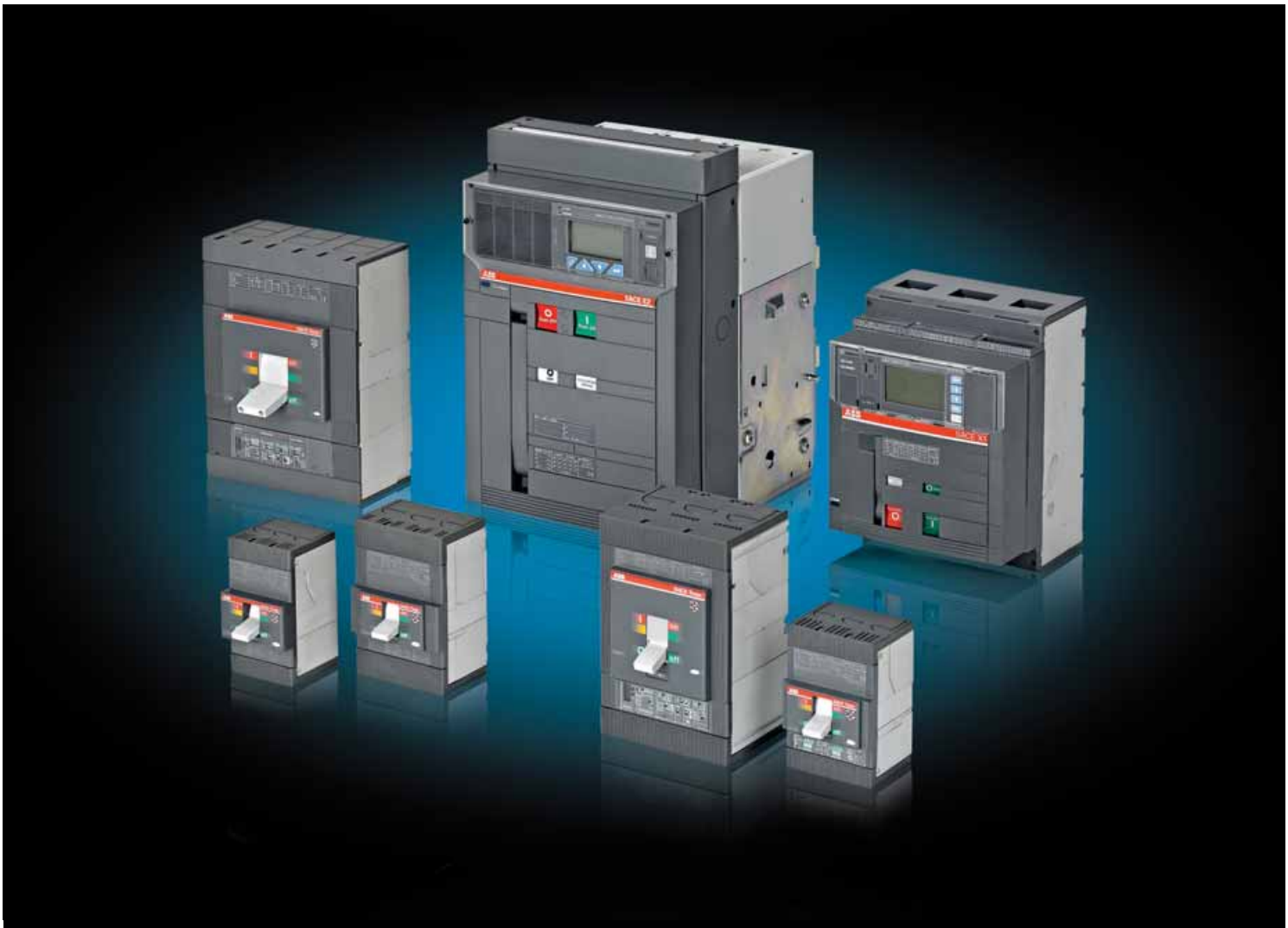


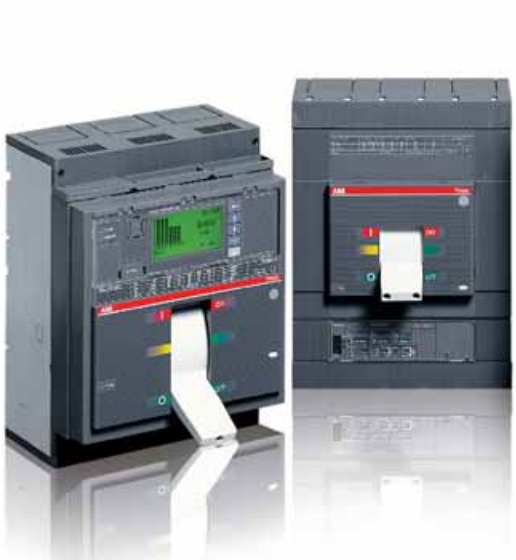
Panorama of the Low Voltage Apparatus
Automatic moulded-case and air circuit-breakers

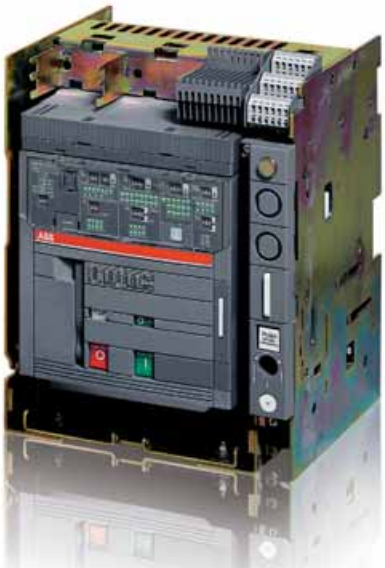
Power and productivity
for a better world™

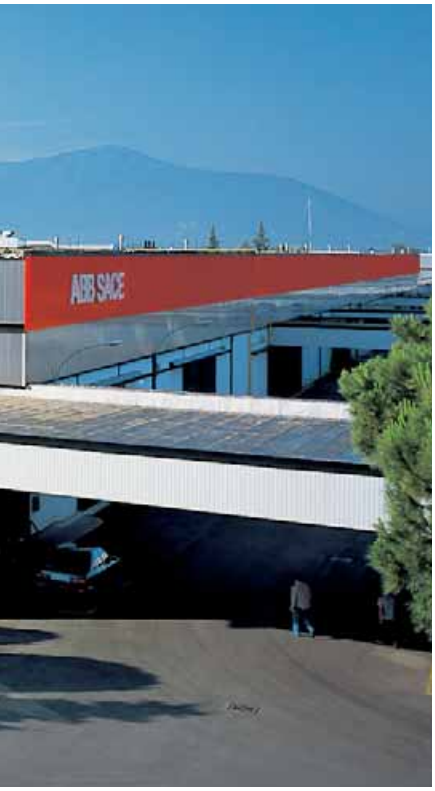
Circuit-breakers and Low Voltage Apparatus

ABB SACE is a synonym of quality and innovation in the Low Voltage sector, with products which, by integrating perfectly, adapt to the various service and installation requirements, thereby satisfying all plant needs, from the small user up to large industrial power distribution plants.
ABB SACE's offer of low voltage circuit-breakers makes products of high quality, reliability and precision available, which guarantee high performances in any conditions, safe-to-use products and, when needed, easy replacement of any faulty parts.

The SACE Emax series of air circuit-breakers, now enriched by the new X1 size, covers all user needs from 630 up to 6300A. Emax X1 is put forward as the best solution for all those applications where dimensions are an important determining







factor in selecting the circuit-breaker, without however necessarily having to do without high rated current values. Rated current up to 1600A, high rated short-time withstand current for selective circuit-breakers and, for the current-limiting version, a short-circuit breaking capacity of 150kA at 415VAC.

The family of SACE Tmax moulded-case circuit-breakers is divided into eight sizes (T1-T8) with rated uninterrupted currents from 160 to 3200A. Perfect integration among the sizes, higher performances in circuit-breakers of even smaller dimensions, and a standardised range of accessories which considerably simplifies selection of the apparatus.

Thanks to the new Tmax T8, the SACE Tmax family is completed so as to respond to all installation and protection requirements, even the most specific ones.

