Technical catalogue

System pro M Residual current devices

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ABB SACE and its commitment to protecting the environment





ABB SACE is one of the forerunners among the companies in the Group in dedicating considerable resources towards reaching its objectives of sustainable development and environmental protection. This is confirmed by the fact that all the company manufacturing sites have been awarded ISO 9001 quality certification and most of them have also been awarded ISO 14001 environmental management system certification. The plants in Frosinone and Patrica have also been awarded the Quality, Environment and Safety Integrated System certification and are certified in compliance with the BS 8800 Standards for health and safety in the workplace.

ABB SACE is actively involved in continuing the policy of improving environmental management by rationalizing the consumption of raw materials and energy, preventing pollution, respecting water and air, reducing noise levels to a minimum, reducing waste from production processes and carrying out periodic environmental checks at the main suppliers' premises.

By using analysis tools such as LCA (Life Cycle Assessment), from the initial design stages ABB SACE assesses and improves the environmental performance of its products throughout their entire life cycle in order to guarantee maximum efficiency in technical and energy performance during operation, control and reduce environmental impact in the manufacturing stage and define end-of-life procedures.

All these goals and activities are the result of a far-sightedness in adopting ecological policies and methods of reducing environmental impact and, here too, ABB SACE is, as already seen in the quality of its products, a leader on the Italian company scene.



System pro *M* modular devices for low voltage installations

System pro M is a modular system developed by ABB which is capable of meeting the requirements of the most modern and up-to-date installations for low voltage applications.

Project criteria

The system is based on two main criteria: complete

functionality and optimum sizing of the devices. The first means there is a wide range of devices which leads to increased safety for the user and greater diversification in command and load management; the second, based on the modular structure, allows the internal space of the switchboard to be used in the best possible way, reduces wiring operations and improves functionality and also the aesthetics of the switchboards.



Functions

Protection, command, measure and load management: for each of these four basic functions which characterize the low voltage electrical applications, the System pro *M* series proposes the right device.

The protection sector which is the basis of the system consists of MCBs, RCBOs, RCCBs and RCD blocks.

These miniature modular devices are technologically advanced, which speeds up installation and simplifies maintenance.



System pro *M* modular devices for low voltage installations

Standards and certification

Each device in the System pro M series has been designed in accordance with strict criteria for safety and functionality in compliance with the dictates imposed by international, European and Italian Standards.

For this reason, the devices in the System pro *M* series have obtained standardization issued by the certifying bodies both in Italy and overseas.

Tropicalization

All the devices in the System pro *M* series, and especially those used for protection, have been carefully designed and constructed to guarantee the maximum operating safety even in difficult environmental conditions. According to the type of device, the metal parts of the switching mechanisms are protected with a suitable galvanic coating or are made of stainless steel to avoid oxidation which may impair operating; even the conductive parts are protected by galvanic coating. The tropicalized devices can withstand the test conditions established in the relevant current Standards (VDE DIN 40046, IEC 68.2, DIN 50016).

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	•••••	••••
TEST DS951-AC C10	AIIII ON TEST TRP 0,03 - RESET - FAST 0,3 - RD2 1 1	
EB 1369 (1) (10,03A) 130 V~ 131 1 0 131 1 0		

Unifix cabling system

Unifix cabling system: the ideal complement for the System pro *M* range

Unifix is the ABB cabling system which makes the work of installers and switchboard builders easier: with its standard connectors, Unifix effects simple, quick and safe wiring of System pro *M* modular devices and SACE Isomax S1 and S2 and Tmax T1...T3 moulded-case circuit-breakers in ArTu[®] switchboards and ABB consumer units.

For this reason, it is the ideal solution for using pro M modular products to best advantage and exploiting the fact that ABB products for low voltage applications can be perfectly integrated whilst at the same time guaranteeing safety and full compliance with Standards.

The system consists of three **series H**, **L** and **SL**. Each one is suitable for specific applications both for the installation of devices and installation in switchboards. In detail:

- the H series, intended for more demanding applications, is used for wiring SACE Isomax S1 and S2 and Tmax T1...T3 mouldedcase circuit-breakers and System pro *M* modular devices in ArTu[®] switchboards (rated currents up to 400A and short-circuit currents up to 50kA);
- the L series is the universal solution for wiring System pro M modular devices in ArTu[®] switchboards and polycarbonate consumer units (rated currents up to 100A and short-circuit currents up to 25kA);
- the **SL** series is the ideal easy and cheap solution for wiring bipolar modular devices in consumer units (rated currents up to 40A and short-circuit currents up to 10kA).

Special features

The main feature of Unifix lies with the possibility of combining different types of circuits (one-phase/three-phase/auxiliary) in a single module. Pre-wiring can be effected at the workbench and installed in the switchboard subsequently, with no limits to the type or combination of devices which can be installed.

Unifix has adjustable pitch which replaces traditional wiring harnesses which means that circuit-breakers with different polarities can be placed in the same row as well as auxiliary modular devices.

The fact that Unifix integrates perfectly with the different ABB low voltage products, both modular and moulded-case devices, switchboards or insulating consumer units, ensures that all devices and accessories can be quickly selected and installed.



N.B. The Unifix cabling system can be used with ABB SACE devices only.



Unifix cabling system



ONE SYSTEM, MANY ADVANTAGES

Considerable **reduction in wiring times**: by using rigid lock connectors which are standardized for the different types of device, each device does not have to be connected using cables

Greater standardization of low voltage switchboards: the rigid connectors enable the results of the type tests (overheating and short-circuit) effected by ABB to be extended also on input wiring of devices.



A more **advanced** and, at the same time, **cheaper technical solution** compared with traditional wiring. This is made possible by cutting down on materials (wires and wire terminals) and space required, thus affecting operating times



Can be used on all ABB standard devices, without modifying or adding accessories and without using special equipment



Adjustable pitch: Unifix uses adjustable pitch unlike traditional wiring harnesses; in this way, circuit-breakers with different polarity can be placed in the same row as well as auxiliary devices



Residual current devices

1

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With the new range of RCBOs DS 9.. 1P+N ABB is able to provide a protection solution for all type of single-phase circuits in modern applications.

All the RCBOs are characterized by an innovative design with a single red/green twocolor operating lever and residual current trip signal on the front of the apparatus.

The DS 9.. range satisfies all protection requirements in two modules, offering the opportunity of choosing between three different breaking capacities, five different sensitivities, and for each of these, the possibility of choosing between type A or type AC residual current protection. The DS 9.. range consists of three series, DS 941, DS 951 and DS 971, with 4.5 kA, 6 kA and 10 kA respectively of breaking capacity.

Overload and short-circuit protection is provided by the same thermomagnetic component as the S 9.. MCBs range; the DS 9.. range thus offers all the benefits of the mechanics of these devices, in particular the closing velocity of the contacts, which is indipendent from the rotation velocity of the toggle; this is ensured by a trip mechanism patented by ABB.

The B and C characteristics are available for all types, with rated current from 6 up to 40 A. The availability of curve B in this range can offer protection to lines of extended length, typically found in terminal singlephase circuits. Each series is available in all required sensitivities for these type of RCBOs: 30 mA - 100 mA - 300 mA - 500 mA - 1000 mA. For DS 941 series only, the 10mA sensitivity is also available with tripping characteristic B.

Type AC RCBOs are suitable for all the installations where there may be loads with alternate faults currents. Type A are designed to be used in case of alternate and pulsating DC fault currents; their use is typical in installations where users are equipped with electronic devices meant to rectify currents or other physical variables.

All RCBOs are insensitive to temporary surge currents generated by lightning, operations on the power network, interferences, etc. The whole DS 9.. range has obtained the IMQ, VDE, UTE, KEMA approvals.

It can be fitted with the same accessories of the S 9.. range, therefore permitting many different functions and configurations.

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Accessories

(*) The auxiliary elements are the same as those from the range of miniature circuit-breakers S 9..

Technical characteristics



			DS 941
Reference Standards			IEC EN 61009, IEC EN 60947-2
Type (wave form of leakage cur	rrent detected)		AC, A
Tripping characteristics			instantaneous
Rated current In		A]	6≤In≤40
Poles			1P+N
Rated voltage one pole a.c.		V]	230
Insulation voltage Ui		V]	500
Max. operating voltage of test l	button	V]	254
Min. operating voltage of test b	button	V]	110
Rated frequency	[]	Hz]	5060
Rated breaking capacity	lcn	A]	4500
Rated breaking capacity	ultimate Icn	(A)	6
acc. to IEC/EN 60947-2 2 pole	s - 230 V service Ics	A]	4.5
Voltage withstanding capacity i	impulse (1.2/50) Uimp	<v l<="" r="" td=""><td>5</td></v>	5
Dielectric test voltage at ind. fr	req. for 1 min.	<v l="" l<="" r="" td=""><td>2.5</td></v>	2.5
Thermomagnetic	B: 3 In≤Im≤5 In		
release characteristic	C: 5 ln≤lm≤10 ln		
	D: 10 ln≤lm≤20 ln		
	K: 8 ln≤lm≤14 ln		
	Z: 2 ln≤lm≤3 ln		
Resistance to unwanted trippin caused by overvoltages (operat Peak amp. (8/20 wave)	g tion or atmospheric)/	A]	250
Rated sensitivity I∆n	[r	nA]	0.01-0.03-0.1-0.3-0.5-1
Tripping threshold	AC type	-	0.51 l∆n
	A type		0.111.4 l∆n
Toggle			black sealable in ON-OFF position
RCD tripped signal			
Electrical life			10000
Mechanical life			20000
Protection degree	housing		IP4X
-	terminals		IP2X
Mechanical shock resistance		20	6 g half wave, duration 6 ms, 2000 shocks
Resistance to vibrations acc. to	D IEC 68-2-6	minimu	im 5 g, duration 30 min., at frequency 080 Hz
Tropicalization	humid heat [°C	/RH]	28 cycles with 55/95100
acc. to DIN 40046 IEC 68-2	const. climatic cond. [°C	/RH]	23/83-40/93-55/20
	variab. climatic cond. [°C	/RH]	25/95-40/95
Thermal releaser calibration te	emperature [°C]	30
Ambient temperature (with dail	ly average ≤+35 °C) [°	°C]	-25+55
Storage temperature	[°C]	-20+70
Terminal size upper/lower per o	cable [m	Im ²]	16/16
Tightening torque	[N	*m]	1.2
Mounting		on rail El	N 60715 (35 mm) by means of rapid fixing device
Pole dimensions	HxDxW [n	nm]	83x70x35.6
Pole weight		g]	200

Technical characteristics





DS 951		DS 971	
	IEC EN 61009, IEC EN 60947-2		
	AC, A		
	instantaneous		
6≤In≤40		6≤ln≤32	
	1P+N		
	230		
	500		
	254		
	110		
	5060		
6000		10000	
10 6		10 10	
Ū.	5		
	2.5		
-		-	
-		-	
	250		
0.03-0.1-0.3-0.5-1		0.03-0.1-0.3-0.5-1	
	0.5…1 l∆n		
	0.111.4 l∆n		
	black sealable in ON-OFF position		
	10000		
	20000		
	IP4X		
	IP2X		
	26 g half wave, duration 6 ms, 2000 shocks		
	minimum 5 g, duration 30 min., at frequency 080 Hz		
	28 cycles with 55/95100		
	23/83-40/93-55/20		
	25/95-40/95		
	30		
	-25+55		

-20...+70 16/16 1.2 on rail EN 60715 (35 mm) by means of rapid fixing device 83x70x35.6

RCBOs - DS 9.. range DS 941 type AC series



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Rated currents	Code	
ln [A]	Characteristic B	C
DS 941 type AC ·	sensitivity 30 mA	
6	EB 000 7	EB 039 5
10	EB 001 5	EB 040 3
16	EB 002 3	EB 041 1
20	EB 003 1	EB 042 9
25	EB 004 9	EB 043 7
32	EB 005 6	EB 044 5
40	EB 006 4	EB 045 2

DS 941 type AC - sensitivity 100 mA			
6	EB 007 2	EB 046 0	
10	EB 008 0	EB 047 8	
16	EB 009 8	EB 048 6	
20	EB 010 6	EB 049 4	
25	EB 011 4	EB 050 2	
32	EB 012 2	EB 051 0	
40	EB 013 0	EB 052 8	



	Tripping characteristics
B (Ir	m=35 ln)
C (Ir	m=510 ln)
	Application: residential and similar
	Connections for UNIFIX available
	Туре
10	U. C.

RCBOs - DS 9.. range DS 941 type AC series

Rated currents	Code	
ln [A]	Characteristic P	<u> </u>
	В	C
DS 941 type AC -	sensitivity 300 mA	
6	EB 014 8	EB 053 6
10	EB 015 5	EB 054 4
16	EB 016 3	EB 055 1
20	EB 017 1	EB 056 9
25	EB 018 9	EB 057 7
32	EB 019 7	EB 058 5
40	EB 020 5	EB 059 3

DS 941 type AC - sensitivity 500 mA 6 EB 021 3

6	EB 021 3	EB 060 1
10	EB 022 1	EB 061 9
16	EB 023 9	EB 062 7
20	EB 024 7	EB 063 5
25	EB 025 4	EB 064 3
32	EB 026 2	EB 065 0
40	EB 027 0	EB 066 8

DS 941 type AC - sensitivity 1000 mA

6	EB 028 8	EB 082 5	
10	EB 029 6	EB 083 3	
16	EB 030 4	EB 084 1	
20	EB 031 2	EB 085 8	
25	EB 032 0	EB 086 6	
32	EB 033 8	EB 087 4	
40	EB 034 6	EB 088 2	

Breaking capacity

Acc. to IEC EN 61009				
In [A]	poles	voltage [V]	lcn [kA]	
640	1P+N	230	4.5	

Acc. to IEC EN 60947.2

In [A]	poles	voltage [V]	lcu [kA]
640	1P+N	230	6

IMQ approval



The DS 941 series RCBOs have obtained the IMQ approval

RCBOs - DS 9.. range DS 941 type A series



Rated currents	Code	
ln [A]	Characteristic B	C
DS 941 type A - s	ensitivity 10 mA	
6	EB 355 5*	
10	EB 356 3*	
16	EB 357 1*	
20		
25		
32		
40		

DS 941 tyj	be A - sensitivity 30 m	A		
6	EB 375 3	EB 410 8		
10	EB 376 1	EB 411 6		
16	EB 377 9	EB 412 4		
20	EB 378 7	EB 413 2		
25	EB 379 5	EB 414 0		
32	EB 380 3	EB 415 7		
40	EB 381 1	EB 416 5		

DS 941 type A - sensitivity 100 mA

6	EB 382 9	EB 417 3	
10	EB 383 7	EB 418 1	
16	EB 384 5	EB 419 9	
20	EB 385 2	EB 420 7	
25	EB 386 0	EB 421 5	
32	EB 387 8	EB 422 3	
40	EB 388 6	EB 423 1	
*			

* Without IMQ approval



Tripping characteristics	J
B (Im=35 In)	
C (Im=510 In)	
Application: residential and similar	
Connections for UNIFIX available	
Туре	
Δ.	

