Doepke

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The experts in residual current protection technology

DIZ

DOEPKE-INFO-ZEITUNG

THE FREE CUSTOMER NEWSLETTER BY DOEPKE SCHALTGERÄTE GMBH

IN THIS ISSUE

The DAFDD Code

It's no mystery

The Doepke AFDD 1 offers complete protection for your fixed installation. Errors are reliably and clearly differentiated and displayed individually.

The tried-and-tested RCBO (residual current operated circuit-breaker with integral overcurrent protection) part identifies leakage currents as per VDE 0100 Part 410 as well as short-circuits and overloads in accordance with the requirements set out in VDE 0100 Part 430 for the protection of people, livestock and property. The two-pole device provides these functions regardless of voltage. Moreover, arc fault detection (AFD) has now been added to the RCBO.

While the AFD unit does take up an extra module width of space, it offers end users and installation experts a wide range of functions for additional safety and convenience. The unit's tricolour lights indicate the device's operating status and the reason for a trip immediately after being switched on again. The lights differentiate be-

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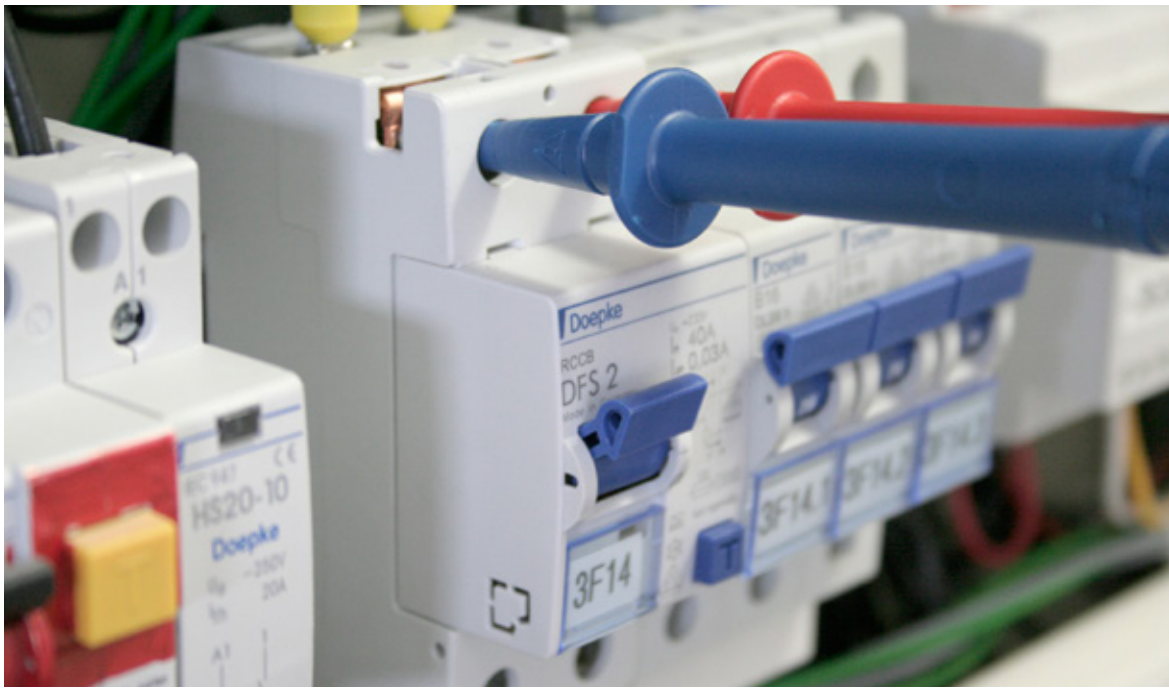

It is recommended that great care is taken when testing residual current circuit-breakers. Different factors need to be taken into account depending on the device type.

Testing with care

Testing and evaluating residual current circuit-breakers

Misinterpretations of test results can lead to uncertainty when testing residual current operated protective devices. A wide range of different measurements is possible with the test equipment available on the market, and as a result it is often the user who ends up doing the testing.

This is compounded by the sheer number of different residual current operated protective devices, such as type AC/A or F residual current circuit-breakers, plus the AC-DC sensitive types B and B+ including all of their different tripping characteristic curves and device versions.

Who's measuring what?