In conformity with the group's commitment and its care paid to protection of the environment, ABB SACE has always paid attention to achieving sustainable and environmentally friendly development objectives.

All the company production sites have obtained ISO 9001 quality certification, and the majority also have ISO 14001 certifications of their environmental management system. The ABB SACE facilities have also obtained certification for integrated management of its Quality, Environment and Safety systems in conformity with the ISO 9001 ISO 14001 OHSAS 18001 Standards. From the safety viewpoint, once again ABB SACE is a guarantee of conformity with the electrical safety standards, in respect of the international regulations. Our products undergo the most severe tests of conformity with the standards and the necessary type tests in the ABB laboratories, accredited by the most important national and international Organisations (SINAL, LOVAG/ ACAE,SEMCO,UL, and CSA).

Ethics and Social Responsibility

The International SA8000 standard (Social Accountability 8000) or System of Social Responsibility is the most widespread and recognised standard at international level whereby it is guaranteed that the company is socially accountable and, in particular, is committed to respecting the rules of work ethics and working conditions.

Based on the so-called "requirements for social accountability", the SA8000 Standard sanctions the ethics of the whole production cycle of a company with regard to child labour, no forced labour, personnel workplace safety and health, freedom of association and the right to collective bargaining, equal opportunities, no discrimination, disciplinary procedures, remuneration and working hours, relationships with suppliers and integration in the community where the company carries out its activities.

In 2004 ABB SACE decided to implement the management system for Social Responsibility according to the SA8000 Standard at the site in Frosinone, which had already certified the integrated QAS (Quality, Environment and Safety) management system in accordance with the ISO 9001, ISO 14001, OHSAS 18001 Standards.

The initiative comes within the more general framework of activities of the ABB Group Function Sustainability Affairs, committed to implementation and pursuit of ABB's sustainability objectives throughout the world.

During the process for implementation of the SA8000 Standard, all the personnel of the sites involved took part in a cycle of debating and training meetings; the suppliers called on to recognise and uphold the principles sanctioned by the SA8000 Standard and by ABB SACE's policy for Social Responsibility, were also involved.

Once again ABB is to the fore to offer you a better service.

Tmax moulded-case circuit-breakers for distribution

Common data		
Voltages		
Rated service voltage, Ue	[V]	690*
Rated impulse withstand voltage, Uimp	[kV]	8-12***
Rated insulation voltage, Ui	[V]	800...1000**
Test voltages at power frequency for 1 min.	[V]	3000...3500
Number of poles		3-4