RCBOs - DS 9.. range DS 941 type A series

Rated currents	Code	
ln [A]	Characteristic B	С
DS 941 type A - s	sensitivity 300 mA	
6	EB 389 4	EB 424 9
10	EB 390 2	EB 425 6
16	EB 391 0	EB 426 4
20	EB 392 8	EB 427 2
25	EB 393 6	EB 428 0
32	EB 394 4	EB 429 8
40	EB 395 1	EB 430 6

DS 941 typ	be A - sensitivity 500 m	A	
6	EB 396 9	EB 431 4	
10	EB 397 7	EB 432 2	
16	EB 398 5	EB 433 0	
20	EB 399 3	EB 434 8	
25	EB 400 9	EB 435 5	
32	EB 401 7	EB 436 3	
40	EB 402 5	EB 437 1	

Breaking capacity

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Acc. to IEC EN 61009			
In [A]	poles	voltage [V]	lcn [kA]
640	1P+N	230	4.5

Acc. to IEC EN 60947.2

In [A]	poles	voltage [V]	lcu [kA]
640	1P+N	230	6

IMQ approval



The DS 941 series RCBOs have obtained the IMQ approval

RCBOs - DS 9.. range DS 951 type AC series





Rated currents	Code	
In [A]	Characteristic B	C
DS 951 type AC -	sensitivity 30 mA	
6	EB 100 5	EB 135 1
10	EB 101 3	EB 136 9
16	EB 102 1	EB 137 7
20	EB 103 9	EB 138 5
25	EB 104 7	EB 139 3
32	EB 105 4	EB 140 1
40	EB 106 2	EB 141 9

DS 951 type A	DS 951 type AC - sensitivity 100 mA				
6	EB 107 0	EB 142 7			
10	EB 108 8	EB 143 5			
16	EB 109 6	EB 144 3			
20	EB 110 4	EB 145 0			
25	EB 111 2	EB 146 8			
32	EB 112 0	EB 147 6			
40	EB 113 8	EB 148 4			



	Tripping characteristics
B (I	m=35 ln)
C (I	m=510 ln)
	Application: residential
	Connections for UNIFIX available
	Туре

RCBOs - DS 9.. range DS 951 type AC series

Rated currents	Code	
In	Characteristic	0
	В	C
DS 951 type AC -	sensitivity 300 mA	
6	EB 114 6	EB 149 2
10	EB 115 3	EB 150 0
16	EB 116 1	EB 151 8
20	EB 117 9	EB 152 6
25	EB 118 7	EB 153 4
32	EB 119 5	EB 154 2
40	EB 120 3	EB 155 9

DS 951 type AC - sensitivity 500 mA

6	EB 121 1	EB 156 7	
10	EB 122 9	EB 157 5	
16	EB 123 7	EB 158 3	
20	EB 124 5	EB 159 1	
25	EB 125 2	EB 160 9	
32	EB 126 0	EB 161 7	
40	EB 127 8	EB 162 5	

DS 951 type AC - sensitivity 1000 mA

6	EB 128 6	EB 163 3	
10	EB 129 4	EB 164 1	
16	EB 130 2	EB 165 8	
20	EB 131 0	EB 166 6	
25	EB 132 8	EB 167 4	
32	EB 133 6	EB 168 2	
40	EB 134 4	EB 169 0	

Breaking capacity

Acc. to IEC EN 61009				
In [A]	poles	voltage [V]	lcn [kA]	
640	1P+N	230	6	

Acc. to IEC EN 60947.2

In [A]	poles	voltage [V]	lcu [kA]
640	1P+N	230	10

IMQ approval



The DS 951 series RCBOs have obtained the IMQ approval

RCBOs - DS 9.. range DS 951 type A series





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Rated currents	Code	
ln [A]	Characteristic B	с
DS 951 type A - s	ensitivity 30 mA	
6	EB 475 1	EB 515 4
10	EB 476 9	EB 516 2
16	EB 477 7	EB 517 0
20	EB 478 5	EB 518 8
25	EB 479 3	EB 519 6
32	EB 480 1	EB 520 4
40	EB 481 9	EB 521 2

DS 951 type	DS 951 type A - sensitivity 100 mA					
6	EB 482 7	EB 522 0				
10	EB 483 5	EB 523 8				
16	EB 484 3	EB 524 6				
20	EB 485 0	EB 525 3				
25	EB 486 8	EB 526 1				
32	EB 487 6	EB 527 9				
40	EB 488 4	EB 528 7				



	Tripping characteristics
В (lm=35 ln)
C (Im=510 In)
	Application: residential and tertiary
	Connections for UNIFIX available
	Туре

RCBOs - DS 9.. range DS 951 type A series

Rated currents	Code	
ln [A]	Characteristic B	C
DS 951 type A - s	ensitivity 300 mA	
6	EB 489 2	EB 529 5
10	EB 490 0	EB 530 3
16	EB 491 8	EB 531 1
20	EB 492 6	EB 532 9
25	EB 493 4	EB 533 7
32	EB 494 2	EB 534 5
40	EB 495 9	EB 535 2

DS 951 type A - sensitivity 500 mA				
6	EB 496 7	EB 536 0		
10	EB 497 5	EB 537 8		
16	EB 498 3	EB 538 6		
20	EB 499 1	EB 539 4		
25	EB 500 6	EB 540 2		
32	EB 501 4	EB 541 0		
40	EB 502 2	EB 542 8		

Breaking capacity



Acc. to IEC EN 61009			
In [A]	poles	voltage [V]	lcn [kA]
640	1P+N	230	6

Acc. to IEC EN 60947.2

In [A]	poles	voltage [V]	lcu [kA]
640	1P+N	230	10

IMQ approval



The DS 951 series RCBOs have obtained the IMQ approval

RCBOs - DS 9.. range DS 971 type AC series



	6	EB 195 5	EB 315
2	10	EB 196 3	EB 316
100	16	EB 197 1	EB 31
1441	20	EB 198 9	EB 318
EPMO	25	EB 199 7	EB 319
F	32	EB 200 3	EB 320
	DS 97	71 type AC - sensitivity 100 mA	

Rated currents	Code	
ln M	Characteristic	<u>^</u>
	В	U
DS 971 type AC -	sensitivity 30 mA	
6	EB 195 5	EB 315 9
10	EB 196 3	EB 316 7
16	EB 197 1	EB 317 5
20	EB 198 9	EB 318 3
25	EB 199 7	EB 319 1
32	EB 200 3	EB 320 9

DS 971 type AC - sensitivity 100 mA						
6	EB 202 9	EB 322 5				
10	EB 203 7	EB 323 3				
16	EB 204 5	EB 324 1				
20	EB 205 2	EB 325 8				
25	EB 206 0	EB 326 6				
32	EB 207 8	EB 327 4				



Tripping characteristics	
B (Im=35 In)	
C (Im=510 In)	
Application: residential and tertiary	
Connections for UNIFIX available	
Туре	

RCBOs - DS 9.. range DS 971 type AC series

Rated currents	Code	
In	Characteristic	
[A]	В	C
DS 971 type AC -	sensitivity 300 mA	
6	EB 209 4	EB 329 0
10	EB 210 2	EB 330 8
16	EB 211 0	EB 331 6
20	EB 212 8	EB 332 4
25	EB 213 6	EB 333 2
32	EB 214 4	EB 334 0

DS 971 type AC - sensitivity 500 mA

6	EB 216 9	EB 336 5	
10	EB 217 7	EB 337 3	
16	EB 218 5	EB 338 1	
20	EB 219 3	EB 339 9	
25	EB 220 1	EB 340 7	
32	EB 221 9	EB 341 5	

DS 971 type AC - sensitivity 1000 mA

6	EB 223 5	EB 343 1
10	EB 224 3	EB 344 9
16	EB 225 0	EB 345 6
20	EB 226 8	EB 346 4
25	EB 227 6	EB 347 2
32	EB 228 4	EB 348 0

Breaking capacity

Acc. to IEC EN 61009				
In [A]	poles	voltage [V]	lcn [kA]	
640	1P+N	230	10	

Acc. to IEC EN 60947.2

In [A]	poles	voltage [V]	lcu [kA]
640	1P+N	230	10

IMQ approval



The DS 971 series RCBOs have obtained the IMQ approval

RCBOs - DS 9.. range DS 971 type A series



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Rated currents	Code	
ln [A]	Characteristic B	с
DS 971 type A - s	sensitivity 30 mA	
6	EB 575 8	EB 665 7
10	EB 576 6	EB 666 5
16	EB 577 4	EB 667 3
20	EB 578 2	EB 668 1
25	EB 579 0	EB 669 9
32	EB 580 8	EB 670 7

DS 971 ty	DS 971 type A - sensitivity 100 mA				
6	EB 582 4	EB 672 3			
10	EB 583 2	EB 673 1			
16	EB 584 0	EB 674 9			
20	EB 585 7	EB 675 6			
25	EB 586 5	EB 676 4			
32	EB 587 3	EB 677 2			



	Tripping characteristics
B (I	lm=35 ln)
C (I	Im=510 In)
	Application: residential and tertiary
	Connections for UNIFIX available
	Туре
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RCBOs - DS 9.. range DS 971 type A series



Rated currents	Code	
ln [A]	Characteristic B	С
DS 971 type A - s	ensitivity 300 mA	
6	EB 589 9	EB 679 8
10	EB 590 7	EB 680 6
16	EB 591 5	EB 681 4
20	EB 592 3	EB 682 2
25	EB 593 1	EB 683 0
32	EB 594 9	EB 684 8

DS 971 type A - sensitivity 500 mA

6	EB 596 4	EB 686 3	
10	EB 597 2	EB 687 1	
16	EB 598 0	EB 688 9	
20	EB 599 8	EB 689 7	
25	EB 600 4	EB 690 5	
32	EB 601 2	EB 691 3	

Breaking capacity





Acc. to IEC EN 61009

In [A]	poles	voltage [V]	lcn [kA]
640	1P+N	230	10

Acc. to IEC EN 60947.2

In [A]	poles	voltage [V]	lcu [kA]
640	1P+N	230	10

IMQ approval



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Auxiliary elements

Auxiliary contacts

The auxiliary contact indicates the "open" or "closed" position of the circuit-breaker. Every variation of the open/closed state, whether manual or automatic, permits the activation of a remote signalling (e.g. light signalling), through its switching contact. The auxiliary contact has a green indicator, allowing determination of the open/closed position of the circuit-breaker (when the circuitbreaker is in the "open" position, the indicator projects from the contact). The indicator also allows execution of the TEST trial (temporary switching of the auxiliary circuit) by pressure on the indicator itself. A maximum of three contacts (signal and/ or auxiliary) can be applied on each circuit-breaker of the DS 9.. series.

Signal contacts

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The signal contact (or tripped relay) signals an automatic tripping caused by an overload or short-circuit. When the circuitbreaker is operated manually it does not indicate any change of state in the circuit-breaker. The signal contact has a yellow indicator projecting from the case if the circuit-breaker is tripped (this indicator also allows manual resetting of the signalling circuit - RESET). The signal contact is also fitted with a test button (TEST) which effects temporary switching of the signalling circuit whatever the ON/OFF state of the magnetothermic circuitbreaker.

Auxiliary elements



Shunt trips

They are used for remote tripping of miniature circuit-breakers. The shunt trips are equipped both with automatic de-energization contacts (for the protection of the coil) in case of held command, and an ON/OFF contact for signalling the state of the coil (energized or de-energized). A DS 9.. circuit-breaker having a shunt trip and 3 auxiliary contacts, can display 4 signals in total. A projecting red indicator signals the opening of the circuit-breaker (if caused by the shunt trip itself).

Undervoltage releases

They are used to protect the load in the event of a voltage drop (threshold between 70% and 35% of its rated value) and/ or to effect a positive safety emergency stop. There are also two versions fitted with a tripping delay of 100 ms (types S 9..-V24AC and S 9.. V24DC), which prevent unexpected trips in the pre-sence of micro interruptions of the voltage in the network lower than 100 ms.

A projecting red indicator indicates the opening of the circuitbreaker (if caused by the undervoltage release itself). The DS 9.. range is also preset for the use of the ABB rapid wiring system Unifix (L and SL versions), which simplifies the job of installers and panel builders by means of its L1- N, L2-N, L3-N rigid connections.

Auxiliary elements

Shunt trips

They are used for the remote opening of the MCBs.

OEPM0291

The shunt trips are equipped with an auto de-energizing contact and an ON-OFF contact which indicate the open/closed position of the device they are connected to.

Code	Туре	Description
for DS 941, DS	951 and DS 971 s	eries
EE 619 1	S9-T24	12-24 V a.c./d.c. shunt trip
EE 620 9	S9-T130	48-130 V a.c./48-60 V d.c. shunt trip
EE 621 7	S9-T415	220-415 V a.c./110-250 V d.c. shunt trip



Technical	chara	cteristics		
Туре		S9-T24	S9-T130	S9-T415
Voltage	[V] a.c.	12-24	48-130	220-415
	[V] d.c.	12-24	48-60	110-250
Frequency	[V]		5060	
Consumption on release	[VA]	20 VA (12 V a.c.) 90 VA (24 V a.c.) 20 VA (12 V d.c.) 90 VA (24 V d.c.)	22 VA (48 V a.c.) 200 VA (130 V a.c.) 22 VA (48 V d.c.)	40 VA (220 V a.c.) 130 VA (415 V a.c.) 10 VA (110 V d.c.) 20 VA (250 V d.c.)
Terminals	[mm ²]		2x1.5	





RCBOs - DS 9.. range Auxiliary elements

Auxiliary/signal contacts

The auxiliary contact indicates the position of the circuit-breaker contact (open/closed). When the position of the contact changes, whether manually or automatically, it indicates its status. The signal contact indicates the position of the circuit-breaker contact after automatic circuit-breaker tripping caused by overloading or short-circuiting. For manual operation, it does not indicate the change in contact position. The signal contacts in the DS 941, DS 951 and DS 971 series breakers are equipped with a test button on the front of the accessory which simulates the functions without acting directly on the circuit-breaker.



