Mounting method:

- Snap-on fastening on DIN-rail to EN 50022 possible in all standard distribution panels.
- Any mounting position possible

Applications:

Power supply of domestic and utility buildings as well as industrial installations.

Designation	Article-No.
20 A	
MCB D20-1	XX 915 424
MCB D20-1+N	XX 915 454
MCB D20-2	XX 915 484
MCB D20-3	XX 915 524
MCB D20-3+N	XX 915 554
MCB D20-4	XX 915 584
25 A	
MCB D25-1	XX 915 425
MCB D25-1+N	XX 915 455
MCB D25-2	XX 915 485
MCB D25-3	XX 915 525
MCB D25-3+N	XX 915 555
MCB D25-4	XX 915 585
32 A	
MCB D32-1	XX 915 426
MCB D32-1+N	XX 915 456
MCB D32-2	XX 915 486
MCB D32-3	XX 915 526
MCB D32-3+N	XX 915 556
MCB D32-4	XX 915 586
40 A	
MCB D40-1	XX 915 427
MCB D40-2	XX 915 487
MCB D40-3	XX 915 527
MCB D40-4	XX 915 587
63 A	
MCB D63-1	XX 915 429
MCB D63-2	XX 915 499
MCB D63-3	XX 915 529
MCB D63-3+N	XX 915 559
MCB D63-4	XX 915 589

Technical data Page 104
Dimensions Page 116

Auxiliary or Fault Signalling Switch DHi 1

Designation	Article-No.
DHi 1	XX 913 998

Function:

The DHi 1 can be retrofitted as an auxiliary switch, or fault signalling switch, to a miniature circuit-breaker of the DLS 5 model range. With the aid of other outputs (buzzer, indicator lamp etc.), or via the Dupline bus system, it thus enables the operating status of miniature circuit-breakers to be indicated. The function setting is via the setting facility on the DHi 1.

Auxiliary switch
Switches upon connection and disconnection of the miniature circuit-breaker

Fault signalling switch
Switches only when the MCB is tripped (central position)

Features:

- Auxiliary switch or, alternatively, fault signalling function
- Retrofittable
- Compact design
- 1 C-O contact and 1 NCC

Mounting method:

- Clamped on the left side of the miniature circuit-breaker
- Snap-fastening on DIN-rail to EN 50022 in all standard distribution panels
- Any mounting position possible

Applications:

Operating status enquiry of power supplies in domestic and utility buildings as well as industrial installations.

Notes:

The auxiliary switch does not affect the functioning of the miniature circuit-breaker.

Technical data Page 98
Dimensions Page 114

Restart Locking Facility WES

for DFS 2 and DFS 4 RCCBs and for DLS 5 MCBs

Function:

To avoid reconnection during maintenance and repair work. Use of the locking facility rules out all possibility of accidental connection of mains voltage, e.g. by unauthorised persons.

Features:

- Quickly fitted, universally applicable
- Without lock
- Dimensions: 17 mm x 29 mm x 3.5 mm
- Material: Stainless steel

Applications:

Power supply of domestic and utility buildings as well as industrial installations.

Accessories:

- Standard padlock (shackle dia. 3.5 mm; not supplied with the device)

Dimensions Page 115

Designation	Article-No.
WES	XX 913 993

Contact Protection Cover

Function:

To provide a touch-proof covering and to secure the double-deck terminals of miniature circuit-breakers DLS 5.

Features:

- Accessory specifically designed for system construction
- Material: polycarbonate

Applications:

Power supply of utility buildings and industrial installations.

Dimensions Page 118

Designation	Article-No.
Contact Protection Cover	XX 913 997

Remote Actuator DFA

for Residual Current and Miniature Circuit-Breakers

EN 50081-1 EN 5082-2

Designation	Article-No.
DFA	XX 100 101

Function:

The DFA remote actuator is a retrofittable device for the remote control and monitoring of residual current and miniature circuit-breakers of model ranges DFS 2 / DFS 4 and DLS 5.
With the aid of the DFA these can be switched on and off remotely. In addition, with residual current circuit-breakers there is also the possibility of remote testing by means of residual current simulation. The actual switching position of the circuit-breakers – connected, tripped or disconnected – can be indicated by integrated relay switching contacts.
The actuation function and the remote tripping function of the DFA can be de-activated with the aid of a rotary switch on the enclosure cover. This ensures that it cannot be accidentally activated from a remote location, e.g. during maintenance work at the electrical downstream installation. There is also the option of operating the DFA in automatic mode, whereby 15 seconds after tripping a single attempt at reconnection will be instigated automatically.
The optionally available DFA-DI interface offers the possibility of controlling and monitoring the protective devices via the Dupline bus system.
The DFA can be operated either with a 24 V AC or 24 V DC power supply.

Features:

- Retrofittable
- For 2- and 4-pole residual current circuit-breakers DFS 2 / DFS 4
- For 1- to 3-pole miniature circuit-breakers DLS 5
- For 2- and 4-pole switch disconnectors DHS 2 / DHS 4
- Remote connection and disconnection of miniature circuit-breakers
- Remote connection, remote disconnection and remote test tripping of residual current circuit-breakers with rated residual current
- Feedback of current toggle switch position
- Automatic reconnection selectable
- Dupline bus interface DFA-DI can be retrofitted

Mounting method:

- Clamped on the left side of the residual current or miniature circuit-breaker
- Snap-fastening on DIN-rail to EN 50022 in all standard distribution panels
- Any mounting position possible

Applications:

Business and industrial installations with remote distribution centres such as e.g.:

- Agricultural establishments
- Wind turbines
- Pumping stations
- Sewage works
- Telecommunication stations
- Radio and transmission stations

Notes:

The DFA does not affect the functioning of the residual current or miniature circuit-breakers.

Accessories:

- RK 24 power supply unit
- DFA-DI Dupline interface board

Technical data	Page 105
Dimensions	Page 116
Accessories	Page 83

Further DIN-Rail Mounted Devices

- Efficient
- Reliable
- Flexible
- Future-orientated
- Independent

50 Years of Innovation and German Quality

Switch Disconnectors DHS

10000 EN 60947

Designation	Article-No.
63 A	
DHS2-63 2-pole	XX 900 005
DHS4-63 4-pole	XX 900 007
80 A	
DHS2-80 2-pole	XX 900 006
DHS4-80 4-pole	XX 900 008
100 A	
DHS2-100 2-pole	XX 900 001
DHS4-100 4-pole	XX 900 003
125 A	
DHS2-125 2-pole	XX 900 002
DHS4-125 4-pole	XX 900 004

Function:

The two-, three- or four-pole DHS switch-disconnectors are used as main switches at the input of system distributions.
They enable the safe disconnection of the distribution and of the downstream installation from the power supply even when subject to load and overload. In some areas the electricity companies make their installation mandatory in their technical connection requirements.

Features:

- Rated currents from 63 A to 125 A
- Highly short-circuit proof and high switching capacity
- Double-deck terminals for large wire diameter and rail at both ends
- Switch position indication
- View panel for labels

Mounting method:

- Snap-on fastening on DIN-rail to EN 50022 possible in all standard distribution panels.
- Any mounting position possible

Applications:

Distributions in widely dispersed power supply nets, e.g. for

- Camping sites
- Marinas
- Allotment sites
- Exhibition grounds
- etc.

Notes:

In pratice the following types are used as main switches in compliance with IEC/EN 60947-3:

- Disconnectors
- Switches and
- Switch-disconnectors.

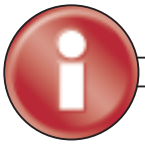
Disconnectors must fulfil the relevant requirements for a disconnecting function when in the Off position, but in operation only currents of negligible strength need to be switched.

A switch has to switch on and switch off currents in an electric circuit under operating conditions, inc. a specified operational overload. When the switch is in the Off position, no disconnecting function is required. A switch is therefore not suitable for safe disconnection as defined in the international design regulations.

The combination of these two types is the switch-disconnector which encompasses the features of both and can thus be employed universally for the completely safe isolation of installations.

Accessories:

- DFA remote actuator
- DHi 2 auxiliary switch
- KA-DFS 4 terminal cover, sealable
- Reconnection locking facility (WES)



Technical data	Page 106
Dimensions	Page 114
Accessories	Page 38, 39, 66, 67

Switch Disconnectors DIS

Designation	Article-No.
16 A	
DIS 16-1	XX 900 101
DIS 16-2	XX 900 102
DIS 16-3	XX 900 103
DIS 16-3.N	XX 900 104
DIS 16-4	XX 900 125
20 A	
DIS 20-1	XX 900 105
DIS 20-2	XX 900 106
DIS 20-3	XX 900 107
DIS 20-3.N	XX 900 108
DIS 20-4	XX 900 126
25 A	
DIS 25-1	XX 900 136
DIS 25-2	XX 900 137
DIS 25-3	XX 900 138
DIS 25-3.N	XX 900 139
DIS 25-4	XX 900 140
32 A	
DIS 32-1	XX 900 109
DIS 32-2	XX 900 110
DIS 32-3	XX 900 111
DIS 32-3.N	XX 900 112
DIS 32-4	XX 900 127
40 A	
DIS 40-1	XX 900 113
DIS 40-2	XX 900 114
DIS 40-3	XX 900 115
DIS 40-3.N	XX 900 116
DIS 40-4	XX 900 128
63 A	
DIS 63-1	XX 900 117
DIS 63-2	XX 900 118
DIS 63-3	XX 900 119
DIS 63-3.N	XX 900 120
DIS 63-4	XX 900 129

Function:

The two-, three- or four-pole switch-disconnectors are used as main switches at the input of system distributions.
They enable the safe disconnection of the distribution and of the downstream installation from the power supply even when subject to load and overload. In certain areas the technical connection requirements of the relevant electricity companies make their installation mandatory.

Features:

- Modular construction
- Wide range of rated currents from 16 A to 100 A
- Highly short-circuit proof and high switching capacity
- Double-deck terminals for large wire diameter and rail at both ends
- Switch position indication
- Conforms to international appliance design regulations IEC 60947-3, EN 60947-3 and BS 5419/77

Mounting method:

- Snap-on fastening on DIN-rail to EN 50022 possible in all standard distribution panels.
- Any mounting position possible

Applications:

Main distributions in widely dispersed power supply nets, e.g. for

- Camping sites
- Marinas
- Allotment sites
- Exhibition grounds
- etc.

Notes:

In pratice the following types are used as main switches in compliance with IEC/EN 60947-3:

- Disconnectors
- Switches and
- Switch-disconnectors.

Disconnectors must fulfil the relevant requirements for a disconnecting function when in the Off position, but in operation only currents of negligible strength need to be switched.

A switch has to switch on and switch off currents in an electric circuit under operating conditions, inc. a specified operational overload. When the switch is in the Off position, no disconnecting function is required. A switch is therefore not suitable for safe disconnection as defined in the international design regulations.

The combination of these two types is the switch-disconnector which encompasses the features of both and can thus be employed universally for the completely safe isolation of installations.

Accessories:

- Reconnection locking facility WES

Designation	Article-No.
80 A	
DIS 80-1	XX 900 131
DIS 80-2	XX 900 132
DIS 80-3	XX 900 133
DIS 80-3.N	XX 900 135
DIS 80-4	XX 900 134
100 A	
DIS 100-1	XX 900 121
DIS 100-2	XX 900 122
DIS 100-3	XX 900 123
DIS 100-3.N	XX 900 124
DIS 100-4	XX 900 130

Technical data	Page 107
Dimensions	Page 116
Accessories	Page 39

Electronic Single-Phase AC Meter RWZ 12.11.13 / RWZ 12.11.14

EN 61036

Designation	Article-No.
25 A	
RWZ 12 11.13 230V 25A	XX 980 690
RWZ 12 11.13 230V 25A, certified	XX 980 691
32 A	
RWZ 12 11.14 230V 32A	XX 980 692
RWZ 12 11.14 230V 32A, certified	XX 980 693

Function:

This model range replaces the classic electromechanical electricity meter. The meter count with its 6-digit display is easy to read. An S0-port provides the necessary counter pulses in energy management systems. Due to its narrow design (1 module) the RWZ product range can be installed in any distribution panel with DIN-rail.

Features:

- Counter with 5 digits and one red decimal point digit
- Also available with PTB authorization for cash accounting purposes
- S0-interface as per DIN 43864 for energy management systems
- Pulse factor for opto-coupler output 2000 i/kWh
- Accuracy class 1
- 1 module width
- Consumption less than 0.5 W
- Conforms to IEC/EN 61036

Mounting method:

- Snap-on fastening on DIN-rail to EN 50022 possible in all standard distribution panels
- Any mounting position possible

Applications:

- Energy management systems
- Camping sites
- Mooring berths
- Other leased facilities

Technical data Page 108
Dimensions Page 116

Electronic Three-Phase AC Meter RDZ 34.52.41

Function:

This model range replaces the classic electromechanical electricity meter. The meter count with its 6-digit display is easy to read. An S0-port provides the necessary counter pulses in energy management systems.

Features:

- RDZ 34.52.41 230 V / 400 V AC, 5(65) A
- Counter with 5 digits and one red decimal point digit
- S0-interface as per DIN 43864 for energy management systems
- Pulse factor for opto-coupler output 2000 i/kWh
- Accuracy class 1
- 4 module widths
- Conforms to IEC/EN 61036

Mounting method:

- Snap-on fastening on DIN-rail to EN 50022 possible in all standard distribution panels
- Any mounting position possible

Applications:

- Energy management systems
- Camping sites
- Mooring facilities
- Other leased objects

EN 61036

Designation	Article-No.
RDZ 34.52.41	XX 980 698

Technical data Page 108
Dimensions Page 116

D0 Master Disconnector – Tytan

Designation		Article-No.
2 A	**pink**	
D0 Master Disconnector, 1-pole		XX 980 385
D0 Master Disconnector, 3-pole		XX 980 391
4 A	**brown**	
D0 Master Disconnector, 1-pole		XX 980 386
D0 Master Disconnector, 3-pole		XX 980 392
6 A	**green**	
D0 Master Disconnector, 1-pole		XX 980 387
D0 Master Disconnector, 3-pole		XX 980 393
10 A	**red**	
D0 Master Disconnector, 1-pole		XX 980 388
D0 Master Disconnector, 3-pole		XX 980 394
16 A	**grey**	
D0 Master Disconnector, 1-pole		XX 980 389
D0 Master Disconnector, 3-pole		XX 980 395
20 A	**blue**	
D0 Master Disconnector, 1-pole		XX 980 390
D0 Master Disconnector, 3-pole		XX 980 396
25 A	**yellow**	
D0 Master Disconnector, 1-pole		XX 980 382
D0 Master Disconnector, 3-pole		XX 980 397
35 A	**black**	
D0 Master Disconnector, 1-pole		XX 980 381
D0 Master Disconnector, 3-pole		XX 980 383
50 A	**white**	
D0 Master Disconnector, 1-pole		XX 980 380
D0 Master Disconnector, 3-pole		XX 980 384
63 A	**copper**	
D0 Master Disconnector, 1-pole		XX 980 086
D0 Master Disconnector, 3-pole		XX 980 087

Function:

The Tytan D0 master disconnectors work on the same plug-in principle as the familiar HRC cutouts. Correct contact pressure for the fuse insert is set at the factory by means of spring loading; constant minimum resistance contact is thus ensured during entire service life. In contrast to the screw method, the multi-pole D0 master disconnectors are always all-pole disconnected by hand.

Features:

- Extensive range of types
  - 1 – 3-pole
  - 2 A – 63 A
  - without fuses
  - with insert
  - with fuse carrier
  - with mechanical indication
- Little Joule's heat loss
- Suitable for fuses D0 1 and D0 2
- Finger- and back-of-the-hand proof
- Terminal cross-section from 1.5 mm^2 to 35 mm^2

Mounting method:

- Snap-on fastening on DIN-rail to EN 50022 possible in all standard distribution panels.
- Any mounting position possible

Applications:

Power supply of domestic and utility buildings as well as industrial installations.

Note:

Fuse carriers of the old „screw cap type" are one of the biggest „generators of heat" in distribution boards.
This thermal problem is exacerbated if the carriers are not fully screwed down or if they work loose over time during operation. A loose screw carrier can be the cause of up to 30 watts of preventable energy loss.

Accessories:

- Fuse carrier set with mechanical indication
- Fuse carrier set with blink indicator
- Restart locking facility with cylinder lock
- Restart locking facility with plastic lock
- Also available with fuse monitoring

Technical data	Page 109
Dimensions	Page 117
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Empty Housing – Tytan

for D0 Master Disconnector

Function:

Empty housing for individual assembly.
The Tytan D0 master disconnectors work on the same plug-in principle as the familiar HRC cutouts. Correct contact pressure for the fuse insert is set at the factory by means of spring loading; constant minimum resistance contact is thus ensured during entire service life. In contrast to the screw method, the multi-pole D0 master disconnectors are always all-pole disconnected by hand.

There are two types of fuse carriers:

- In the case of fuse carriers with blink indicator, a flashing LED signals the outage of a D0 fuse.
- With mechanical indication, it is the same as with the standard screw-in type. A defective fuse can be identified by looking through the window provided.

Features:

- Designed for fitting 2 – 63A fuse carrier sets either with LED indicator or with mechanical indication
- Extensive range of types
- 1-pole, 1-pole+N, 2-pole, 3-pole, 3-pole+N
- Little Joule's heat loss (0.5 W per current path)
- Suitable for fuses D0 1 and D0 2
- Finger- and back-of-the-hand proof
- Terminal cross-section from 1.5 mm^2 to 35 mm^2

Mounting method:

- Snap-on fastening on DIN-rail to EN 50022 possible in all standard distribution panels.
- Any mounting position possible

Applications:

Power supply of domestic and utility buildings as well as industrial installations.

Note:

Fuse carriers of the old „screw cap type" are one of the biggest „generators of heat" in distribution boards. This thermal problem is exacerbated if the carriers are not fully screwed down or if they work loose over time during operation. A loose screw carrier can be the cause of up to 30 watts of preventable energy loss.

Accessories:

- Fuse carrier set with mechanical indication
- Fuse carrier set with blink indicator
- Restart locking facility with cylinder lock
- Restart locking facility with plastic lock
- Also available with fuse monitoring

Technical data	Page 109
Dimensions	Page 117
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Designation	Article-No.
1 – 63 A	
Empty Housing, 1-pole for D0 Master Disconnector	XX 980 101
Empty Housing, 1-pole+N for D0 Master Disconnector	XX 980 104
Empty Housing, 2-pole for D0 Master Disconnector	XX 980 102
Empty Housing, 3-pole for D0 Master Disconnector	XX 980 103
Empty Housing, 3-pole+N for D0 Master Disconnector	XX 980 105

Lockable Empty Housing – Tytan

for D0 Master Disconnector

Designation	Article-No.
1 – 63 A	
Lockable Empty Housing, 3-pole for D0 Master Disconnector	XX 980 106
Lockable Empty Housing, 3-pole+N for D0 Master Disconnector	XX 980 107

Function:

Empty housing for individual assembly.
The Tytan D0 master disconnectors work on the same plug-in principle as the familiar HRC cutouts. Correct contact pressure for the fuse insert is set at the factory by means of spring loading; constant minimum resistance contact is thus ensured during entire service life. In contrast to the screw method, the multi-pole D0 master disconnectors are always all-pole disconnected by hand. Some electricity companies make installation of the lockable type mandatory. Such locking can then only be carried out with the electricity company's special key.

Features:

- Designed for fitting 2 – 63 A fuse carrier sets either with LED indicator or with mechanical indication
- 3-pole, 3-pole+N
- Little Joule's heat loss
- Suitable for fuses D0 1 and D0 2
- Finger- and back-of-the-hand proof
- Terminal cross-section from 1.5 mm^2 to 35 mm^2

Mounting method:

- Snap-on fastening on DIN-rail to EN 50022 possible in all standard distribution panels.
- Any mounting position possible

Applications:

Power supply of domestic and utility buildings as well as industrial installations.

Note:

Fuse carriers of the old „screw cap type" are one of the biggest „generators of heat" in distribution boards. This thermal problem is exacerbated if the carriers are not fully screwed down or if they work loose over time during operation. A loose screw carrier can be the cause of up to 30 watts of preventable energy loss.

Accessories:

- Fuse carrier set with mechanical indication
- Fuse carrier set with blink indicator
- Restart locking facility with cylinder lock
- Restart locking facility with plastic lock

Technical data	Page 109
Dimensions	Page 117
Accessories	Page 80 - 82

Empty Housing with Fuse Monitor – Tytan

for D0 Master Disconnector

Function:

Empty housing for individual assembly.
The Tytan D0 master disconnectors work on the same plug-in principle as the familiar HRC cutouts. Correct contact pressure for the fuse insert is set at the factory by means of spring loading; constant minimum resistance contact is thus ensured during entire service life. In contrast to the screw method, the multi-pole D0 master disconnectors are always all-pole disconnected by hand. The fuse monitoring facility serves as operating mode indicator. In the event of a fuse outage the fuse monitor will send a message to an optional signalling device (buzzer, indicator lamp etc.). The fuse monitor ensures three-phase operation and thus provides additional protection for three-phase motors.

Features:

- Designed for fitting 2 – 63 A fuse carrier sets either with LED indicator or with mechanical indication
- Extensive range of types
- 1-pole, 1-pole+N, 2-pole, 3-pole, 3-pole+N
- LED green (ON), 1 normally-open contact 250 V / 5 A, electrically isolated
- LED red flashing (short-circuit), 2 change-over contacts, 250 V / 5 A each, electrically isolated
- Little Joule's heat loss
- Suitable for fuses D0 1 and D0 2
- Finger- and back-of-the-hand proof
- Terminal cross-section from 1.5 mm² to 35 mm²

Mounting method:

- Snap-on fastening on DIN-rail to EN 50022 possible in all standard distribution panels.
- Any mounting position possible

Applications:

Power supply of domestic and utility buildings as well as industrial installations.

Note:

Fuse carriers of the old „screw cap type" are one of the biggest „generators of heat" in distribution boards. This thermal problem is exacerbated if the carriers are not fully screwed down or if they work loose over time during operation. A loose screw carrier can be the cause of up to 30 watts of preventable energy loss.