We often get questions like "Is my residual current circuit-breaker faulty if it needs 50 ms for the time measurement?" or "If the tripping threshold for my 30-mA residual current circuit-breaker is, say, 38 mA,

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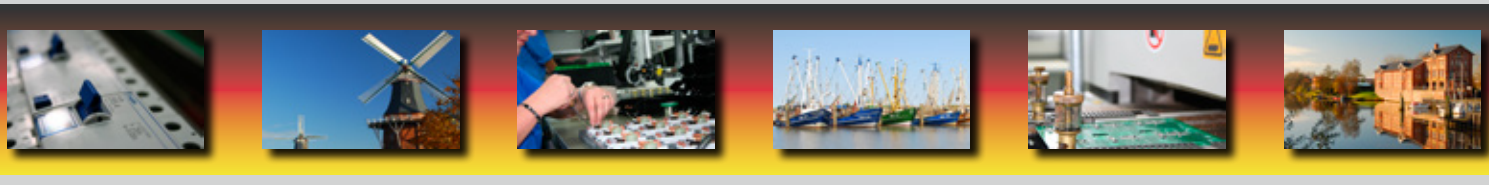

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is the circuit-breaker faulty?" Both values can be both right and wrong, which is why it is important to know what should be tested and how it should be tested. The test current value plays an important role in the time measurement, while it is the type of test current that is a deciding factor for the threshold measurement.

Depending on the residual current type and value, different tripping thresholds and times are defined in the product standards: while with AC residual current, the residual current circuit-breaker should have tripped by the nominal value printed on the label at the latest, this threshold increases to 1.4 times the nominal value with pulsating or phase-controlled residual currents.

The situation is similar for tripping times: if, for example, a device designed to trip at a residual current equal to its rated current is tested, the device must trip by 300 ms at the latest. But if the device is designed to trip at residual currents five times the rated current, the device must trip by the usual 40 ms. The same tripping times must be adopted for pulsating DC residual currents, but the test current should be increased to 1.4 times the current value. What this means specifically in the example of a test current that is five times the rated current is: 1.4 × 5 × IΔn.

Short time delayed devices

Short time delayed residual current circuit-breakers have the advantage of not tripping automatically in the event of short-term residual currents (caused by electronic equipment like lighting strips). Due to a non-tripping time of 10 ms, the time measurements end up being longer accordingly, but the tripping thresholds and times for instantaneous devices must be adopted (as listed in table 2) and these are also observed without problems. Personal protection is not endangered by the tripping delay. The devices can easily be replaced in order to increase system availability.

Selective devices

With selective residual current circuit-breakers, the non-tripping time is at least 50 ms, which entails extended maximum tripping times. The advantage of this setup is that when residual current operated protective devices are connected in series, the protective device closest to the fault will trip. Selective circuit-breakers do not guarantee personal protection; these devices are designed for system protection.

AC-DC sensitive devices

The DC threshold for type B and B+ residual current circuit-breakers, which can be double the nominal value, is also the source of occasional confusion. Sometimes the idea is raised that 60 mA is twice as much as 30 mA and therefore twice as dangerous. But this assumption comes up short: the tripping thresholds are based on the ventricular fibrillation threshold defined in IEC 60479, which sets the highest risk of cardiac injury to the human body at 50 Hz, with the risk decreasing at other frequencies (see also the technical information sheet "Tripping characteristic curves for DFS 4 AC-DC sensitive residual current protection").

Testing

Initial and recurrent testing must be conducted in accordance with DIN VDE 0100-600. Initial testing must take place even while the electrical installation is being set up or once it is completed. Recurrent testing, on the other hand, depends on the location of use, external influences and also the frequency of system maintenance. We recommend checking DIN VDE 0105-100 or the DGUV-V3, which both specify appropriate test intervals. For example, with portable electrical systems such as those used on construction sites, the test key should be pressed on a daily basis. By contrast stationary systems only need to undergo a function test (again using the test key) every six months. This increases the availability of the circuit-breaker significantly and should be communicated to the user by the electrician when the electrical installation is commissioned.

When testing tripping thresholds and times for a residual current circuit-breaker, it is sufficient to take both a time and threshold measurement to determine the effectiveness of the protective device. This may mean that in some circumstances three measurements are necessary: the tripping time, the AC residual current threshold and the DC residual current threshold (if a type B or B+ residual current operated protective device is used).

It depends on the right configuration

As previously mentioned, there is a wide range of test equipment available on the market, with countless configuration options. Some test devices assess the received test results, while others simply display the test value. Type B or B+ residual current circuit-breakers can only be tested using newer equipment.

If the thresholds and test equipment are known, it should be possible to correctly interpret the test values in order to evaluate the device being tested. After successful testing, any residual current circuit-breaker can be safely left in the customer's hands until it's time to test again. ■