Code	Туре	Description	
For DS 941,	DS 951 and DS 97	1 series	
EE 610 0	S9-X	auxiliary contact 1NO + 1NC (1/2 module)	
EE 611 8	S9-S	signal contact 1NO + 1NC (1/2 module)	







1

Auxiliary elements

Undervoltage releases

These are used to protect the load in the event of a voltage drop (between 70% and 35% of its rated value) and/or to effect a positive safety emergency stop. If used for an emergency stop, they cause unwanted tripping also for temporary microinterruptions of the voltage for a few dozen milliseconds. Undervoltage releases equipped with a tripping time delay of 100 ms (S 9-V24CA and S 9-V24CC types) are different and eliminate unwanted tripping when there is an interruption in the network voltage which is less than 100 ms. ABB has also developed DDA AE blocks which perform the residual current function and the positive safety emergency stop without use of an auxiliary energy source (battery) and auxiliary circuits. The DDA AE blocks perform the functions of a shunt trip but without the disadvantages of an unwanted tripping.

Code	Туре	Description
for DS 941, DS	951, DS 971 series	5
EE 612 6	S9-V24CA	24 V a.c. undervoltage release with delay
EE 613 4	S9-V24CC	24 V d.c. undervoltage release with delay
EE 614 2	S9-V48CA	48 V a.c. undervoltage release
EE 615 9	S9-V48CC	48 V d.c. undervoltage release
EE 616 7	S9-V230CA	230 V a.c. undervoltage release







Technical characteristics

Туре		S9-V24CA	S9-V24CC	S9-V48CA	S9-V48CC	S9-V230CA
Voltage	[V] a.c.	24	-	48	-	230
	[V] d.c.	_	24	-	48	-
Frequency	[Hz]			5060		
Consumption on release	[VA]	6	2	4.3	2	4.3
Terminals	[mm ²]			2x1.5		

RCBOs - DS 9.. range Accessories

Busbars

Available in versions of 4 and 12 modules, these are made of a copper conductor and an insulating plastic housing. For all of the different types of busbars, the maximum capacity is 60 A, whilst the copper cross-section is 10 mm².

Code	Туре	Description
For S 9 and	I DS 9 series	
EA 095 8	BCP 1P - 12 mod.	pin type busbar 1P - 12 modules
EA 096 6	BCP N - 12 mod.	pin type busbar 1P (N) - 12 modules
EA 097 4	BCP 1P - 4 mod.	pin type busbar 1P - 4 modules
EA 098 2	BCP N - 4 mod.	pin type busbar 1P (N) - 4 modules
EA 099 0	BCP 2P - 12 mod.	pin type busbar 2P - 12 modules
EA 100 6	BCP 3P - 12 mod.	pin type busbar 3P - 12 modules
EA 101 4	BCP 4P - 12 mod.	pin type busbar 4P - 12 modules
EA 102 2	MR 25-15	pin type connecting clamp 25 mm ² - 15 mm
EA 103 0	MR 25-30	pin type connecting clamp 25 mm ² - 30 mm





The DS... range of RCBOs combines in a single device the residual current protection and the thermal+magnetic protection which is typical of MCBs; they trip in both the case of earth leakage and overload or short-circuit.

These RCBOs series are derived from the corresponding series of MCBs, from which they take the characteristics and performances with regard to the thermomagnetic part.

To be precise, in the DS 640 the overcurrent protection is provided by the same thermomagnetic release of the S 240. In the same way the DS 650 and the DS 750 use the same thermomagnetic release of the S 250, and the DS 670 the same thermomagnetic release of the S 270.

All DS 640, DS 650 and DS 670 mount a residual current release type AC, while the DS 750 have an A type release.

Also available is the double sensitivity AC type DS 850 series, known as VARIMAT.

F 500 is the type A residual current circuit-breaker with overcurrent protection derived from the S 500 heavy duty circuit-breaker.





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Technical characteristics		
Order information		
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E 500 series	1/33	

N.B. The auxiliary elements and accessories being the same as those in the circuit-breakers series S 2.., please refer to the catalogue no. 2CSC400001D0201.

Technical characteristics

			DS 640
Reference Standards			IEC EN 61009, IEC EN 60947-2
Type (wave form of leakage current detected)		[AC]	AC
Tripping characteristics			instantaneous
Kated current in Poles		A	6≤In≤32
Rated voltage lie	1P+N	M	230
	2P, 4P	[M]	230/400
Insulation voltage Ui			500
Max. operating voltage of test button	V		440
Min. operating voltage of test button Rated frequency	V	[Ц-]	195
		[1 12]	4500
Rated breaking capacity Icn acc.to IEC EN 61009 Rated breaking conservity	Weede Inc.		2
Rated breaking capacity acc to IEC EN 60947-2 2 poles - 230 V	ultimate ich service los	[KA]	о 6
Rated breaking capacity	ultimate Icn	[kA]	v
acc.to IEC EN 60947-2 4 poles - 400 V	service lcs	[kA]	
Voltage withstanding capacity impulse (1.2/	50) Uimp	[kV]	5
Dielectric test voltage at ind. freq. for 1 min		[kV]	2.5
Thermomagnetic release	B: 3 In <im<5 in<="" th=""><th></th><th>•</th></im<5>		•
characteristic	C: 5 ln <lm<10 ln<="" td=""><td></td><td>•</td></lm<10>		•
	D: 10 ln≤lm≤20 ln		
	K: 8 ln≤lm≤14 ln		
	7.2 Inclm<3 In		
Resistance to unwanted tripping	2.2 11311130 11		
caused by overvoltages		[A]	250
(operation or atmospheric)/Peak amp. (8/20	wave)		
Kated sensitivity I∆n	AC turco	[A]	0.03
mpping mesnou	A type		U.S1 IAH
Toggle	1P+N		black sealable in ON-OFF position
Electrical life	2P, 4P		black (MCB part) sealable in ON-OFF position + blue (RCD part) operating just from OFF position
Mechanical life			20000
Protection degree	housing		IP4X
	terminals		IP2X
Mechanical shock resistance			26 g half wave, duration 6 ms, 2000 shocks
			minimum 5 g, dulation 50 min., at requeits 000 mz
Tropicalization	humid heat	[°C/RH]	28 cycles with 55/95100
acc.to bin 40040 inc 00-2	constant climatic cond.	[°C/RH]	23/83-40/93-55/20
	variable climatic cond.	[°C/RH]	25/95-40/95
Thermal releaser calibration temperature	variable climatic cond.	[°C/RH] [°C]	25/95-40/95 30 (20 for curves K, Z)
Thermal releaser calibration temperature Ambient temperature (with daily average ≤+	variable climatic cond. 35 °C)	[°C/RH] [°C] [°C]	25/95-40/95 30 (20 for curves K, Z) -25+55 2070
Thermal releaser calibration temperature Ambient temperature (with daily average ≤+ Storage temperature	variable climatic cond. 35 °C)	[°C/RH] [°C] [°C] [°C]	25/95-40/95 30 (20 for curves K, Z) -25+55 -20+70
Thermal releaser calibration temperature Ambient temperature (with daily average ≤+ Storage temperature Terminal size upper/lower net cable	variable climatic cond. 35 °C) 2P	[°C/RH] [°C] [°C] [°C] [mm²]	25/95-40/95 30 (20 for curves K, Z) -25+55 -20+70 25/25
Thermal releaser calibration temperature Ambient temperature (with daily average ≤+ Storage temperature Terminal size upper/lower per cable	variable climatic cond. 35 °C) 2P 4P In≤25 A	[°C/RH] [°C] [°C] [°C] [mm²]	25/95-40/95 30 (20 for curves K, Z) -25+55 -20+70 25/25 25/10
Thermal releaser calibration temperature Ambient temperature (with daily average ≤+ Storage temperature Terminal size upper/lower per cable	variable climatic cond. 35 °C) 2P 4P In<25 A 4P 32 A <in<40 a<="" td=""><td>[°C/RH] [°C] [°C] [°C] [mm²] [mm²]</td><td>25/95-40/95 30 (20 for curves K, Z) -25+55 -20+70 25/25 25/10 25/16</td></in<40>	[°C/RH] [°C] [°C] [°C] [mm²] [mm²]	25/95-40/95 30 (20 for curves K, Z) -25+55 -20+70 25/25 25/10 25/16
Thermal releaser calibration temperature Ambient temperature (with daily average ≤+ Storage temperature Terminal size upper/lower per cable	variable climatic cond. 35 °C) 2P 4P In≤25 A 4P 32 A≤In≤40 A 4P 50 A≤In≤63 A	[°C/RH] [°C] [°C] [°C] [mm²] [mm²] [mm²]	25/95-40/95 30 (20 for curves K, Z) -25+55 -20+70 25/25 25/10 25/16 25/25
Thermal releaser calibration temperature Ambient temperature (with daily average ≤+ Storage temperature Terminal size upper/lower per cable	variable climatic cond. 35 °C) 2P 4P In≤25 A 4P 32 A≤In≤40 A 4P 50 A≤In≤63 A 2P	[°C/RH] [°C] [°C] [°C] [mm²] [mm²] [mm²]	25/95-40/95 30 (20 for curves K, Z) -25+55 -20+70 25/25 25/10 25/16 25/25
Thermal releaser calibration temperature Ambient temperature (with daily average ≤+ Storage temperature Terminal size upper/lower per cable Tightening torque Magnetothermic part/	variable climatic cond. 35 °C) 2P 4P In≤25 A 4P 32 A≤In≤40 A 4P 50 A≤In≤63 A 2P 4P In≤25 A	[°C/RH] [°C] [°C] [rm²] [mm²] [mm²] [mm²] [mm²]	25/95-40/95 30 (20 for curves K, Z) -25+55 -20+70 25/25 25/10 25/16 25/25 25/25 25/25
Thermal releaser calibration temperature Ambient temperature (with daily average ≤+ Storage temperature Terminal size upper/lower per cable Tightening torque Magnetothermic part/ RCD part	variable climatic cond. 2P 4P In≤25 A 4P 32 A≤In≤40 A 4P 50 A≤In≤63 A 2P 4P In≤25 A 4P 32 A≤In≤40 A	[°C/RH] [°C] [°C] [rm²] [mm²] [mm²] [mm²] [mm²] [mm²]	25/95-40/95 30 (20 for curves K, Z) -25+55 -20+70 25/25 25/10 25/16 25/25 25/25 25/25 2/2 2/1.2 2/2
Thermal releaser calibration temperature Ambient temperature (with daily average ≤+ Storage temperature Terminal size upper/lower per cable Tightening torque Magnetothermic part/ RCD part	variable climatic cond. 2P 4P In≤25 A 4P 32 A≤In≤40 A 4P 50 A≤In≤63 A 2P 4P In≤25 A 4P 32 A≤In≤40 A 4P 32 A≤In≤40 A 4P 50 A≤In≤63 A	[°C/RH] [°C] [°C] [rm²] [mm²] [mm²] [mm²] [mm²] [mm²] [N*m] [N*m] [N*m]	25/95-40/95 30 (20 for curves K, Z) -25+55 -20+70 25/25 25/10 25/16 25/25 25/25 25/25 2/2 2/2 2/1.2 2/2
Thermal releaser calibration temperature Ambient temperature (with daily average ≤+ Storage temperature Terminal size upper/lower per cable Tightening torque Magnetothermic part/ RCD part	variable climatic cond. 35 °C) 2P 4P In≤25 A 4P 32 A≤In≤40 A 4P 50 A≤In≤63 A 2P 4P In≤25 A 4P 32 A≤In≤40 A 4P 50 A≤In≤63 A	[°C/RH] [°C] [°C] [mm ²] [mm ²] [mm ²] [mm ²] [mm ²] [mm ²] [N*m] [N*m] [N*m]	25/95-40/95 30 (20 for curves K, Z) -25+55 -20+70 25/25 25/10 25/16 25/25 2/2 2/1.2 2/2 2/2 2/2 2/2 2/2
Thermal releaser calibration temperature Ambient temperature (with daily average ≤+ Storage temperature Terminal size upper/lower per cable Tightening torque Magnetothermic part/ RCD part Mounting Dimensions	variable climatic cond. 35 °C) 2P 4P In≤25 A 4P 32 A≤In≤40 A 4P 50 A≤In≤63 A 2P 4P In≤25 A 4P 32 A≤In≤40 A 4P 50 A≤In≤63 A	[°C/RH] [°C] [°C] [mm ²] [mm ²]	25/95-40/95 30 (20 for curves K, Z) -25+55 -20+70 25/25 25/10 25/16 25/25 25/25 25/25 25/25 2/2 2/2 2/2 2/2
Thermal releaser calibration temperature Ambient temperature (with daily average ≤+ Storage temperature Terminal size upper/lower per cable Tightening torque Magnetothermic part/ RCD part Mounting Dimensions H94xD68xW	variable climatic cond. 35 °C) 2P 4P In≤25 A 4P 32 A≤In≤40 A 4P 50 A≤In≤63 A 2P 4P In≤25 A 4P 32 A≤In≤40 A 4P 50 A≤In≤63 A 2P 2P	[°C/RH] [°C] [°C] [°C] [mm²] [mm²] [mm²] [mm²] [N*m] [N*m] [N*m] [N*m]	25/95-40/95 30 (20 for curves K, Z) -25+55 -20+70 25/25 25/10 25/16 25/25 25/25 25/25 2/2 2/1.2 2/2 2/1.2 2/2 0 n rall EN 60715 (35 mm) by means of rapid fixing device
Thermal releaser calibration temperature Ambient temperature (with daily average ≤+ Storage temperature Terminal size upper/lower per cable Tightening torque Magnetothermic part/ RCD part Mounting Dimensions H94xD68xW	variable climatic cond. 35 °C) 2P 4P In≤25 A 4P 32 A≤In≤40 A 4P 50 A≤In≤63 A 2P 4P In≤25 A 4P 32 A≤In≤40 A 4P 50 A≤In≤63 A 2P 4P 50 A≤In≤63 A	[°C/RH] [°C] [°C] [°C] [mm²] [mm²] [mm²] [mm²] [N*m] [N*m] [N*m] [N*m]	25/95-40/95 30 (20 for curves K, Z) -25+55 -20+70 25/25 25/10 25/16 25/25 25/25 2/2 2/2 2/1.2 2/2 2/2 on rail EN 60715 (35 mm) by means of rapid fixing device
Thermal releaser calibration temperature Ambient temperature (with daily average ≤+ Storage temperature Terminal size upper/lower per cable Tightening torque Magnetothermic part/ RCD part Mounting Dimensions H94xD68xW	variable climatic cond. 35 °C) 2P 4P In≤25 A 4P 32 A≤In≤40 A 4P 50 A≤In≤63 A 2P 4P In≤25 A 4P 32 A≤In≤40 A 4P 50 A≤In≤63 A 2P 4P In≤25 A 4P 50 A≤In≤63 A	[°C/RH] [°C] [°C] [°C] [mm ²] [mm ²] [mm ²] [mm ²] [mm [N*m] [N*m] [N*m] [N*m] [N*m] [N*m] [N*m]	25/95-40/95 30 (20 for curves K, Z) -25+55 -20+70 25/25 25/10 25/16 25/25 2/2 2/2 2/1.2 2/2 2/2 on rail EN 60715 (35 mm) by means of rapid fixing device
Thermal releaser calibration temperature Ambient temperature (with daily average ≤+ Storage temperature Terminal size upper/lower per cable Tightening torque Magnetothermic part/ RCD part Mounting Dimensions H94xD68xW	2P 4P In≤25 A 4P 32 A≤In≤40 A 4P 50 A≤In≤63 A 2P 4P 1n≤25 A 4P 50 A≤In≤63 A 2P 4P 1n≤25 A 4P 1n≤25 A 4P 50 A≤In≤63 A 2P 4P 1n≤25 A 4P 50 A≤In≤63 A 2P 4P 50 A≤In≤63 A	[°C/RH] [°C] [°C] [°C] [°m²] [mm²] [mm²] [mm²] [N*m] [N*m] [N*m] [N*m] [N*m] [N*m]	25/95-40/95 30 (20 for curves K, Z) -25+55 -20+70 25/25 25/10 25/16 25/25 2/2 2/1.2 2/2 2/1.2 2/2 2/2 on rall EN 60715 (35 mm) by means of rapid fixing device 70 - -
Thermal releaser calibration temperature Ambient temperature (with daily average ≤+ Storage temperature Terminal size upper/lower per cable Tightening torque Magnetothermic part/ RCD part Mounting Dimensions H94xD68xW	2P 4P In≤25 A 4P 32 A≤In≤40 A 4P 50 A≤In≤63 A 2P 4P 1n≤25 A 4P 32 A≤In≤40 A 4P 32 A≤In≤40 A 4P 1n≤25 A 4P 50 A≤In≤63 A 2P 4P 1n≤25 A 4P 50 A≤In≤63 A 2P 4P 50 A≤In≤63 A	[°C/RH] [°C] [°C] [°C] [°C] [°m²] [mm²] [mm²] [mm²] [N*m] [N*m] [N*m] [N*m] [N*m] [N*m] [N*m] [N*m] [N*m]	25/95-40/95 30 (20 for curves K, Z) -25+55 -20+70 25/25 25/10 25/16 25/25 2/2 2/1.2 2/2 2/1.2 2/2 2/2 on rail EN 60715 (35 mm) by means of rapid fixing device 70 - - 460/550