Accessories:

- Fuse carrier set with mechanical indication
- Fuse carrier set with blink indicator
- Restart locking facility with cylinder lock
- Restart locking facility with plastic lock

Designation	Article-No.
1 – 63 A	
Empty Housing with fuse monitor, 1-pole for D0 Master Disconnector	XX 980 088
Empty Housing with fuse monitor, 1-pole+N for D0 Master Disconnector	XX 980 091
Empty Housing with fuse monitor, 2-pole for D0 Master Disconnector	XX 980 089
Empty Housing with fuse monitor, 3-pole for D0 Master Disconnector	XX 980 090
Empty Housing with fuse monitor, 3-pole+N for D0 Master Disconnector	XX 980 092

Technical data	Page 109
Dimensions	Page 117
Accessories	Page 80 - 82

D0 Fuse Carrier Set – Tytan

with Mechanical Indicator

Designation	Article-No.
2 A	
D0 Fuse Carrier Set with mechanical indicator, 3x2A	XX 980 120
4 A	
D0 Fuse Carrier Set with mechanical indicator, 3x4A	XX 980 121
6 A	
D0 Fuse Carrier Set with mechanical indicator, 3x6A	XX 980 122
10 A	
D0 Fuse Carrier Set with mechanical indicator, 3x10A	XX 980 123
16 A	
D0 Fuse Carrier Set with mechanical indicator, 3x16A	XX 980 124
20 A	
D0 Fuse Carrier Set with mechanical indicator, 3x20A	XX 980 125
25 A	
D0 Fuse Carrier Set with mechanical indicator, 3x25A	XX 980 126
35 A	
D0 Fuse Carrier Set with mechanical indicator, 3x35A	XX 980 127
50 A	
D0 Fuse Carrier Set with mechanical indicator, 3x50A	XX 980 128
63 A	
D0 Fuse Carrier Set with mechanical indicator, 3x63A	XX 980 129

Function:

This box is designed for fitting into the D0 empty housing and contains 3 plug-in holders, 3 inserts and 3 fuses with mechanical indicator. The box can be snap-fastened on to a DIN-rail and thus can also serve as a reserve box.

Features:

- Fits into the Tytan D0 empty housing
- Reserve box
- 3 fuses with mechanical indication
- 3 inserts
- 3 plug-in carriers
- 2 – 63 A, colour-coded

Mounting method:

- Snap-on fastening on DIN-rail to EN 50022 possible in all standard distribution panels.

Applications:

Power supply of domestic and utility buildings as well as industrial installations.

Technical data Page 109
Dimensions Page 117

D0 Fuse Carrier Set – Tytan

with Blink Indicator

Function:

This box is designed for fitting into the D0 empty housing and contains 3 plug-in holders, 3 inserts and 3 fuses with blink indicator. The flashing LED signals the outage of a D0 fuse. The box can be snap-fastened on to a DIN-rail and thus can also serve as a reserve box.

Features:

- Fits into the Tytan D0 empty housing
- Reserve box
- 3 fuses with flashing indicator
- 3 inserts
- 3 plug-in carriers
- 2 – 63 A, colour-coded

Mounting method:

Snap-on fastening on DIN-rail to EN50022 possible in all standard distribution panels.

Applications:

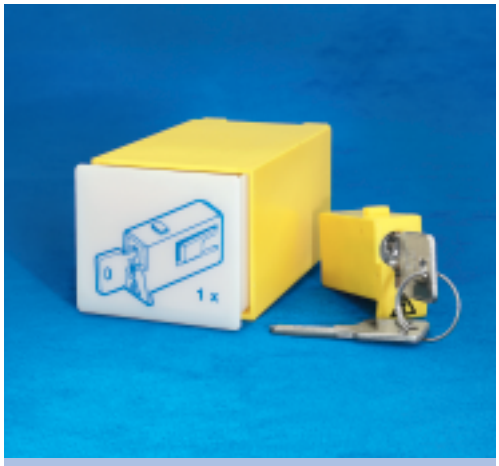
Power supply of domestic and utility buildings as well as industrial installations.

Designation	Article-No.
1 A	
D0 Fuse Carrier Set with blink indicator, 3x1A	XX 980 109
2 A	
D0 Fuse Carrier Set with blink indicator, 3x2A	XX 980 110
4 A	
D0 Fuse Carrier Set with blink indicator, 3x4A	XX 980 111
6 A	
D0 Fuse Carrier Set with blink indicator, 3x6A	XX 980 112
10 A	
D0 Fuse Carrier Set with blink indicator, 3x10A	XX 980 113
16 A	
D0 Fuse Carrier Set with blink indicator, 3x16A	XX 980 114
20 A	
D0 Fuse Carrier Set with blink indicator, 3x20A	XX 980 115
25 A	
D0 Fuse Carrier Set with blink indicator, 3x25A	XX 980 116
35 A	
D0 Fuse Carrier Set with blink indicator, 3x35A	XX 980 117
50 A	
D0 Fuse Carrier Set with blink indicator, 3x50A	XX 980 118
63 A	
D0 Fuse Carrier Set with blink indicator, 3x63A	XX 980 119

Technical data Page 109
Dimensions Page 117

D0 Restart Locking Facility – Tytan

with Cylinder Lock/Plastic Lock



Designation	Article-No.
D0 Restart Locking Facility with Cylinder Lock, 5A5, black	XX 980 130
D0 Restart Locking Facility with Cylinder Lock, 5A4, blue	XX 980 131
D0 Restart Locking Facility with Cylinder Lock, 5A3, green	XX 980 132
D0 Restart Locking Facility with Cylinder Lock, 5A1, red	XX 980 133
D0 Restart Locking Facility with Cylinder Lock, 5A2, yellow	XX 980 134

Function:

For securing the installation against restoring power when carrying out maintenance or repair work.
Setting the lock reliably prevents the accidental reconnection of mains voltage with the Tytan fuse disconnector by e.g. unauthorized personnel.
The lock is supplied with a storage box which can easily be snapped on to a DIN-rail.

Features:

Cylinder lock with 2 keys

Mounting method:

Snap-on fastening on DIN-rail to EN 50022 possible in all standard distribution panels.

Applications:

Power supply of domestic and utility buildings as well as industrial installations.

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Designation	Article-No.
D0 Restart Locking Facility with Plastic Lock, black	XX 980 135
D0 Restart Locking Facility with Plastic Lock, blue	XX 980 136
D0 Restart Locking Facility with Plastic Lock, green	XX 980 137
D0 Restart Locking Facility with Plastic Lock, yellow	XX 980 138
D0 Restart Locking Facility with Plastic Lock, red	XX 980 139

Function:

For securing the installation against restoring power when carrying out maintenance or repair work.
Setting the lock reliably prevents the accidental reconnection of mains voltage with the Tytan fuse disconnector by e.g. unauthorized personnel.
The lock is supplied with a storage box which can easily be snapped on to a DIN-rail.

Mounting method:

Snap-on fastening on DIN-rail to EN50022 possible in all standard distribution panels.

Applications:

Power supply of domestic and utility buildings as well as industrial installations.

Technical data Page 109
Dimensions Page 117

Doorbell Transformer RK

Function:

Transformers for converting the 230 V mains voltage into protective extra low-voltage (SELV as per IEC 60 364-4-410).

Features:

- Short-circuit resistant due to PTC
- Tested to EN 61558
- Certified by both VDE and KEMA, carries the ENEC-mark for use anywhere in Europe.

Mounting method:

- Snap-on fastening on DIN-rail to EN 50022 (2 modules) possible in all standard distribution panels.
- Any mounting position possible

Applications:

- AC power supply for
  - bell systems
  - locking systems
  - relay circuits
  - etc.

Notes:

- Restore operation after a short-circuit by briefly disconnecting the primary power input.
- With small loads, or idling, the output voltage may rise
- Only for transient loading
- In the case of permanent loads we recommend using safety transformers

Accessories:

- RKM 36
- Surface mounting set for RK 81, RK 81 S, RK 12, RK 12 S, RK 24
- RKM 54
- Surface mounting set for RK 3 U

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Designation	Article-No.
8 V	
RK 81, 1 A	XX 980 029
RK 81 S, 1 A	XX 980 030
4/8/12 V	
RK 12, 2/2/1,5 A	XX 980 033
RK 12 S, 2/2/1,5 A	XX 980 034
RK 3U, 3/2/2 A	XX 980 085
8/12/24 V	
RK 24, 2/1,3/0,6 A	XX 980 654
Accessories	
RKM 36, Surface mounting set for RK 81, RK 81 S, RK 12, RK 12 S, RK 24	XX 980 652
RKM 54, Surface mounting set for RK 3U	XX 980 653

Rotary Dimmer 500 VA LT 500 M

Designation	Article-No.
LT 500M	XX 500 224

Function:

Dimmer operated by a rotary knob for the power control of all standard types of illuminations, such as e.g. incandescent lamps, high-voltage and low-voltage halogen lamps with electric or conventional transformers.
For these resistive-inductive loads or resistive-capacitive loads the dimmer can work in a normal or reverse phase control mode. If the operating mode has been set incorrectly, or if a short-circuit occurs, the dimmer will automatically disconnect the load. In addition, the LT 500 M is equipped with thermal overload protection, electronic short-circuit cut-out, overvoltage protection and a soft-start function.
The device is also provided with electronic half-wave balancing and idle monitoring. This ensures the prevention of magnetic bias when conventional mains transformers are connected and of overvoltages when idling.

Features:

- Operated by integral rotary knob
- Dimming capacity: 15 VA – 500 VA
- 2 module widths only
- Phase control and reverse phase control dimmer
- Central On and Off function, memory function

Mounting method:

- Snap-on fastening on DIN-rail to EN 50022 (2 modules) possible in all standard distribution panels.
- Any mounting position possible

Applications:

- Lighting control in
  - Restaurants
  - etc.

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Dimensions Page 118

Remote Dimmer 420 VA RUD 1

actuated via external push-buttons

Function:

Remote dimmer for controlling the light intensity of all standard type of illuminations, such as e.g. incandescent lamps, high-voltage and low-voltage halogen lamps with electric or conventional transformers.
For these resistive-inductive loads or resistive-capacitive loads the dimmer can work in a normal or reverse phase control mode. If the operating mode has been set incorrectly, or in the event of a short-circuit, it will automatically disconnect the load. In addition, the RUD 1 is equipped with thermal overload protection, electronic short-circuit cut-out, overvoltage protection and a soft-start function.
The device is also provided with electronic half-wave balancing and idle monitoring. This ensures the prevention of magnetic bias when conventional mains transformers are connected and of overvoltages when idling.

Features:

- Actuation via standard push-buttons
- Dimming capacity: 15 VA – 420 VA
- 2 module widths only
- Phase control and reverse phase control dimmer
- Central On and Off function, memory function

Mounting method:

- Snap-on fastening on DIN-rail to EN 50022 (2 modules) possible in all standard distribution panels.
- Any mounting position possible

Applications:

- Lighting control in
  - Private houses
  - Banks
  - Hospitals
  - Restaurants
  - etc.

Designation	Article-No.
RUD 1	XX 500 028

Technical data Page 112
Dimensions Page 118

Remote Dimmer Control Unit RUD 2

Designation	Article-No.
RUD 2	XX 500 203

Function:

The RUD 2 functions as a control module for the remote dimmer load units LT 500 and LT 1200. Actuation of the RUD 2 is via standard push-buttons.

Features:

- Output: Puls Width Modulation (PWM) signal for actuating up to ten LT 500 and LT 1200 load units
- Small size (1 module)
- Central On and Off function, memory function

Mounting method:

- Snap-on fastening on DIN-rail to EN 50022 (2 modules) possible in all standard distribution panels.
- Any mounting position possible

Applications:

- In conjunction with the remote dimmer load units the RUD 2 controls lighting in
  - Private houses
  - Banks
  - Hospitals
  - Restaurants
  - etc.

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Dimensions Page 115

Remote Dimmer Power Units LT 500 and LT 1200

Function:

Power units for light intensity control of all standard type of illuminations, such as e.g. incandescent lamps, high-voltage and low-voltage halogen lamps with electric or conventional transformers.
If the operating mode has been set incorrectly, or in the event of a short-circuit, the LT 500 and LT 1200 will automatically disconnect the load. In addition, both devices are equipped with thermal overload protection, electronic short-circuit cut-out, overvoltage protection and a soft-start function.
The load output stages are also provided with electronic half-wave balancing and idle monitoring. This ensures the prevention of magnetic bias when conventional mains transformers are connected and of overvoltages when idling.
Up to 10 load units can be actuated via the PWM signal output of a remote dimmer, a dimmer control unit or a lighting scene control device, and can be operated either in a normal or reverse phase control mode. It is also permissible to connect two stages in parallel at the output side.
Selection of the output stages thus enables the control to be flexibly adapted to the lamp load.

Features:

- Parallel connection at output side of two LT 1200 possible (2400 VA)
- Dimming capacity LT 500: 15 VA – 500 VA (2 modules)
- Dimming capacity LT 1200: 15 VA – 1200 VA (4 modules)
- Phase control and reverse phase control dimmer

Mounting method:

- Snap-on fastening on DIN-rail to EN 50022 possible in all standard distribution panels.
- Any mounting position possible

Applications:

- Lighting control in buildings with extensive artificial lighting such as
  - Banqueting and theatre halls
  - Churches
  - Restaurants
  - etc.

Designation	Article-No.
LT 500	XX 500 226
LT 1200	XX 500 227

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Power Supply Unit NT 24-250

10000 EN 61008

Designation	Article-No.
NT 24-250	XX 500 162

Function:

The NT 24-250 power pack is primary pulsed, stabilized 24 V DC power supply and meet the requirement of electrical isolation between the protective low voltage and low-voltage side as specified in IEC 60 364-4-41.
They are overload as well as sustained short-circuit resistant and are equipped with indicators for such overload faults.
Once the fault in the output circuit has been remedied, they will automatically return to the normal operating status.

Features:

- Compact design
- High degree of efficiency
- Protective extra low voltage (SELV) conforming to IEC 60 364-4-41
- High stability of output voltage
- Overload proof
- Sustained short-circuit resistant
- Status and Overload indication via LEDs on front panel

Mounting method:

- Snap-on fastening on DIN-rail to EN 50022 possible in all standard distribution panels
- Any mounting position possible

Applications:

- Power supply unit for 24 V DC DIN-rail devices such as e.g. Dupline bus system, SI system etc.

Notes:

Basically, it is possible to connect several power supply units in parallel; in such cases however the total load capacity of the parallel-connected power supply units must be reduced by 10%.
Only a maximum of 3 power supply units of the same type, either NT 24-250 or NT 24-1300, may be connected in parallel.

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Power Supply Unit NT 24-1300

Function:

The NT 24-1300 power pack is primary pulsed, stabilized 24 V DC power supply and meet the requirement of electrical isolation between the protective low voltage and low-voltage side as specified in IEC 60 364-4-41.
They are overload as well as sustained short-circuit resistant and are equipped with indicators for such overload faults.
Once the fault in the output circuit has been remedied, they will automatically return to the normal operating status.

Features:

- Compact design
- High degree of efficiency
- Protective extra low voltage (SELV) conforming to IEC 60 364-4-41
- High stability of output voltage
- Overload proof
- Sustained short-circuit resistant
- Status and Overload indication via LEDs on front panel

Mounting method:

- Snap-on fastening on DIN-rail to EN 50022 possible in all standard distribution panels
- Any mounting position possible

Applications:

- Power supply unit for 24 V DC DIN-rail devices such as e.g. Dupline bus system, SI system etc.

Notes:

Basically, it is possible to connect several power supply units in parallel; in such cases however the total load capacity of the parallel-connected power supply units must be reduced by 10%. Only a maximum of 3 power supply units of the same type, either NT 24-250 or NT 24-1300, may be connected in parallel.

10000 -25 EN 61008

Designation	Article-No.
NT 24-1300	XX 500 163

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- Efficient
- Reliable
- Flexible
- Future-orientated
- Independent

50 Years of Innovation and German Quality

Twilight Switch DASY

Designation	Article-No.
10 A	
DASY 10, 10A	XX 500 013
16 A	
DASY 16, 16A	XX 500 012

Function:

Electronic twilight switch for daylight-dependent switching of electrical loads.

Features:

- Wide setting range for switching light levels as well as high stability of switching thresholds.
- A logarithmic setting characteristic, together with a LED to indicate when switching thresholds are reached, ensure fast and precise setting of the desired switching light levels over the complete range.
- Largely immune to optical feedback when lighting is switched on, due to the preset hysteresis between the threshold values for switch-on and switch-off light levels.
- Delayed switching reaction prevents unwanted switching as a result of temporary changes in environmental light levels.
- Rugged switching contact enables switching of e.g. parallel-compensated fluorescent illuminations.
- Generously dimensioned connecting space and cable feed-in at both top and bottom of the device to facilitate lead connection.

Mounting method:

- Surface-mounted housing for wall-mounting inside and outside

Applications:

Switching of lighting for paths, terraces, car parks, shop windows etc. upon onset of twilight, even at locations where no switched lead of the supply cable is available.

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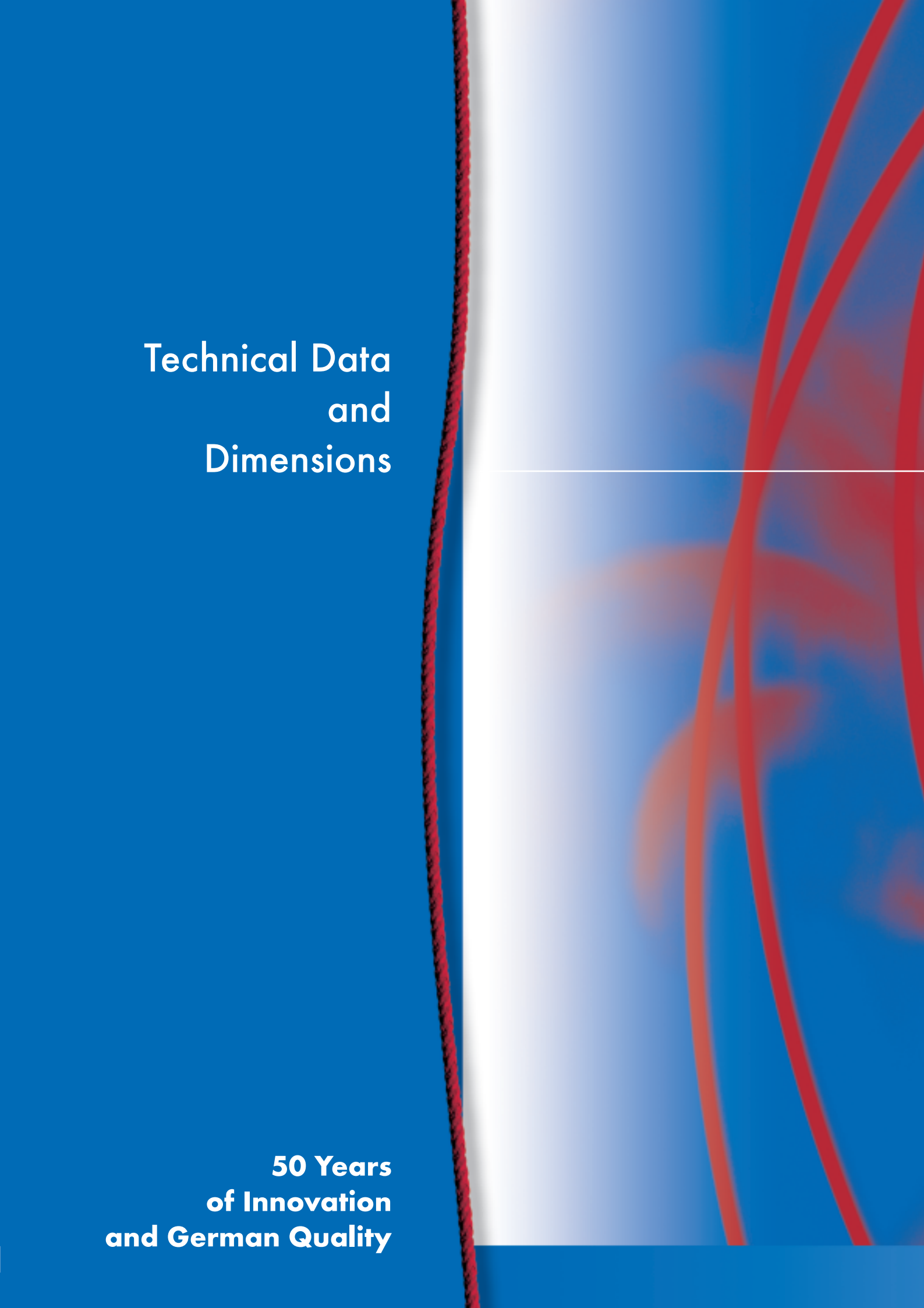
Dimensions Page 118