Type of circuit-breaker			Tmax T1 1p	Tmax T1			Tmax T2			
Frame			160	160			160			
Rated ultimate short-circuit breaking capacity, Icu			**B**	**B**	**C**	**N**	**N**	**S**	**H**	**L**
	(AC) 50-60 Hz 220/230 V	[kA]	25(1)	25	40	50	65	85	100	120
	(AC) 50-60 Hz 380/415 V	[kA]	–	16	25	36	36	50	70	85
	(AC) 50-60 Hz 440 V	[kA]	–	10	15	22	30	45	55	75
	(AC) 50-60 Hz 500 V	[kA]	–	8	10	15	25	30	36	50
	(AC) 50-60 Hz 690 V	[kA]	–	3	4	6	6	7	8	10
	(DC) 250 V-2 poles in series	[kA]	25 (at 125 V)	16	25	36	36	50	70	85
	(DC) 250 V-3 poles in series	[kA]	–	20	30	40	40	55	85	100
	(DC) 500 V-2 poles in series	[kA]	–	–	–	–	–	–	–	–
	(DC) 500 V-3 poles in series	[kA]	–	16	25	36	36	50	70	85
	(DC) 750 V-3 poles in series	[kA]	–	–	–	–	–	–	–	–
Rated service short-circuit breaking capacity, Ics (at 415 V)		[%Icu]	75%	100%	75%	75%	100%	100%	100%	75%(3)
Rated short-circuit making capacity, Icm (415 V)		[kA]	52.5 (at 220/230 V)	32	52.5	75.6	75.6	105	154	187
Opening time (415 V)		[ms]	7	7	6	5	3	3	3	3
Rated short-time withstand current for 1 s, Icw		[kA]								
Category of use (IEC 60947-2,EN 60947-2)			A	A			A			
Isolation behaviour			•	•			•			
Reference Standard IEC 60947-2, EN 60947-2			•	•			•			
Release:										
thermomagnetic	T fixed, M fixed (10xIn) TMF		•	–			–			
	T adj., M fixed (10xIn) TMD		–	•			•			
	T adj., M adj. (5...10xIn) TMA		–	–			–			
	T adj., M fixed (3xIn) TMG		–	–			•			
	T adj., M adj. (2.5...5xIn) TMG		–	–			–			
magnetic only	M adjustable (6...12xIn) MA		–	–			• (MF up to In 12.5 A)			
eletronic	PR221DS (I-LS/I)		–	–			•			
	PR221MP/PR221GP		–	–			•			
	PR222DS/P (LSI-LSIG)		–	–			–			
	PR222 MP		–	–			–			
	PR223DS/P		–	–			–			
	PR223EF		–	–			–			
	PR231/P (I-LS/I)		–	–			–			
	PR232/P (LSI)		–	–			–			
	PR331/P (LSIG)		–	–			–			
	PR332/P (LI-LSI-LSIG-LSIRc)		–	–			–			
Interchangeability			–	–			–			
Versions			F	F			F-P			
Terminals	Fixed (F)		FC Cu	FC Cu-EF-FC CuAl-HR			F-FC Cu-FC CuAl-EF-ES-R			
	Plug-in (P)		–	–			F-FC Cu-FC CuAl-EF-ES-R			
	Withdrawable (W)		–	–			–			
Fixing on DIN rail			–	DIN EN 50022			DIN EN 50022			
Mechanical life		[No. operations /hourly oper.]	25000/240	25000/240			25000/240			
Electrical life (at 415 V)		[No. operations /hourly oper.]	8000/120	8000/120			8000/120			
Basic fixed dimensions	3/4 poles	L [mm]	25.4 (1 pole)	76/102			90/120			
		D [mm]	70	70			70			
		H [mm]	130	130			130			
Weights	fixed	3/4 poles [kg]	0.4 (1 pole)	0.9/1.2			1.1/1.5			
	plug-in	3/4 poles [kg]	–	–			1.5/1.9			
	Withdrawable	3/4 poles [kg]	–	–			–			

* 240 V for T1 1p
** 500 V for T1 1p
*** only for T8

(1) Settings In=16 and In=20 with Icu =16 kA @ 220/230 V
(2) Version with Icu =35 kA certified at 36 kA
(3) 70 kA
(4) 27 kA






