHz are taken into consideration. Tolerances are taken into account insofar as the DRCA 1 software evaluates the tripping of a switch right in the middle of the tolerance range. Minor deviations from the real switch will of course always exist here. Fluctuations in the last 5% are negligible.

7. Does the display in the 'Frequency analysis' window indicate the actual state at the current transformer (unfiltered)?

For every frequency from 10 Hz to 100 kHz, the frequency analysis shows the RMS value.
Nothing is converted, evaluated etc. here.

**8. What is the meaning of the red numbers at the left-hand side of the 'Product group selection' window – is this an addition over the entire frequency spectrum or the maximum value of a specific peak?
Is the frequency spectrum shown the same as the one in the 'Frequency analysis' window when the settings are the same, or has it already been evaluated? What does 100% mean here?**

The tripping current reached is shown as a percentage.



For the type B residual current circuit-breakers, the total RMS value over the entire frequency range is always used to evaluate the pre-loading. For each frequency, the frequency spectrum indicates the percentage of the tripping current that is reached at the frequency in question.
The example used here is a DFS 4 B NK at 30 mA and with the following tripping curve (please note the cursor key):

Cursor 1: 50 Hz – 22.5 mA
Cursor 2: 60 kHz – 270 mA

Both cursors are in the middle of the tripping limits for this switch.

Assumption 1: A residual current of 22.5 mA, 50 Hz is flowing. In the frequency analysis, 22.5 mA is displayed at 50 Hz. In the evaluated analysis, a peak of 100% at 50 Hz would now be displayed, because the evaluation is based on the tripping threshold of 22.5 mA.

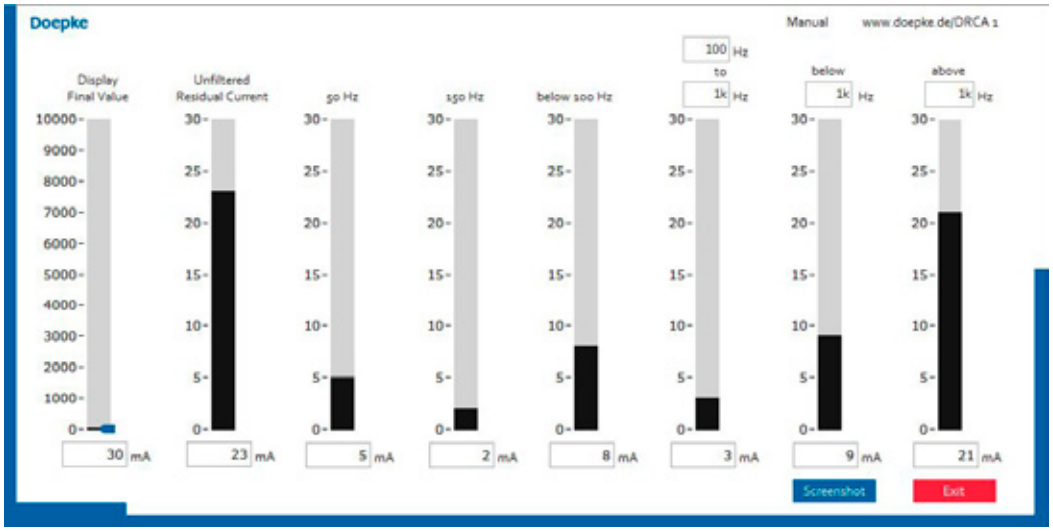
Assumption 2: A residual current of 22.5 mA, 60 kHz is flowing. In the frequency analysis, 22.5 mA is displayed at 60 kHz. In the evaluated analysis, a peak of 10% at 60 kHz would now be displayed, because the evaluation is based on the tripping threshold of 270 mA.

To obtain the overall percentage, the entire spectrum is evaluated using the curve, giving the percentage value for the respective type.

9. How is the RMS diagram formed – what sources and formulae are used for calculating the bars, in particular in the case of frequency ranges?

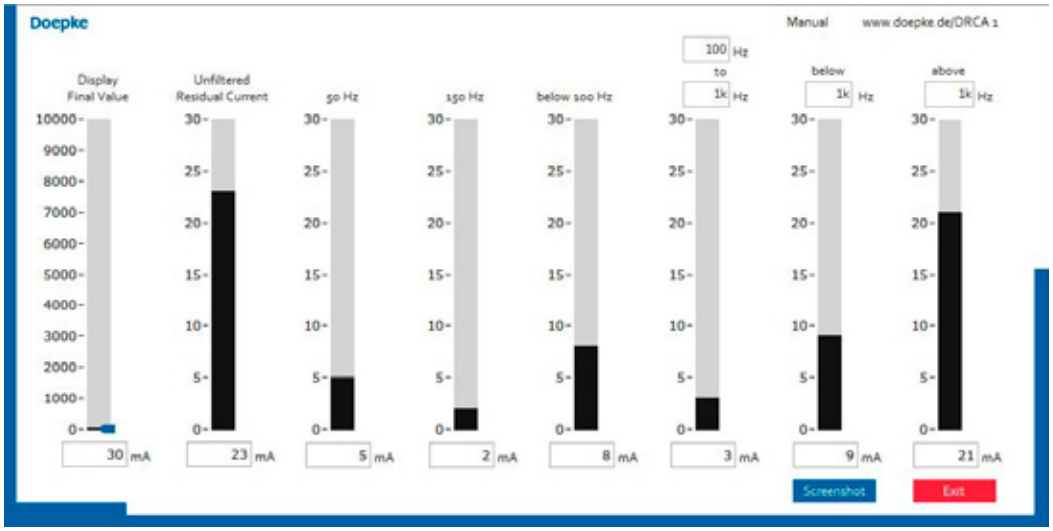
Individual frequency ranges are displayed on the basis of the entire residual current measured.

- overall signal: Total RMS value 10 Hz to 100 kHz
- 50 Hz: RMS value at 50 Hz
- 150 Hz: RMS value at 150 Hz
- less than 1 kHz: Total RMS value 10 Hz to 1 kHz etc.



10. How can the individual values of the various frequencies be added so that a total leakage current can be determined, e.g. in order to enable comparison with a leakage current probe, and are the different frequencies weighted differently in this process?

The values are added together by the software, meaning that no further calculations are required by the user.
The different frequencies are not weighted. Weighting is only carried out in the menu item 'Evaluated signal analysis'.
The value of the residual current is displayed.



11. Is the same data shown in the 'Trigger mode' window as in the 'Signal progression' window when the settings are the same?

Yes.

12. Is it correct to assume that the 'Reading a file' window shows the same information as the 'RMS value' window, only recorded over a specific time frame?

Yes.