Technical Data and Dimensions

50 Years of Innovation and German Quality



Technical data	DFS 2, 2-pole / DFS 4, 4-pole						
Operating characteristic	Type A: AC and pulsating DC residual current ; Type AC: AC residual current						
Rated current I_n	16 A	25 A	40 A	63 A	80 A	100 A	125 A
Rated residual operating current $I_{\Delta n}$	0,01 A						
	0,03 A ; 0,1 A ; 0,3 A ; 0,5 A						
Resistance to surge current	0,5 µs / 100 kHz ring-wave-test						
Rated voltage U_n	230 V ~ / 400 V ~						
Max. allowable operational voltage	U_n + 10 %						
Rated frequency	50 Hz						
Working voltage range of test device	100 V ~ – 250 V ~						
Max. break time	1 x $I_{\Delta n}$: ≤ 300 ms ; 5 x $I_{\Delta n}$: ≤ 40 ms						
Rated making and breaking capacity I_m	500 A			800 A		1000 A	1250 A
Rated residual making and breaking capacity $I_{\Delta m}$	500 A			800 A		1000 A	1250 A
Rated conditional short-circuit current I_{nc} DFS 2	10 kA					6 kA	
Rated conditional residual short-circuit current $I_{\Delta c}$ DFS 2	10 kA					6 kA	
Rated conditional short-circuit current I_{nc} DFS 4	10 kA						
Rated conditional residual short-circuit current $I_{\Delta c}$ DFS 4	10 kA						
Short-circuit fuse Type „A“ Type „AC“	100 A/gL 63 A/gL			100 A/gL 100 A/gL		125 A/gL 125 A/gL	
Power dissipation DFS 2	0,3 W	0,8 W	1,8 W	4,3 W	7,0 W	11,5 W	17,9 W
Power dissipation DFS 4	0,6 W	1,4 W	3,7 W	8,3 W	13,1 W	21,2 W	29,8 W
Position of normal use	Any direction						
Degree of protection	IP 40 (after installation in distribution board)						
Resistance to mechanical shock and impact	20 g / 20 ms duration						
Resistance to mechanical vibration	> 5g (f ≤ 80 Hz, duration > 30 min.)						
Ambient temperature	- 25° C to + 40° C						
Climatic reliability	conforming to DIN IEC 60068-2-30: damp / heat cyclic (25° C / 55° C ; 93 % / 97 % rF)						
Terminal cross-sections Round wire, solid	1 x 1,5 – 50 mm² (1-cond. terminal); 2 x 1,5 – 16 mm² (2-cond. terminal)						
Stranded	1 x 1,5 – 50 mm² (1-cond. terminal); 2 x 1,5 – 16 mm² (2-cond. terminal)						
Fine-stranded	1 x 1,5 – 35 mm² (1-cond. terminal); 2 x 1,5 – 16 mm² (2-cond. terminal)						
Tightening torque of clamping screws	3 Nm						
Min. cross-sections of conductor						50 mm²	
Mechanical endurance	> 5000 switching cycles						
Electrical endurance	> 2000 switching cycles						
Design requirements	DIN VDE 0664, EN 61008, IEC 61008						

DFS 2, 2-pole	Page 6 - 13	DFS 4, 4-pole	Page 14 - 22
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Technical data	DFS 4B NK / DFS 4B SK						
Number of poles	4-pole						
Operating characteristic	Type B NK ; Type B SK						
Rated current I_n	16 A	25 A	40 A	63 A	80 A	100 A	125 A
Rated residual operating current $I\Delta n$	0,03 A ; 0,1 A ; 0,3 A ; 0,5 A						
Frequency range of tripping	0 – 1 MHz; selectable: 0 – 100 kHz						
Resistance to surge current	5 kA, impulse 8/20 µs						
Rated voltage U_n	230 V AC / 400 V AC						
Min. required operating voltage for detecting Type A residual currents for detecting Type B residual currents	0 V (mains voltage-independent)[2] 30 VAC						
Max. allowable operational voltage	U_n + 10 %						
Rated frequency	50 Hz						
Working voltage range of test device	185 V AC – 440 V AC						
Tripping times DFS 4B, DFS 4B SK	1 x $I\Delta n$: ≤ 300 ms ; 5 x $I\Delta n$: ≤ 40 ms						
Response time delay DFS 4B SK S	1 x $I\Delta n$: 130 ms < T ≤ 500 ms ; 5 x $I\Delta n$: 50 ms < T ≤ 150 ms						
Rated making and breaking capacity I_m	500 A			800 A		1000 A	1250 A
Rated residual making and breaking capacity $I\Delta m$	500 A			800 A		1000 A	1250 A
Rated conditional short-circuit current I_{nc}	10 kA						
Rated conditional residual short-circuit current $I\Delta c$	10 kA						
Short-circuit fuse to DIN VDE 0636 / IEC 60269-1	100 A/gL					125 A/gL	
Power dissipation	0,5 W	1,2 W	2,9 W	7,2 W	12 W	18 W	28 W
Power consumption	max. 3,5 W						
Supply terminals	terminals N, 3, 5, 7[1]						
Position of normal use	optional						
Degree of protection	IP 40 (after installation in distribution board)						
Resistance to mechanical shock and impact	20 g / 20 ms duration						
Resistance to mechanical vibration	> 5g (f ≤ 80 Hz, duration > 30 min.)						
Ambient temperature	- 25° C to + 40° C						
Climatic reliability	conforming to IEC 68 - 2 - 30: damp / heat cyclic (25° C / 55° C ; 93 % / 97 % rel. hum., 28 cycles)						
Terminal cross-sections Round wire, solid Stranded Fine-stranded	1 x 1,5 – 50 mm² (1-wire connect.); 2 x 1,5 – 16 mm² (2-wire connect.) 1 x 1,5 – 50 mm² (1-wire connect.); 2 x 1,5 – 16 mm² (2-wire connect.) 1 x 1,5 – 50 mm² (1-wire connect.); 2 x 1,5 – 16 mm² (2-wire connect.)						
Tightening torque of clamping screws	3 Nm						
Min. cross-sections of conductor						50 mm²	
Mechanical endurance	> 5000 switching cycles						
Electrical endurance	> 2000 switching cycles						
Design requirements	DIN VDE 0664 Pt. 10, E DIN VDE 0664 Pt. 100						
Elektromagnetic compatibility	DIN VDE 0664 Pt. 30; DIN VDE 0839 Pt. 6 – 2 (interference resistance – industrial environment)						

[1] Recommended for simple insulation tests at the installation side as it then possible by switching off the DFS 4B SK to isolate the internal overvoltage protection elements from the load end of the installation.
[2] At mains voltages below 30 VAC tripping for residual currants of Type A and AC is ensured by means of a mains voltage-independent function.

DFS 4B NK / DFS 4B SK	Page 24/29
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Technical data		DFL 8 A (X)				
Rated current I_n		100 A	125 A	160 A	200 A	250 A
Rated residual operating current $I_{\Delta n}$	DFL 8 A DFL 8 A X	0,03 A adjustable: 0,3 A ; 0,5 A ; 1,0 A ; 3,0 A				
Rated operational voltages U_e		400 / 690 V AC				
Rated frequency		50 Hz				
Number of poles		4-pole				
Rated impulse withstand voltage U_{imp}		8 kV				
Short-circuit fuse to IEC 60269-1		250 A/gL				
Impact resistance		20 g / 20 ms duration (IEC 60068-2-27)				
Vibration resistance		1,0 g (f = 2 – 100 Hz) (IEC 60068-2-6)				
Degree of protection		IP 20				
Position of normal use		vertical (N-left), or 90° tilted				
Supply terminals		any				
Ambient temperature		- 25° C to + 70° C				
Environmental testing		IEC 60068				
Dry heat		IEC 60068-2-2				
Humid heat	constant cyclic	IEC 60068-2-78 IEC 60068-2-30				
Terminals	solid-core multi-core	1 x 2,5 – 16 mm²; 2 x 4 – 16 mm² 1 x 25 – 185 mm²; 2 x 25 – 70 mm²				
Tightening torque		14 Nm				
Service life, mechanical		> 2000 switching cycles				
Service life, electrical		> 2000 switching cycles				
Design requirements	overload trip residual current trip	VDE 0660 / EN 60947-2 VDE 0660 / EN 60947-2 Annex B				
Electromagnetic compatibility		EN 60947				
Residual current protection						
Detection range of residual current		50 Hz ~ ⎍				
Working range of test circuit		280 V AC – 690 V AC				
Surge current resistance		5 kA				
Response times	DFL 8 A DFL 8 A X at 2 x $I_{\Delta n}$	1 x $I_{\Delta n}$ ≤ 300 ms ; 5 x $I_{\Delta n}$ ≤ 40 ms range I = 60 – 120 ms range III = 300 – 420 ms range II = 150 – 250 ms range IV = 450 – 600 ms				
Short-time delay	DFL 8 A	Short time delay / G-characteristic ≤ 10 ms				
Auxiliary switch		1 NOC / M22-K10 + 1 NCC / M22-K01				
Power rating auxiliary switch		AC-15: 230 V/6 A; 400 V/4 A; 500 V/2 A DC-13: 24 V/3 A; 110 V/0,8 A; 220 V/0,3 A				
Rated impulse withstand voltage U_{imp}		6 kV				
Rated insulation voltage U_i		500 V				
Terminals: solid-core and multi-core		1 x 0,75 – 2,5 mm²; 2 x 0,75 – 1,5 mm²				
Tightening torque		≤ 0,8 Nm				
Circuit-breaker						
Dissipated power P_V (typ.)		35 W	43 W	55 W	72 W	85 W
Rated ultimate short-circuit breaking capacity I_{cu}		85 kA at 240 V AC 50 kA at 400/415 V AC		35 kA at 440 V AC 25 KA at 525 V AC	20 kA at 690 V AC	
Rated service short-circuit breaking capacity I_{cs}		85 kA at 240 V AC 50 kA at 400/415 V AC		35 kA at 440 V AC 25 kA at 525 V AC	10 kA at 690 V AC	
Rated residual short-circuit making an breaking capacity $I_{\Delta m}$		85 kA at 240 V AC 50 kA at 400/415 V AC		35 kA at 440 V AC 25 kA at 525 V AC	20 kA at 690 V AC	
Current-setting range of an overload release life conductor		80-100 A	100-125 A	125-160 A	160-200 A	200-250 A
Current-setting range of an overload release neutral conductor		80-100 A	100-125 A	125-160 A	160-200 A	200-250 A
Current-setting range of an short-circuit release		600-1000 A	750-1250 A	960-1600 A	1200-2000 A	1500-2500 A

DFL 8 A (X) Page 30 - 33
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Technical data		DFL 8 B (X)				
Rated current I_n		100 A	125 A	160 A	200 A	250 A
Rated residual operating current $I_{\Delta n}$	DFL 8 B DFL 8 B X	0,03 A adjustable: 0,1 A ; 0,5 A ; 1,0 A				
Rated operational voltages U_e		230 / 400 V AC				
Rated frequency		50 Hz				
Number of poles		4-pole				
Rated impulse withstand voltage U_{imp}		4 kV				
Short-circuit fuse to IEC 60269-1		250 A/gL				
Impact resistance		20 g / 20 ms duration (IEC 60068-2-27)				
Vibration resistance		1,0 g (f = 2 – 100 Hz) (IEC 60068-2-6)				
Degree of protection		IP 20				
Position of normal use		vertical (N-left), or 90° tilted				
Supply terminals		any				
Ambient temperature		- 25° C to + 70° C				
Environmental testing		IEC 60068				
Dry heat		IEC 60068-2-2				
Humid heat	constant cyclic	IEC 60068-2-78 IEC 60068-2-30				
Terminals	solid-core multi-core	1 x 2,5 – 16 mm²; 2 x 4 – 16 mm² 1 x 25 – 185 mm²; 2 x 25 – 70 mm²				
Tightening torque		14 Nm				
Service life, mechanical		> 2000 switching cycles				
Service life, electrical		> 2000 switching cycles				
Design requirements	overload trip residual current trip	VDE 0660 / EN 60947-2 VDE 0660 / EN 60947-2 Annex B				
Electromagnetic compatibility		EN 60947				
Residual current protection						
Rated residual operating current $I_{\Delta n}$	DFL 8 B DFL 8 B X	0,03 A 0,1 A ; 0,3 A ; 1,0 A				
Detection range of residual current		~ 0 – 100 kHz ; ⎍ 50 Hz				
Min. operation voltage for detecting type A/AC residual currents for detecting type B residual currents		0 V (mains voltage-independent) 50 V AC				
Power consumption		2,5 – 3 W				
Working range of test circuit		50 V AC – 400 V AC				
Surge current resistance		5 kA				
Response times	DFL 8 B DFL 8 B X at 2 x $I_{\Delta n}$	1 x $I_{\Delta n}$ ≤ 300 ms ; 5 x $I_{\Delta n}$ ≤ 40 ms range I = 60 – 120 ms range III = 300 – 420 ms range II = 150 – 250 ms range IV = 450 – 600 ms				
Auxiliary switch		1 NOC / M22-K10 + 1 NCC / M22-K01				
Power rating auxiliary switch		AC-15: 230 V/6 A; 400 V/4 A; 500 V/2 A DC-13: 24 V/3 A; 110 V/0,8 A; 220 V/0,3 A				
Rated impulse withstand voltage U_{imp}		6 kV				
Rated insulation voltage U_i		500 V				
Terminals: solid-core and multi-core		1 x 0,75 – 2,5 mm²; 2 x 0,75 – 1,5 mm²				
Tightening torque		≤ 0,8 Nm				
Circuit-breaker						
Dissipated power P_V (typ.)		35 W	43 W	55 W	72 W	85 W
Rated ultimate short-circuit breaking capacity I_{cu}		85 kA at 240 V AC 50 kA at 400/415 V AC			35 kA at 440 V AC	
Rated service short-circuit breaking capacity I_{cs}		85 kA at 240 V AC 50 kA at 400/415 V AC			35 kA at 440 V AC	
Rated residual short-circuit making an breaking capacity $I_{\Delta m}$		85 kA at 240 V AC 50 kA at 440 V AC			35 kA at 440 V AC	
Current-setting range of an overload release life conductor		80-100 A	100-125 A	125-160 A	160-200 A	200-250 A
Current-setting range of an overload release neutral conductor		80-100 A	100-125 A	125-160 A	160-200 A	200-250 A
Current-setting range of an short-circuit release		600-1000 A	750-1250 A	960-1600 A	1200-2000 A	1500-2500 A

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Technical data	DHi 1 / DHi 2
Rated Voltage U_n	230 V AC / 110 V DC
Rated Current I_n	6 A AC / 1 A DC
Terminal cross-sections	1 – 1,5 mm²
Tightening torque of clamping screws	0,8 Nm

DHi 1	Page 64	DHi 2	Page 38
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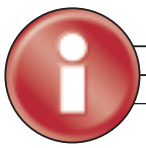
Different technical data to the table DFS 2 / DFS 4 (page 94)

Technical data	DFS 2 KV / DFS 4 KV
Resistance to surge current	3000 A / impulse 8/20 µs

Technical data	DFS 2 S / DFS 4 S				
Rated current I_n	40 A	63 A	80 A	100 A	125 A
Rated residual operating current $I\Delta n$	0,1 A ; 0,3 A ; 0,5 A				
Resistance to surge current	3000 A / impulse 8/20 µs				

Technical data	DFS 4 V 500				
Rated current I_n	16 A	25 A	40 A	63 A	80 A
Short-circuit fuse	63 A/gL			100 A/gL	



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Technical data	DMD 1
Rated operating voltages U_e	230 V
Rated frequency	50 – 60 Hz
Residual current sensitivity	Type A; AC 50 Hz; pulsating DC 50 Hz
Rated residual operating current $I\Delta n$	30 mA
Transformer diameter internal	25 mm
Semiconductor outputs	connection for external DMD-P panel
Power-on indicator	green LED
Fault indicator	red LED
Actuators	test button
Surge current immunity	> 250 A (8/20 µs)
Terminals	max. 2,5 mm²
Degree of protection	IP 40
Ambient temperature	- 25° C to + 40° C
Design requirements	IEC / EN 62020

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Technical data	DMD 2	DMD 2 E			
Rated operating voltages U_e	230 V				
Rated frequency	50 Hz				
Residual current sensitivity	Type A; AC 50 Hz; pulsating DC 50 Hz				
Rated residual operating current $I\Delta n$	adjustable: 30 mA, 100 mA, 300 mA, 1000 mA				
Limit value (response threshold)	adjustable: 10 – 100 %				
Response delay t_v at $I\Delta n$	adjustable 0,1 s ... 1 s				
Actuating time at t_v = 0,1 s	1 x $I\Delta n \leq$ 100 ms; 5 x $I\Delta n \leq$ 40 ms				
Transformer diameter internal	25 mm				
Transformer external		DWP 35	DWP 70	DWP 105	DWP 140
Transformer diameter external		35 mm	70 mm	105 mm	140 mm
Max. cable length to transformer		50 m at 0,5 mm²			
Relay output	1 change-over contact, 250 V / 6 A				
Semiconductor outputs	connection for external DMD-P panel (max. loading capacity 10 mA, short-circuit resistant)				
Power-on indicator	green LED				
Fault indicator	red LED				
Actuators	test button, residual current switch, potentiometer for residual current and delay time				
Response threshold	10-fold LED indicator bar, 10 – 100 % static indicator, resolution 10 %				
Residual current $I\Delta$	10-fold LED indicator bar, 10 – 100 % flashing indicator, resolution 5 %				
Surge current immunity	> 250 A (8/20 µs)	> 3 kA (8/20 µs)			
Terminals	max. 2,5 mm²				
Degree of protection	IP 40				
Ambient temperature	- 25° C to + 65° C				
Design requirements	IEC / EN 62020				

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Technical data	DMD 3-1 B	DMD 3-2 B
Rated operating voltages U_e	85 V – 264 V	
Rated frequency	50 – 60 Hz	
Residual current sensitivity	Type B; AC / DC 0 – 100 Hz; pulsating DC 50 Hz	
Rated residual operating current $I\Delta n$	settable: 30 mA, 100 mA, 300 mA	settable: 300 mA, 500 mA, 1000 mA
Response threshold, main alarm	100 % of selected rated residual current	
Response threshold, prelim. alarm	adjustable: 10 – 90 % $I\Delta n$	
Response delay t_v at 2 x $I\Delta n$	adjustable 0,1 s ... 1 s	
Transformer diameter internal	25 mm	
Relay output main alarm preliminary alarm	electrically isolated relay contacts 1 change-over contact 230 V / 2 A 1 change-over contact 230 V / 2 A	
Power-on indicator	green LED	
Fault indicator	red LED; flashing indicator; relay outputs	
Actuators	test button, reset-prog. button, switch for residual current, potentiometer for preliminary current and delay time	
Response threshold indication, prelim. alarm	10-fold LED indicator bar, 10 – 90 %	
Residual current $I\Delta$ indication	10-fold LED indicator bar, 10 – 100 %	
Surge current immunity	> 3 kA (8/20 µs)	
Terminals	max. 2,5 mm²	
Degree of protection	IP 40	
Ambient temperature	- 25° C to + 40° C	
Others	automatic reconnection after power is restored	
Design requirements	IEC / EN 62020	

DMD 3-1 B / DMD 3-2 B	Page 46/47
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Technical data	DMD P
ON indicator	yellow LED
Alarm indicator	– visual: flashing red LED – acoustic: intermittent tone
Acoustic alarm	can be cancelled with reset button
Installation	flush-mounted / surface mounted

DMD P	Page 48
Dimensions	Page 115

Technical data	SIR 16M
Rated voltage	24 V DC ± 10 %
Power consumption	100 m W (On) / 0 W (Off)
Control voltage	24 V DC ± 10 %
Control current	max. 4 mA
Required trigger impulse length	min. 20 ms
Output data	
Type of contact	single pole floating NO micro gap
Rated voltage	250 V
Rated current	16 A
Making and breaking capacity (>100.000 operation cycles)	
Incandescent lamps	3700 W
Fluorescent lamps - uncompensatet or lead-lag ballast - parallel compensatet	 3200 VA 2300 VA
Mercury vapour lamps	2300 VA
Max. capacitor for parallel compensation	70 µF
Power dissipation at rated load	2,5 W
Overload protection	none
Make delay	20 ms
Break delay	25 ms
Housing	Polycarbonat, gray 1 pitch
Mounting	on rail (EN 50022) in distribution boards, 1 pitch
Position of normal use	arbitrary
Degree of protection	IP 40 (after fitting in distribution board)
Terminals	screw types, 1x supply+, supply-, 1x L_{IN}, L_{OUT}, 1x control input
Tightening torque	0,5 Nm
Nominal cross-sectional area	1x 2,5 mm² rigid conductors, 1x 1,5 mm² flexible conductors
Smallest possible conductor size	0,4 mm in diameter
Control inputs	A1 for momentary contact switch
Lenght of control wires	1000 m
On-Off indicator	by LED
Further indicators	none
Actuators	none
Ambient temperature	- 25° C to + 45° C
Design requirements	IEC 60669
Approvals	none

SIR 16M	Page 48
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Technical data	FIB/FIC 1 p+N	FIB/FIC 3 p+N
Number of poles	1 p+N	3 p+N
Design requirements	EN 61009, IEC 1009	
Rated voltage	~ 230 V	~ 400 V
Rated frequency	50 Hz	50 / 60 HZ
Residual current sensitivity		
AC residual current	Type AC	
AC and pulsating DC residual currents	Type A	
Energy limiting class	3	
Rated breaking capacity / short circuit resistance	10 kA	6 kA
Tripping characteristic	B and C	
Back-up fuse	100 A/gL	
Contact cross-section	1 – 25 mm²	
Enclosure protection type, installed	IP 40	
Ambient temperature	- 25° C to + 40° C	
Tightening torque of connecting terminals	2 – 2,4 Nm	
Mounting	on DIN EN 50022 rail	

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Technical data	Hi11 for FIB/FIC 2-pole
Contact function	1 NOC, 1 NCC
Rated operating voltage	250 V AC / DC
Rated insulation voltage	250 V
Min. operating current	10 mA
Min. voltage per switching track	5 V AC / DC
Rated current	6 A
Qualified short-circuit current	1000 A
AC 15 mode	2 A / 250 V
AC 13 mode	3 A / 250 V
DC 12 mode	0,5 A / 110 V
Conductor cross-section	max. 2,5 mm^2 flexible conductors only with wire and ferrule
Tightening torque of terminals	0,8 – 1 Nm
Module width	9 mm
Dimension of base	80 mm
Cover fitting dimension	45 mm

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Technical and mechanical data	FAM 1 for FIB/FIC 2-pole
Technical data	
Rated voltage	230 (400) V AC
For combined RCCB / MCBs with rated residual op. current	0,01 – 0,3 A
Operating range	230 – 400 V ± 10 % AC
Mechanical data	
Retrofittable, housing width	0,5 module
Terminals	4 lift terminals, 1 x 1 mm^2 – 2 x 2,5 mm^2 terminals W1 / W2 resist. + switching contact
Terminal torque	0,8 – 1 Nm

