

Safety solutions using Preventa

Safety techniques: electrical hazards

Protection against electric shocks and overcurrent

Disconnection from energy sources

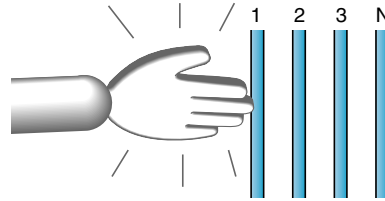
Objective

Safe operation

Installations must be designed and built so as to ensure satisfactory operation and safety levels.
(conforming to standards IEC 364)

Protection against electric shocks

Direct contact



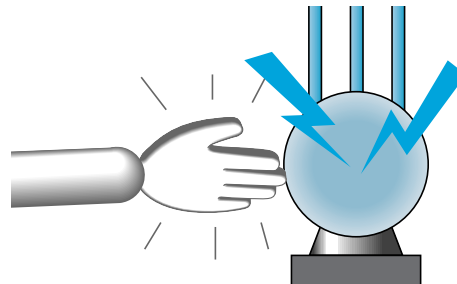
■ Complete protection:

- equipment installed in enclosures,
- minimum degree of protection: IP ...,
- closure using a tool or a key,
- metal enclosures must be connected to the protective earth conductor.

■ Special protection: use of very low power voltage or very low safety voltage.

■ Additional protection: use of high sensitivity residual current devices (RCD) (< 30 mA).

Indirect contact



■ Protection by automatic cutting off of the power supply at the 1st or 2nd fault, in accordance with the earth connection scheme.

■ Use of double insulated equipment (class II) conforming to standards IEC 536.

Protection of live conductors against overcurrent

Use of an automatic breaking device against overload and short-circuits (fuses or circuit breakers)

The device must be installed on the incoming supply of each circuit (change of conductor c.s.a.). Selection is determined by:

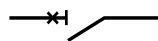
- the rating (c.s.a. of the cable to be protected),
- the breaking capacity: short-circuit current at the point in question (I_{cu}),
- the operational voltage (U_e),
- the type of circuit to be protected: cable lengths, type of load ...,
- the required auxiliary functions: signalling, remote control or tripping, etc.,
- the required installation or operating accessories: rotary operators, inter-locking and locking, terminal shrouds, etc.

Disconnection from energy sources

Principle of padlocking

Isolation of a machine or of a short-circuit must be achieved by the use of devices and means which ensure that operators can work safely when carrying out maintenance operations.

Positive break indication



A circuit breaker always performs isolation and breaking functions. It meets specifications for positive break indication.

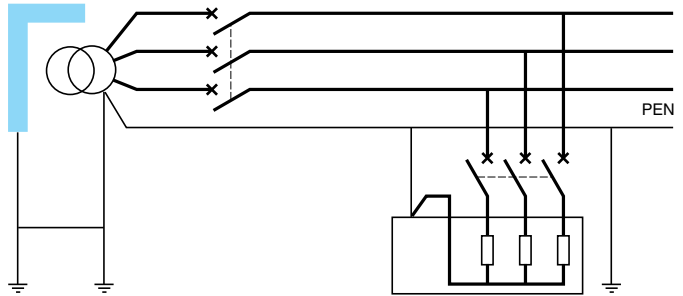
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Protection against insulation faults

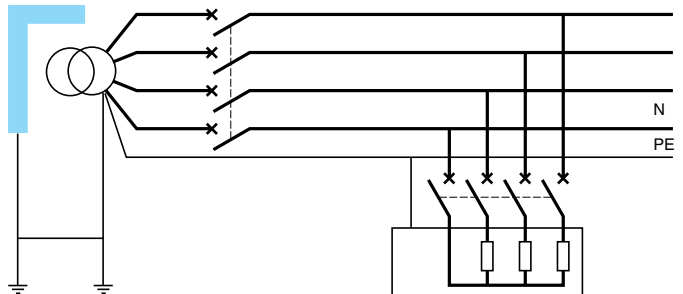
Protection against insulation faults

Earth connection type TN-C



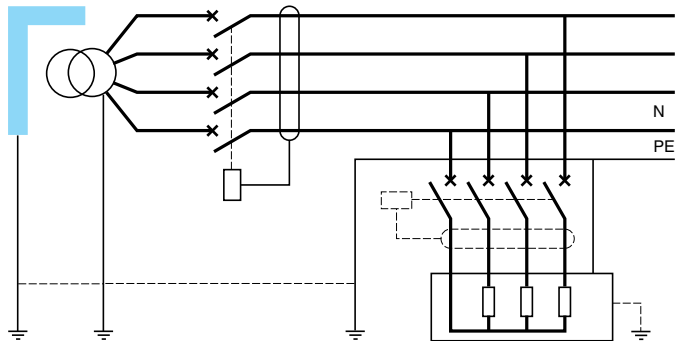
Tripping always occurs at the first fault. A phase-to-earth fault causes a short-circuit. Protection is provided by the magnetic trips of the circuit breaker.

Earth connection type TN-S



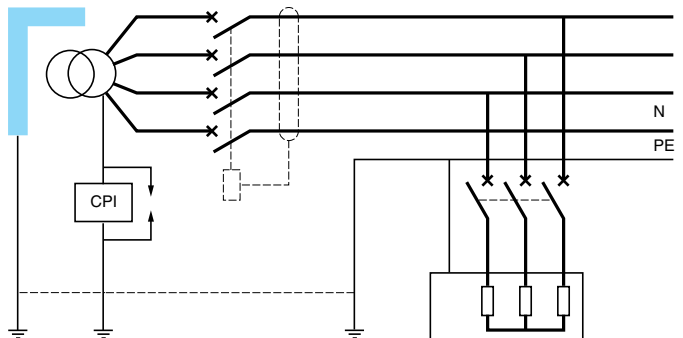
The addition of a residual current device may be necessary.

Earth connection type TT



Tripping always occurs at the first fault. A residual current device must be fitted on the incoming supply of the installation. The use of one protection device for each starter improves uptime.

Earth connection type IT



The mains supply is monitored by a continuous insulation monitor. The first fault (not dangerous) is signalled by the monitor. The second fault causes tripping (magnetic trips in the circuit breakers or residual current devices).