Technical characteristics

DS 650	DS 670			
IEC EN 61009	, IEC EN 60947-2			
instar	Itaneous			
0.5: 2P 4P	≤In≤63			
١٣, ١٢	230			
23	0/400			
· · · · · · · · · · · · · · · · · · ·	440			
	195			
6000	10000			
20 (10 1P+N) 15 (7 5 1P+N)	25 (15 1P+N) 18 7 (11 2 1P+N)			
10	15			
7.5	5			
	2.5			
	•			
	•			
	250			
0.01 - 0.03 - 0.3	0.03 - 0.3			
0.01	0.111.4 IΔn			
black sealable in ON-OFF position black (MCB part) sealable in ON-OFF position + blue (RCD part) operating just from OFF position				
2	0000			
	P4X P9y			
26 g half wave, dura	tion 6 ms, 2000 shocks			
minimum 5 g, duration 30	min., at frequency 080 Hz			
28 cycles w	ith 55/95100			
23/83-4	0/93-55/20			
25/9 30 (20 for	5-40/95 curves K. Zi			
-25	+55			
-20	+70			
2	5/25			
2	5/10			
2	b/16			
2	5/25			
	2/2			
2	2/2			
	2/2			
on rail EN 60715 (35 mm) t	by means of rapid fixing device			
	70			
	105			
	123			
46	0/550			
RCBOs - DS ... range Elettrostop DS 640 series



Characteristic C		
Rated currents	Code	
ln [A]	Sensitivity 0.03 A	
2P - DS 642 P ty	/pe	
6	EY 021 8	
8	EY 027 5	
10	EY 022 6	
13	EY 028 3	
16	EY 023 4	
20	EY 024 2	
25	EY 025 9	
32	EY 026 7	



RCBOs - DS ... range Elettrostop DS 650 series



Characterist	tic C			
Rated curre	nts Code			
ln [A]	Sensitivity 0.01 A	0.03 A	0.3 A	
2P - DS 652	type			
6	EY 040 8	EY 050 7	EY 060 6	
8	EY 041 6	EY 051 5	EY 061 4	
10	EY 042 4	EY 052 3	EY 062 2	
13		EY 589 4	EY 590 2	
16	EY 043 2	EY 053 1	EY 063 0	
20		EY 054 9	EY 064 8	
25		EY 055 6	EY 065 5	
32		EY 056 4	EY 066 3	

Rated currents	Code			
in [A]	Sensitivity 0.03 A	0.3 A		
IP - DS 654 typ	e			
i	EY 1109	EY 120 8		
}	EY 111 7	EY 121 6		
10	EY 112 5	EY 122 4		
16	EY 1133	EY 123 2		
20	EY 114 1	EY 124 0		
25	EY 1158	EY 125 7		
32	EY 191 9	EY 193 5		

Breaking capacity Acc. to IEC EN 61009

Acc. to IEC EN 60947.2

poles

2P

2P

4P

poles

2P

2P

4P

In [A]

6....32

6...32

6...32

In [A]

6...32

6...32

6....32



•

Tripping characteristics

C (Im=5...10 In) at 30 °C, B (Im=3...5 In) at 30 °C

Application: residential and similar

DS 652 and DS 654 series connections for UNIFIX available

Туре

400 10 400 10

voltage [V]

voltage [V]

230

400

400

230

lcn [kA]

lcu [kA]

20

10

6

6

DS 650 In=6...32 A I∆n=0.03-0.3 A

IMQ approval



RCBOs - DS ... range Elettrostop DS 670 series



Characteristic C	
Rated currents	Code
In [A]	Sensitivity 0.03 A
2P - DS 672 type	
0.5	EY 730 4
1	EY 731 2
1.6	EY 732 0
2	EY 733 8
3	EY 734 6
4	EY 735 3
6	EY 200 8
8	EY 201 6
10	EY 202 4
13	EY 774 2
16	EY 203 2
20	EY 204 0
25	EY 205 7
32	EY 206 5
40	EY 207 3
50	EY 208 1
63	EY 209 9



Acc. to IEC EN	61009		
In [A]	poles	voltage [V]	lcn [kA]
0.563	2P	230	15
0.563	2P	400	10
0.563	4P	400	10

Acc: 10 120 2N 00347.2					
In [A]	poles	voltage [V]	lcu [kA]		
0.563	2P	230	25		
0.563	2P	400	15		
0.563	4P	400	15		

RCBOs - DS ... range Elettrostop DS 670 series

Characteristic C			
Rated currents	Code		
ln [A]	Sensitivity 0.03 A	0.3 A	
4P - DS 674 type			
0.5	EY 742 9		
1	EY 743 7		
1.6	EY 744 5		
2	EY 745 2		
3	EY 746 0		
4	EY 747 8		
6	EY 260 2	EY 270 1	
8	EY 261 0	EY 271 9	
10	EY 262 8	EY 272 7	
13	EY 776 7	EY 778 3	
16	EY 263 6	EY 273 5	
20	EY 264 4	EY 274 3	
25	EY 265 1	EY 275 0	
32	EY 515 9	EY 517 5	
40	EY 516 7	EY 518 3	
50	EY 268 5	EY 278 4	
63	EY 269 3	EY 279 2	

IMQ approval

DS 670

In=0.5…63 A I∆n=0.03-0.3 A



RCBOs - DS ... range Double sensitivity Varimat DS 850 series



Characteristic C					
Rated currents	Code				
In [A]	Sensitivity 0.03 A/0.2 A				
2P - DS 852 type					
10	EY 188 5				
16	EY 189 3				
20	EY 190 1				



Breaking ca	\sim		
Acc. to IEC EN	61009		
In [A]	poles	voltage [V]	lcn [kA]
1020	2P	230	6
1020	2P	400	6

Acc.	to	IEC	ΕN	60947.2
				000 11 12

In [A]	poles	voltage [V]	lcu [kA]
1020	2P	230	15
1020	2P	400	10

RCBOs - DS ... range F 500 series



Characteristic C				
Rated currents	Code			
In [A]	Sensitivity 0.01 A	0.03 A	0.3 A	
2P - F 502 type				
10	on request	El 371 5	El 381 4	
16	on request	EI 372 3	El 382 2	
20	on request	EI 373 1	EI 383 0	
25	on request	EI 374 9	El 384 8	
40	-	EI 376 4	El 386 3	
63		-	-	

4P - F 504 type

10	on request	EI 391 3	EI 401 0	
16	on request	El 392 1	EI 402 8	
20	on request	EI 393 9	EI 403 6	
25	on request	EI 394 7	EI 404 4	
40	-	EI 396 2	EI 406 9	
63	-	EI 398 8	EI 408 5	

Characteristic D

2P, 3P, 4P - F 502, F 503, F 504 types

Available on request with In 25...63 A and I $\!\!\!\!\Delta n$ 0.03 - 0.3 A

Characteristic K

3P, 4P - F 503, F 504 types

Available on request with In 0.28...45 A (adjustable thermal) and I ${\rm \Delta n}$ 0.01-0.03-0.3 A



•

Technical characteristics

Rated current	[A]	In=1063
Rated voltage	[V]	Ue=230/400
Min. operating voltage	[V]	Umin=175
Rated RCD breaking capacity	[kA]	l∆m=25
Electric operations	[n°]	10000
Mechanical operations	[n°]	20000
Poles		2P/4P
Weight	[g]	800, 1600
Self-extinguishing degree		V0 thickness 1.6 mm
Cage terminals	[mm ²]	up to 25
Tropicalization acc. to DIN 50016		95% UR at 55 °C
Rated impulse withstand voltage	[A]	250 peak (wave 8/20 μs) acc. to VDE 0432 Part 2
Mounting position		Any

Acc. to IEC EN	61009		
In [A]	poles	voltage [V]	lcn [kA]
663	2P, 4P	230/400	25

Acc. to IEC EN 60947.2						
In [A]	poles	voltage [V]	lcu [kA]			
663	2P, 4P	230/400	50			

А

RCCBs are sensitive only to fault currents to earth. Overloads or short circuits are not detectable. These breakers have to be connected in series with a MCB or fuse that protects them against thermal and dynamic stresses of occasional overcurrents, when these reach values that may damage the device.

The ABB range of RCCBs gives protection against indirect contact in any plant engineering situation. Apart from the traditional AC type known as ELETTROSTOP (for the detection of alternate leakage current) and the A type known as VARISTOP (for the detection of alternate/pulsating leakage current with DC components), the range also includes the selective type that provides RCDs selectivity, types suitable for high frequencies which give protection up to 400 Hz and the those capable of detecting DC type residual currents.

Since the RCCBs can be tripped by impulsive disturbances in the power supply, for example atmospheric discharges or rough operation of on the network, they can be the cause of out of services or malfunctions with economic consequences that sometimes may be very serious.



ABB has a solution for this problem with the F 3.. circuitbreakers series.

The F3.. AR circuit-breakers consist of a single block combining an F 3.. type RCCB with an electronic automatic reclosing device.

Thanks to an electronic circuit able to distinguish between temporary leakage caused by a disturbance and permanent leakage caused by a fault, the new AP residual current operated circuit-breakers resist a current impulse with 8/20 μ s form and 3000 A peak.



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RCCBs - F 3.., F 6.., F 800 ranges

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RCCBs - F 3.., F 6.., F 800 ranges

			F 360/F360 AR	F 360 AP	F 660
Reference Standards			IEC EN 61008	IEC EN 61008	IEC EN 61008
Type (wave form of leakage c	urrent detected)		AC	AC	AC
Tripping characteristics				instantaneous	
Rated current In		[A]	16, 25, 40, 63, 80	25, 63	80, 100, 125
Poles				2P, 4P	
Rated voltage Ue		[V]		230/400	
Insulation voltage Ui		[V]		500	
Max. operating voltage of tes	t button	[V]	254	254	254 (440 ln=125 A)
Min. operating voltage of tes	t button	[V]	110	110	110 (185 ln=125 A)
Rated frequency		[Hz]		5060	
Rated conditional	SCPD - fuse gl 63 A	[kA]	6	6	-
short-circuit current Inc	SCPD - fuse gl 125 A	[kA]	6 (In=80 A)	6 (In=80 A)	10
Rated breaking capacity IAn	n	[kA]	1.5	1.5	2
Voltage withstanding capacity	y impulse (1.2/50) Uimp	[kV]	6		4
Dielectric test voltage at ind.	freq. for 1 min.	[kV]		2.5	
Resistance to unwanted tripping (operation or atmospheric)/Peak	caused by overvoltages amp. (8/20 wave)	[A]	250	3000	250
Rated sensitivity I∆n		[A]	0.01-0.03-0.1-0.3-0.5	0.03	0.03-0.3
Tripping threshold	AC type A type		0.5…1 l∆n	0.5…1 l∆n	0.5…1 l∆n
Toggle			blue	sealable in ON-OFF po	sition
Contacts position indication			-	-	
Electrical life			10	0000 (5000 for In=125	A)
Mechanical life			2	0000 (5000 for In=125	A)
Equipment protection degree	housing terminals			IP4X IP2X	
Mechanical shock resistance		26 g half	wave, duration 6 ms, 2000 sho	cks (20 g, duration 20	ms for In = 125 A)
Resistance to vibrations acc.	to IEC 68-2-6		minimum 5 g, d	luration 30 min., at freq	uency 080 Hz
Tropicalization	humid heat	[°C/RH]	28	3 cycles with 55/9510	00
400.10 DIN 40040 ILO 00 Z	const. climatic cond.	[°C/RH]		23/83 - 40/93 - 55/20	
	var. climatic cond.	[°C/RH]		25/95 - 40/95	
Ambient temperature (with da	aily average ≤+35 °C)	[°C]	-25+55	-25+55	-5+55 (+40 for In=125 A)
Storage temperature		[°C]		-40+70	
Terminal size upper/lower pe	r cable	[mm ²]	25/25	25/25	35/35
Tightening torque		[N*m]	2	2	3
Mounting			on rail EN 6071	5 (35 mm) by means of	f rapid fixing device
Dimensions					
H90xD68xW	2P In<80 A	[mm]		35	
	4P ln<100 A	[mm]		70	
	2P AR	[mm]		105	
	4P AR	[mm]		140	
H85xD69.5xW	4P In=125 A	[mm]		70	
Pole weight	2P	[g]		345/355	
	4P	[g]		460	
	2P AR	[g]		745/755	
	4P AR	[a]		860	

