



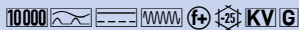
DATA SHEET

residual current circuit-breaker

DFS 4 016-4/0,03-B SK NA HD

AC/DC sensitive type B, emergency switching-off function, for harsh environments

Article number 09114861HD



Function

Residual current circuit-breakers (RCCBs) are components for implementing protective measure "Automatic disconnection of the power supply" as per VDE 0100 part 410 or corresponding international installation regulations. Series DFS 4 devices are compact two or four-pole residual current circuit-breakers. In the standard design, they only take up four module width units of space. Although DFS 4 devices for AC and pulsating DC residual currents are actually designed for three-phase networks, they can also be used in single-phase networks. However, in addition to these, special variants are also available for single or three-phase operation in the form of the AC/DC sensitive designs (type B, type B+). In spite of the compact dimensions, a number of different tripping currents and characteristics are available at rated currents, depending on the design, up to 125 A. All devices are available in the "HD" design, which is especially suitable for use in extreme environments (tunnels, swimming pools, etc.) They also have large two-tier terminals for large conductor cross-sections, a practical multifunctional switch toggle and can be provided with pre-prepared labels using free-of-charge software. DFS 2 and DFS 4 devices with residual current characteristic B detect smooth DC residual currents as well as all other Type B residual currents as per IEC 60755. The operating voltage required for this is taken from the mains supply. Correct power supply is ensured when the voltage between the mains conductors is ≥ 50 V. Type A residual currents are detected regardless of the mains voltage. Furthermore, these residual current circuit-breakers completely detect residual currents of all frequencies up to 100 kHz. With this wide frequency range for residual current detection, it more than meets the requirements for the design standards for type B residual current circuit-breakers. Protection as per VDE 0100 part 410 is provided with a corresponding earth resistance via the entire frequency range of residual current detection. The maximum permissible earth resistance is calculated as the quotient from the permissible touch voltage and the maximum trip residual current in the entire detected frequency range. For residual current circuit-breakers with characteristic curve SK, the frequency response of the tripping current is designed so that residual currents with high frequencies, such as in the clock frequency range for frequency converters, as opposed to the rated frequency are detected with significantly reduced sensitivity. Undesired trips caused by leakage currents can therefore be widely avoided. However, fire protection depending on the rated residual current of the switch (0.03 A, 0.1 A or 0.3 A) is only provided for residual currents with frequencies up to 1 kHz, 300 Hz or 100 Hz, while the devices with tripping current frequency response B+ or NK offer protection over the entire tripping frequency range up to 20 kHz or 150 kHz, respectively. DFS with emergency shut-off function ('NA' variant) make it possible to connect control elements, e.g. push-buttons for disconnecting the RCCB in emergency situations. The device is connected via the compact, factory mounted module; parallel wiring of multiple DHS is also possible. The integrated LED signals tripping by a control element as well as a possible wire breakage. In this state, reclosing of the RCCB is prevented. With an airtight, encapsulated tripping mechanism from a special alloy and the stainless steel latch, residual current circuit-breakers in HD design are protected, in particular from corrosion, corrosive gases, moisture and extreme temperature fluctuations.

Features

High level of immunity against leakage and residual currents due to operational conditions from frequency 1 kHz and higher, AC/DC sensitive for residual currents with frequencies and mixed frequencies of 0 Hz (smooth direct current) up to 150 kHz, high availability even of voltage-independent detection of smooth DC residual current and AC residual current with frequencies not equal to 50/60 Hz thanks to full functional compatibility with mains voltages from at least 50 V AC on any two active conductors, mains-voltage-independent tripping when type A residual currents occur, With emergency switching off function for tripping or disconnection by means of control elements, Monitoring of emergency switching off function for wire breakage and signalling by LED, In the event of a power failure, the emergency switching off function does not trip, compact design for all rated currents, high short-circuit resistance, double-sided two-tier terminals for large conductor cross-section and busbar, switch position indicator, viewing window for labels, multifunction switch toggle with three positions: "on", "off" and "tripped", Neutral conductor position left

Mounting

quick fastening to mounting rail, any installation position, supply from top

Applications

Commercial and industrial installations with TT, TN-S and TN-C-S systems, where power electronics equipment is used without galvanic isolation from the mains, e.g. frequency converters, switching power supplies, high-frequency converters, photovoltaic installations and

Subject to technical changes

UPS equipment with frequency converters without transformers, NA series RCCBs are especially suitable for systems where an emergency switching off circuit with disconnector properties is required, e.g. in teaching rooms or production facilities.

Notes

suitable for use in 50 Hz AC networks, RCCBs for other frequencies available upon request, Not designed for use in direct current networks or on the output side of controlled electrical equipment such as frequency converters.

Accessories

terminal caps KA, information stickers HAS, restart locks DFS WES, software DBS

Technical Data

Technical Data	DFS 4 016-4/0,03-B SK NA HD
Series	DFS 4 B SK NA
Number of poles	4
Residual current type	B
Tripping characteristic curve	SK
Rated current (AC)	16 A
Rated residual current $I_{\Delta n}$	0.03 A
Short-time delayed	true
Selective	false
min. Operating voltage range of test circuit	250 V
max. Operating voltage range of test circuit	440 V
Minimum rated operating voltage (Type A/AC operation)	0 V AC
Minimum rated operating voltage (Type B operation)	50 V AC
Non-trip time	10 ms
Tripping frequency	0 Hz ... 150 kHz
Maximum disconnection times	$1 \cdot I_{\Delta n}: \leq 300 \text{ ms}; 5 \cdot I_{\Delta n}: \leq 40 \text{ ms}$
Internal consumption	max. 2.2 W
	auxiliary device (Emergency shut-off device)
Additional device AE1 operating voltage	50 V ... 440 V (AC)
Auxiliary device AE1 Voltage of the monitoring circuit	12 V (DC)
Auxiliary device AE1 Voltage of the monitoring circuit	max. 1 mA (DC)
max. Auxiliary device AE1 Cable length of the monitoring circuit	500 m
	load circuit
Specification	load disconnect contact
min. Contact opening	4 mm
Rated voltage (AC)	230 V, 400 V
Rated current (AC)	16 A
Rated short-circuit current	10 kA
Surge current strength	3 kA
max. Total rated switching capacity	500 A
Rated insulation voltage	400 V
Rated impulse withstand voltage	4 kV
Rated frequency	50 Hz
Current heat loss per current path	0.2 W

