Comparison of AC-DC sensitive residual current circuit-breakers

Many standards, regulations and directives demand the provision of a Type B AC-DC sensitive residual current ciruit-breaker (RCCB).

Wherever three-phase electronic equipment is connected to mains without electrical isolation, AC-DC sensitive residual current circuit-breakers must be employed. There are, however, also cases in the 230 V mains net where they are applicable, e. g. photovoltaic (solar energy) installations with inverters lacking a transformer.

Pumping stations, air conditioning and ventilation facilities, escalators, welding equipment, medical-technical equipment, UPS and photovoltaic installations, agricultural and work premises with potential fire hazard, lecture rooms with experimentation facilities, exhibitors' mobile shops. These are a few examples where – because mainly pulsed equipment is employed for the power control in such installations (e. g. frequency converters) – the use of residual current circuit-breakers is imperative.

To select the correct RCCB for each individual application, we offer you three

Standards and Directives for employing Type B residual current circuit-breakers
VDE 0100-530 Erection of low voltage installations: selection and installation of electrical equipment, switch and control devices
VDE 0100-482 Fire protection in cases of special risks and dangers
VDE 0100-704 Requirements for work premises, rooms and special types of installations – construction sites
VDE 0100-712 Requirements for work premises, rooms and special types of installations; solar energy, photovoltaic power supply systems (new)
VDE 0100-723 Requirements for work premises, rooms and special types of installations: lecture rooms with experimentation facilities
BGI 608 Selection and operation of electrical installations and equipment on construction sites
GDV Publication (VdS 3501) Insulation protection in electrical installations with electronic equipment – RCD and frequency converters
VdS 3145 Photovoltaic installations – Technical Guidelines

Model range NK

The most reliable fire protection with high frequencies. Ideal for work premises subject to fire hazard.

The NK model range guarantees classic fire protection from 300 mA at frequencies up to 100 kHz and thereby substantially exceeds the requirements of the new Standard for Type B+ residual current circuit-breakers (RCCBs). It is thus the optimum protection for installations with residual currents at high frequencies. It is thus the optimum protection for installations with residual currents at high frequencies.

Model range B+

Fire protection for installations up to max. 20 kHz.