Proper function of residual current operated protective device of type

Test current type	Type AC	Type A	Type F	Type B	Type B+	Tripping threshold
DC residual current	✔	✔	✔	✔	✔	0.5 to 1.0 × IΔn
Pulsating DC residual currents (pos. or neg. half-phase)	–	✔	✔	✔	✔	0.35 to 1.4 × IΔn
Phase-controlled half-phase currents	–	✔	✔	✔	✔	0.25 to 1.4 × IΔn with 90° phase angle
	–	✔	✔	✔	✔	0.11 to 1.4 × IΔn with 135° phase angle
AC residual current with overlapping smooth direct current	–	✔ +6 mA DC	✔ +10 mA DC	✔ +0.4 IΔn	✔ +0.4 IΔn	max. 1.0 × IΔn + DC offset
Half phases with overlapping smooth direct current	–	✔ +6 mA DC	✔ +10 mA DC	✔ +0.4 IΔn	✔ +0.4 IΔn	max. 1.4 × IΔn + DC offset
Mixed frequency residual current	–	–	✔	✔	✔	0.5 to 1.4 × IΔn
Smooth direct current	–	–	–	✔	✔	0.5 to 2.0 × IΔn

Type AC residual current operated protective devices are not permitted in Germany (DIN VDE 0100-530:2011-06 Para. 531.3.2).

Switch-off times and non-tripping times for RCCBs

Residual current type	Design	Rated residual current	1 × IΔn	2 × IΔn	5 × IΔn	10 × IΔn	
DC residual current	general	< 0.03 A	0.3 s	0.15 s	0.04 s		max. switch-off time
		0.03 A	0.3 s	0.15 s	0.04 s		
		> 0.03 A	0.3 s	0.15 s	0.04 s		
	selective	> 0.03 A	0.5 s	0.2 s	0.15 s		
			0.13 s	0.06 s	0.05 s		min. non-tripping time
These values must also be adopted for pulsating DC residual currents and mixed-frequency test signals, but IΔn × 1.4							
Smooth DC residual current	general	any value	0.3 s			0.04 s	max. switch-off time
	selective	> 0.03 A	0.5 s			0.15 s	
			0.13 s			0.05 s	min. non-tripping time

Heino Thoben-Mescher
Product Management

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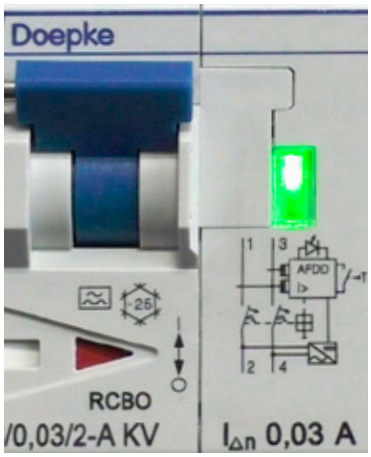
tween serial and parallel arc faults, for example, which can take some of the work out of troubleshooting. Trips resulting from a consumer operated in the circuit causing irregularities in the voltage delivery are referred to as 'dimmer errors'.

But the AFD unit can do even more: in order to ensure the best self-protection possible, it is equipped with a voltage (max. 270 V) and temperature sensor (max. 115°C). By shutting down when there is a continuous increase in voltage, it not only protects itself from overload but also the downstream consumers. A temperature above 115°C may also suggest inconsistencies in the distribution board.

The correct function of the AFD unit is permanently monitored. The switch trips if a functional defect is identified. It can be switched back on for a period of 24 hours for emergency operation in order to avoid having to take circuits completely out of operation. In this case, the RCBO part is fully functional without limitations and the lights permanently flash, alternating between red and yellow. This sends a message that is loud and clear even to laypersons: "Something is wrong here." And technicians understand the situation, too: "This part needs to be replaced." As a result, extra trips to the customer's premises and long periods of troubleshooting can be avoided. Once the 24-hour period has elapsed, the AFD unit trips again as a reminder that it is still experiencing a fault.



Green is good:
this device is in working order

DAFDD 1 fire protection switch.
Easy to identify on the front of the device: viewing window for visual status messages

The error codes are described in detail in the operating instructions, which are available online at any time. A sticker with an overview of the error codes, which can be affixed to the distribution board near the device, is included in delivery for users.

And don't forget: the last reason for tripping is saved and can be accessed again at any time. Simply turn off the switch using the toggle and then switch it on again while also pressing the test key. There are, of course, suitable single-phase or three-phase busbars for the DAFDD 1, in fixed twelve module width units or as metre bars which can be cut to length. ■

Melanie Brandes
Product Management

Factory visit under grey skies

Rain, fish and good spirits

From 8 to 10 June 2017, the Norden factory welcomed a group of visitors from wholesaler Panno, based in Bornheim.

Nicole Sikken and Stefan Ahrling met our guests from Bornheim in Papenburg and treated them to a midday snack at the Arkadenhaus. They then headed to the Meyer-Werft shipyard to take the 'Allure of Shipbuilding' tour. Meyer-Werft is best known for its cruise liners, all of which have to make their way to the North Sea via the specially dammed River Ems, which involves a great deal of PR work and very little water under the keel. After an impressive tour, the group continued on to Norddeich to check into their rooms and have dinner.