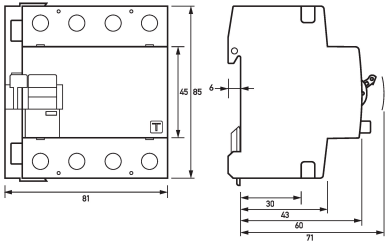
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Technical Data	DFS 4 016-4/0,03-B SK NA HD
Thermal Backup-fuse OCPD	16 A
Short-circuit backup-fuse SCPD	100 A
Back-up fuse type	gG
	Auxiliary switch (additional emergency shut-off device)
Specification	switching contact
Number of poles (total)	1
Contact assignment	1 CO
Rated voltage (AC)	12 V ... 230 V
Rated voltage (DC)	12 V ... 110 V
Rated impulse withstand voltage	4 kV
	screw-type terminal top and bottom (load circuit)
Neutral conductor position	left
Protection against direct contact	DGUV V3, VDE 0660-514, finger and back-of-hand proof
Connection C1 Maximum number of conductors per terminal	2 (conductors of same type and cross-section)
Cross section solid	1-wire: 1.5 mm ² ... 50 mm ² ; 2-wire: 1.5 mm ² ... 16 mm ²
Connecting capacity flexible	1-wire: 1.5 mm ² ... 50 mm ² ; 2-wire: 1.5 mm ² ... 16 mm ²
Cross section stranded	1-wire: 1.5 mm ² ... 50 mm ² ; 2-wire: 1.5 mm ² ... 16 mm ²
Cross section AWG, solid	15 ... 1
Cross section AWG, stranded	15 ... 1
Cross section AWG, flexible	15 ... 1
Cross section AWG, flexible with ferrule	15 ... 1
Tightening torque	2.5 Nm ... 3 Nm
	screw-type terminal top and bottom (Emergency shut-off device, auxiliary switches)
Allowed types of wires	solid conductor, flexible conductor, stranded conductors with ferrule
Connection C2 Maximum number of conductors per terminal	2 (conductors of same type and cross-section)
Cross section solid	1-wire: 1 mm ² ... 1.5 mm ² ; 2-wire: 1 mm ² ... 1.5 mm ²
Cross section flexible with ferrule	1 mm ² ... 1.5 mm ²
Cross section stranded	1-wire: 1 mm ² ... 1.5 mm ² ; 2-wire: 1 mm ² ... 1.5 mm ²
Cross section AWG, solid	17 ... 16
Cross section AWG, stranded	17 ... 16
Cross section AWG, flexible with ferrule	17 ... 16
Tightening torque	max. 0.8 Nm
	General data
Operating position	optional
max. Operating altitude above MSL	2000 m
Mechanical endurance	min. 5000 cycles
Electrical endurance	min. 2000 cycles
Surrounding atmosphere	harsh environmental conditions
Storage temperature	-35 °C ... 75 °C
Ambient temperature	-25 °C ... 60 °C
Climate resistance	according to IEC 60068-2-30: humid heat / cyclic (25 °C / 55 °C; 93 % / 97 % RH)
Shock resistance	20 g / 20 ms Duration
Fatigue limit	> 5 g (f ≤ 80 Hz, duration > 30 min.)
Housing type	distribution board housing

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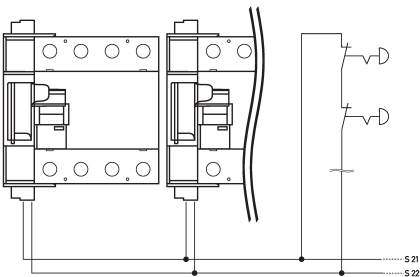
Technical Data		DFS 4 016-4/0,03-B SK NA HD
Installation type		Mounting rail (35 mm)
Housing material		thermoplastic
Protection class		IP20 (installed: IP40)
sealable		true
Width		81 mm
Height		85 mm
Depth		75 mm
Installation depth		69 mm
Module widths		4.5
Weight		0.533 kg
Design requirements/Standards		VDE 0664-10, VDE 0664-40, ÖVE/ÖNORM E 8601, DIN EN 61008-1, EN 62423
Degree of pollution		2

Dimensions

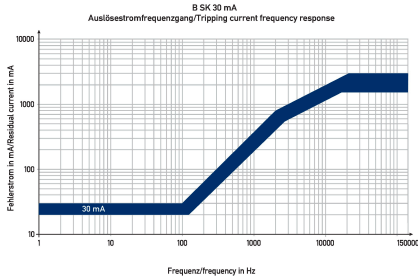


Dimensional drawing Group view

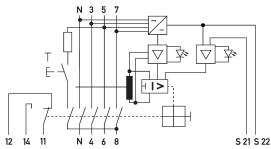
Wiring example



Diagrams



Characteristic B SK 30 mA



Wiring diagram

Wiring diagram additional file