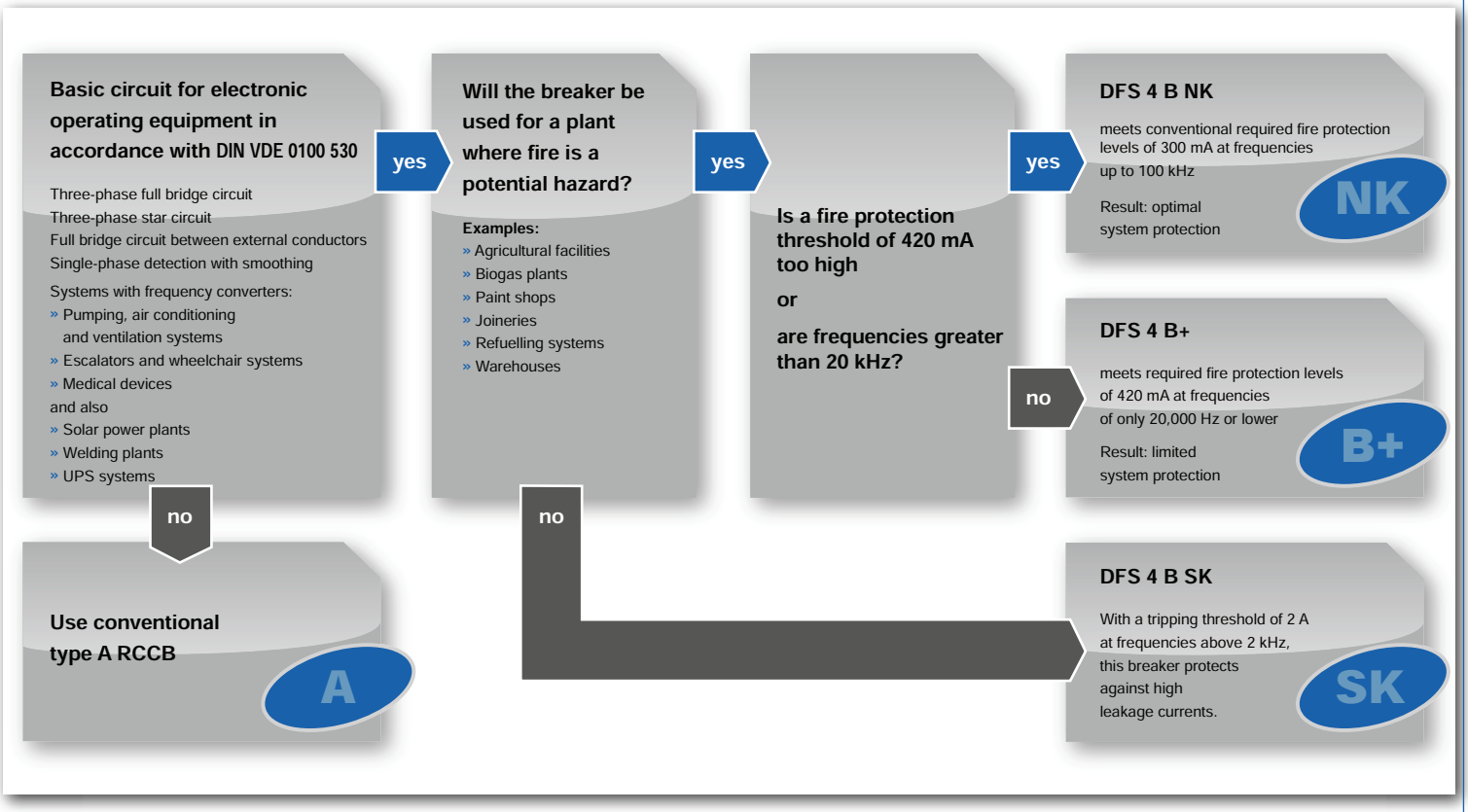
The B+ model range is based on the new V VDE V 0664-110 Standard. Compared to residual current circuit-breakers of the SK model range, these devices will trip when residual currents up to max. 20 kHz occur within an upper response limit of 420 mA and offer a higher preventative fire protection.

Model range SK

Protection for installations for which fire protection is not mandatory.

In many electrical installations, such as e. g. in construction site power distributors, fire protection plays a secondary role. Here it is often the case that only fault protection and high availability of plant are demanded. Due to the lower response sensitivity at higher frequencies, there are few equipment-related unwanted tripping incidents. The devices in the SK model range conform to the Standard E DIN VDE 0664-100.

Guidelines for the selection of AC-DC sensitive residual current circuit-breakers in relation to fire protection criteria



Informations concerning fire protection

In contrast to the already existing Draft Standard E DIN VDE 0664-100, in which tripping thresholds for residual currents up to max. 2 kHz are defined, the new Preliminary Standard V VDE V 0664-110 specifies an upper limit of 420 mA for the tripping thresholds of residual currents up to max. 20 kHz.

With this the new Preliminary Standard also satisfies the requirements of insurers (see also VdS 3501) in order to comply in most cases with a defined fire protection in respect of installations with electronic equipment such as e. g. frequency converters. RCCBs suitable for this purpose are with rated residual operating currents up to and including 300 mA.

Increasingly, electronic equipment is being employed which, in the event of a fault, could also generate residual currents with frequencies above 20 kHz, which latter are not taken into consideration in the new standard.

In addition, the harmonics of switching frequencies < 20 kHz are not completely covered. Yet in the meantime switching frequencies up to 50 kHz are being reached. If residual currents > 20 kHz are technically possible then, according to the VdS regulations, residual current circuit-breakers that also cover these higher frequencies have to be used – such as the devices in the NK range:

Our AC-DC sensitive residual current circuit-breakers in the NK model range, which have been in production since 2004, meet and substantially exceed the requirements of the new DIN V VDE V 0664-110 for Type B+ RCCBs. In the NK X version this applies only to the setting with a rated residual operating current of 300 mA.

For example, the devices of the DFS 4 B NK range detect residual currents up to 100 kHz at an upper tripping limit of max. 300 mA across the whole tripping frequency range and thus fulfil the "classic fire protection" role and even provide protection far above and beyond this.