FAM 1	Page 55
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Technical data	DLS 5, B + C Characteristic
Number of poles	1-pole; 1-pole+N; 2-pole; 3-pole; 3-pole+N; 4-pole
Operating characteristics	B and C
Rated current I_n B characteristic: C characteristic:	6 A; 10 A; 13 A; 16 A; 20 A; 25 A; 32 A; 40 A; 50 A; 63 A 0,5 A; 1 A; 2 A; 4 A; 6 A; 10 A; 13 A; 16 A; 20 A; 25 A; 32 A; 40 A; 50 A; 63 A
Rated voltage U_n	230 / 400 V AC, 60 V DC
Min. operating voltage	$U_{Bmin.}$ = 12 V AC / 12 V DC
Max. operating voltage	$U_{Bmax.}$ = 250 / 440 V AC, 60 V DC
Rated frequency	16 2/3 – 60 Hz at 400 Hz the response value of the magnetic switch is increased by approx. 30 %
Rated short-circuit capacity I_{cn}	10 kA 6 – 63 A 10 kA C 0,5 – 4 A as conforming to EN 60898
Back-up protection Protection against short-circuit currents exceeding the breaking capacity limit (EN 60947-2, IEC 947-2)	up to I_k = 50 kA C: I_n 0,5 – 4 A with BF* 20 A B, C: I_n 6 – 10 A with BF* 80 A B, C: I_n 13 – 32 A with BF* 100 A B, C: I_n 40 – 63 A with BF* 125 A The installation specifications of DIN VDE 0100 must be observed *BF = back-up fuse NHgG
Resistance to surge voltage	5 kV (1,2 / 50 µs)
Resistance to alternating surge voltage	3 kV (50 to 60 Hz)
Position of normal use	optional
Degree of protection	IP 20, with cover IP 40
Ambient temperature, daily average	T_{max} = + 55° C ; T_{min} = - 25° C
Tightening torque of clamping screws	2 Nm
Electrical / mechanical endurance	min. 4000 switching cycles
Design requirements	DIN VDE 0641 Part 11, EN 60898, IEC 893 B, C: EN 60947-2, IEC 947-2
Mounting	on rail conforming to EN 50022; W = 35 mm

Technical data	MCB, D Characteristic
Number of poles	1-pole; 1-pole+N; 2-pole; 3-pole; 3-pole+N; 4-pole
Operating characteristic	D
Rated current I_n	1 A; 2 A; 4 A; 6 A; 10 A; 13 A; 16 A
Rated voltage U_n	240 / 415 V AC, 1-pole 60 V DC 2-pole 125 V DC with both poles connected in series
Min. operating voltage	$U_{Bmin.}$ = 12 V AC / 12 V DC
Max. operating voltage	$U_{Bmax.}$ = 250 / 440 V AC, 60 V DC
Rated frequency	16 2/3 to 60 Hz With higher frequencies the electromagnetic response values will be increased – by a factor of approx. 1,1 at 100 Hz; 1,2 at 200 Hz ; 1,4 at 400 Hz, for DC 1,5-fold
Rated short-circuit capacity I_{cn}	10 kA / 15 kA
Back-up protection up to 50 kA	At all rated currents with a max. 100 A back-up fuse
Resistance to surge voltage	5 kV (1,2 / 50 µs)
Resistance to alternating surge voltage	3 kV (50 / 60 Hz)
Position of normal use	optional
Degree of protection	IP 20
Ambient temperature	- 25° C to + 55° C
Tightening torque of clamping screws	max. 2 Nm
Mechanical endurance	20000 switching cycles (20000 each switching On and Off)
Design requirements	10 kA as per IEC 60898, EN 60898, VDE 0641
Mounting	on rail conforming to DIN EN 60715, W = 35 mm

DLS 5, B Characteristic	Page 58/59	DLS 5, C Characteristic	Page 60/61	MCB, D Characteristic	Page 62/63
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Technical data	DFA
Rated voltage	24 V AC or 24 V DC ± 10 % at different terminals
Power consumption	ca. 1,8 W
Short term current input	1 A (while motor activity)
Control voltage	24 V DC (generated by DFA)
Control current	1 mA
Required trigger impulse length	min. 60 ms
Output data	
Relay outputs	
Type of contacts (status indicator)	single pole non-floating NO micro gap
Rated voltage	24 V AC or DC
Rated current	1 A
Output for remote trip	generates adjustable residual current to trip RCCB by connecting crossover to L and N from RCCB
Semiconductor output	
Type of contact	small signal semiconductor, open collector
Rated current	50 mA by external pull-up resistor to 24 V
Housing	Polyamid, grey
Mounting	on rail (EN 50022) in distribution boards, 4 pitch
Degree of protection	IP 30 (after fitting in distribution board)
Terminals	screw types
Tightening torque	0,5 Nm
Nominal cross-sectional area	1x 2,5 mm² rigid conductors, 1x 1,5 mm² flexible conductors
Smallest possible conductor size	0,4 mm in diameter
Control inputs	- start making operation - start breaking operation - remote tripping test
Control outputs (relay)	- RCCB / MCB in closed position - RCCB / MCB in opened position - RCCB / MCB has tripped
Control outputs (semiconductor)	External operation indicator (e.g. LED)
Operation indicator	by LED
Further indicators	Status by different flashing frequencies of the operation LED
Actuators	rotary switch for mode: - on: device is only following control commands - auto: device follows control commands and resets automatically 15 s after tripping, up to 3 times - off: device doesn't accept control commands (e.g. while maintenance)
Ambient temperature	- 25° C to + 60° C
Design requirements	IEC 60669
Approvals	none

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Technical data	DHS 2		DHS 4	
Number of poles	2-pole		4-pole	
Rated duty	continuous duty			
Rated operational current I_e	nominal current			
Utilization category	AC 22 A			
Rated operational voltage U_e	230 V / 400 V			
Max. operational voltage U_i	U_n + 10 %			
Rated insulation voltage U_i	400 V			
Rated frequency	50 Hz / 60 Hz			
Rated impulse withstand voltage U_{imp}	4 kV			
Rated short-time withstand voltage I_{cw}	3 x I_n			
Rated short-circuit making capacity I_{cm}	10 kA			
Rated short-circuit current I_{nc}	10 kA			
Rated current I_n	63 A	80 A	100 A	125 A
Back-up fuse	100 A	100 A	125 A	125 A
Back-up fuse, short-circuit protection as per DIN VDE 0636	100 A/gL		125 A/gL	
Resistance to mechanical shock and impact	20 g / 20 ms duration			
Resistance to mechanical vibration	> 5 g (f < 80 Hz, duration > 30 min)			
Ambient temperature	- 25° C to + 40° C			
Climatic reliability	conforming to DIN IEC 60068-2-30: damp, heat cyclic (25° C / 55° C ; 93 % / 97 % rel. hum., 28 cycles)			
Positioning, direction of input	optional			
Terminal cross-sections Round wire, solid Stranded Fine-stranded	 1 x 1,5 - 50 mm² (1-wire connect.) ; 2 x 1,5 - 16 mm² (2-wire connect.) 1 x 1,5 - 50 mm² (1-wire connect.) ; 2 x 1,5 - 16 mm² (2-wire connect.) 1 x 1,5 - 35 mm² (1-wire connect.) ; 2 x 1,5 - 16 mm² (2-wire connect.)			
Tightening torque of clamping screws	3 Nm			
Terminal cross-section			50 mm²	
Enclosure protection type	IP 40			
Mechanical endurance	> 10000 switching cycles			
Electrical endurance	> 1500 switching cycles			
Design requirements	DIN EN 60947-1		DIN EN 60947-3	

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Technical data	DIS
Number of poles	1 to 4 poles
Rated current I_n	16 to 100 A
Rated short-circuit current I_{nc}	25 kA with 100 A/gL back-up fuse
Utilization category	AC 22
Rated voltage	240 / 415 V
Rated frequency	50 / 60 Hz
Switching capacity	1,25 x I_n ; 1,1 x U_n
Enclosure protection type	IP 40 (installed condition)
Terminal cross-section	max. 50 mm^2
Terminals	shock-hazard protection acc. to DIN VDE 0106 (VBG 4)
Disconnection	position switch with positive opening operation acc. to DIN VDE 0113

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Technical data	RWZ 12 11.13
Rated voltage	230 V AC
Rated current	5 (25) A
Rated freguency	50 – 60 Hz with blocked inverse counting
Power consumption	approx. 0,5 W
Voltage working limit range	195 V to 253 V
Starting current with cos. φ	= 1 typical 22 mA
Wiring of passive impulse-output	As per S0-conditions of DIN 43864 standards: 18 V to 27 V, max. 27 mA; Impulse length ≥ 30 ms; + lead to terminal 20
Interface	S0-optical coupler (as per DIN 43864)
Pulse value	R_A = 0,5 or 1 Wh / Imp. (see meter)
Display	5 digits for kWh and 1 decimal
Accuracy	Class 1
Installation	For mounting on rail conforming to DIN EN 50022
Width of housing	18 mm
Limits of ambient temperature	- 20° C to + 50° C
Max. relative air humidity	Average year value 75 %, short time value 95 %
Design requirements	IEC 1036, EN 61036, PTB-approval pending

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Technical data	RDZ 34.52.41
Rated voltage	3x 230 / 400 V AC
Rated current	5 (65) A
Rated freguency	50 Hz with blocked inverse counting
Power consumption	approx. 0,6 W
Limits of voltage range each phase against neutral	184 V to 265 V
Starting current with cos. φ	= 1 = 1 typical 14 mA, harmonics considered until 7 kHz
Wiring of passive impulse-output interface	As per S0-conditions of DIN EN 62053-31 standards: 18 V to 27 V, max. 27 mA; pulse length ≥ 30 ms; + lead to terminal 20 (S0+), pulse signal out on terminal 21 (S0-)
Pulse interface	S0 according to DIN EN 62053-31
Pulse rate electrical	R_A = 1 Wh / Imp.
Pulse rate optical	Red LED; R_L = 1 Wh / Imp. Red LED is showing continue light, as soon as power supply is connected without load and change to flashing synchronous 1 Wh / Imp. = R_L
Display	Drumtype register with 5 digits kWh plus 1 decimal digit
Accuracy	Class index 1, class index 2
Installation	For mounting on rail conforming to DIN EN 50022
Width of housing	90 mm
Limits of ambient temperature	- 20° C to + 50° C
Max. relative air humidity	Average year value 75 %, short time value 95 %
Design requirements	EN 62052-11, CE and EN 62053-21, PTB-approval pending

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Technical data	D0 Master Disconnector
Rated operating voltage U_e	400 V AC 1-pole up to 110 V DC 2-pole up to 220 V DC
Rated operating current I_e	63 A
Rated constant current I_u	63 A
Overvoltage category / contamination level	IV / 3 (DIN VDE 0110)
Rated surge capacity U_{imp}	6000 V
Heat loss per current path at I_e	0,5 W
Connection	stainless steel – cage terminal
Tightening torque / screw type	max. 4 Nm / M6 pozidriv
Fixed terminal cross-sections	min. 1,5 / max. 35 mm^2
Rated short-circuit making capacity I_{cm}	50 kA eff.
Switching category	AC 22 B DC 21 B
Specifications	DIN VDE 0660, 0636, 0638, 43880, EN 60947, IEC 60947-3, IEC 60269-3
Test mark	VDE
Number of poles	1-pole, 2-pole, 3-pole, 1-pole+N, 3-pole+N
Handling	without fuse-carrier plug-in system, similar to HRC
Suitable for fuses gL, gG, aM	DO 1: 1*, 2, 4, 6, 10, 16 A (* = non-standard) DO 2: 20, 25, 35, 50, 63
Ambient temperature	- 25° C to + 60° C
Insulation components	plastic, free of halogen, phosphorus and silicone
Fire classification / creep resistance	UL 94 IVO, filament test 960° C / CTI 600
Enclosure protection / contact protection	IP 20 / finger and back of the hand protection
TYTAN II Relay Part – Main Protection	
Operating voltage range	24 – 240 V AC / DC
Operating voltage tolerance	- 10 / + 10 %
Power consumption	5 W
Frequency	50 – 60 Hz
Operation indicator	
Mains	1 LED
Malfunction	1 LED
Duty cycle	100 % continuous
Response delay	approx. 100 ms
Recovery time	approx. 100 ms
Relay contact	2 change-over contacts 5 A / 250 V
Rated surge voltage resistance U_{imp}	4000 V
Special features	
Fault indication	reliable via opto-electrical flashing indicator
Reconnection	immediately via spare box

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Technical data	RK 81 / 81 S / 12 / 12 S / 3 U / 24
Primary voltage	230 / 240 V ~
Frequency	50 Hz
Duty cycle	Short time load 1 min.
Housing	grey RAL 7035
Approvals	EN 61558
Enclosure protection type	IP 40, currently IP 00, IP 20 (with protection cap)
Mounting	DIN-rail to EN 50022
Overload protection	PTC, primary side
Terminals	strain-relief clamps for 2 x 1,5 mm^2 ; 2 x 2,5 mm^2 or 1 x 4 mm^2

Note: With low loads, or when idling, higher output voltage!
To restart after a short-circuit temporarily disconnect primary side from the mains.

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Technical data	LT 500 M
Rated voltage	230 V ± 10 % / 50 Hz
Power consumption	max. 1 W
Output data	
Type of contact	power semiconductor
Rated voltage	230 V
Rated current	2,5 A
Making and breaking capacity (>100.000 operation cycles)	
Incandescent lamps	500 W
Fluorescent lamps	illegal
Mercury vapour lamps	illegal
Max. capacitor for parallel compensation	illegal
Mains voltage halogen lamps	500 W
Low voltage halogen lamps - with electronic transformers* - with ironcored transformers**	 500 W 500 W
Minimum load	10 W
Power dissipation at rated load	4,5 W
Overload protection	yes by electronics
Make delay	ca. 1 s from 0 % to 100 % (Softstart)
Break delay	ca. 1 s from 100 % to 0 % (Softstop)
Housing	Polycarbonat, grey 2 pitch
Mounting	on rail (EN 50022) in distribution boards
Position of normal use	vertikal, N upper side
Degree of protection	IP 40 (after fitting in distribution board)
Terminals	screw types
Tightening torque	0,5 Nm
Nominal cross-sectional area	1x 2,5 mm² rigid conductors, 1x 1,5 mm² flexible conductors
Smallest possible conductor size	0,4 mm in diameter
Control inputs	none
On-Off indicator	by LED
Further indicators	by LED: 1 Hz flashing: internal temperature too high
Actuators	rotary button to adjust the lightness
Ambient temperature	- 10° C to + 45° C without derating
Design requirements	IEC 60669
Approvals	none

* With LV-halogen lamps it is necessary to allow for the transformer's own consumption in addition to the lamps' capacity when calculating the total power loss. This may be assumed to be approx. 10 % of the lamps' capacity.

** Conventional transformers for LV-halogen lamps should be loaded to at least 20 %. If the inductance is too high, the dimmer will be switched off. Basically, only those transformers which have been specified by the manufacturer as being suitable for phase angle control dimmers should be used.

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Technical data	RUD 1	RUD 2	LT 500	LT 1200
Rated voltage	230 V ± 10 % / 50 Hz			
Power consumption	max. 1 W			
Control voltage	230 V ± 10 % / 50 Hz		PDM (24 V) from RUD 2	
Control current	max. 1 mA			
Required trigger impulse lenght	min. 20 ms			
Output data				
Type of contact	power semiconductor	PDM semiconductor (24 V non-isolated) for controlling up to 10 LT power mod.	power semiconductor	
Rated voltage	230 V	n.a.	230 V	
Rated current	2,5 A	n.a.	2,5 A	5 A
Making and breaking capacity (>100.000 operation cycles)				
Incandescent lamps	420 W	n.a.	500 W	1200 W
Fluorescent lamps	illegal	n.a.	illegal	
Mercury vapour lamps	illegal	n.a.	illegal	
Max. capacitor for parallel compensation	illegal	n.a.	illegal	
Mains voltage halogen lamps	420 W	n.a.	500 W	1200 W
Low voltage halogen lamps - with electronic transformers* - with ironcored transformers**	 420 W 420 W	 n.a. n.a.	 500 W 500 W	 1200 W 1200 W
Minimum load	10 W	n.a.	10 W	40 W
Power dissipation at rated load	4,5 W	100 mW	4,5 W	12 W
Overload protection	yes by electronics	none	yes by electronics	
Make delay	ca. 1 s from 0 % to 100 % (softstart)	n.a.	ca. 1 s from 0 % to 100 % (softstart)	
Break delay	ca. 1 s from 100 % to 0 % (softstop)	n.a.	ca. 1 s from 100 % to 0 % (softstop)	
Housing	Polycarbonat, grey 2 pitch	Polycarbonat, grey 1 pitch	Polycarbonat, grey 2 pitch	Polycarbonat, grey 4 pitch
Mounting	on rail (EN 50022) in distribution boards			
Position of normal use	vertical	arbitrary	vertikal, N upper side	
Degree of protection	IP 40 (after fitting in distribution board)			
Terminals	screw types			
Tightening torque	0,5 Nm			
Nominal cross-sectional area	1x 2,5 mm² rigid conductors, 1x 1,5 mm² flexible conductors			
Smallest possible conductor size	0,4 mm in diameter			
Control inputs	A1: ON to memory value A2: ON to memory / OFF / DIMM A3: OFF (e.g. central) A4: ON to 100 % lightness		S+ and S- for PDM from RUD 2	
Lenght of control wires	max. 100 m			
On-Off indicator	by LED			
Further indicators	by LED: 1 Hz flashing: internal temperature too high			
Actuators	rotary switch for operation mode: - phase control - reverse phase control	none	rotary switch for operation mode: - phase control - reverse phase control	
Ambient temperature	- 10° C to + 45° C without derating			
Design requirements	IEC 60669			
Approvals	none			

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Technical data	NT 24-250	NT 24-1300
AC input voltage range	195 V – 265 V	
Power consumption at rated load	7,5 W	40 W
Input frequency range	48 Hz – 62 Hz	
Output data		
Output voltage	24 V DC ± 2,5 %	
Output current	250 mA	1300 mA
Effiency	> 80 %	
Ripple at rated load	< 200 mV_{pp}	
Capacativ loads	n.a.	15000 µF
Overload protection	fold-back characteristic with automatic restart	
Class of protection	III, SELV	
Dielectric strenght	4 kV output to input	
Housing	Polycarbonat, grey, 2 Pitch	Polycarbonat, grey, 4 Pitch
Mounting	on rail (EN 50022) in distribution boards	
Degree of protection	IP 40 (after fitting in distribution board)	
Terminals	screw types, 2 x 24 VDC, 0 V, 1 x LIN, N	
Tightening torque	0,5 Nm	
Nominal cross-sectional area	1 x 2,5 mm^2 rigid conductors, 1 x 1,5 mm^2 flexible conductors	
Smallest possible conductor size	0,4 mm in diameter	
Operating indicator	by LED	
Further indicators	overload by LED	
Ambient temperature	- 10° C to + 45° C without derating	
Design requirements	IEC 60950	
Approvals	none	

Technical data	DASY 10	DASY 16
Rated voltage	230 V ± 10 % / 50 Hz	
Power consumption	1 W	
Output data		
Type of contact	single pole non-floating NO micro gap	additional triac in parallel to relaycontact
Rated voltage	230 V	
Rated current	10 A	16 A
Making and breaking capacity (>100.000 operation cycles)		
Incandescent lamps	2300 W	3700 W
Fluorescent lamps - uncompensatet or lead-lag ballast - parallel compensatet	 2300 VA 2300 VA	 3700 VA 3700 VA
Mercury vapour lamps	2300 VA	3700 VA
Max. capacitor for parallel compensation	70 µF	140 µF
Power dissipation at rated load	2,5 W	
Overload protection	none	
Make delay	10 s	
Break delay	40 s	
Housing	impact resistant polycarbonat, white	
Mounting	wall surface	
Position of normal use	status indicator face down	
Cable entry glands	1 x top, 2 x bottom, 1 x back (PG16)	
Degree of protection	IP 54	
Terminals	screw types 1 x LIN, LOUT, PE, 2 x N	
Tightening torque	0,5 Nm	
Nominal cross-sectional area	1 x 2,5 mm^2 rigid conductors, 1 x 1,5 mm^2 flexible conductors	
Adjusting range	2 to 1000 lux	
On-Off indicator	by LED	
Ambient temperature	- 25° C to + 45° C	
Design requirements	IEC 60669	
Approvals	SEMKO, NEMKO, DEMKO	

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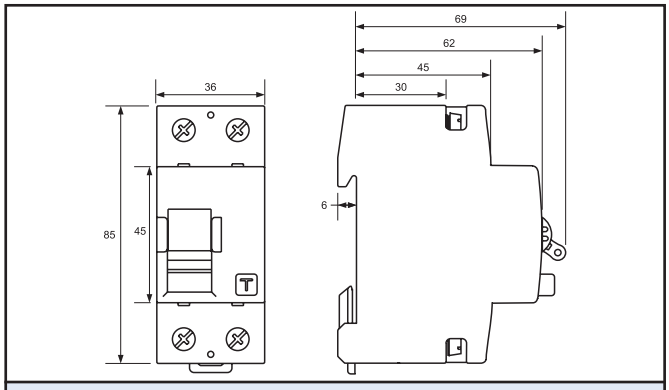
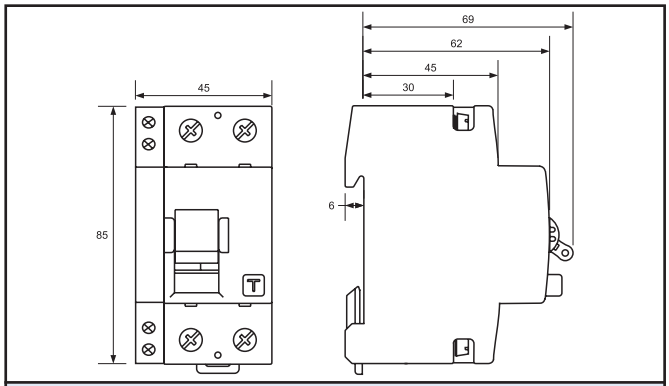
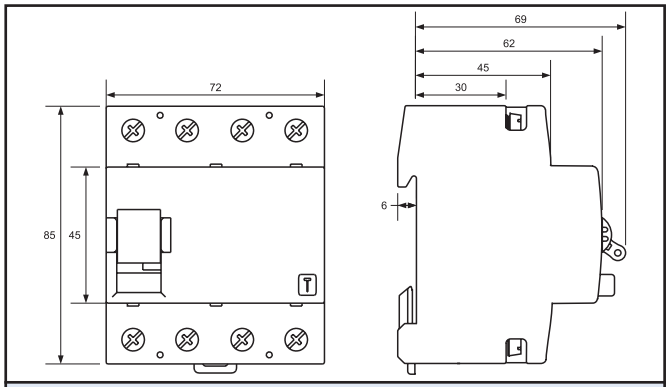
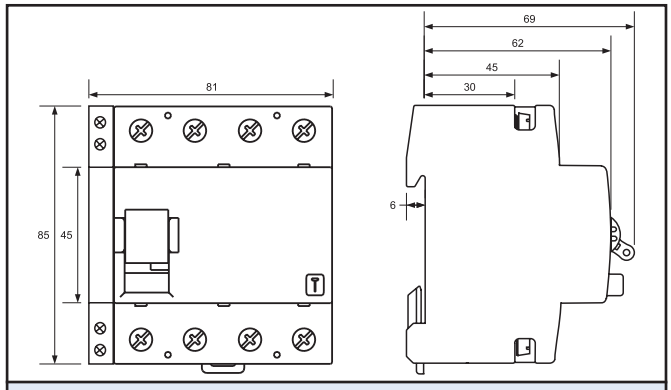
Dimensions	Page 118	Dimensions	Page 118
Wiring diagram	Page 125	Wiring diagram	Page 123