Tmax T3		Tmax T4					Tmax T5					Tmax T6				Tmax T7				Tmax T8	
250		250/320					400/630					630/800/1000				800/1000/1250/1600				2000/2500/3200	
N	S	N	S	H	L	V	N	S	H	L	V	N	S	H	L	S	H	L	V [7]	L	V
50	85	70	85	100	200	200	70	85	100	200	200	70	85	100	200	85	100	200	200	85	130
36	50	36	50	70	120	200	36	50	70	120	200	36[2]	50	70	100	50	70	120	150	85	130
25	40	30	40	65	100	180	30	40	65	100	180	30	45	50	80	50	65	100	130	85	130
20	30	25	30	50	85	150	25	30	50	85	150	25	35	50	65	40	50	85	100	65	100
5	8	20	25	40	70	80	20	25	40	70	80	20	22	25	30	30	30	50	60	–	–
36	50	36	50	70	100	150	36	50	70	100	150	35	50	65	100	–	–	–	–	50	80
40	55						–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	25	36	50	70	100	25	36	50	70	100	20	35	50	65	–	–	–	–	–	–
36	50						–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	16	25	36	50	70	16	25	36	50	70	16	20	36	50	–	–	–	–	–	–
75%	50%[4]	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	75%	100%	100%	100%	100%	100%	75%
75.6	105	75.6	105	154	264	440	75.6	105	154	264	440	75.6	105	154	220	105	154	264	330	187	286
7	6	5	5	5	5	5	6	6	6	6	6	10	9	8	7	15	10	8	8	–	–
–		–					5 (400 A)					7.6 (630 A)-10 (800 A)				15 (version V)-20 (versions S-H-L)				–	
A		A					B (400 A)-A (630 A)					B (630 A-800 A)-A (1000 A)				B				B	
●		●					●					●				●				●	
●		●					●					●				●				●	
–		–					–					–				–				●	
●		● (up to 50 A)					–					–				–				●	
–		● (up to 250 A)					●					● (up to 800 A)				–				●	
●		–					–					–				–				–	
–		–					●					–				–				–	
●		●					–					–				–				–	
–		●					●					●				–				–	
–		●					●					●				–				–	
–		●					●					●				–				–	
–		●					●					●				–				–	
–		●					●					●				–				–	
–		●					●					●				–				–	
–		–					–					–				●				–	
–		–					–					–				●				●	
–		–					–					–				●				●	
–		–					–					–				●				●	
–		●					●					●				●				●	
F-P		F-P-W					F-P-W					F-W [5]				F-W				F	
F-FC Cu-FC CuAl-EF-ES-R		F-FC-Cu-FC CuAl-EF-ES-R-MC					F-FC Cu-FC CuAl-EF-ES-R					F-EF-ES-FC (CuAl)-RC-R				F-EF-ES-FC CuAl-HR/VR				F-HR/VR-ES-VR [1]	
F-FC Cu-FC CuAl-EF-ES-R		EF-ES-HR-VR-FC Cu-FC CuAl					EF-ES-HR-VR - FC Cu-FC CuAl					–				–				–	
–		EF-ES-HR-VR-FC Cu-FC CuAl					EF-ES-HR-VR-FC Cu-FC CuAl					EF-HR-VR				F-HR/VR				–	
DIN EN 50022		–					–					–				–				–	
25000/240		20000/240					20000/120					20000/120				10000/60				1500/60	
8000/120		8000 (250 A)-6000 (320 A)/120					7000 (400 A)-5000 (630 A)/60					7000 (630 A)-5000 (800 A) -4000 (1000 A)/60				2000/60 (version S, H, L) 3000/60 (version V)				3000/20	
105/140		105/140					140/184					210/280				210/280				427/553	
70		103.5					103.5					103.5				154 (manual) 178 (motorizable)				282	
150		205					205					268				268				382	
1.5/2		2.35/3.05					3.25/4.15					9.5/12				9.7/12.5 (manual) 11/14 (motorizable)				107/140	
2.7/3.7		3.6/4.65					5.15/6.65					–				–				–	
–		3.85/4,9					5.4/6.9					12.1/15.1				29.7/39.6 (manual) 32/42.6 (motorizable)				–	

KEY TO TERMINALS

F = Front
EF = Front extended
ES = Front extended spread

FC = Front for copper cables
FC CuAl = Front for copper-aluminium cables
R = Rear

RC = Rear for copper-aluminium cables
HR = Rear flat horizontal
VR = Rear flat vertical