RCCBs - F 3.., F 6.., F 800 ranges

		and the second sec	
F 370/F 370 AR/F 370 400Hz	F 370 AP	F 670	F 390/F 390AR
IEC EN 61008	IEC EN 61008	IEC EN 61008	IEC EN 61008
A	A	A	А
instantane	eous	selective	e
16, 25, 40, 63, 80	25, 63	80, 100, 125	40, 63
		2P, 4P	
	2	500	
254	254	254 (440 ln=125 A)	254
110	110	110 (185 ln=125 A)	110
5060 (50400 x F370 400Hz)		5060	
6	6	_	6
6 (In=80A)	6 (In=80A)	10	U U
1.5	1.5	2	1.5
6		4	6
		2.5	
250	3000	250	3000
0.01-0.03-0.1-0.3-0.5	0.03	0.03-0.3	0.3-0.5-1
0.5…1 l∆n	0.5…1 l∆n	0.5…1 l∆n	0.5…1 l∆n
0.11…1.4 l∆n	0.11…1.4 l∆n	0.11…1.4 l∆n	0.111.4 l∆n
	blue sealable	in ON-OFF position	
			•
	10000 (50	000 for In=125 A)	
	20000 (50	JUU for In=125 A)	
26 g	half wave duration 6 ms 2000	shocks (20 a, duration 20 ms for $\ln = 12$	5 A)
	minimum 5 g, duration 3	30 min., at frequency 080 Hz	
	28 cycles	with 55/95100	
	23/83	-40/93-55/20	
	20/00	/95-10/95	
-25 +55	-25 +55	$-25 \pm 55 (\pm 40 \text{ for } \ln - 125 \text{ A})$	-25 +55
20	-40+70		
25/25	25/25	35/35	25/25
2	2	3	2
	on rail EN 60715 (35 mm) by means of rapid fixing device	
		35	
		70	
		105	
		140	
		70	
	(345/355	
		460	
	7	745/755	
		860	

RCCBs - F 3.., F 6.. ranges Elettrostop F 360 and F 660 type AC series



Rated currents	Code				
ln [A]	Sensitivity 0.01 A	0.03 A	0.1 A	0.3 A	0.5 A
2P - F 362, F 662	type				
16	EY 600 9				
25		EY 601 7	EB 911 5	EY 605 8	EB 914 9
40		EY 602 5	EB 912 3	EY 606 6	EB 915 6
63		EY 603 3	EB 913 1	EY 607 4	EB 916 4
80		EY 604 1		EY 608 2	
100		EB 877 8		EB 879 4	

4P	- F	364	F	664	type
		007,		004	Lype

16				
25	EY 622 3	EB 919 8	EY 625 6	EY 628 0
40	EY 623 1	EB 920 6	EY 626 4	EY 629 8
63	EY 624 9	EB 921 4	EY 627 2	EY 630 6
80	EB 880 2		EB 883 6	
100	EB 881 0		EB 884 4	
125	EB 947 9		EB 966 9	



IMQ approval



F 360 2P, 4P In=25…63 A I∆n=0.03-0.3 A

RCCBs - F 3.., F 6.. ranges Elettrostop F 360 IEC Standards series



Rated currents	Code				
ln [A]	Sensitivity 0.01 A	0.03 A	0.1 A	0.3 A	
2P - F 362 type					
16	11159886				
25		11159833	11159838	11159843	
32		11159834	11159839	11159844	-
40		11159835	11159840	11159845	
63		11159836	11159841	11159846	
80		11159887			

4P - F 364 type

16				
25	11159848	11159853	11159858	
32	11159849	11159854	11159859	
40	11159850	11159855	11159860	
63	11159851	11159856	11159861	
80				



Approvals



PSB, SAFETY MARK, CCC, SIRIM, DFT

RCCBs - F 3.., F 6.. ranges Varistop F 370 and F 670 type A series



Rated currents	Code				
In [A]	Sensitivity 0.01 A	0.03 A	0.1 A	0.3 A	0.5 A
2P - F 372, F 672	type				
16	EY 609 0				
25		EY 610 8	EB 917 2	EY 614 0	
40		EY 611 6	EB 918 0	EY 615 7	
63		EY 612 4	EB 910 7	EY 616 5	
80		EY 613 2		EY 617 3	
100		EB 893 5			





16				
25	EY 631 4	EB 922 2	EY 634 8	EY 637 1
40	EY 632 2	EB 923 0	EY 635 5	EY 638 9
63	EY 633 0	EB 924 8	EY 636 3	EY 639 7
80	EB 886 9		EB 889 3	
100	EB 887 7		EB 890 1	
125	EB 950 3		EB 998 2	



IMQ approval



F 370 2P, 4P In=25...63 A I∆n=0.03-0.1-0.3-0.5 A



RCCBs - F 3.. range Selective Varistop F 390 type A series







The front of the A type selective Varistop F 390 breaker is fitted with a cam which can be turned using a screwdriver. When set to the "O" position the breaker cannot be closed. This allows the system to be kept out of operation in a safe state (e.g.: so that repairs and maintenance can be carried out). Return the cam to the "I" position and the breaker can be closed.

RCCBs - F 3.. range

Code

EY 668 6

EY 656 1

Rated currents

25

63

Anti-disturbance F 360 AP type AC and F 370 AP type A series





[A]	0.03 A	
2P - F 362 typ	e	
25	EY 667 8	
63	EY 655 3	

	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				
25	EY 6	669 4			
63	EY 6	657 9			

4P - F 374 ty	ре			
25	EY 670 2			
63	EY 658 7			
		-		



Technical characteristics

Resistance to unwanted tripping

3000 A peak (8/20 µs wave)

RCCBs - F 3.. range

F 360 AR, F 370 AR, F 390 AR series with automatic reclosing device



F 360 AR, AC type

Rated currents	Code			
ln [A]	Sensitivity 0.03 A	0.3 A	0.5 A	1 A
2P - F 362 AR type				
25	EY 646 2			
40	EY 647 0		EY 644 7	
63	EY 673 6	EY 659 5	EY 663 7	
4P - F 364 AB type				

EY 651 2

EY 653 8

F 370 AR, A type

63

63

2P - F 372 AR type		
25	EY 648 8	
40	EY 649 6	
63	EY 674 4	EY 675 1

EY 652 0

EY 677 7

4P - F 374 AR type

F 390 AR, selective A type

EY 676 9	EY 680 1		
EY 678 5	EY 654 6	EY 679 3	
	EY 676 9 EY 678 5	EY 676 9 EY 680 1 EY 678 5 EY 654 6	EY 676 9 EY 680 1 EY 678 5 EY 654 6 EY 679 3







The output contacts allow remote indication of the system fault status, for example, using a warning light.

RCCBs - F 3.. range F 370 for high frequencies (400 Hz) type A series

Increasing the frequency generates an increase of the magnetic reluctance of the toroidal transformer of the RCCB and what follows is the value of the increasing operating residual current at 400 Hz reaching values 4-5 times higher than those of the residual current at 50 Hz.

The RCCB F 370/400 Hz guarantees protection against direct contact considering that the operating residual current doesn't increase with the increase of the network frequency.

The use of these RCCBs is especially suitable for the industrial sector, i.e. installation where high speed FM lines are used, laboratories, textile industries and telecommunications.

Rated currer	nts Code	
ln [A]	Sensitivity 0.03 A	
4P - F 374/40	00Hz type	
25	EY 786 6	
40	EY 787 4	



Rated conditional short-circuit		
current SCPD	[kA]	6 with 63A gL fuse
Rated current	[A]	In=25-40
Rated voltage	[V]	Ue=230-400 a.c.
Rated breaking		
capacity	[kA]	l∆m=1.5
Minimum operating		
voltage	[V]	Umin=110
Frequency	[Hz]	50/400
Sensitivity	[A]	0.03
Poles		4P
Weight	[g]	460
Self-extinguishing degree		V0 thickness 1.6 mm
Protection degree		IPXXB/IP2X
Operating temperature	[°C]	-25+55
Electric operations	[n°]	10000
Mechanical operations	[n°]	20000
Terminals	[mm ²]	25
Tropicalization acc.to		
DIN40046		95% UR at 55 °C
Rated impulse	[A]	250 peaks
withstand current		(8/20 μs)
		acc. to VDE 0432 part 2
Mounting position		Any

RCCBs - F 800.. range F 800 B type series for fault currents with d.c. components







Rated conditional short-circuit		
current SCPD	[kA]	10 with 100 A gL fuse
Rated current	[A]	63
Rated voltage	[V]	230-400 a.c.
Operating voltage	[V]	175/440 a.c.
Frequency	[Hz]	50/60
Sensitivity	[A]	0.03-0.3
Poles		4P
Protection degree		
front		

Protection degree		
- front		IPXXB/IP2X
 mounted in housing or in consumer unit 		IPXXD/IP4X
Operating temperature	[°C]	-25+40
Electric operations	[n°]	>10000
Mechanical operations	[n°]	>10000
Shell terminals	[mm ²]	25
Rated impulse withstand current	[A]	250 peaks (8/20 μs) acc. to VDE 0432 part 2
Mounting position		Any

RCCBs - F 3.., F 6.. ranges

Auxiliary elements and accessories

The F 3.. and F 6.. series of RCCBs can be equipped with auxiliary contacts. Accessories for installation are also available for the F 3.. series.





Code	Туре	Description	
Auxiliary elem	ents for F 360, F	370, F 390 series	
KU 909 4	F3-H	auxiliary contact 1NO+1NC change over	

Auxiliary ele	Auxiliary elements for F660, F670 series (only 125 A RCCBs)			
KU 924 3	F6-S/H	signal contacts + auxiliary contacts		

Assembly of auxiliary elements for F 360, F 370 and F 390 series



RCCBs - F 3.., F 6.. ranges

Auxiliary elements and accessories



Code	Туре	Description
Accessories	for F 360, F 370 a	nd F 390 series
EB 185 6	PCD/N2	projecting terminal cover - 2 modules
EB 186 4	PCD/N4	projecting terminal cover - 4 modules
EB 187 2	PCD/N6	projecting terminal cover - 6 modules
EB 188 0	PCD/N8	projecting terminal cover - 8 modules

EB 176 5	FP1	spacer - false pole - 1 module
EB 177 3	FP2	spacer - false pole - 2 modules
EB 178 1	FP4	spacer - false pole - 4 modules
EB 179 9	FP6	spacer - false pole - 6 modules
EB 183 1	SFP	Support for spacer - false pole FP

The SFP support is necessary for false pole installation on DIN rail

EA 214 5	BSA1	mechanical block
EA 213 7	BSA2	padlock for BSA1
EA 215 2	END/CLAMP	clamp for DIN rail



2.44

Padlock BSA2



Support for spacer – false pole SFP

Flange for rear board



Label carrier ST

KU 930 0	ME1	flange for rear board fixing 1 module	
KU 931 8	ME2	flange for rear board fixing 2 modules	
KU 932 6	ME3	flange for rear board fixing 3 modules	
KU 933 4	ME4	flange for rear board fixing 4 modules	
KU 934 2	ME6	flange for rear board fixing 6 modules	
KU 935 9	ME8	flange for rear board fixing 8 modules	

EP 742 9	ST	label carrier
EP 743 7	ST-E	neutral labels

The IEC EN 61009 Standard of 1994 introduced the possibility of creating RCBOs through the assembly of a circuit-breaker and a RCD block capable of detecting residual current and consequently controlling breaker opening.

The application field of the RCD blocks is that of the circuitbreakers they are coupled to. The ABB DDA range of RCD blocks includes devices from 25 to 63 A, suitable for doublepole, three-pole and four-pole circuit-breakers. The DDA blocks are available in AC type (DDA 60 series), A type (DDA 70 series) and selective type (DDA 90 series). In each series the blocks from 25 to 63 A are suitable for assembly with MCBs in the S 240, S 250, S 270, S 280 series.

In compliance with IEC EN 61009, which establishes that RCD blocks may be assembled with a circuit-breaker only once, the DDA blocks have a tamperevident seal which must be inserted in a purpose-made opening at the end of the assembly process. Moreover, they are supplied with unlosable coupling elements and with purposely modelled pins, that prevent incorrect assembly between the elements when the rated current of the block is lower





than the current of the circuitbreaker.

The DDA series RCD blocks are not sensitive to impulsive atmospheric and operational discharges; therefore, they are not subject to unwanted tripping in accordance with EN 61008-1, EN 61009-1 and even with $8/20 \ \mu$ s wave up to 250A in accordance with VDE 0432 T2.

Special versions of RCD blocks are also available, such as DDA 60 AP and 70, AP, and DDA 60 AE.

The first are special antidisturbance versions, while the AEs combine the protection function with the positive safety emergency stop function for remote tripping, as illustrated in the technical details section.