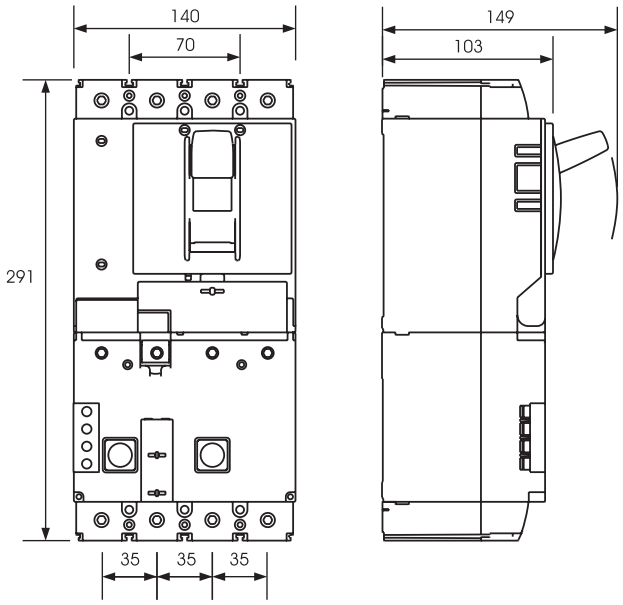
Dimensions

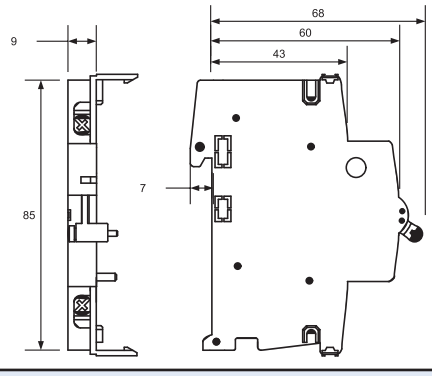


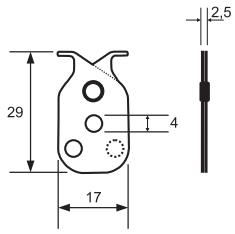


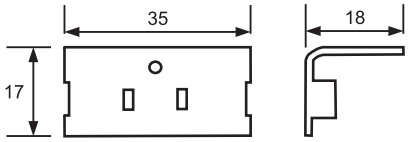


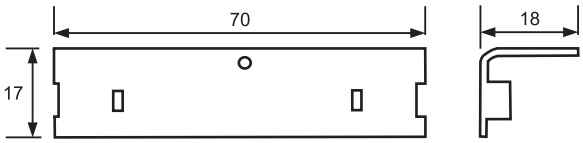


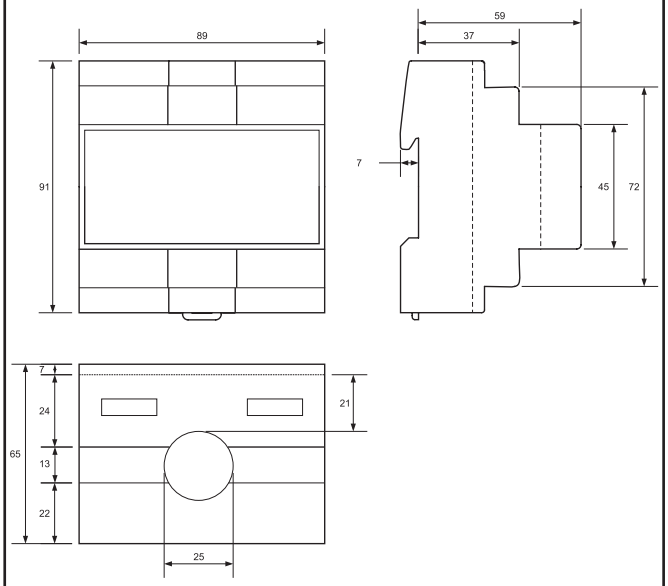


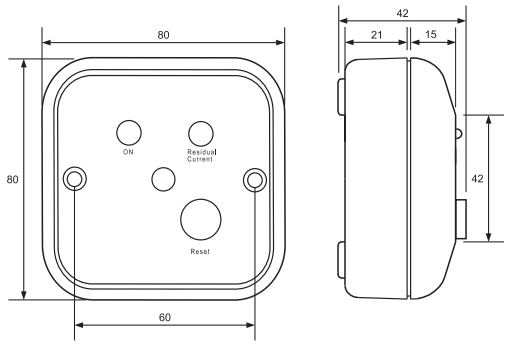


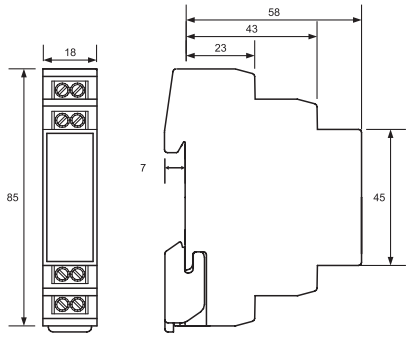


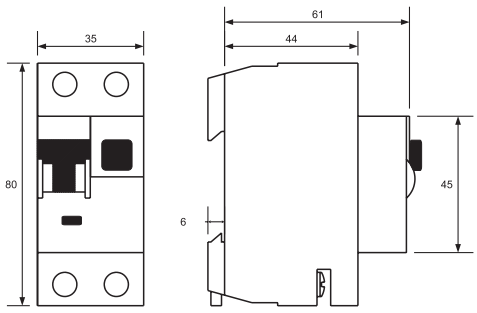


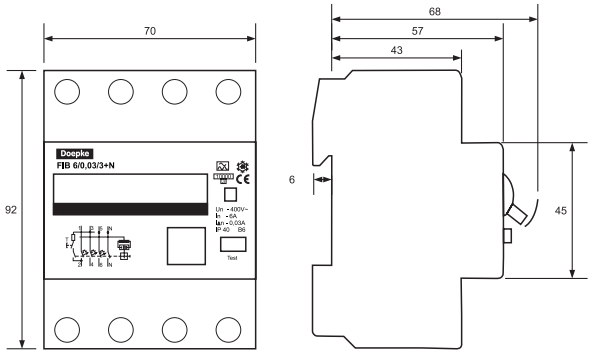












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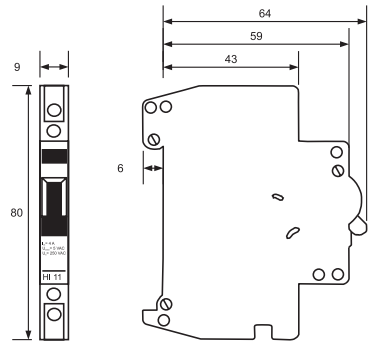
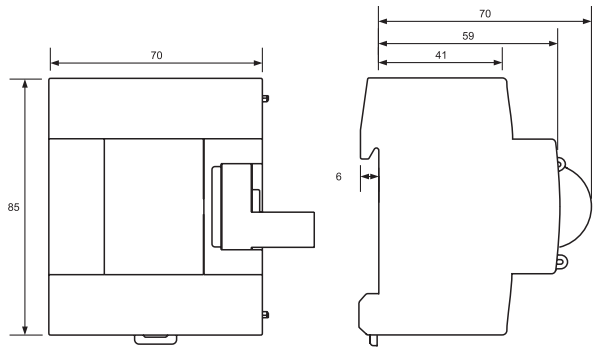
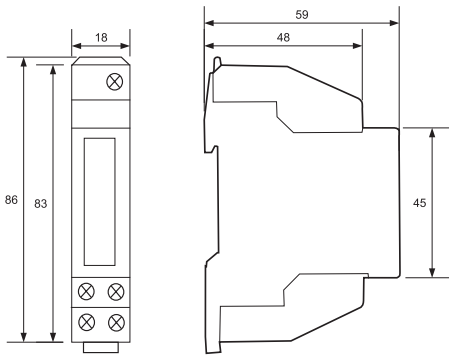


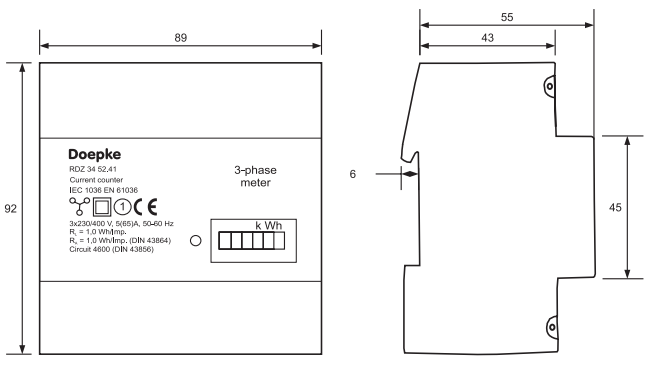
- Hi 11 ..... Page 54
- FAM 1 ..... Page 55



- DFA ..... Page 66/67

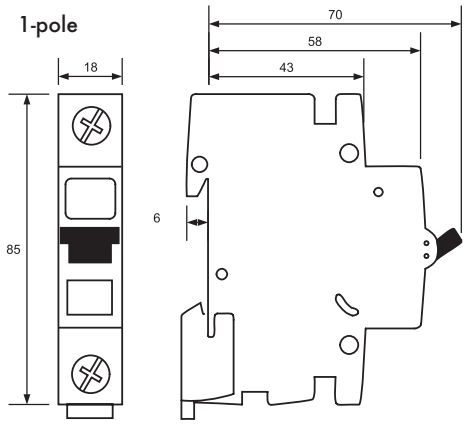


- RWZ ..... Page 74

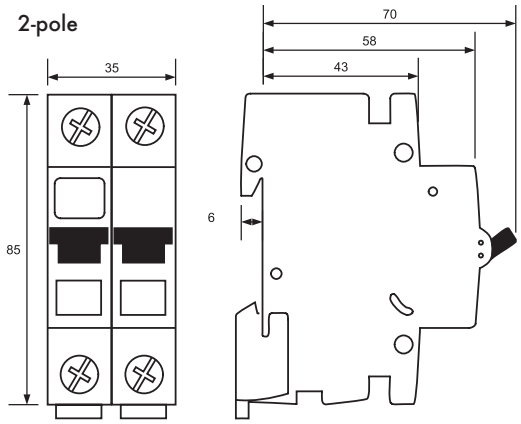


- RDZ ..... Page 75

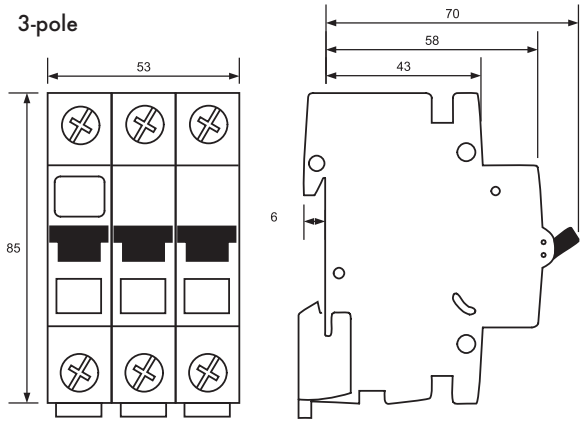
1-pole



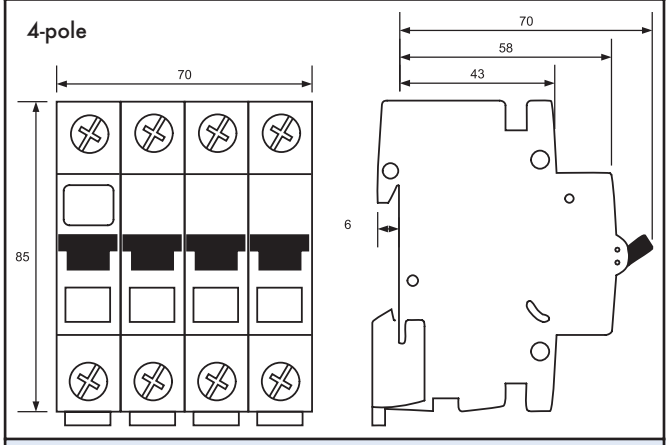
2-pole



3-pole

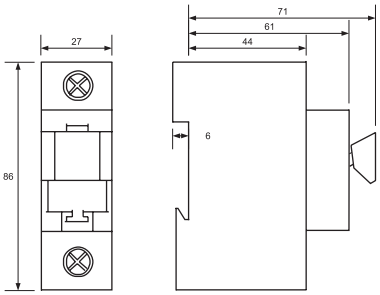


4-pole

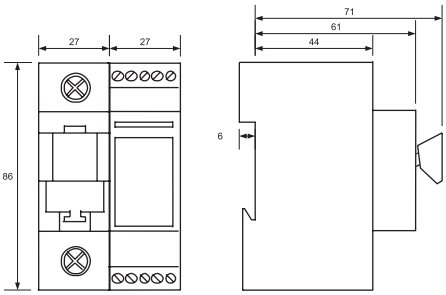


- DLS 5 ..... Page 58 - 63
- DIS ..... Page 72 - 73

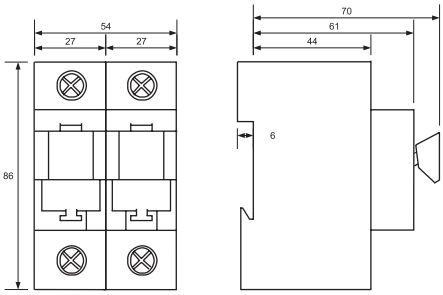
Tytan 1-pole



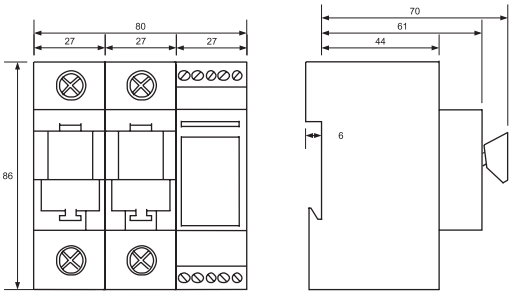
Tytan 1-pole with fuse Monitor



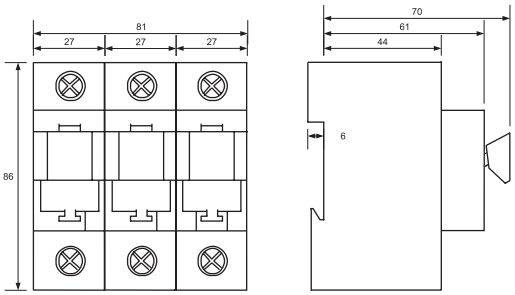
Tytan 2-pole



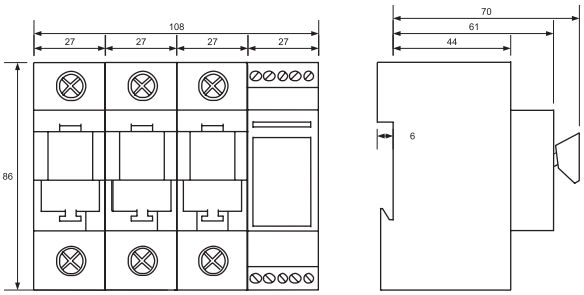
Tytan 2-pole with fuse Monitor



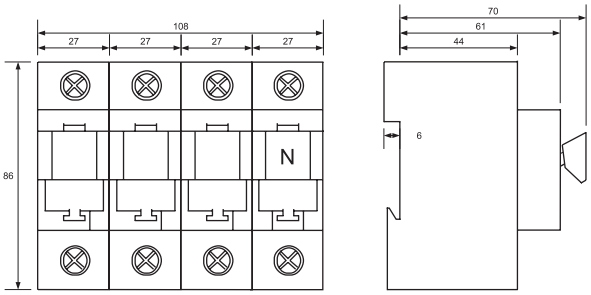
Tytan 3-pole



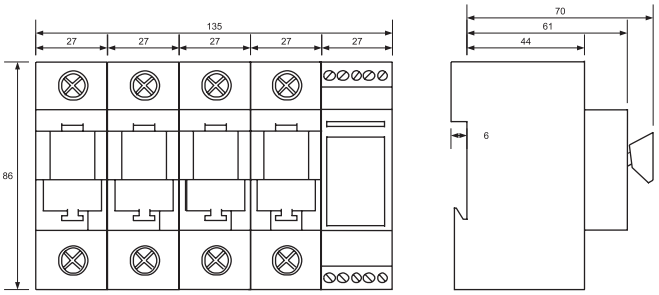
Tytan 3-pole with fuse Monitor

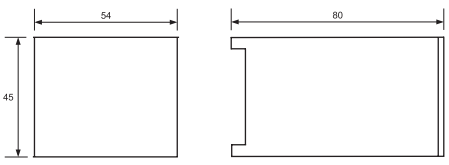


Tytan 3+N-pole



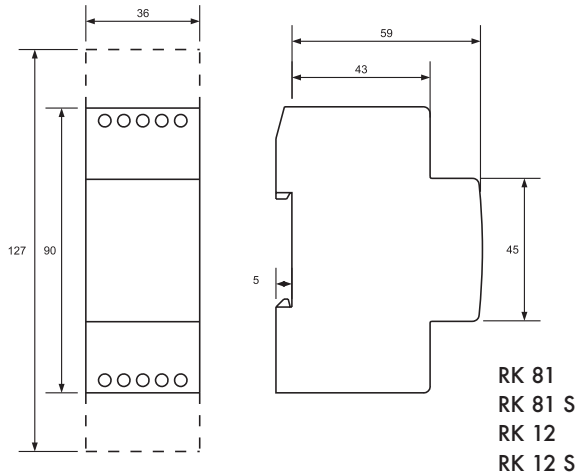
Tytan 3+N-pole with fuse Monitor



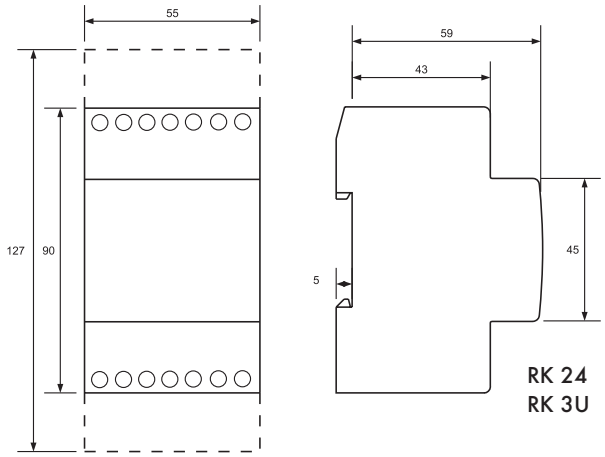


• D0 Master Disconnector ..... Page 76 - 82

Dimensions



RK 81
RK 81 S
RK 12
RK 12 S



RK 24
RK 3U

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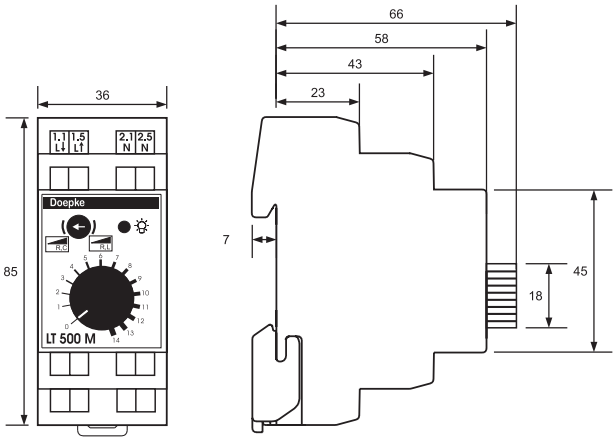
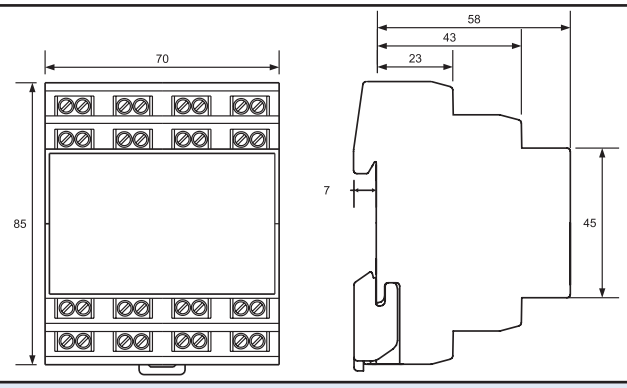
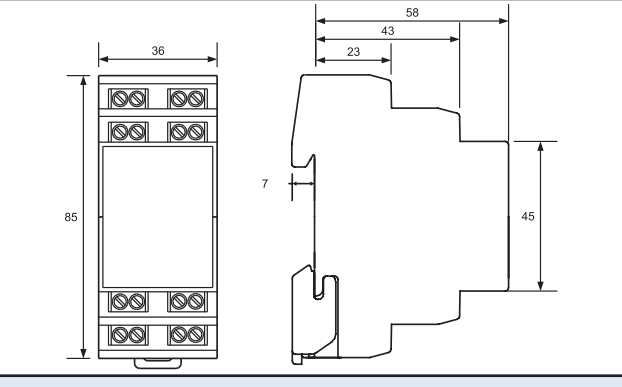