Tmax moulded-case circuit-breakers for specific applications

			Tmax T1	Tmax T2	Tmax T3
Current-limiting					
				T2L	
Poles			–	3-4	–
Frame			–	160	–
Ue		[V]	–	690	–
Icu @ 380/415 V		[kA]	–	85	–
Icu @ 440 V		[kA]	–	75	–
Icu @ 690 V		[kA]	–	10	–
Ics/Icu		[%]	–	75% (70 kA)	–
Dimensions	L	[mm]	–	90/120	–
	D	[mm]	–	70	–
	H	[mm]	–	130	–
Advanced zone selectivity					
Poles		[No]	–	–	–
Frame			–	–	–
Ue	(AC) 50-60 Hz	[V]	–	–	–
EFDP Zone selectivity			–	–	–
ZS Zone selectivity			–	–	–
Motor protection					
				T2	**T3**
Poles			–	3	3
Frame			–	160	250
Ue		[V]	–	690	690
Magnetic only release	M fixed		–	• (up to In 12.5)	–
Magnetic only release	M adjustable		–	• (from In 20)	•
Electronic release	PR221MP		–	•	–
Electronic release	PR221DS-I, IEC 60947-2		–	•	–
Electronic release	PR222MP, IEC 60947-4-1		–	–	–
Electronic release	PR231/P-I, IEC 60947-2		–	–	–
Cbs for use up to 1150 V AC and 1000 V DC					
Poles			–		
Frame			–	–	–
Icu @ 1000 V AC		[kA]	–	–	–
Icu @ 1150 V AC		[kA]	–	–	–
Icu @ 1000 V DC	4 poles in series	[kA]	–	–	–
Disconnectors according to IEC 60947-3 Standard					
			T1D	**–**	**T3D**
Poles			3-4	–	3-4
Frame			160	–	250
Ie AC23		[A]	125	–	200
Ue	(AC) 50-60 Hz	[V]	690	–	690
	(DC)		500	–	500
Uimp		[kV]	8	–	8
Ui		[V]	800	–	800
Icm		[kA]	2.8	–	5.3
Icw		[kA]	2	–	3.6
UL/CSA (UL 489 and CSA C22.2)					
			T1	**T2**	**T3**
Poles			1-3-4	3-4	3-4
Frame			100	100	225
Maximum Ampere Interrupting Capacity	≅ 480 V	[kA]	22	35-65	25-35
Maximum Ampere Interrupting Capacity	≅ 600 V/347 V AC	[kA]	10	–	10
Maximum Ampere Interrupting Capacity	≅ 600 V	[kA]	–	–	–
Thermal-magnetic trip unit			•	•	•
Magnetic only			–	•	•
Microprocessor based trip unit			–	•	–
MCCB			•	•	•
MCP			–	•	•
MCS			•	–	•

	Tmax T4	Tmax T5	Tmax T6	Tmax T7	Tmax T8
	T4V	**T5V**	**T6L**	**T7V**	
	3-4	3-4	3-4	3-4	–
	250/320	400/630	630/800/1000	800/1000/1250	–
	690	690	690	690	–
	200	200	100	150	–
	180	180	80	130	–
	80	80	30	60	–
	100%	100%	75%	100%	–
	105/140	140/184	210/280	210/280	–
	103.5	103.5	103.5	154 (manual) /178 (motorizable)	–
	205	205	268	268	–
	T4	**T5**	**T6**	**T7**	
	3-4	3-4	3-4	3-4	–
	250/320	400/630	630/800/1000	800/1000/1250/1600	–
	690	690	690	690	–
	●	●	●	–	–
	–	–	–	●	–
	T4	**T5**	**T6**	**T7**	
	3	3	3	3	–
	250-320	400-630	800	800/1000/1250	–
	690	690	690		–
	–	–	–	–	–
	●	–	–	–	–
	–	–	–	–	–
	●	●	●	–	–
	●	●	●	–	–
	–	–	–	●	–
	T4	**T5**	**T6**		
	3-4	3-4	3-4	–	–
	250	400-630	630-800	–	–
	20	20	12	–	–
	12	12	–	–	–
	40	40	40	–	–
	T4D	**T5D**	**T6D**	**T7D**	**T8**
	3-4	3-4	3-4	3-4	3-4
	320	400/630	630-800-1000	1000/1250/1600	2000/2500/3200
	320	400/630	630-800-1000	1000/1250/1600	2000/2500/3200
	690	690	690	690	690
	750	750	750	750	–
	8	8	8	8	12
	800	800	1000	1000	1000
	5.3	11	30	52.5	–
	3.6	6	15	20	40
	T4	**T5**	**T6**	**T7**	**T8**
	3-4	3-4	3-4	3-4	3 -4
	250	400-600	800	1000-1200	1600-2000-2500-3000
	25-150	25-150	35-100	50-100	125
	–	–	–	–	–
	18-100	18-100	20-42	25-65	100
	●	●	●	–	–
	–	–	–	–	–
	●	●	●	●	●
	●	●	●	●	●
	●	●	●	–	–
	●	●	●	●	●

