

# Digital Switchgear Communication at Eye Level



**EATON**

*Powering Business Worldwide*





# Yesterday, the future was yet to come. Today, it's already here.

## The future has already begun.

For us, innovation is tradition: in 1957 Eaton's Moeller segment developed the first fault current protection switch, and with this, a new era of electrical safety engineering began. And now, Eaton is still ahead of its time: the new digital switchgear range in the Eaton xEffect series communicates potential problems in advance and sets new standards in precision, security and convenient service.

### Maximal safety with optimal ease

Modern Residual Current Circuit Breakers (RCCB) protect people and technical equipment conveniently and reliably against faulty currents. The digital RCCB from the xEffect series do more than just switch off. They monitor electrical installations and give advance warning of critical current flows. So plant/factory shutdowns – and the resulting costs – can be avoided.

### Precise Release – Highest Reliability

Short-time fault currents or other briefly occurring malfunctions do not cause the digital protection switch to shut down, thanks to the short time delay and optimized tripping threshold. So the electrical installation is optimally protected against nuisance tripping.

### Easy and adaptable installation for fast modernization

The big Eaton plus: It is very easy to upgrade a switchboard! Simply replace the RCCB – and you have all advantages of digitalization.





## Digital protection switches – the new era has begun.

### More security through proactive communication!

The new xEffect models exceed the IEC/EN-61008 standard: their trigger reaction is much more precise than that of conventional switches to the 100% fault current threshold. The digital protection switches support in addition the preventive maintenance which is recommended by IEC 60204. With a fault current, the information is reported to the security center of the industrial plant, and troubleshooting would begin before there would be a shutdown or plant failure. So the cause of the fault current can be determined precisely and the system service can be easily planned ahead. Therefore, system availability is increased and service is improved because of the convenience of the remote control.

### Numerous advantages at a glance

- The difference between harmless and critical fault currents is detected
- Precise switching and reduction of nuisance tripping
- Continuous monitoring of plant/factory status – prompt warning of a change in status quo
- Convenient troubleshooting by precise location of the malfunction
- As easy to install as a conventional RCCB
- Longer intervals between servicing
- Ideal for system monitoring thanks to preventive information
- Warning of tripping at leakage current
- Clear status display of the fault current problem with tri-colored LEDs
- Real contact position indicator
- Indicator for fault current tripping
- Comprehensive range of accessories available
- Can be integrated in several bus systems

# Highly qualified controllers offer their services

## PROMOTION

Allow us to introduce ourselves: **FRCdM** and **FRBdM** would like to work in your switchbox. We're two highly qualified control robots from the famous EATON talent factory – the first of the new digital generation.

It's not only that I work completely reliably as a Residual Current Operated Circuit Breaker with integrated Overcurrent Protection (RCBO), but I also display the cause and extent of the flowing fault current. This enables to take fast actions in order to maintain system availability.

And since I'm the RCCB a fault current protection switch, I don't wait until the tripping threshold is reached; I check the present status and register any possible failures, and send this information by remote warning immediately to the central control system. This increases system safety, application availability and minimizes maintenance costs.

**Hire us – and experience finally communication at eye level!**

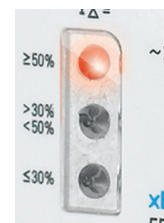
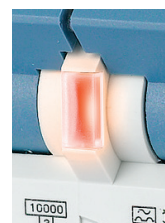
The LEDs set off an alarm when fault currents or a shutdown are coming. This makes the troubleshooting faster and much easier. The service mode of the RCBO quickly indicates the extent of the flowing fault current in milliamp increments. By pushing the service button, the blinking LED identifies the area where the fault current is located in. The potential-free contact which is integrated in the RCCB offers a connection to a monitoring system.

- Residual current protection and additional protection with other digital functions
- Auto-reclosure is possible



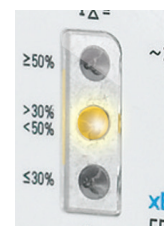
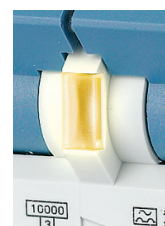
### Red

When the red LED lights up, the leakage current is already higher than 50 percent of the nominal fault current. Therefore the system is in a critical status – the digital RCCB only trips when the fault current continues to increase.



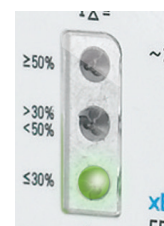
### Yellow

The yellow LED shows a residual current in the ambit of 30 to 50 percent of the nominal fault current. Before the system is shut down, professional countermeasures can be taken.



### Green

If the current flow in the system to ground is in the ambit from 0 to 30 percent of the nominal fault current, the green LED indicates the proper status.



# FRBdM and FRCdM offer several other advantages



The LED enables a fault current display directly on site. In the service mode, malfunction causes can be determined quickly and without complication.

## Digital combi-switch FRBdM

With help of the service mode, the exact extent of the leakage current can be identified. This is a big advantage for industrial plants and any locations where the maximum security of supply must be ensured in time before the shutdown of the plant.

## Digital RCBO Type A

Protects against special forms of residual pulsating DC which have have not been smoothed.

## Digital RCBO Type F

Sensitive to pulsating DC residual current and detection of multifrequency residual currents up to 1 kHz

- Increased protection due to the detection of mixed frequencies
- Higher load rating with DC residual currents up to 10 mA
- Reduction of nuisance tripping thanks to time delayed tripping and increased current withstand capability of 3 kA



The digital display facilitates real-time diagnostics directly at the switch. By means of the LEDs, the system status can be checked anytime, and with one glance.

All models have at least a short time delay to prevent from nuisance tripping due to transient disruptions (lightning, engine start).

## Digital RCCB Type A

Protection in case of sinusoidal AC fault currents and pulsating currents with DC components up to 6 mA.

## Digital RCCB Type B

In addition to fault currents in the AC and pulse current range, type B also detects smooth DC fault currents which can occur in frequency inverter controls, photovoltaic systems and increases safety considerably.

## Digital RCCB Type B+

Complies with the standard VDE 0664-400 (formerly VVDEV 0664-110) for superior fire protection as required by the Association of German Insurance Companies. The type B+ detects high frequency currents up to 20 kHz and the tripping level is limited to max. 420 mA over the defined frequency range.

## Digital RCCB Type Bfq

The type Bfq complies with the requirements of the type B. The tripping curve is extended and allows the defection of high frequency currents up to 50 kHz. The adjusted frequency behaviour (insensitive to higher frequencies) prevents nuisance tripping errors in industrial plants with powerful frequency inverter controllers.



Eaton's electrical business is a global leader with deep regional application expertise in power distribution and circuit protection; power quality, backup power and energy storage; control and automation; life safety and security; structural solutions; and harsh and hazardous environment solutions. Through end-to-end services, channel and an integrated digital platform & insights Eaton is powering what matters across industries and around the world, helping customers solve their most critical electrical power management challenges.

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