• LT 500 M ..... Page 84



• LT 1200 ..... Page 87
• NT 24-1300 ..... Page 89



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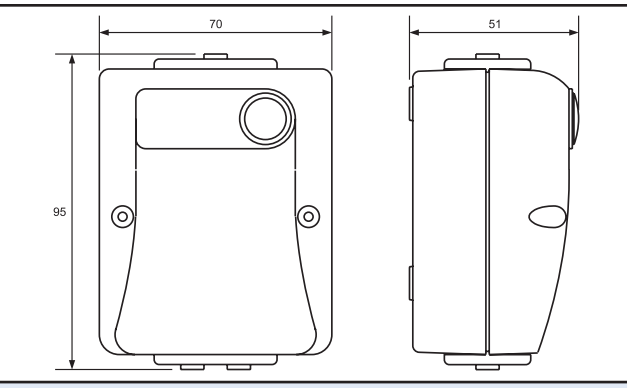
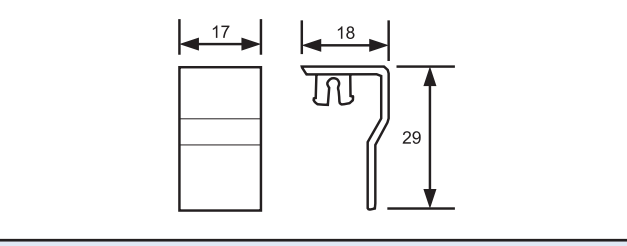
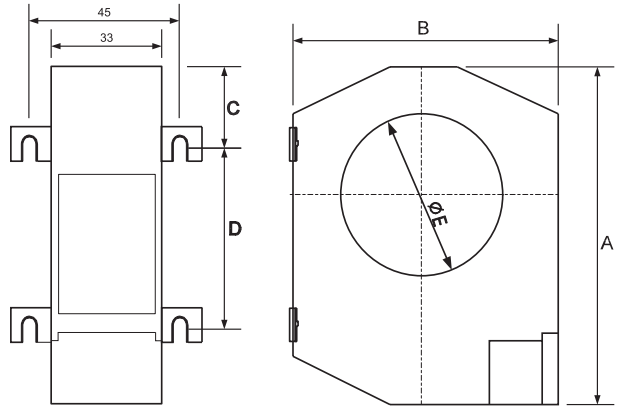
• LT 500 ..... Page 87
• NT 24-250 ..... Page 88



• DASY ..... Page 92



• Contact Protection Cover ..... Page 65



Type	Dimensions					
	A	B	C	D	ØE	kg
..... 35	100	79	26	48,5	35	0,25
..... 70	130	110	32	66	70	0,38
.....105	170	146	38	94	105	0,70
.....140	220	196	48,5	123	140	1,50

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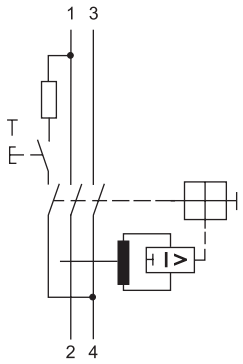
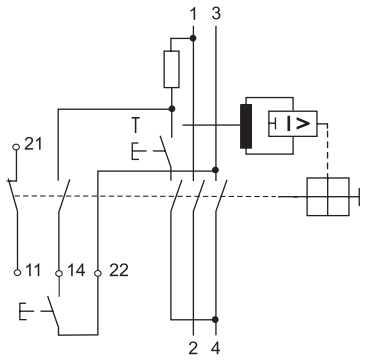
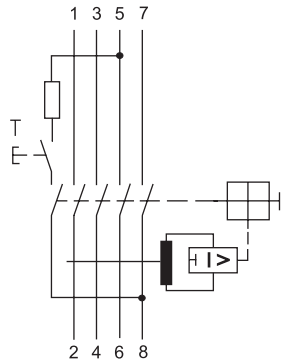
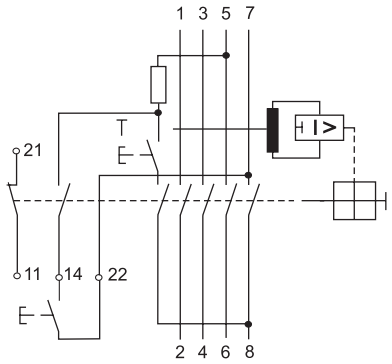
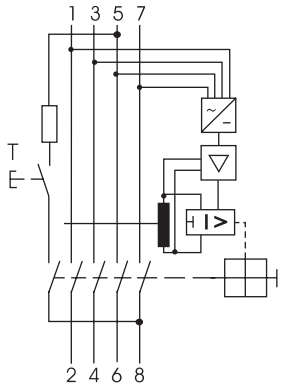
Wiring diagrams

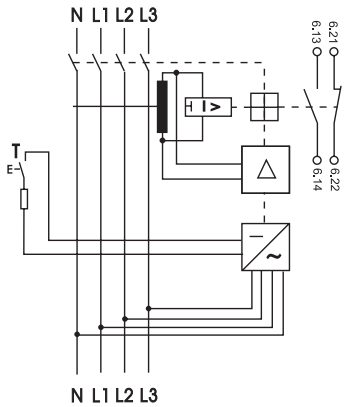


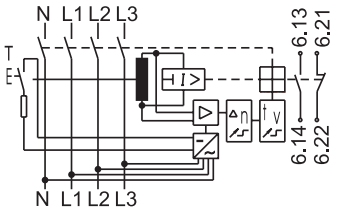


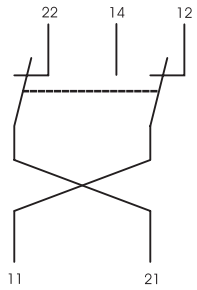


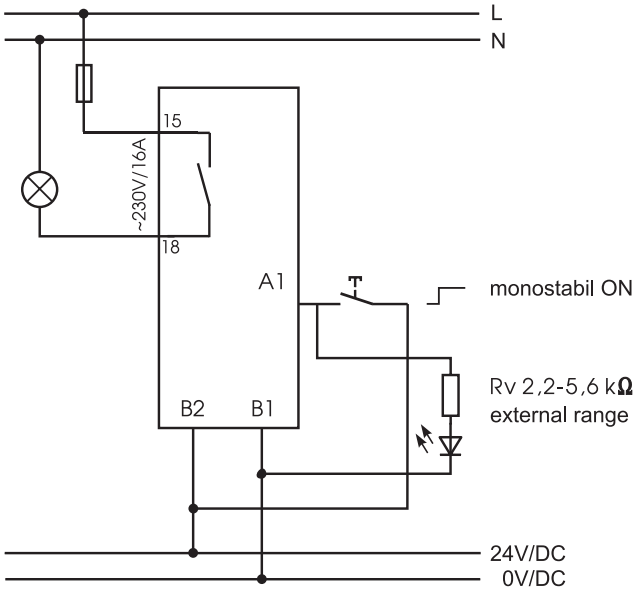


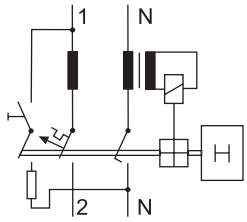


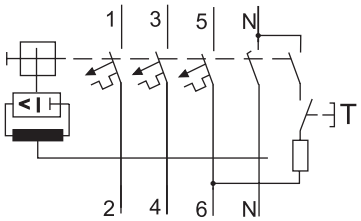


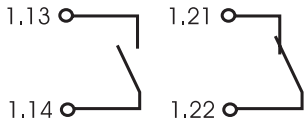


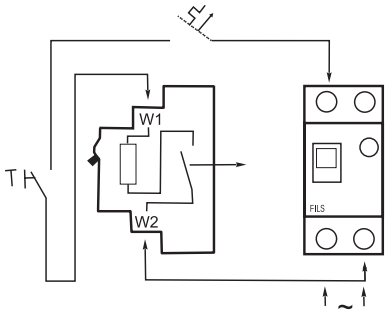


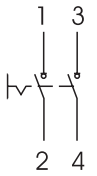


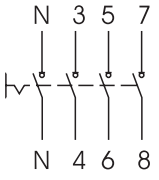




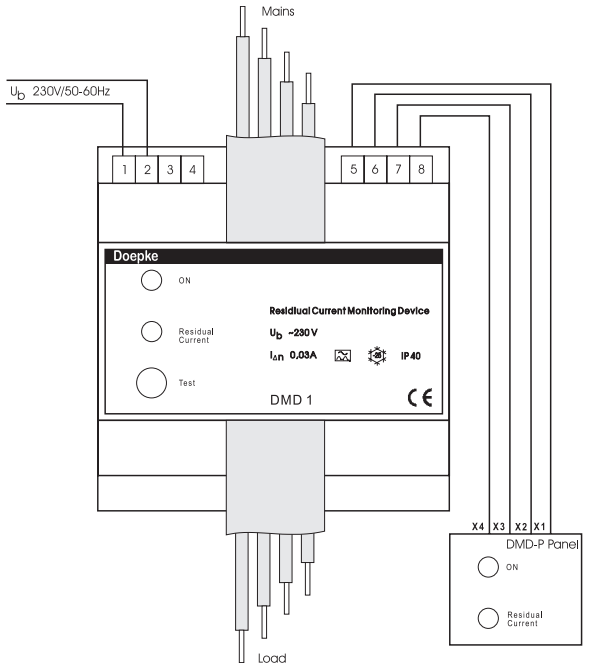




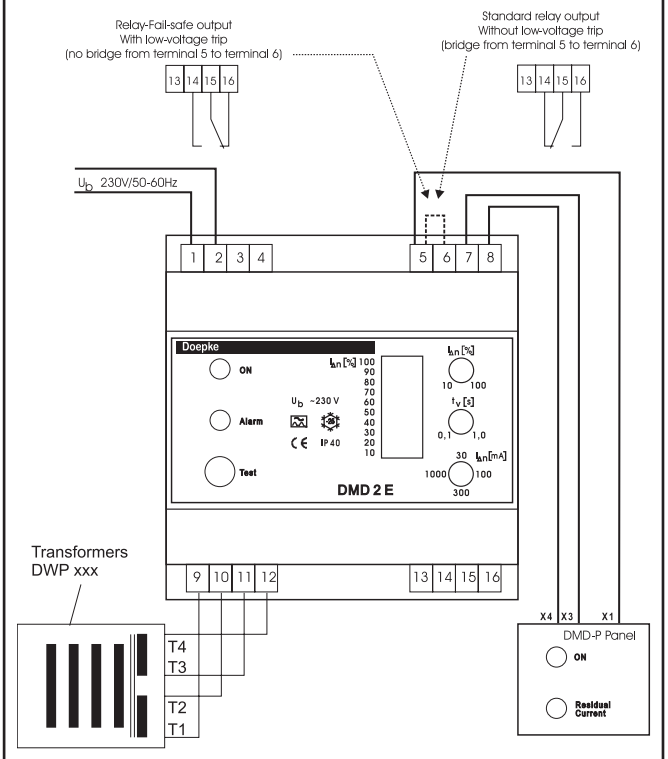




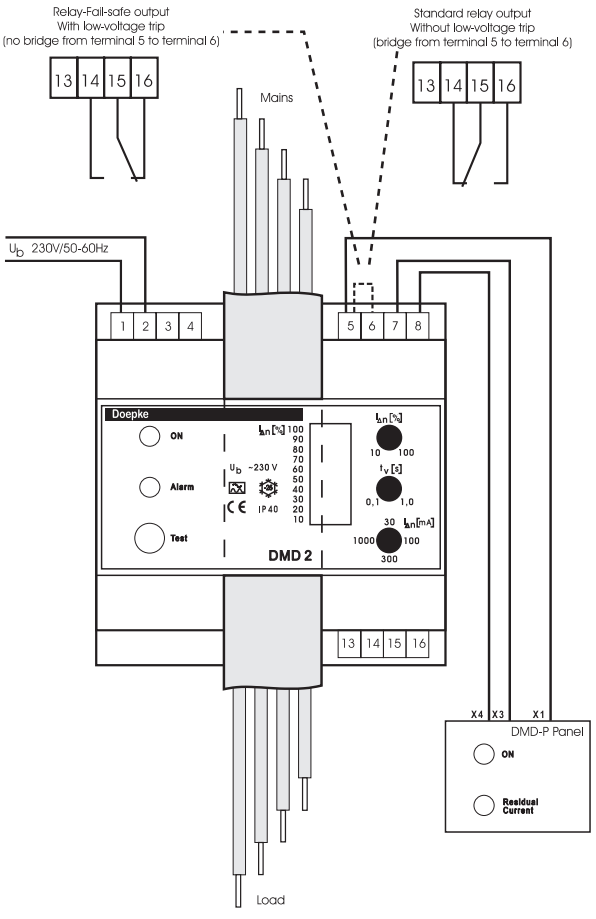
Wiring diagrams



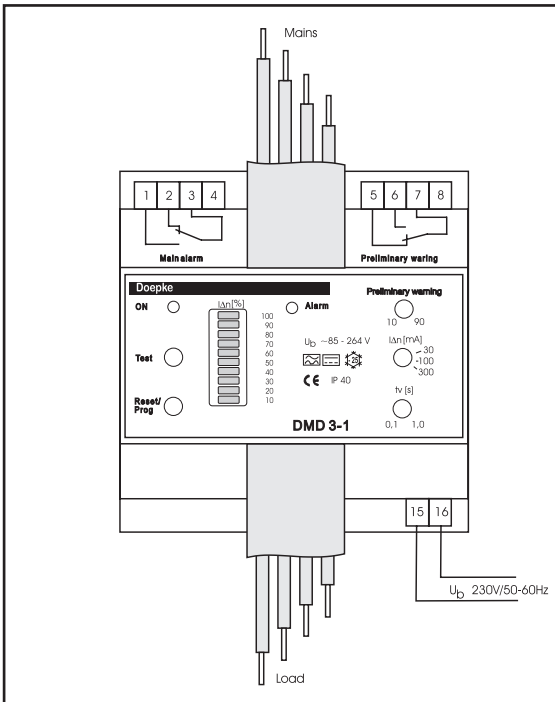
• DMD 1 ..... Page 42



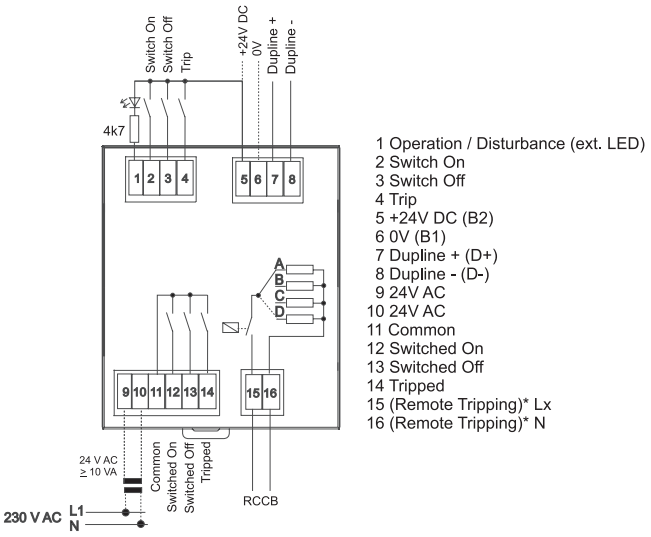
• DMD 2E..... Page 44/45



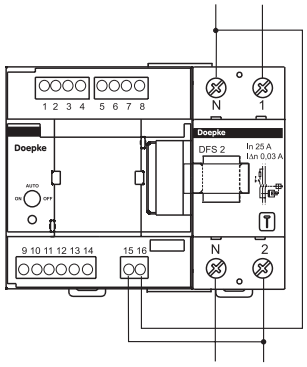
• DMD 2 ..... Page 43

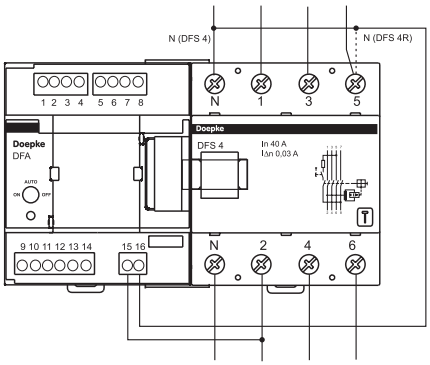


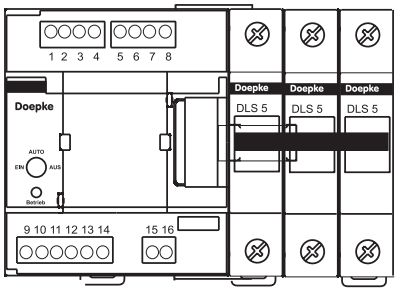
• DMD 3 Type B ..... Page 46/47



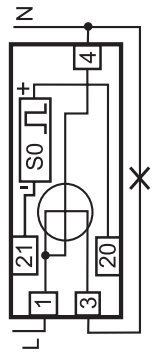
1 Operation / Disturbance (ext. LED)
2 Switch On
3 Switch Off
4 Trip
5 +24V DC (B2)
6 0V (B1)
7 Dupline + (D+)
8 Dupline - (D-)
9 24V AC
10 24V AC
11 Common
12 Switched On
13 Switched Off
14 Tripped
15 (Remote Tripping)* Lx
16 (Remote Tripping)* N



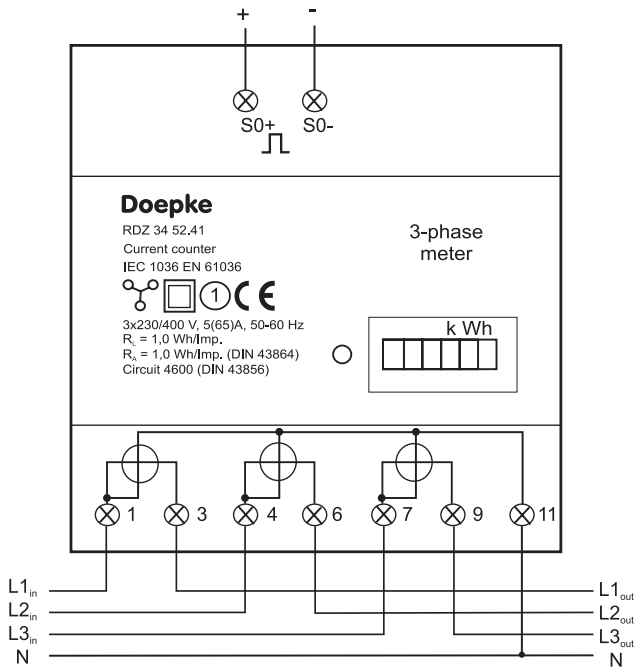




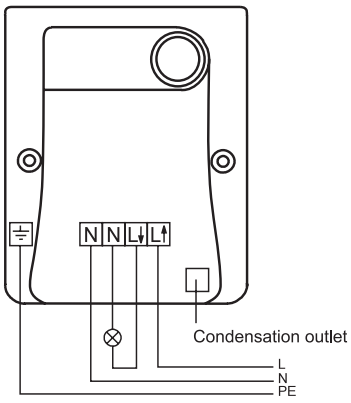
• DFA..... Page 66/67



• RWZ..... Page 74

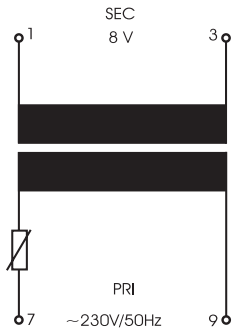


• RDZ..... Page 75



• DASY..... Page 92

Wiring diagrams



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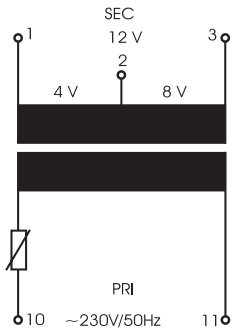

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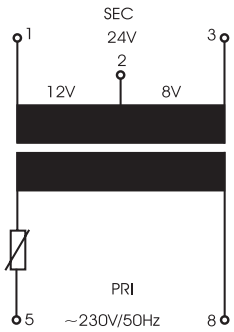
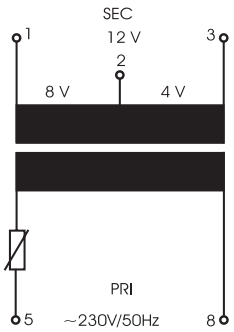
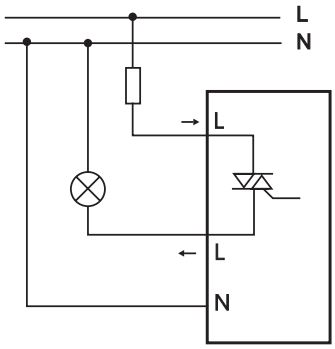