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						4
			DDA 60		DDA 60 AP	
Reference Standards			10	IEC EN 61009, app. G	10	
lype (wave form of leakage curre	ent detected)		AC		AC	
Impling characteristics		[4]	05 40 00	Instantaneous	05.00	
SIZE Poles		[A]	25, 40, 63		25, 63 20 40	
Rated voltane lie		ΓΛI	27, 37, 47		220/400	
Insulation voltage De		[v] [v]	200/400	500	200/400	
Max operating voltage of test hu	itton	[v]		440		
Min. operating voltage of test bu	tton	M		195		
Rated frequency		[Hz]		5060		
Breaking capacity IEC EN 61009		[A]	e	equivalent to coupled MC	В	
Breaking capacity IEC EN 60947-	2	[A]	e	equivalent to coupled MC	В	
Rated residual current	with S 240	[kA]		4.5		
breaking capacity l Δ m	with S 250	[kΔ]		6		
	with 0 200			7 5		
	with 5 270	[KA]		6.7		
	with S 280	۸) [L- ۸]		10.5		
	(110.52; 1025	A) [KA]		12.5		
	with S 280					
	(In 3240 A)	[kA]		7.5		
	with S 280					
	(In 38; 5063	A)[kA]		7.5		
Voltage withstanding capacity impul	se (1.2/50) Uimp	[kV]		5		
Dielectric test voltage at ind. fre	q. for 1 min.	[kV]		2.5		
Resistance to unwanted tripping cau	sed by overvoltages	[A]	250		3000	
(operation or atmospheric)/Peak am	p. (8/20 wave)					
Rated sensitivity I∆n		[A]	0.03-0.1-0.3-0.	5-1-2	0.03	
Tripping threshold	AC type			0.5…1 l∆n		
	A type					
Toggle			blue c	operating just from OFF p	osition	
Electrical life				10000		
Mechanical life	less stars			20000		
Protection degree	housing			IP4X		
Maahanigal shook registance	terminais		06 a bolf	IPZX)O abaaka	
Resistance to vibrations acc. to I	DIN IEC 68-2-6		20 y Hali minimum 5 g	duration 20 min at frogu		
			minimum o g,			
acc to DIN 40046 IFC 68-2	numid neat	[°C/RH]	. 2	28 Cycles with 55/9510	0	
	const. climatic cond.	[°C/RH]		23/83-40/93-55/20		
	var. climatic cond.	[°C/RH]		25/95-40/95	05 55	
Ambient temperature (with daily a	verage ≤+35 °C)		-5+55	40 . 70	-25+55	
Storage temperature	2P cizo un to 62 A	[°C]		-40+70		
Terminal Size	3P//P size 025 A	[[]]][] [mm ²]		20		
	3P/1P size 20 A	[mm ²]		16		
	3P/4P size 63 A	[mm ²]		25		
Tightoning torquo		[NI*m]		1.0		
nginening torque	size 20 A	[N 11] [N *m]		0		
Mounting	3126 40 and 00 A		on rail EN 6071	5 (35 mm) by means of ra	nid fixing device	
Dimonsions						
H94xD68xW	2P size up to 63 A	[mm]		35		
	3P/4P size 25 A	[mm]		35		
	3P/4P size 40 A	[mm]		52.5		
	3P/4P size 63 A	[mm]		70		
Pole weight	2P size up to 63 A	A [g]		190/210		
	3P/4P size up to 63	A [g]		270/330		

Technical characteristics

DDA 60 AE	DDA 70	DDA 70 AP	DDA 90
AC	Δ IEC EN 6	1009, app. G Δ	Δ
110	insta	ntaneous	selective
63	25, 40, 63	25, 63	63
2P, 3P, 4P	2P, 3P, 4P	2P, 4P	2P, 3P, 4P
230 (2P), 400 (3P/4P)	230/400	230/400	230/400
		500	
254 (2P), 440 (3P/4P)		440	
195 (2P), 340 (3P/4P)		195	
	50	060	
	equivalent t	o coupled MCB	
	equivalent t	o coupled MCB	
		4.5	
		6	
		7.5	
		12.5	
		7.5	
		7.5	
		-	
		5	
250	250	3000	3000
200	200	3000	3000
0.03-0.3-0.5-1	0.03-0.1-0.3-0.5-1	0.03	0.1-0.3-0.5-1-2
0.5-1		0.51 l∆n	
		0.111.4 l∆n	
	blue operating ju	ist from OFF position	
	1	0000	
	2	0000	
		IP4X	
		IP2X	
	26 g half wave, dura	ation 6 ms, 2000 shocks	
	minimum 5 g, duration 30) min., at frequency 080 Hz	
	28 cycles w	/ith 55/95100	
	23/83-4	0/93-55/20	
	25/9	95-40/95	
-5+55	-5+55	-25+55	-25+55
	-40	0+70	
		25	
		10	
		25	
		1.0	
		2	
	on rail EN 60715 (35 mm)	by means of rapid fixing device	
		35	
		35	
		52.5 70	
	10	00/210	
	27	70/330	
	21		

DDA 60 type AC series



FDWWW

Rated currents	Code						
ln [A]	Sensitivity 0.01 A	y 0.03 A	0.1 A	0.3 A	0.5 A	1 A	2 A
2P - DDA 62 type	•						
25	EY 849 2	EY 850 0		EY 854 2	EY 857 5		
40		EY 851 8		EY 855 9	EY 858 3		
63		FY 852 6	EY 853 4	EY 856 7	FY 859 1	EY 860.9	FY 861 7

3P - DDA 63 type

25	EY 862 5		EY 866 6	EY 869 0		
40	EY 863 3		EY 867 4	EY 870 8		
63	EY 864 1	EY 865 8	EY 868 2	EY 871 6	EY 872 4	EY 873 2

4P - DDA 64 type						
25	EY 874 0		EY 878 1	EY 881 5		
40	EY 875 7		EY 879 9	EY 882 3		
63	EY 876 5	EY 877 3	EY 880 7	EY 883 1	EY 884 9	EY 885 6



	\sim
equivalent to coupled MCB	
equivalent to coupled MCB	
	equivalent to coupled MCB equivalent to coupled MCB

IMQ approval



DDA 60, 2P 3P 4P In=25…63 A I∆n=0.03-0.3-0.5-1 A

DDA 70 type A series



Rated currents	Code					
In [A]	Sensitivity 0.01 A	0.03 A	0.1 A	0.3 A	0.5 A	1 A
2P - DDA 72 type	1					
25	EY 889 8	EY 890 6		EY 894 8	EY 897 1	
40		EY 891 4		EY 895 5	EY 898 9	
63		EY 892 2	EY 893 0	EY 896 3	EY 899 7	EY 900 3

3P - DDA 73 type					
25	EY 902 9		EY 906 0	EY 909 4	
40	EY 903 7		EY 907 8	EY 910 2	
63	EY 904 5	EY 905 2	EY 908 6	EY 911 0	EY 912 8

4P - DDA 74 type						
25	EY 913 6		EY 917 7	EY 920 1		
40	EY 914 4		EY 918 5	EY 921 9		
63	EY 915 1	EY 916 9	EY 919 3	EY 922 7	EY 923 5	



Breaking capacity		
in short-circuit Acc. to IEC EN 61009	equivalent to coupled MCB	
Acc. to IEC EN 60947.2	equivalent to coupled MCB	

IMQ approval



DDA 70, 2P 3P 4P In=25...63 A I∆n=0.03-0.1-0.3-0.5-1 A 1

Selective DDA 90 type A series





Breaking capacity		\sim
in short-circuit		
Acc. to IEC EN 61009	equivalent to coupled MCB	
Acc. to IEC EN 60947.2	equivalent to coupled MCB	

DDA 60 AE type AC series for emergency stop





	1 ↓	3 ↓	5 ↓	7/№	J	_	
	0	\bigcirc	0	0			
	ABB						
					0000		
Power from above is man	ndato	iry			2 4 6 8/	'N	

Breaking capacity		\sim
in short-circuit Acc. to IEC EN 61009	equivalent to coupled MCB	
Acc. to IEC EN 60947.2	equivalent to coupled MCB	

No more than one DDA AE can be controlled using the same control circuit. Each DDA AE requires a dedicated control circuit.

Max. len	gth of release cir	cuit		
	1.5 mm ² cable	[m]	600	
	2.5 mm² cable	[m]	1000	

Anti-disturbance DDA 60 AP type AC and DDA 70 AP type A series



Rated current	ts Code	
In [A]	Sensitivity 0.03 A	
2P - DDA 62 /	AP type	
25	EY 949 0	
63	EY 950 8	

4P - DDA 64 AP type

EY 948 2

63

Rated currents	Code	
ln [A]	Sensitivity 0.03 A	
2P - DDA 72 AP 1	уре	
25	EY 951 6	
63	EY 888 0	

4P - DDA 74 AP type 63 EY 887 2



Breaking capacity		\sim
in short-circuit Acc. to IEC EN 61009	equivalent to coupled MCB	
Acc. to IEC EN 60947.2	equivalent to coupled MCB	

Rated impulse		
withstand current	[A]	3000 peak (8/20 μs wave)

Auxiliary elements and accessories



Code	Туре	
KU 939 1	S2-MP2	rear terminal for rear board fixing 25mm ² for DDA 63 A
KU 944 1	CPV3	sealable screw protection cover only for DDA 25 A
KU 945 8	CPV4	sealable screw protection cover only for DDA 63 A

⁻

The range of DDA 60, 70 and selective 90 RCD blocks for the S 290 series includes 100A devices suitable for assembly with MCBs in the S 290 series of type C only.

The DDA 560, 570 and 590 series include blocks of type A, AC and selective with a rated current of 63 A, which can be assembled with all MCBs in the S 500 series (with the exception of S 500 in curve K, 6 A in curves B, C, D and 75 A in curve KM).

In compliance with IEC EN 61009, which establishes that the RCD blocks can be assembled with an MCB only once, the S 290 series DDA blocks have a mechanical pin which prevents disassembly once inserted.

In contrast, RCD blocks for the S 500 series which conform to IEC EN 60947-2 app. B do not have unlosable coupling elements. DDA RCD blocks for the S 290 and S 500 series are not sensitive to impulsive atmospheric and operational discharges, therefore, they are not subject to unwanted tripping in accordance with IEC EN 61008, and IEC EN 61009, even with 8/20 μ s wave up to 250 A in accordance with VDE 0432 T2.







RCD blocks – DDA range for S 290 and S 500 series MCBs

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RCD blocks - DDA range for S 290 series MCBs

_	

			DDA 60	DDA 70	DDA 90	
Reference Standards				IEC EN 61009 App.G		
Type (wave form of leakage curre	ent detected)		AC	А	A	
Tripping characteristics			instantaneous	instantaneous	selective	
Size		[A]		100		
Poles				2P, 4P		
Rated voltage Ue		[V]		230/400		
Insulation voltage Ui		[V]		500		
Max. operating voltage of test bu	ıtton	[V]		240 (2P), 415 (4P)		
Min. operating voltage of test bu	tton	[V]		100 (2P), 175 (4P)		
Rated frequency		[Hz]		5060		
Breaking capacity IEC EN 61009		[A]		equivalent to coupled MCE	В	
Breaking capacity IEC EN 60947-	2	[A]		equivalent to coupled MCE	В	
Rated residual current breaking capacity l∆m	with S 290 with S 500	[kA]				
Voltage withstanding capacity im	npulse (1.2/50) Uimp	[kV]		4		
Dielectric test voltage at ind. fre	q. for 1 min.	[kV]		2.5		
Resistance to unwanted tripping car (operation or atmospheric)/Peak an	used by overvoltages np. (8/20 wave)	[A]	250	1000	3000	
Rated sensitivity I∆n		[A]	0.03-0.3	0.03-0.3	0.3-1	
Tripping threshold	AC type			0.51 l∆n		
	A type		-	0.111.4 l∆n	0.111.4 l∆n	
Toggle			black	operating just from OFF p	osition	
Electrical life				10000		
Mechanical life				20000		
Protection degree	housing terminals			IP4X IP2X		
Mechanical shock resistance			26 g hal	f wave, duration 6 ms, 200	00 shocks	
Resistance to vibrations acc. to I	DIN IEC 68-2-6		minimum 5	g, duration 30 min., at fre	quency 080 Hz	
Tropicalization	humid heat	[°C/RH]		28 cycles with 55/9510	0	
acc.to DIN 40046 IEC 68-2	const. climatic cond.	[°C/RH]		23/83-40/93-55/20		
	variab. climatic cond.	[°C/RH]		25/95-40/95		
Ambient temperature (with daily	average ≤+35 °C)	[°C]		-25+45		
Storage temperature		[°C]		-40+60		
Terminal size		[mm ²]		50		
Tightening torque		[N*m]		3.5		
Mounting			on rail EN 607	15 (35 mm) by means of ra	pid fixing device	
Dimensions						
H94xD68xW	2P	[mm]		61		
	3P/4P	[mm]		Q()		
Pole weight	2P	[[]]		325		
i olo wolynt	3P/4P	[a]		600		
	0.711	191		000		

RCD blocks - DDA range for S 500 series MCBs

DDA 560	DDA 570	DDA 590
	IEC EN 60947-2 App. B	
AC	А	A
instantaneous	instantaneous	selective
	63	
2P, 3P, 4P	2P, 3P, 4P	4P
	230/400	
	690	
	440	
	195	
	5060	
	equivalent to coupled MCB	
7 5		
6.7	25	
	5	
	25	
250	250	3000
0.03-0.3	0.03-0.3	0.3-0.5-1
0.00 0.0	0.51 JAn	0.0 0.0 1
_	0.111.4 l∆n	0.111.4 I <u></u>
	blue operating just from OFF position	
	10000	
	20000	
	IP4X/IPXXD (excluding terminal area) IP2X/IPXXB	
	26 g half wave, duration 6 ms, 2000 shocks	
	minimum 5 g, duration 30 min., at frequency 080 Hz	
	28 cycles with 55/95100	
	23/83-40/93-55/20	
	25/95-40/95	
	-25+55	
	-40+70	
	25	
	2 op roll EN 60715 (25 mm) by means of rooted finite relation	
		3
	11	
	70	
	25	
	325/390	

RCD blocks – DDA range for S 290 series MCBs

DDA 60, DDA 70 and selective DDA 90 series





Patad ourrants	Codo	
In	Sensitivity	
[A]	0.03 A	0.3 A
2P - DDA 62 type	•	
100	KV 900 2	KV 901 0
4P - DDA 64 type	•	
100	KV 904 4	KV 905 1
Rated currents	Code	
ln [A]	Sensitivity	0.3 A
2P - DDA 72 type		
100	KV 906 9	KV 907 7
	100000	
4P - DDA 74 type	•	
100	KV 910 1	KV 911 9
Rated currents	Code	
ln M	Sensitivity	1.0
	0.5 A	
2P - DDA 92 type	2	
100	KV 912 7	KV 913 5
4P - DDA 94 type	•	
100	KV 916 8	KV 917 6





 in short-circuit
 equivalent to coupled MCB

 Acc. to IEC EN 60947.2
 equivalent to coupled MCB

Remote tripping

For remote tripping, the equipment may be connected to a button outside terminals Y1 and Y2. We normally recommend buttons without a light signal. If using buttons with a light signal, use buttons with a maximum operating current of 2 mA.

1. 11

Remote tripping operating voltage

Double-pole Ue = 100...240 V Four-pole Ue = 175...415 V

Caution!

If, with remote tripping, two or more residual current circuit-breakers with overload protection are connected to a shared external button, all of the terminals 5/6 and 7/8 (four-pole version) and 1/2 and 3/4 (two-pole version) must be connected to the same potential, as illustrated.