On Friday morning, we welcomed our guests to the factory in Norden. After greetings over East Frisian tea, we took them on a tour of the factory, which was at least as impressive as the shipbuilding tour in Papenburg.

The group enjoyed lunch on Norderney, the most famous of the seven East Frisian islands. The weather may have been very cloudy and rainy, but no one let that take the shine off their day as they cycled around to see most of the sights on Norderney.

Snapshots from the Doepke training room

After a day by the sea, it was fitting that fish was on the evening menu.

Our guests returned to Bornheim on the Saturday. ■

New Sales Promotion contact person

The Doepke South sales region has been divided into two new regions, Southwest and Southeast, for organisational reasons. While the Southeast region will continue to be headed up by Hans-Wolfgang Sorg as usual, the sales team for the Southwest region has gained a new member.

His name is Florian Schmitt. He is 29 years old and hails from Eisingen near Würzburg in Bavaria.

After completing his training at technical college in 2009, he worked in the electrical planning department at an engineering firm and in the photovoltaics industry in the field of maintenance and system management.

A new face on the Doepke sales team: Florian Schmitt is responsible for the Southwest region

He has been working for Doepke in Sales Promotion as a member of the team for the Southwest region (Baden-Württemberg) since April of this year.

In his free time he likes to travel, enjoys football and has a passion for cooking and barbecues. ■

Julio on the move

Hedgehog on safari in Kenya

This time we find our hedgehog on an adventure in Kenya, at the Tsavo East National Park and in the Taita Hills, where some unlucky souls were eaten by lions while constructing the railway in 1898.
Today, these lions are on exhibition at the Field Museum of Natural History in Chicago. On the two-day safari, Julio slept at the Salt Lick Game Lodge, a hotel on stilts with a nearby watering hole for local wildlife. Elephants, giraffes, buffalo, zebras and lions all came within touching distance! There is also a tunnel leading from the hotel to a second watering hole, from where the animals can be observed at ground level. Kenya also has some fantastic beaches on the Indian Ocean, beautiful hotels and friendly locals. Tip: there are hardly any mosquitoes to contend with if you travel at the right time and stay close to the sea. ■

East Frisian tea culture now officially a protected UNESCO heritage

In 2016, the East Frisian way of life was incorporated into Germany's cultural heritage

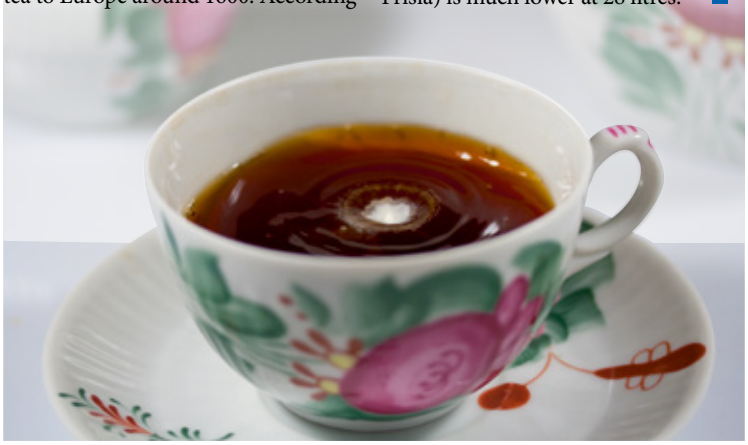
UNESCO acts on multiple levels to protect cultural heritage around the world. The best known of these is the world heritage list, which includes globally significant monuments, city ensembles and cultural and natural landscapes.

But there are also other lists of cultural offerings which are worth protecting, such as the list of intangible cultural heritage, which includes special traditions and customs or craftsmanship. At the end of 2016, the German UNESCO Commission added East Frisian tea culture to this list.

Other entries in the list include German bread culture, the journeymen's wanderings on the road, marksmanship or various types of theatre.

The inclusion of the custom of enjoying tea in East Frisia documents how important this practice is even today and how long-standing a tradition it is.

It is probably the proximity to the sea trade and the Netherlands which has made tea such a popular pastime in East Frisia. After all, it was the Dutch East Asian Company that first brought tea to Europe around 1600. According to the German Tea Association, East Frisia is the world's top consumer of tea with more than 300 litres consumed per person on an annual basis. Compare that to Europe's most famous tea drinkers, the British, who consume about 100 litres less! Average consumption for Germany (including East Frisia) is much lower at 28 litres. ■



A cup of East Frisian tea with a traditional rose motif.

DATES/NOTES

efa Leipzig
20–22 September 2017
Hall 5, Stand G21

PLC/IPC/Drives Nuremberg
28–30 November 2017
Hall 3, Stand 3-467

Doepke's tendering documents
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www.ausschreiben.de

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QUOTE OF THE QUARTER

It is not important where you are,
but rather what you do where you are.

African proverb

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