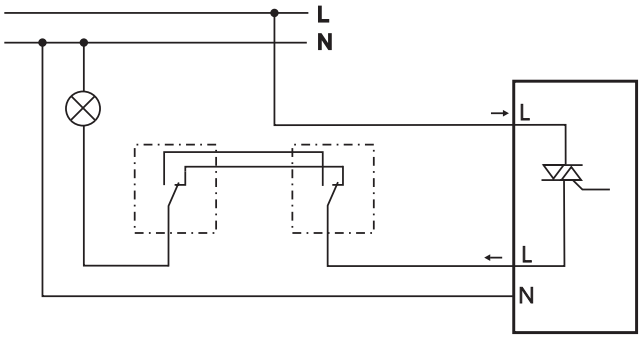
RK 24



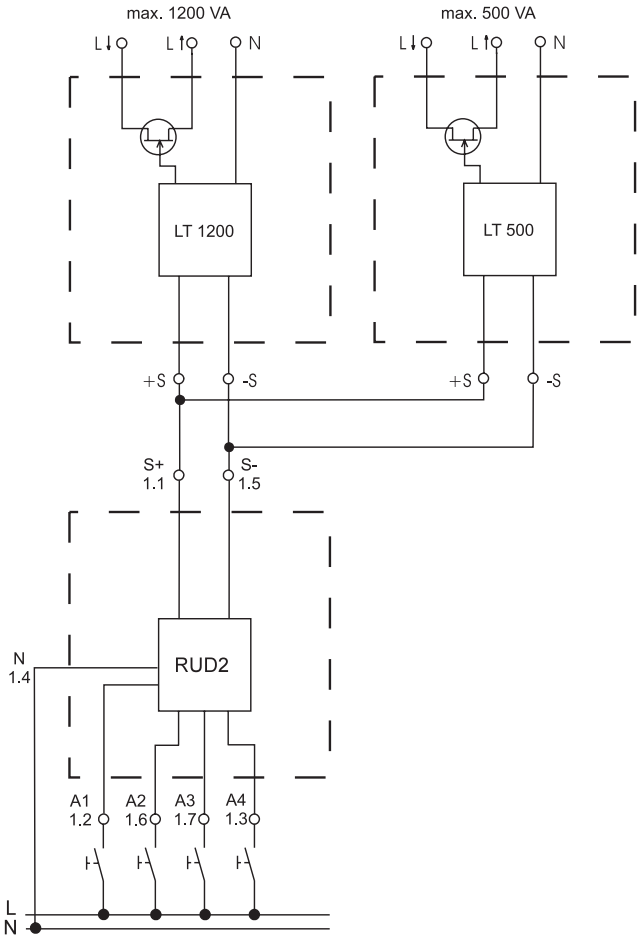
RK 3U

• Doorbell Transformer ..... Page 83

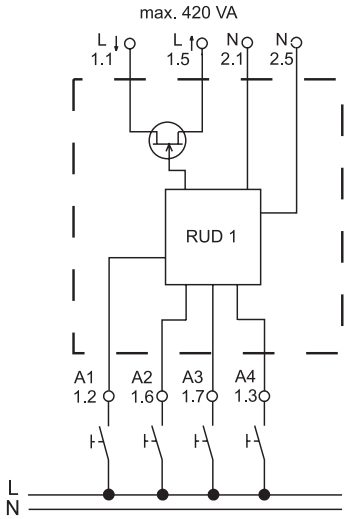




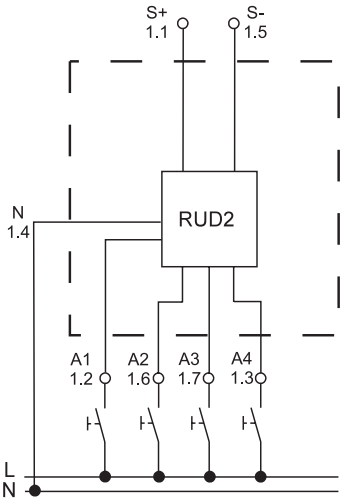
• LT 500 M ..... Page 84



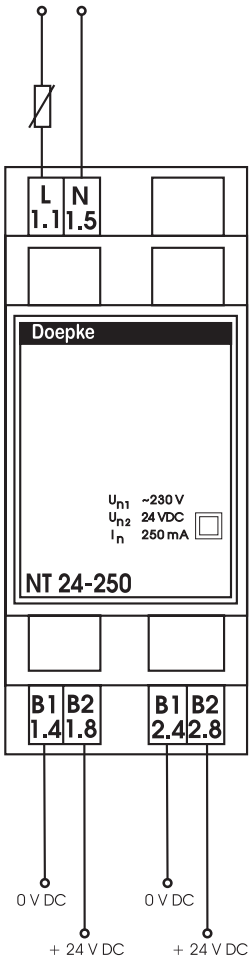
• LT 500/LT 1200 ..... Page 87



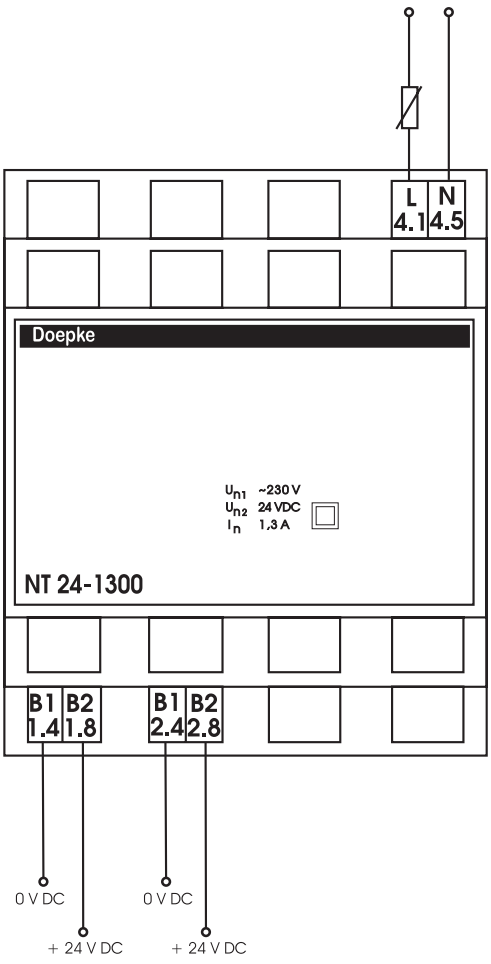
• RUD 1 ..... Page 85



• RUD 2 ..... Page 86



• NT 24-250 ..... Page 88



• NT 24-1300 ..... Page 89

1. General Explanations regarding Residual Current Protective Devices (RCD)

1.1 Principle

Residual current operated protective devices (abbr. RCD) continuously establish the total of the momentary values of all currents flowing via the active conductors to an electrical installation operated by an earthed AC mains supply. According to Kirchhoff's first law, this total must always be zero. In the event of a short-to-earth due to defective insulation, such currents will not total zero, because – depending upon the fault resistance RF and the ground circuit resistance RA – a residual current, also called fault current, will not flow via the active conductors but return via the earth to the power supply. If the r.m.s. value of the residual current exceeds the rated residual operating current $I\Delta n$ of the RCD, then the latter will trigger the disconnection of the installation from the power supply.
An auxiliary power source may be required for detecting and evaluating the residual current or, alternatively, it can be accomplished independently of auxiliary voltage.

1.2 Protection by automatic disconnection from the power supply in the event of indirect contact as per IEC 60364-4-41 (Fault Protection)

If, in the event of defective insulation, earthed conductive installation components that do not form part of the operating current system, e.g. housings of Protection Class 1 electrical equipment, carry a voltage in excess of the maximum permissible contact voltage ULperm, then the installation to be protected must be quickly disconnected from the power supply. Earthing such components with a sufficiently low earthing resistance RA can result in the contact voltage's ULperm driving a residual current, which causes an RCD to be tripped and thus the immediate disconnection of the installation from the power supply. In order for this to occur the residual current must exceed the rated residual operating current $I\Delta n$ of the RCD. Fig. 1 illustrates this principle.

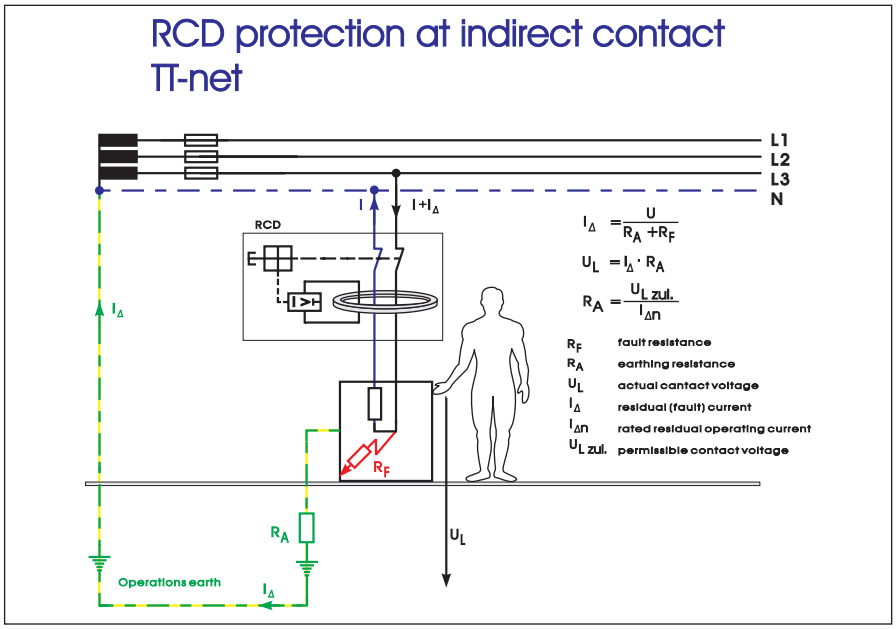


Fig. 1: Fault current circuit with correct residual current protection in a TT net

The maximum values for RA for the max. permissible contact voltages of 25 V and 50 V are listed in the columns of Table 1. The resistance data herein for applications to -25ºC are reduced by a factor of 0.8 compared to the data for -5ºC, because at -25ºC the operating current $I\Delta$ of the RCD may be 25% above the rated residual operating current $I\Delta n$.

In view of this extended range of protection, many erection standards dictate that either an RCCB as per IEC 61008, or an RCBO as per IEC 61009 with $I\Delta n \leq 0{,}03$ A must be provided when installing equipment in areas at particularly high risk of accident.
This applies e.g. to
- locations containing a bath or shower (IEC 60364 -7-701)

Rated res. op. current $I\Delta n$	- 5°C 25 V	- 5°C 50 V		- 25°C 25 V	- 25°C 50 V
0,01 A	2500 Ω	5000 Ω		2000 Ω	4000 Ω
0,03 A	830 Ω	1660 Ω		660 Ω	1330 Ω
0,10 A	250 Ω	500 Ω		200 Ω	400 Ω
0,30 A	83 Ω	166 Ω		60 Ω	130 Ω
0,50 A	50 Ω	100 Ω		40 Ω	80 Ω

Table 1: Maximum permissible earthin resistance RA as a function of the rated residual operating current $I\Delta n$ and the touch voltage ULperm at the minimum ambient temperatures of -5°C and. -25°C respectively.

1.3 Additional protection in the event of direct contact as per IEC 60364-4-41 (Protection of persons)

The additional protection necessary in the event of direct contact with a live (unearthed) component can be provided by employing highly sensitive RCDs with a rated residual operating current of $I\Delta n \leq 30$ mA. Such additional protection is required if
- the insulation of shockproof equipment or of a lead is damaged,
- there is a break in the earth wire
- the earth wire and an active wire have been interchanged so that conductive, normally earthed components have been rendered live, or
- a component which is live during normal operation is touched during repairs.
- caravans, boats and yachts, as well as power supply thereof at camping sites and berth (IEC 60364-7-721)
- temporary electrical installations for structures, amusement devices and booths at fairgrounds, amusement parks and circuses (IEC 60364-7-740).

Since, in the event of direct contact, the residual current will pass through the human body to earth, such additional protection should under no circumstances be regarded as a basic safety feature. It is rather an "emergency brake" in the above mentioned cases of electrical faults.
According to IEC 364-5-53 only RCDs as described in Section 1.5 may be used for this additional protection.

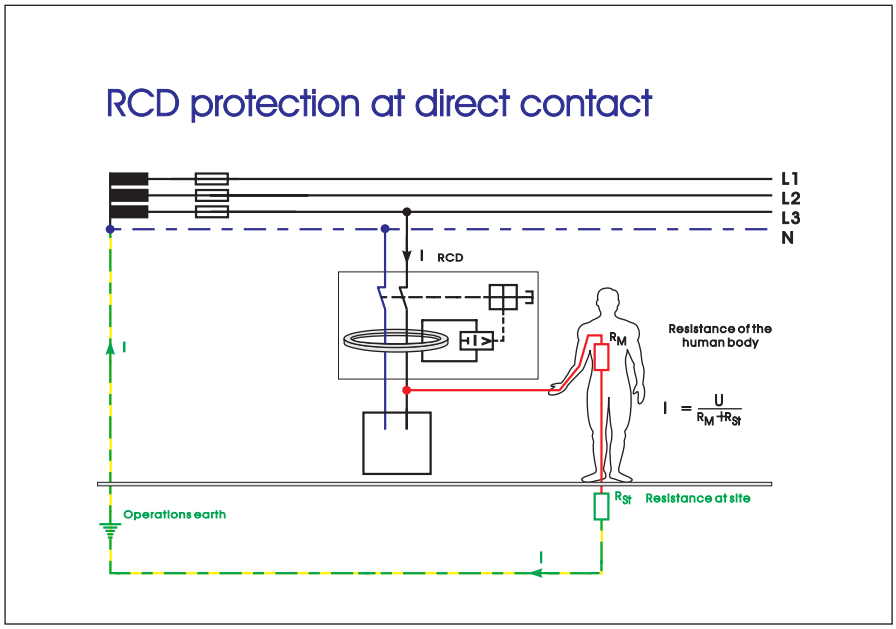


Fig. 2

1.4 Fire protection

Even relatively insensitive RCCBs ($I\Delta n \leq 300$ mA) can provide effective protection against fires caused by earth leakage currents. In the case of residual currents ≤ 300 mA, the electrical energy converted at the earth fault location is generally not sufficient to ignite standard flammable building materials. With higher residual currents an ignition might be possible on account of the energy released; however the RCCB will disconnect the power supply in less than 0.3 s, thereby limiting the electrical ignition energy to harmless levels.

1.5.1 RCDs for fault protection, protection of persons and fire protection

According to IEC 60364-5-53 (Selection and Erection of Electrical Equipment-Isolation, Switching and Control) the following RCDs can be employed for the above mentioned protection categories:

- Residual current operated circuit breakers conforming to IEC 61008-1 Abbreviation: **RCCB** (**R**esidual **C**urrent operated **C**ircuit **B**reaker without integral overcurrent protection)
- Combined residual current/miniature circuit breakers conforming to IEC- 61009-1 Abbreviation: **RCBO** (**R**esidual **C**urrent operated Circuit **B**reaker with integral **O**vercurrent protection)
- Circuit breakers with residual current trip element conforming to IEC 60947-2 Appendix B Abbreviation: **CBR** (**C**ircuit **B**reaker providing **R**esidual current protection)
- Modular residual current devices, where the unit for residual current detection, residual current evaluation and the power circuit breaker (CBR) unit are housed in separate enclosures in conformance with IEC 60947-2 Appendix M Abbreviation: **MRCD** (**M**odular **R**esidual **C**urrent protective **D**evice)

RCD Type	Sensitivity to residual currents	Symbol
AC	Pure AC residual currents with limited harmonics component, i.e. sinusoidal residual currents whose mean value over one cycle of the mains frequency equals zero.	
A	Type AC residual currents and pulsating DC residual currents whose momentary value for at least a semi-cycle of the mains frequency is approximately zero (< 6 mA)	
B	Type A (i.e. also Type AC) residual currents as well as smooth DC residual currents and AC residual currents with frequencies up to 1000 Hz	

Table 2: Classification of residual current and RCDs according to its time-related course

2. Technical Features and Notes on Applications

2.1 Tripping behaviour of RCDs with different time-related shapes of the residual current

Only in the case of installations whose equipment consists exclusively of linear, or approximately linear, electrical components, i.e. those whose current flow is proportional to the voltage, can it be assumed that purely AC residual currents with the frequency of the mains voltage will flow to earth in the event of a fault. These are components with resistive, inductive or capacitive behaviour. Equipment containing non-linear, passive or active electronic components, e.g. rectifier diodes, thyristors or transistors, can give rise to currents - even when subject to sinusoidal mains voltage – which contain strong harmonics and/or whose mean value over one cycle of the mains frequency does not equal zero, i.e. which include a percentage of DC current.
Depending upon the type and circuitry of the employed electronic components, the time-related shape of these fault currents can thus deviate significantly from the ideal sinus curve with a mean value of zero. Therefore, in order to insure their detection, RCDs with differing technologies are necessary. The Technical Report IEC 60755 describes different types of RCD in respect of the curve run of the residual currents to which they must respond as shown in Table 2.

A summary (Fig. 3) of commonly used basic circuit layouts of equipment with non-linear components (in short electronic equipment, EE), and the assigning of the resulting types of residual currents, are listed e.g. in EN 50178.

Like the shape of the residual current curve, the base frequency will influence the response behaviour of the RCD. The operating current, and the operating times, will therefore only lie within the range of standardized values if the residual current frequency corresponds with the rated frequency of the RCD. For our standard devices this is 50 Hz. Special variants of our Type A and AC RCDs for frequencies of 16 to 400 Hz are available upon request.

Line	Basic circuit with fault site	Shape of the load current	Shape of the residual current	Flt/res. current response		
				~	⎍	⎍
1	Single-phase				•	•
2	Single-phase with smoothing					•
3	Full bridge circuit				•	•
4	Full bridge, semi-controlled				•	•
5	Full bridge between outer phases				•	•
6	Three-phase star connection					•
7	Three-phase full bridge					•
8	Phase angle control			•	•	•
9	Burst control			•	•	•

Source: DIN VDE 0100-530; Appendix B

Fig. 3: Basic circuit diagram with load and residual current shapes

2.1.1 Application for Type AC and A RCDs

It follows, according to Section 2.1, that in the event of an earth fault Type AC RCDs will respond only within the prescribed limits if an approximately sinusoidal residual current is flowing, i.e. a current whose time-related mean value equals zero and which is not subject to strong distortions. This is the case with resistive loads and components with inductive or capacitive characteristics. Therefore, in installations which are fitted exclusively with this type of equipment, Type AC RCDs are capable of providing adequate protection.

Modern loads however frequently contain, e.g. for power control purposes, electronic components in circuit layouts as illustrated in Fig. 3. In the event of a short-to-earth these can cause non-sinusoidal residual currents as detailed in Fig. 3, lines 1-7, which will not be detected by Type AC RCDs.

Because of this limited protection level the installation of RCDs of Type AC has been prohibited in Germany and several other western European countries since 1986.

RCDs of Type A are now usually employed in their stead. Their function is based – as is the case with Type AC RCDs – exclusively on the induction principle. Accordingly they will therefore respond only to those residual currents that effect sufficient change of the magnetic flux in the transformer core. In order for this to occur, a residual current has to pulsate in such a manner that its momentary value equals, or approximately equals, zero over at least a semi-cycle of the mains frequency.

As is evident in Fig. 3, Type A RCDs provide adequate protection for the majority of all electronic equipment at single phase mains.

RCDs of Type A do not respond to smooth DC residual currents. Their design function of responding to Type A residual currents will in fact be disrupted by smooth DC residual currents arising at the same time. For this reason EN 50178 / VDE 0160 stipulates that any EE which could give rise to smooth DC residual currents may not under any circumstances be connected downstream of a Type A RCD.

As per EN 50178, in cases where an EE could cause smooth DC residual currents, i.e. where protection by a Type A RCD is no longer guaranteed, the manufacturer of the equipment is duty-bound to point out this fact in the operating instructions.

2.1.2 Application of Type B RCDs

When equipment as per Lines 6 and 7 in Fig. 3 can give rise to a smooth residual current which is not detected by a Type A RCD, the manufacturer of the equipment must in compliance with EN 50178 point out the necessity of providing a Type B RCD. This applies mainly to power electronics equipment (EE) if

these operate without being electrically isolated by three-phase earthed nets, such as e.g. frequency converters (FCs), larger uninterruptable power supplies, welding current inverters etc.
This type of equipment normally outputs a voltage in the form of bipolar, pulse-width modulated rectangular pulses with clock frequencies of 1 kHz up to several tens of kilohertz. In the case of frequency converters, due to the inductivity of the connected motors, the resulting load current then has a sinusoidal shape with the desired, set motor frequency. However isolation faults are normally of an ohmic nature. The output voltage of a frequency converter therefore drives pulse-width modulated rectangular residual currents with the clock frequency.
It follows that, in order to provide comprehensive protection in such applications, an RCD must also respond to residual currents with the FCs clock frequency and its harmonics (3rd and 5th harmonics). However, the response thresholds, over the complete frequency range, may not exceed the maximum permissible values of a specific protection level (fault protection, fire protection or protection of persons). This fact is unfortunately not given sufficient attention in the currently applicable standards for Type B RCDs. In the German VDE Standard 0664-100 the details given are only for residual current detection up to 2 kHz, while the international Standard IEC 60755, and the forthcoming IEC 62423, demand sensitivity to residual currents only up to 1 kHz. For these upper frequencies, moreover, response thresholds of up to approx. 20 or 10 times of the rated residual operating current are permitted. Whereas, in order to provide e.g. fire protection, a response frequency range of at least 100 kHz with a max. response threshold of 0.3 A would really be required.
A serious problem, which frequently makes the use of RCDs more difficult, is posed by leakage currents of different frequencies which are continuously discharged to earth during operation, e.g. via anti-interference capacitors. When strong enough they can cause unwanted tripping of a Type B RCD if this is highly sensitive and able to detect residual currents over a broad frequency range. By selecting the RCD according to its frequency response and by the rated residual operating current it is frequently possible to avoid unwanted response. It is recommended, however, that the appropriate equipment already be selected during the planning stage of the installation in order to ensure that the sum of the leakage currents does not exceed the RCD's lower response threshold and spurious operation is thus prevented.
To this end we specify in the catalogue texts of our range of RCDs with tripping characteristic B the course of the response current frequency for every type of device. For further details on RCDs with tripping characteristic B please refer to our separate information leaflets or the descriptions on our Internet website www.doepke.de.

2.1.3 RCDs with increased surge current resistance

Impulse-type overvoltages caused by switching operations or lightning can give rise to leakage current surges due to the equipment capacitance to earth, or the line capacitance, which may occasionally cause non-delay RCDs spuriously to respond. Critical in this respect is equipment which has a high capacitance to earth, either because of the large area of its live components or because it is equipped with anti-interference capacitors. The former loads include e.g. large numbers of fluorescent lamps (> 20 lamps per current path) with conventional ballast.
The latter type of loads include e.g. fluorescent lamps with electronic ballast, X-ray machines and computer equipment. In order to ensure reliable operation without unwanted tripping in these particularly critical cases, we recommend using our RCDs with increased surge current resistance (for RCCBs - Type suffix KV).
Thanks to the special design of their residual current detection and evaluation unit, these devices are largely insensitive to residual current surges. Surge current resistance is normally tested with the standardized 8/20 surge current in compliance with IEC60060-1.
This is measured by the peak value of the maximum surge current which is permitted to pass in either direction through the RCD - and via all current paths - without causing the device to respond.