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RCD blocks – DDA range for S 500 series MCBs

DDA 560 type AC, DDA 570 type A and selective DDA 590 type A series

ln [A]	Sensitivity 0.03 A	0.3 A		
2P - DDA 562 t	уре			
63	EY 830 2	EY 831 0		
3P - DDA 563 t	уре			
63	EY 832 8	EY 833 6		
4P - DDA 564 t	уре			
63	EY 834 4	EY 835 1		
Rated currents	Code			
In [A]	Sensitivity 0.03 A	0.3 A		
2P - DDA 572 t	уре			
63	EY 836 9	EY 837 7		
63 3P - DDA 573 t	EY 836 9	EY 837 7		
63 3P - DDA 573 t 63	EY 836 9 ype EY 838 5	EY 837 7 EY 839 3		
63 3P - DDA 573 t 63 4P - DDA 574 t	EY 836 9 ype EY 838 5 ype	EY 837 7 EY 839 3		
63 3P - DDA 573 t 63 4P - DDA 574 t 63	EY 836 9 EY 838 5 ype EY 840 1	EY 837 7 EY 839 3 EY 841 9		
63 3P - DDA 573 t 63 4P - DDA 574 t 63 Rated currents	EY 836 9 EY 838 5 ype EY 840 1 Code	EY 837 7 EY 839 3 EY 841 9		
63 3P - DDA 573 t 63 4P - DDA 574 t 63 Rated currents In [A]	EY 836 9 EY 838 5 ype EY 840 1 Code Sensitivity 0.3 A	EY 837 7 EY 839 3 EY 841 9 0.5 A	1.4	
63 3P - DDA 573 t 63 4P - DDA 574 t 63 Rated currents In [A] 4P - DDA 594 t	EY 836 9 EY 838 5 ype EY 840 1 Code Sensitivity 0.3 A	EY 837 7 EY 839 3 EY 841 9 0.5 A	1 A	



Breaking capacity

in short-circuit acc. to IEC EN 60947.2 equivalent to coupled MCB

DDA 500 RCD blocks cannot be connected to S 500 MCBs with B, C, D-In=6 A and S 500 KM-In=75 A

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1
RCD blocks – DDA range for S 290 series MCBs

Auxiliary elements and accessories





Туре	
S2-MP2	rear terminal for rear board fixing 25mm ² for DDA 63 A
CPV3	sealable screw protection cover for DDA 3/4 poles In=25A
CPV4	sealable screw protection cover for DDA 2 poles and DDA 3/4 poles In=63A
	Type S2-MP2 CPV3 CPV4

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Functions and classification criteria for RCDs

A residual current operated circuit-breaker is an amperometric protection device which is tripped when the system leaks a significant current to earth.

This device continuously calculates the vector sum of the single-phase or three-phase system line currents and while the sum is equal to zero allows electricity to be supplied. This supply is rapidly interrupted if the sum exceeds a value preset according to the sensitivity of the device.

Residual current operated circuit-breakers can be classed according to four parameters:

- type of construction
- detectable wave form
- tripping sensitivity
- tripping time.

Depending on the type of construction, RCDs may be classed as:

- RCBOs (magnetothermic with overcurrent protection)
- RCCBs (without overcurrent protection releaser incorporated)
- RCD blocks.

RCBOs combine, in a single device, the residual current function and the overcurrent protection function typical of MCBs. RCBOs are tripped by both current leakage to earth and overloads and short-circuits and they are self-protecting up to a maximum short-circuit current value indicated on the label.

RCCBs are only sensitive to current leakage to earth. They must be used in series with an MCB or fuse which protects them from the potentially damaging thermal and dynamic stresses of any overcurrents.

These devices are used in systems already equipped with MCBs which preferably limit the specific energy passing through, also acting as the main disconnecting switches upstream of any derived MCBs (e.g.: domestic consumer unit).

RCD blocks (DDA) are residual current devices suitable for assembly with a standard MCB. IEC/EN 61009 app. G only allows assembly of RCBOs once on site, that is to say outside the factory, using adaptable RCD blocks and the appropriate MCBs. Any subsequent attempts to separate them must leave permanent visible damage. The residual current operated circuit-breaker obtained in this way maintains both the electrical characteristics of the MCB and those of the RCD block.

According to the wave form of the earth leakage currents they are sensitive to, the RCDs may be classed as:

- AC type (for alternating current only)
- A type (for alternating and/or pulsating current with DC components)
- B type (for alternating and/or pulsating current with DC components and continuous fault current).

AC type RCDs are suitable for all systems where users have sinusoidal earth current.

They are not sensitive to impulsive leakage currents up to a peak of 250 A (8/20 wave form) such as those which may occur due to overlapping voltage impulses on the mains (e.g.: insertion of fluorescent bulbs, X-ray equipment, data processing systems and SCR controls).

A type RCDs are not sensitive to impulsive currents up to a peak of 250 A (8/20 wave form).

They are particularly suitable for protecting systems in which the user equipment has electronic devices for rectifying the current or phase cutting adjustment of a physical quantity (speed temperature, light intensity, etc.) supplied directly by the mains without the insertion of transformers and insulated in class I (class II is, by definition, free of faults to earth). These devices may generate a pulsating fault current with DC components which the A type RCD can recognise.

B type RCDs are recommended for use with drives and inverters for supplying motors for pumps, lifts, textile machines, machine tools, etc., since they recognise a continuous fault current with a low level ripple.

Type AC and type A RCDs comply with IEC/EN 61008/61009, whilst type B RCDs are not yet covered by any reference Standard for the industrial or residential sector.

According to tripping sensitivity (I Δ n value), RCDs may be divided into the following categories:

- low-sensitivity (I Δ n >0.03 A), not suitable for protection against direct contacts; co-ordinated with the earth system according to the formula I Δ n <50/R, to provide protection against indirect contacts;
- high-sensitivity (IΔn: 0.01...0.03 A), or "physiologically sensitivity" for protection against indirect contacts, with simultaneous additional protection against direct contacts.



According to their tripping time, RCDs can be classed as:

- instantaneous or rapid or general
- type S selective, or incorrectly delayed.

Selective RCDs (RCBOs - RCCBs or RCD-blocks) have a delayed tripping action and are installed upstream of other rapid residual current operated circuit-breakers to guarantee selectivity and limit the power out only to the portion of the system affected by a fault.

2

The tripping time is not adjustable. It is set according to a predetermined time – current characteristic with an intrinsic delay for small currents, tending to disappear as the current grows.

IEC/EN 61008 and 61009 establish the tripping times relative to the type of RCD and the I Δ n.

In [A]	Ι Δ [A]	Tripping times (s)xcurrents					
		1xlΔ	2xl∆	5xlΔ	500A		
Any	Any	0.3	0.15	0.04	0.04		
≥25	>0.030	0.5-0.13	0.2-0.06	0.15-0.05	0.15-0.04		
	In [A] 	In [A] I∆ [A] Any Any ≥25 >0.030	In [A] IΔ [A] Tripping time Any Any 0.3 ≥25 >0.030 0.5-0.13	In [A] IΔ [A] Tripping times (s)xcurrents 1xlΔ 2xlΔ Any Any 0.3 0.15 ≥25 >0.030 0.5-0.13 0.2-0.06	In [A] IΔ [A] Tripping times (s)xcurrents 1xlΔ 2xlΔ 5xlΔ Any Any 0.3 0.15 0.04 ≥25 >0.030 0.5-0.13 0.2-0.06 0.15-0.05	In [A] I∆ [A] Tripping times (s)xcurrents 1xl∆ 2xl∆ 5xl∆ 500A Any Any 0.3 0.15 0.04 0.04 ≥25 >0.030 0.5-0.13 0.2-0.06 0.15-0.05 0.15-0.04	

The range of ABB RCDs also includes AP (anti-disturbance) devices which trip according to the limit times allowed by the Standards for instantaneous RCDs. This function is due to the slight tripping delay (approx. 10ms) relative to the standard instantaneous ones.

The graph shows the comparison of the qualitative tripping curves for:

- a 30 mA instantaneous RCD
- a 30 mA AP instantaneous RCD
- a 100 mA selective RCD



Influence on RCDs of currents with d.c. components

For many years the manufacturers of electrical appliances and other electrical equipment have been using electronic components to improve the performance of their products, increase comfort and save energy.

Loads such as washing machines with variations in spin speed, variable-speed tools, thermostats and dimmers operate at currents with varying wave shapes (pulsating currents with d.c. components, inverted currents, levelled currents).

There are three different types of current (fig. A).

2









Type I Inverted current with d.c. components, with value continuously greater then zero, caused by:

- three-phase current
- median point and three-phase current
- jumper connection
- unidirectional rectification with inductive and capacitive levelling
- Villard type voltage doubling.

Type II Pulsating current with d.c. components sometimes with zero value, caused by ohmic load with:

- unidirectional rectification without levelling
- single-phase jumper connection with or without levelling
- regulation of the symmetrical and asymmetrical phase operating angle (dimmers, RPM meters).

Type III Pulsating current with d.c. components passing through zero caused by inductive loads with:

- unidirectional rectification without levelling
- single-phase jumper connection with or without levelling
- symmetrical and asymmetrical regulation of the phase operating angle (dimmers, RPM meters).

If there is a fault current to earth after an insulation fault on live parts supplied with rectified current, the contact voltages are the same size as in alternating current.

Standard RCDs, which are designed to operate with alternating current at 50-60Hz, are insensitive to fault currents with d.c. components.

Non-tripping of a RCD when there are fault currents with DC components may have two consequences:

- it is dangerous for people and equipment (electrocution or fire)
- it causes desensitivation of RCD due to excessive polarization of the transformer core that is no longer able to send the necessary power supply to the releaser (figure B hysteresis cycle 1).

To avoid this problem, type A RCDs must be used. Thanks to the specific technology of the residual current transformer toroidal cores, the supply level is increased to a value sufficient to trigger the releaser or tripping mechanism (figure B - hysteresis cycle 2).

The sensitivity of the tripping mechanism is further increased by its connection to an electrical circuit sensitive to the wave shape of the current.

In this way the tripping of the RCD is assured for any unidirectional pulsating wave shape even in case of overlapping of a d.c. component up to 6mA.

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Selectivity

RCDs raise similar issue to those surrounding the installation of MCBs, and in particular the need to reduce to a minimum the parts of the system out of order in the event of a fault.

For RCBOs the problem of selectivity in the case of short-circuit currents may be handled with the same specific criteria as for MCBs.

However, for correct residual current protection, the more important aspects are linked to tripping times. Protection against contact voltages is only effective if the maximum times indicated on the safety curve are not exceeded.

If an electrical system has user devices with earth leakage currents which exceed the normal values (e.g.: presence of capacitor input filters inserted between the device phase and earth cables) or if the system consists of many user devices, it is good practice to install various RCDs, on the main branches, with an upstream main residual current or non-residual current device instead of a single main RCD.

Horizontal selectivity

The non-residual current main circuit-breaker provides "horizontal selectivity", preventing an earth fault at any point on the circuit or small leakage from causing unwanted main circuit-breaker tripping, which would put the entire system out of order.

However, in this way, section k of the circuit between the main circuit-breaker and the RCDs remains without "active" protection. Using a main RCD to protect it would lead to problems with "vertical selectivity", which require tripping of the various devices to be co-ordinated, so that service continuity and system safety are not compromised. In this case, selectivity may be amperometric (partial) or chronometric (total).



Vertical selectivity

Vertical selectivity may also be established for residual current tripping, bearing in mind that in working back from system peripheral branches to the main electrical panels the risk of unskilled persons coming into contact with dangerous parts is significantly reduced.

Amperometric (partial) selectivity

Selectivity may be created by placing low-sensitivity RCDs upstream and higher-sensitivity RCDs downstream.

An essential condition which must be satisfied in order to achieve selective co-ordination is that the $I\Delta 1$ value of the breaker upstream (main breaker) is more than double the $I\Delta 2$ value of the breaker downstream.

In this case, selectivity is partial and only the downstream breaker trips for earth fault currents $|\Delta 2 < |\Delta m < 0.5^*|\Delta 1$.



Chronometric (total) selectivity

To achieve total selectivity, delayed or selective RCDs must be installed.

The tripping times of the two devices connected in series must be co-ordinated so that the total interruption time t2 of the downstream breaker is less than the upstream breaker's no-response limit time t1, for any current value. In this way, the downstream breaker completes its opening before the upstream one.

To completely guarantee total selectivity, the $|\Delta$ value of the upstream device must also be more than double that of the downstream device in accordance with IEC 64-8/563.3, comments.

For safety reasons, the delayed tripping times of the upstream breaker must always be below the safety curve.



Table of RCD selectivity

	Upstream l∆n [mA]	10	30	100	300	300	500	500	1000	1000	2000
Downstream I/ [mA]	<u>v</u> n	inst	inst	inst	inst	S	inst	S	inst	S	S
10	inst										
30	inst										
100	inst										
300	inst										
300	S										
500	inst										
500	S										
1000	inst										
1000	S										
2000	S										

inst=instantaneous S=selective ■=amperometric (partial) selectivity ■=chronometric (total) selectivity

Comparison tables: current, impedance, dissipated power

DS serie	es							
Rated current	ated Two-pole RCBOs urrent Resistance* Diss. pwr*			Three/four-pole RCBOs Resistance* Diss. pwr*				
In [A]	$[m\Omega]$	[W]	$[m\Omega]$	[W]				
6	50	1.8	54.5	2.0				
10	16	1.6	16.5	1.65				
16	10.5	2.7	11	2.8				
20	6.2	2.2	6.7	2.7				
25	5.5	3.5	6	3.75				
32	4	4.1	4.1	4.2				
40	3.5	5.6	3.6	5.8				
50	1.6	3.9	1.8	4.5				
63	1.9	7.5	2	7.8				

F.. series RCCBs

Туре	Rated current	Total diss. pwr.	Total resistance
	In [A]	[W]	[mΩ]
F 362-F 372	25	2	3.2
F 362-F 372-F 392	40	4.1	2.6
F 362-F 372-F 392	63	5.6	1.4
F 362-F 372	80	8.5	1.3
F 364-F 374	25	4	6.4
F 364-F 374-F 394	40	8.2	5.1
F 364-F 374-F 394	63	12.6	3.2
F 662-F 672	100	12	1.2
F 664-F 674	80	12	1.9
F 664-F 674	100	18	1.8
F 664-F 674	125	28	1.8

* Internal resistance and dissipated power per pole

Total dissipated power DDA blocks

class AC-A	l∆n=30 (pe	r lb 100 A: l	$\Delta n=30$ and I	∆n=300)
Rated current	Two-pole RO Resistance	CD blocks Diss. pwr	Three/four-p Resistance	oole RCD blocks Diss. pwr
lb [A]	[mΩ]	[W]	[mΩ]	[W]
25	4.0	2.5	4.8	3
40	2.8	4.5	3.5	5.5
63	0.7	3	0.9	3.5
100	-	4.13	-	4.13

The dissipated power shown in the table refers to **Ib**. For use with circuit-breakers with lower rated current **In** the dissipated power in W must be determined using the formula:

$$W = \left(\frac{I}{Ib}\right)^2 \bullet W_{IB}$$

Coordinated protection for RCCBs

When installing RCCBs, it is important to check that these devices are properly protected against overload and short-circuit; this check varies according to whether RCCBs without releasers are used or RCBOs.

