Local authorities should be consulted for information on where the use of Bender RCMA type B is allowed to substitute RCD´s.

Unfortunately RCDs of type B are quite expensive. Besides they have to be installed separately from any RCD type AC and type A. Planning example from EN 50178 is shown in figure 3.

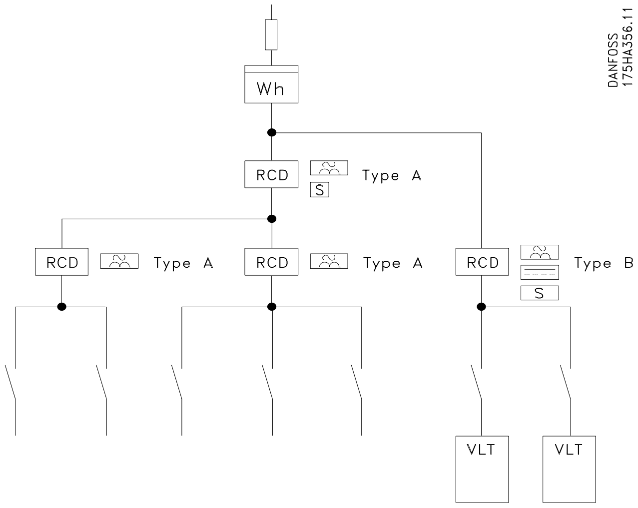

Fig. 3

■ Fault currents

For common line-side circuit configurations of frequency converters figure 4 shows waveforms of the fault current and where a DC content can occur in the fault current in the event of wrong connection to earth.

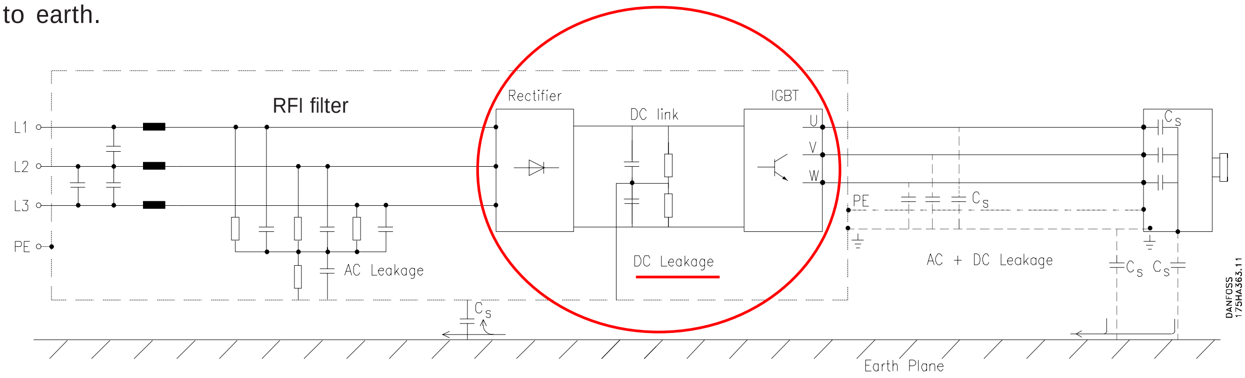

Fig. 4

■ Choosing RCD type

The RCD type AC is never to be used with frequency converters, since fault currents are never clean AC fault currents.

A single phase frequency converter has a B4 rectifier as shown in figure 5. The fault current is a combination of AC and pulsating DC. The pulsating DC fault current always touches zero in between two pulses. The RCD coil (W1 in figure 1) therefore will not saturate due to the DC content in the fault current and RCD type A may be applied.

Three phase frequency converters have a B6 rectifier. As shown in figure 5, the fault current does not cross zero. This is because all the diodes are never off at the same time.

The DC content in the fault current from a B6 rectifier will therefore most likely cause the RCD coil W1 to saturate. Therefore RCD type B must be applied. This RCD type has two monitoring circuits, one of which is designed for monitoring DC fault currents (W2 + E in figure 1). The RCD coil W2 will not saturate due to the electrical circuit to which it is connected.