The surge current resistance of our standard RCCB and RCBO models is > 200 A, while the increased surge current resistant versions with the type suffix KV are surge current resistant to over 3 kA (> 5 kA available upon request). All other RCDs (CBRs and MRCDs) as well as the RCMs are surge current resistant to > 3 kA.
For all RCDs the response time for normal sinusoidal residual currents is within the limits as stipulated in IEC 60755 for non-delayed response devices or, in the case of devices with selectable response times, can be set accordingly (see Fig. 6).

2.1.4 Selectivity

Selective RCDs will respond to a residual current's occurring only after a current flow lasting several cycles of the mains frequency. This delay permits selective disconnection e.g. if two RCCBs are connected in series. In other words, in the event of a fault it will only trigger the RCCB upstream of the section affected by the short to earth even in the case of high residual currents. Fig. 4 illustrates this principle.

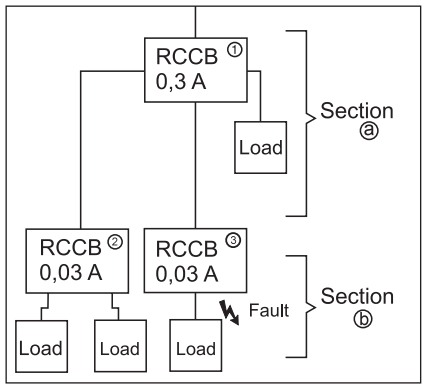


Fig. 4: Series-connection of two residual current protection circuits

If a normal RCCB were used in place of RCCB 1, a residual current of $I\Delta$ > 0.3 A in section b of the system would trip RCCB 1 as well as RCCB 3. It is solely the delay feature of the selective RCCB 1 which ensures that only RCCB 1 responds.

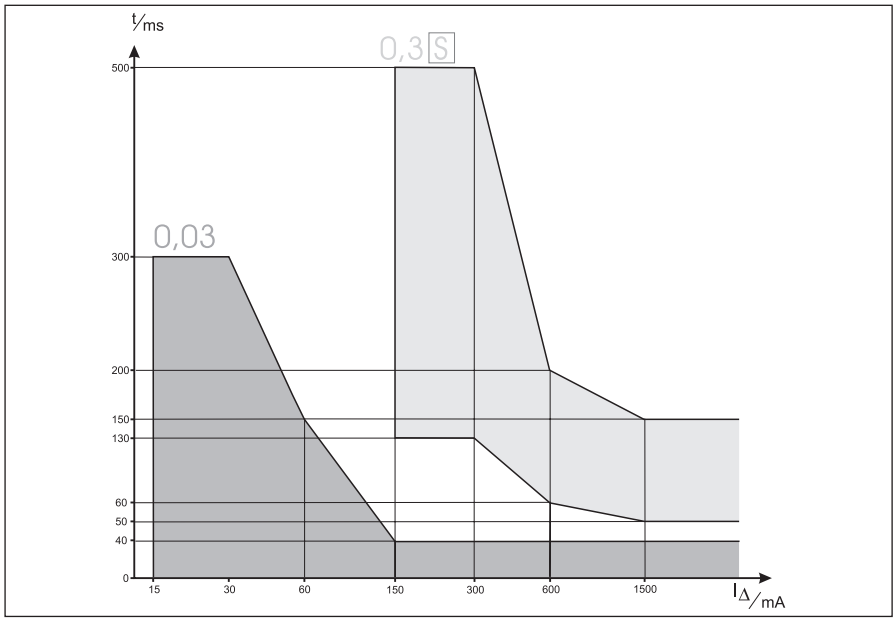


Fig. 5: Response times of a delayed and non-delayed (selective) RCCB type DFS as a function of the magnitude of the residual current.

The response delay time of both selective and normal RCCBs depends upon the strength and the form of the residual current. This is illustrated by the example shown in Fig. 5 of a normal RCCB with $I\Delta n$ = 0,03 A and a selective RCCB with $I\Delta n$ = 0,3 A.

Table 3 gives an overview of the selective combinations possible of RCDs of model ranges DFS 2/4 and DFL 8. The boxes for the permissible combinations detail the prerequisite for the staggering of the rated residual operating currents.

		Upstream RCD 1 ($I\Delta n1$)				
		DFS 2/4 S	DFL 8 Time setting I	DFL 8 Time setting II	DFL 8 Time setting III	DFL 8 Time setting IV
Downstream RCD 2 ($I\Delta n2$)	**DFS 2/4 S**	$I\Delta n1 > I\Delta n2$ (min. 1 stage)			$I\Delta n1 \geq I\Delta n2$	$I\Delta n1 \geq I\Delta n2$
	DFL 8 non-delayed ($I\Delta n$ = 0,03)			$I\Delta n1 \geq I\Delta n2$	$I\Delta n1 \geq I\Delta n2$	$I\Delta n1 \geq I\Delta n2$
	DFL 8 Time setting I			$I\Delta n1 \geq I\Delta n2$	$I\Delta n1 \geq I\Delta n2$	$I\Delta n1 \geq I\Delta n2$
	DFL 8 Time setting II				$I\Delta n1 \geq I\Delta n2$	$I\Delta n1 \geq I\Delta n2$
	DFL 8 Time setting III					$I\Delta n1 \geq I\Delta n2$

Table 3: Combinations of RCDs of model ranges DFS 2/4 and DFL 8 and staggering of rated residual operating currents for selective response in series connection systems

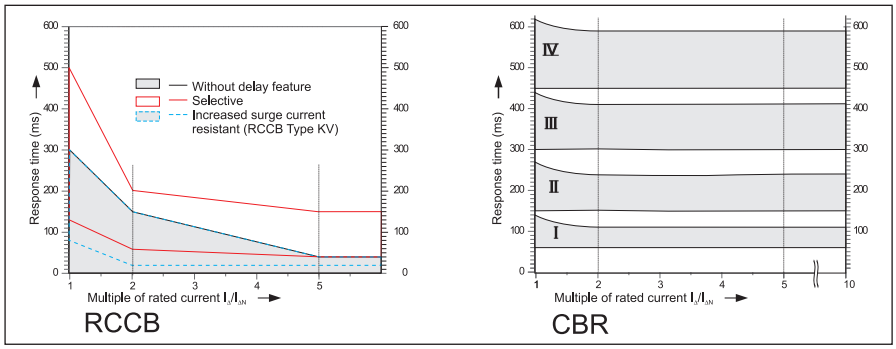


Fig. 6: Total disconnection times for non-delayed and delayed RCCB Types DFS 2, DFS 4 and CBRs of model range DFL 8

2.2 Disconnection Times

Fig. 6 show the disconnection times of our RCCBs and CBRs as a function of a multiple of the rated residual operating current. From these it is possible to establish, for any desired residual current value, the disconnection times for devices of all residual operating current ratings.

2.3 Mains Voltage Dependence

A mains voltage-independent RCD, e.g. in the form of a classic residual current operated circuit breaker (RCCB), takes the energy required for responding exclusively from the earth residual current. An RCCB is thus still able to function if the mains voltage should drop, or if there is a break in the neutral wire. Even prolonged overvoltage caused by a fault in the mains will not effect its operation. Because of this high operational safety level, a residual current operated circuit breaker should always be chosen in preference to a mains voltage-dependent device. It is for this reason that, in the case of installations which are operated by technically untrained personnel, or which are not subject to regular maintenance by trained technicians, it is obligatory in some European countries that the basic protection measure "Protection by Automatic Disconnection of the Power Supply" as specified in IEC 60364-4-41 is implemented only by means of RCDs operating independent of auxiliary voltage.

Our residual current operated circuit breakers of model ranges DFS 2 and DFS 4 meet the requirement of being mains voltage-independent, as do the CBRs of model range DFL 8, which are also equipped with an auxiliary voltage-independent residual current trip element.

Our AC-DC sensitive DFS 4B residual current operated circuit breakers and the CBRs of model range DFL 8B are also considered as mains voltage-independent within the meaning of DIN EN Standard 61008-1 VDE 0664-10 as they react to Type A residual currents even in the event of mains voltage failure, i.e. when two phases plus neutral are disrupted. These devices require a very small auxiliary voltage of 30 VAC

solely for tripping in response to smooth DC residual currents and residual currents whose frequency differs from that of the mains frequency. Even such auxiliary voltage is below the permissible touch voltage of 50 V for normal installations. The requirements of the standard for Type B RCCBs, VDE 0664-100, are thus more than fully met, with those of the future international Standard IEC 62423 being exceeded even further.

2.4 Ambient temperature range

The normal ambient temperature range for RCDs is specified in almost all international standards as -5 °C to +35 °C with short-term temperatures up to 40 °C for 1 hr in 24 hrs. Our RCDs are generally designed for a lower temperature of -25 °C. This feature is indicated on the nameplate by the -25 symbol.

If these RCDs are to operate at temperatures below -5 °C they are permitted by all international standards to have a 25% higher tripping current. In order still to ensure tripping with a touch voltage of < 50 V or < 25 V, the earthing resistance must be reduced to 80% when compared to usage up to -5 °C.

2.5 Short circuit resistance

RCDs must be protected against short circuits and, should this seem possible, against overloads by means of suitable protective provisions. The data tables for our RCCBs inside of this catalog show the rated short circuit current in conjunction with the maximum permissible back-up fuse (according to IEC 60269). As may be seen there, our RCCBs are protected by a 63 A fuse against short circuit currents up to the rated short circuit current, i.e. in most cases the service fuse will already provide the necessary short circuit protection.

Please note that the short- circuit fuse does not automatically guarantee overload protection. An overload has to be excluded by suitable planning of the installation taking into consideration the simultaneity factors.

3. Installation Instructions

3.1 Mounting

The positioning of our RCDs is optional and, except for RCCBs and CBRs with tripping characteristic B, neither is the direction of input and load sides stipulated. 4-pole devices may also be employed for 2-pole and 3-pole operations. Here, however, attention should be paid to the power supply of the RCDs test circuit. The devices are mounted on a rail to DIN EN 50022.

Protection level IP 40, which is achieved by careful covering of the terminals, guarantees protection only against contact. Therefore, without the provision of an additional housing, the RCDs may only be used in dry, dust-free rooms. For use in rooms subject to occasional dampness, or in particularly dirty locations, we recommend providing additional housing of protection type IP 54.

3.2 Reset function

The switch mechanism of RCCBs in model ranges DFS 2 and DFS 4 provides a reset function. The position of the switch lever indicates whether the RCCB has been switched off manually (position O) or as the result of a fault (central position). In order to cancel the central positioning the switch needs first to be moved to position 'O', only then can the RCCB be switched on again (see Fig. 7).

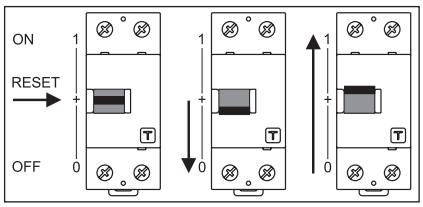


Fig. 7

3.3 Connecting and testing

Pass all leads (including neutral) required for operating the installation through the RCCB. Check all leads for proper insulation to earth (test with an insulation meter). Earth all equipment which is to be protected. Before putting into service, check that not only the RCCB but also the entire protective circuit is functioning correctly (measure the earthing resistance and the maximum possible contact voltage for the residual current at the tripping limit of the RCCB). This should be carried out every 6 months in order to ensure trouble-free mechanical functioning of the RCCBs.

4. Marks of Quality

- the metal parts of the switch mechanism are made from stainless materials
- all devices comply with the requirements of the RoHS guidelines-all used materials can be recycled
- all electrical data are repeatedly checked in extensive final tests and, having been assigned to every individual device, permanently filed.

Miniature Circuit Breakers

1.0 General Explanations regarding Miniature Circuit Breakers

Miniature circuit breakers are current limiting devices that extinguish electrical arcing, not at the crossover of the current, but already within a half-wave of mains frequency. The short circuit current is thus unable to increase to its full height as it is already curtailed while rising.

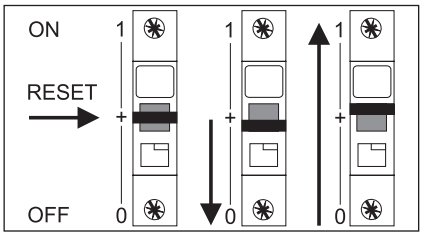
By means of a trip armature and by utilizing the magnetic current forces, the response time tE (break delay), i.e. the time from the start of the short circuit current until the contacts' opening, is kept extremely short. In the disconnection oscillogram the time tE = 0.7 ms. The fast contact opening time causes the developing arc to be rapidly pulled apart, resulting in a steeply rising arc voltage and thereby forcing the arc into the arc extinguishing chamber by its own electrodynamic and thermodynamic forces. The full arc drop voltage UB = 340 V is already reached after 1.4 ms. The fast rising arc voltage acts like an additional impedance which effectively dampens the short circuit current and extinguishes it after just 4.3 ms, well before the natural crossover of the current.

Because of their strong current limiting ability, our miniature circuit breakers not only meet the requirements of the highest Current Limiting Class 3 as per EN 60898/IEC 898, but their actual integrals of energy flow are also significantly lower.

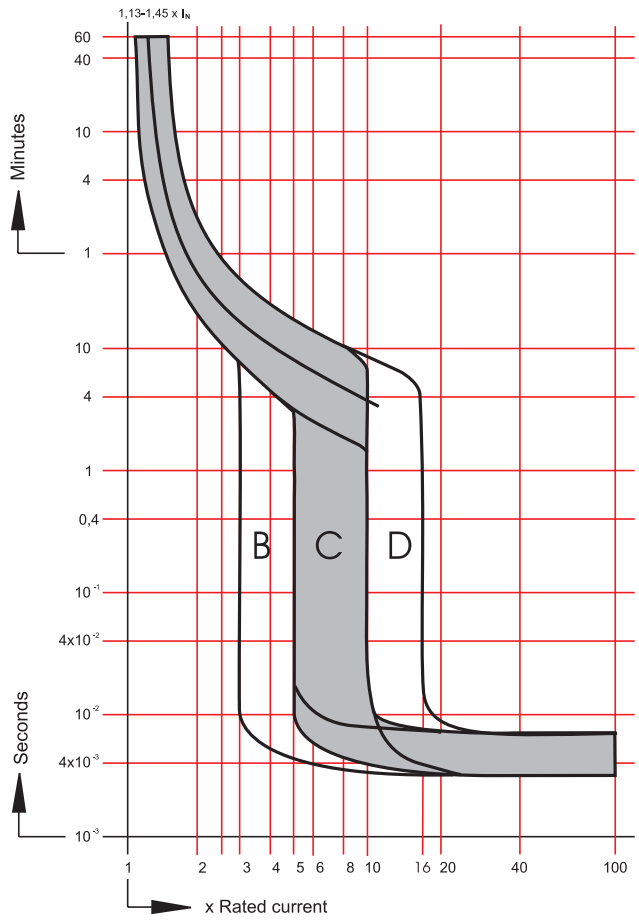
1.1 Reset function

In the case of model range DLS 5 the switch mechanism is provided with a reset function. After a cut-off the position of the lever will indicate whether this was caused by a fault (central, position +) or if it had been switched manually (position O).

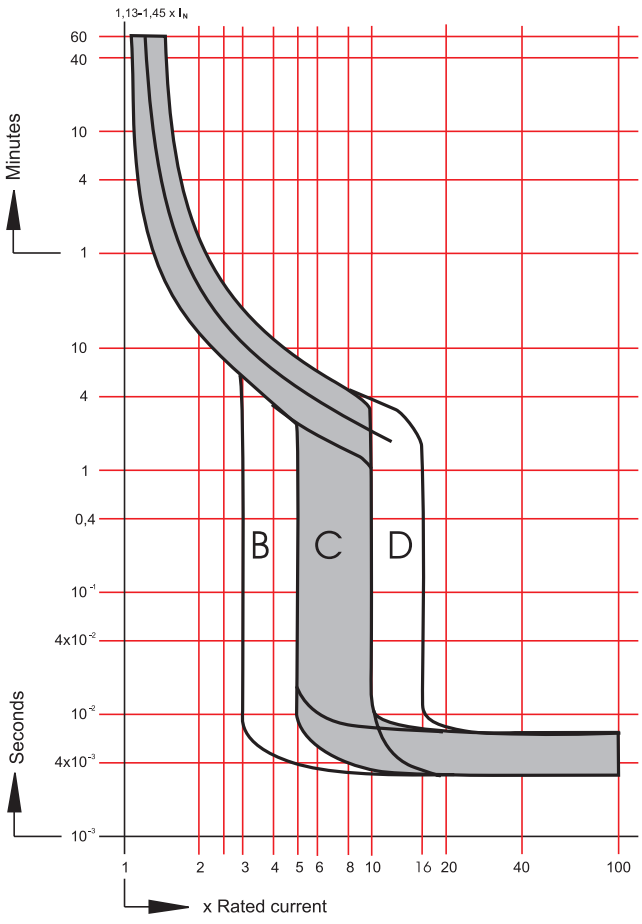
To reset the switch it must first be moved into position 'O', it can then be switched into position '1' (see illustration).



1.2 Tripping Characteristic of Model Ranges DLS 5... / FIB... / FIC...



Tripping caracteristic B I_n = 6 - 8 A
Tripping caracteristic C and D I_n = 0,3 - 8 A



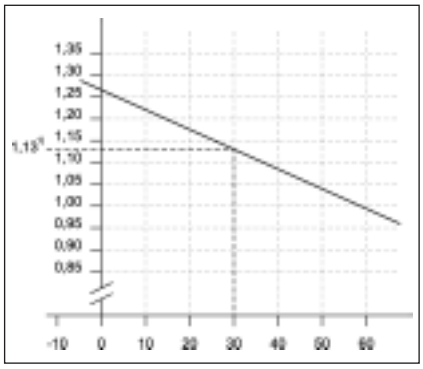
Tripping caracteristic B, C and D I_n = 10 - 63 A

1.3 Effect of ambient temperature

With multi-pole or closely positioned devices, depending upon the number of poles or devices, a correction coefficient for the no-tripping current must be taken into consideration according to the following table.

No. of Poles	Correction Coefficient
1	1
2-3	0,93
4-5	0,90
6	0,87

It should also be noted that the non-actuation current is effected by the ambient temperature. The figure of 1.13 In at a temperature of 30°C as given in the Standard EN 60898 increases with a drop in temperature and will decrease with rising ambient temperatures.



Non-actuation current as a multiple of the rated current I_n dependent on the ambient temperature

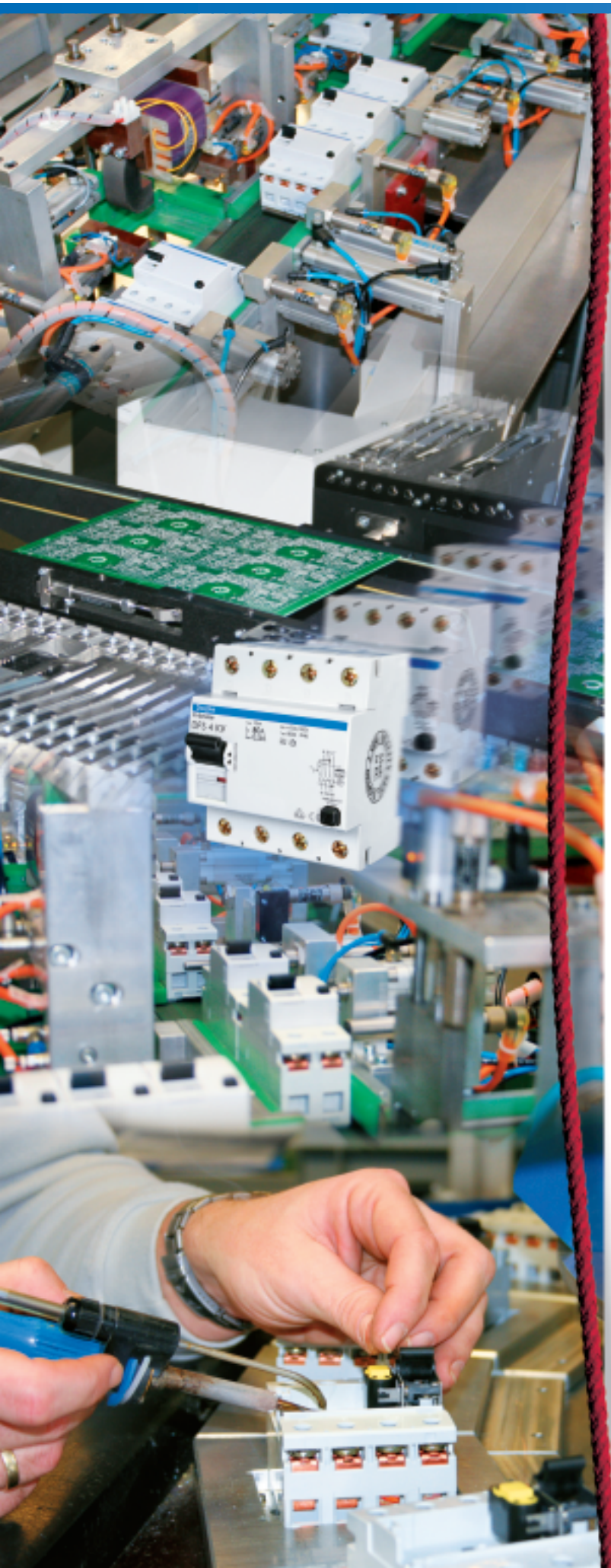
1.4 Heat Losses

Joule's heat per pole at I = I_n	
Type B / C / D 6 A	1,60 W
Type B / C / D 10 A	1,90 W
Type B / C / D 13 A	1,95 W
Type B / C / D 16 A	2,00 W
Type B / C / D 20 A	2,40 W
Type B / C / D 25 A	2,75 W
Type B / C / D 32 A	2,85 W
Type B / C / D 40 A	3,40 W
Type B / C / D 50 A	3,55 W
Type B / C / D 63 A	5,05 W

1.5 Selectivity

Selective up to prospective short circuit current I_c / A			
Back-up fuse IEC 60269 gL	Types B u. C < 16 A	Types B u. C < 25 A	Types B u. C < 63 A
25 A	1300	700	-
35 A	2500	1300	800
50 A	3000	2200	1300
63 A	4800	3800	2200
80 A	6500	5000	3200
100 A	8000	7000	4500
125 A	10000	10000	6500
160 A	10000	10000	10000

Doepke



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