In the first case, the devices must be protected using special miniature circuit-breakers or fuses. Using both devices leads to two short-circuit current values: conditional short-circuit current ($I\Delta c$) and conditional short-circuit current (Inc).

ABB RCCBs have a breaking capacity of 0.5-1.5 kA for earth fault in accordance with the test cycle specified in IEC 1008/EN 61008 Standard.

When the value of the earth fault current exceeds the $I\Delta m$ value (residual current breaking capacity), the device inserted to protect against short-circuits must be able to protect the installation and the RCCB by limiting Ip and I²t to the maximum values indicated in the table below.

The table indicates the breaking capacities of some protective combinations of RCCBs effected using miniature circuit-breakers or fuses.

RCCB rated current	In [A]	16	25	40	63	125
Rated breaking capacity	l∆m [A]	1500	1500	1500	1500	1500
Max. withstanding I²t	I²t [A²s]	28000	28000	40000	60000	90000
Max. withstanding peak current	lp [A]	5000	5000	6000	6000	10000

The RCBOs do not have a protection problem since they are designed to be self-protecting up to the breaking capacity value indicated on the block.

In the event of a short-circuit through earth, the devices have a residual current breaking capacity which is equal to the breaking capacity for service insulated short-circuits indicated on the label.

Varimat DS 850

Function

The VARIMAT RCBO carries out the same functions as the out-dated circuit-breakers with manual sensitivity change, but automatically.

VARIMAT RCBO not only measures the current in the live conductors but also in the protection conductor (PE) and are therefore able to distinguish direct contact (without current in the PE) from indirect contact.

The VARIMAT RCBO is sized so that sensitivity is 30 mA for direct contacts and 200 mA for indirect contacts.

Advantages

The VARIMAT RCBO enables high sensitivity protection to be used also in installations where the earth leakage is so high that it would prevent the use of normal 30 mA RCBOs.

In other words, with VARIMAT it is possible to add protection against direct contacts in situations where this would not be possible with traditional devices because of nuisance tripping.



Emergency stop using DDA AE series RCD blocks

The AE series RCD block combines the protection supplied by the RCBOs with a positive safety emergency stop function for remote tripping.

In the AE version, the DDA AE series RCD blocks are available.

Operating principle (patented)

Two additional primary circuits powered with the same voltage and equipped with the same resistance have been added to the transformer; under normal conditions the same current would flow through, but since they are wound by the same number of coils in opposite directions they cancel each other out and do not produce any flow.

One of these two windings acts as the remote control circuit: the emergency stop is obtained by interrupting the current flow in this circuit.

The positive safety is therefore obvious: an accidental breakage in the circuit is equivalent to operating an emergency control button.

Advantages

Compared with the devices which are normally used in emergency circuits, DDA AE blocks have the following advantages:

- positive safety
- no undesirable tripping if there is a temporary reduction or interruption of the mains voltage
- efficient immediate operating even after long off-service periods of the installation.

Use

Application of the DDA AE blocks complies with the requirements of IEC/EN 60364-8. They are therefore suitable, for example, for escalators, lifts, hoists, electrically operated gates, machine tools, car washes and conveyor belts.

No more than one DDA AE can be controlled using the same control circuit. Each DDA AE requires a dedicated control circuit.





Unwanted tripping

In the event of disturbance in the mains, the RCDs normally present in the system are tripped, breaking the circuit even in the absence of a true earth fault.

Disturbances of this kind are most often caused by:

- operation overvoltages caused by inserting or removing loads (opening or closing protection of control devices, starting and stopping motors, switching fluorescent lighting systems on and off, etc.)
- overvoltages of atmospheric origin, caused by direct or indirect discharges on the electrical line.

Under these circumstances, breaker tripping is unwanted, since it does not satisfy the need to avoid the risks due to direct and indirect contacts. On the contrary, the sudden and unjustified interruption of the power supply may result in very serious problems.

AP RCDs

The ABB range of AP anti-disturbance residual current circuit-breakers and blocks was designed to overcome the problem of unwanted tripping due to overvoltages of atmospheric or operation origin.

The electronic circuit in these devices can distinguish between temporary leakage caused by disturbances on the mains and permanent leakage due to actual faults, only breaking the circuit in the latter case.

AP residual current circuit-breakers and blocks have a slight delay into the tripping time, but this does not compromise the safety limits set by the Standards in force (release time at 2 $I\Delta n$ =150 ms).

Guaranteeing conventional residual current protection, their installation in the electrical circuit therefore allows any unwanted tripping to be avoided in domestic and industrial systems in which service continuity is essential.



Provisions of the Standards

IEC/EN 61008 and IEC/EN 61009 check RCD resistance to operation overvoltages, envisaging the use of the 0.5 μ s/100 kHz ring wave. All RCDs must pass the test with a current peak value of 200 A.

For overvoltages of atmospheric origin, IEC 61008 and IEC 61009 establish the resistance to a $8/20 \,\mu s$ surge with 3000A peak current, but limit the provision to RCDs classed as selective. No test is required for other types of RCDs.

ABB's AP anti-disturbance RCDs pass the general resistance test at 0.5 μ s/100 kHz, also resisting the 8/20 μ s surge with the same peak current of 3000 A prescribed for the selective RCDs.

For continuous service of priority circuits and simultaneous protection of user devices and systems from transient overvoltage peaks, combine RCCBs and AP blocks with overvoltage surge protective devices OVR.

To make protection more effective and widespread, it may be useful to create a cascade system extending over several levels, like the one illustrated below.





F 3.. AR RCCBs with automatic reclosing 1. Description

F 3.. AR circuit-breakers consist of a single block containing an F 3.. type RCCB and an electronic automatic reclosing device. The automatic reclosing device has an auxiliary change over contact which indicates the locked state.

2. Supply

The RCCB must be supplied from above. The automatic reclosing device powers itself, therefore, no auxiliary supply is required.

3. Device operation

A selector on the front of the breaker allows selection of one or three automatic reclosing operations, or automatic reclosing device disabling. Select "1" or "3" if the system protected by the RCCB is not manned. Otherwise, we recommend that you disable the automatic reclosing device by moving the selector to the "0" position. In this case, after you move the selector to "0" several seconds pass before the red "LOCKED" LED lights up.

Depending whether the fault is temporary (e.g.: overvoltage caused by lightning) or permanent (e.g.: earth leakage fault) and according to the number of automatic reclosing operations set, the RCCB is rearmed in a time of approx. 8 seconds.

On the front of F 3.. AR breakers there are 3 indicator LEDs which show the operating status of the automatic reclosing device:

- 1 the first green LED indicates that automatic reclosing power is ON (SUPPLY);
- 2 the second green LED indicates that automatic reclosing is operating (NORMAL OPERATING);
- **3** the red LED indicates that the automatic reclosing device is OFF (LOCKED).

The LEDs refer exclusively to the automatic reclosing device. The



status of the RCCB is indicated by the position of the blue lever.

Identifying the type of temporary or permanent fault if the RCCB is tripped in situations when the automatic reclosing device is switched off

In this situation the selector is set to "0" and all of the LEDs are lit. If a temporary or permanent fault occurs, the RCCB is tripped and is not rearmed (the blue lever remains in the OFF position). To differentiate between the two types of faults: 1) make sure that no one is near the loads supplied by the device, 2) move the selector to "1" or "3" and check if the red "LOCKED" LED goes out.

- In the case of a temporary fault (fig. 4) the automatic reclosing device rearms the RCCB, restoring the power supply.
- In the case of a permanent fault (fig. 5) the automatic reclosing device attempts to rearm the RCCB, but the latter trips immediately. When the number of reclosing operations set (1 or 3) has been reached, the automatic reclosing device switches to the locked state, with the red "LOCKED" LED lit and the green "NORMAL OPERATING" LED off.

5. Identifying the cause of the permanent fault

If there is a permanent fault, contact a qualified installer to find and eliminate the cause. To do this: 1) cut the power supply to the system using the RCBO upstream and disconnect all loads supplied by the RCCB, 2) restore the power supply from the RCBO, checking that the F 3.. AR breaker selector is set to "1" or "3" so that the RCCB is rearmed, 3) insert one load after another to identify which caused the automatic reclosing device to lock, i.e.: the red "LOCKED" LED to light up and the green "NORMAL OPERATING" LED to go out, 4) disconnect the faulty load again, leaving it out of order until it is repaired.

Connecting four-pole RCCBs in a three-phase circuit without neutral

F 364, F 374 and F 394 four-pole RCCBs have a maximum operating voltage of U_{bmax} =440 V and a minimum operating voltage of U_{bmin} =110 V.

The test button circuit for these RCCBs is connected inside the device between terminals 5 and 7 as illustrated, and is sized for an operating voltage of between 110 and 254 V.



When installing these RCCBs in three-phase circuits without neutral, <u>if the line voltage between the phase cables is between 110 and 254 V</u>, there are two possible solutions for correct test button operation:

- 1) connect the three phase cables to terminals 3, 5, 7 at input and to terminals 4, 6, 8 at output;
- 2) connect the phase cables normally (to terminals 1, 3, 5 at input and to terminals 2, 4, 6 at output) and create a "U" between terminals 1 and 7 so as to bring the potential of the first phase cable to terminal 7. In this way the line voltage is between the phase cables on the test button circuit.

If the line voltage between the cables on the circuit is more than 254 V, as normally occurs in low-voltage three-pole networks in which the line voltage between the cables is 400 V (and the star voltage between the phase and neutral is 230 V), these types of connections are not made, since there would be 400 V on the test button and its circuit would be damaged.

To allow test button operation even on three-phase circuits without neutral, with 400 V line voltage between the cables, connect the phase cables as normal (to terminals 1, 3, 5 at input and to terminals 2, 4, 6 at output) and connect a 3 k Ω resistor between terminals 4 and 8 of the RCCB as illustrated below.



In this way, when the test button is pressed, the circuit is subjected to 400 V but in series with the test circuit resistance we find the 3.3 k Ω resistor R_{est}. This causes a drop in the voltage, leaving a voltage of no more than 254 V on the test circuit resistor. The resistor R_{est} must have more than 4 W of power which can be dissipated.

Under normal operating conditions (without pressing the test button) the resistor R_{est} is not supplied, therefore, its does not cause dissipation.











L1 N F3 AR F3 AR F3 AR CONTROL PANEL L1 N

F 362 AR

L1 N



F3.. AR residual current circuit-breakers with automatic reclosing

Operating principle

F3.. AR circuit-breakers are residual current circuit-breakers with an electronic – mechanical block which monitors the state of the device (open or closed) and automatically recloses the circuit-breaker after it has opened. Each time the residual current circuit-breaker is tripped, reclosing is attempted up to three consecutive times. After the third attempt, the fault is considered permanent and, as a result, the breaker remains open. The breaker is equipped with a selector switch which allows automatic reclosing to be disabled for a simple residual current circuit-breaker protective function (e.g.: during periods when the system is manned) or when the breaker needs to be opened manually.

Application environments

F3.. AR breakers offer the solution to the problem of untimely tripping caused by pulse interference on power lines (for example, due to overvoltages of atmospheric origin caused by lightning, rapid switch movements, etc.). This means that they are the ideal solution in domestic and service industry systems, where service continuity must always be guaranteed (for refrigerators, alarms, servers, etc.) and in unmanned industrial systems (refrigeration, water pumping, air conditioning, telephony, data transmission and remote sensing systems).

Example of installation

As shown in the diagrams, one of the possible applications for F3.. AR circuit-breakers is protecting the power supply lines of refrigerators in shops and supermarkets against indirect contact. The refrigerators require guaranteed service continuity in order to preserve goods correctly. Following a transient overvoltage on the power lines caused by lightning, the residual current circuit-breaker may trip, cutting off the power supply to the equipment. The circuit-breaker is reclosed immediately and, since there is no effective fault, the circuit-breaker remains closed and the power supply to the refrigerators is re-established.

PRIORITY USERS (E.G.: REFRIGERATORS)









2



DDA AE residual current blocks

Operating principle

Compared with conventional DDAs, DDA AE blocks have two additional primary windings on the residual current transformer, whose effect is cancelled out under normal operating conditions. One of these additional windings can be fitted, by means of two terminals on the device, with one or more NC emergency stop pushbuttons to create the breaker opening remote control. Thanks to this construction detail, using one of the pushbuttons to interrupt the current in the additional winding circuit results in the residual current release of the circuit-breaker connected to the block. Obviously, the emergency function performed by the DDA AE blocks is of the fail-safe type, since accidental interruption of the circuit opens the circuit-breaker in the same way as pressing the pushbuttons but, unlike a minimum voltage coil (normally used for this type of control), the device does not open if there is a loss of voltage on the line - e.g.: after a black-out caused by a storm.

Application environments

DDA AE blocks perform the normal residual current protective functions, also offering the possibility of creating fail-safe release circuits. This makes them particularly suitable for installation in rooms for heating plants with a power rating of more than 35 kW and similar environments in which fail-safe emergency release is required using NC pushbuttons. They are also suitable for protecting machinery, handling systems or all systems in which this type of solution is recommended.

Example of installation

The diagrams show installation of an emergency stop pushbutton outside a heating plant room. The pushbutton is connected to the DDA AE block residual current circuit, and in accordance with the standards in force issues a command to open the main circuit-breaker in the event of danger. This cuts off the electrical power supply in the room, guaranteeing positive safety and at the same time total insensitivity to the loss of voltage.



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DDA 62 AE



ABB Overall dimensions

Contents

RCDs	. 3 /2
Auxiliary elements	. 3 /6



DS 642 - DS 650 - DS 670 - DS 751 - DS 850







F 360 AR - F 370 AR - F 390 AR





F 804

6 modules





3



ABB SACE





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In consideration of modifications to Standards and materials, the characteristics and overall dimensions indicated in this catalogue may be considered binding only following confirmation by ABB SACE