Main release characteristics

Combination of release - circuit-breaker

		T1	T2	T3	T4	T5	T6	T7	T8
	In	160	160	250	250/320	400/630	630/800/1000	800/1600	2000/2500/3200
	Version	F	F-P	F-P	F-P-W	F-P-W	F-W	F-W	F
Thermomagnetic	MF	–	●	–	–	–	–	–	–
	MA	–	●	●	●	–	–	–	–
	TMF	● *	–	–		–	–	–	–
	TMD	●	●	●	●	–	–	–	–
	TMG	–	●	●	–	●	–	–	–
	TMA	–	–	–	●	●	●	–	–
Electronic	PR221DS	–	●	–	●	●	●	–	–
	PR221GP	–	●	–	–	–	–	–	–
	PR221MP	–	●	–	–	–	–	–	–
	PR222/P- /PD	–	–	–	●	●	●	–	–
	PR222 MP	–	–	–	●	●	●	–	–
	PR223DS	–	–	–	●	●	●	–	–
	PR223EF	–	–	–	●	●	●	–	–
	PR231/P	–	–	–	–	–	–	●	–
	PR232/P	–	–	–	–	–	–	●	●**
	PR331/P	–	–	–	–	–	–	●	●
	PR332/P	–	–	–	–	–	–	●	●

* only available for T1 1p ** dedicated version only for T8

Electronic releases

	PR221DS	PR221GP	PR221MP	PR222DS/P-DS/PD	PR222MP
					
Protections available	**LS/I-I**	**LSI**	**LI**	**LSI-LSIG**	**LIRU**
Compatible circuit-breakers	T2-T4-T5-T6	T2	T2	T4-T5-T6	T4-T5-T6
Applications	Distribution/Motor protection	Generator protection	Motor protection	Distribution	Motor protection
Basic protections					
L	(DS) I1=0.4-1 In	(DS) I1=0.4-1 In	(DS) I1=0.65-1 In	(DS) (E) I1=0.4-1 In	(DS) (E) I1=0.4-1 In
	(DS) t1=3-12 s (t1=3-6 s T2) t=k/I2	(DS) t1=0.7-5.5 s t=k/I2	(DS) t1=2.77-11.1 s t=k/I2	(DS) (E) t1=3-18 s t=k/I2	(DS) (E) t1=3-18 s t=k/I2
S	(DS) I2=1-10 In	(DS) I2=1-2.5 In	–	(DS) (E) I2=0.6-10 In	–
	(DS) t2=0.1-0.25 s t=k/I2	(DS) t2=0.07-0.75 s t=k/I2 or t=k	–	(DS) (E) t2=0.05-0.5 s t=k/I2 or t=k	–
I	(DS) I3=1-10 In	(DS) I3=4 I2-Fixed	(DS) I3=2.5-17.5 In	(DS) (E) I3=1.5-12 In	(DS) (E) I3=6-13 In
	t3=instantaneous t=k	t3=instantaneous t=k	t3=instantaneous t=k	t3=instantaneous t=k	t3=instantaneous t=k
G	–	–	–	(DS) (E) I4=0.2-1 In	–
	–	–	–	(DS) (E) t1=0.1-0.8 s t=k/I2	–
Rc	RC221 (T2)-RC222 (T2-T4-T5)	RC221-RC222	RC221-RC222	RC222 (T4-T5)-RC223 (T4)	RC222 (T4-T5)-RC223 (T4)
	RC223 (T4)-RCQ SACE (T6)		–	RCQ SACE (T6)	RCQ SACE (T6)
OT	–	–	–	–	–
	–	–	–	–	–
U	–	–	–	–	(DS) (E) I6=0.4 I1
	–	–	–	–	(DS) (E) t6=1-10 s
Advanced protections					
UV	–	–	–	–	–
	–	–	–	–	–
OV	–	–	–	–	–
	–	–	–	–	–
RV	–	–	–	–	–
	–	–	–	–	–
RP	–	–	–	–	–
	–	–	–	–	–
UF	–	–	–	–	–
	–	–	–	–	–
OF	–	–	–	–	–
	–	–	–	–	–
S2	–	–	–	–	(DS) (E) I5=3-10 I1
	–	–	–	–	(DS) (E) t5=1-10 s
Communication	–	–	–	Dialogue unit integrated with protocol Modbus-PR021/K remote signalling only on DS/PD	PR021/K remote signalling
Measurements	–	–	–	Basic-with PR010T or BT030 for DS/P, standard for DS/PD	Basic-with PR010T
NOTES	–	–	Motor protection with powers up to 55kW	Setting (E) with PR010T or with BT030-Interface front of panel HMI030 on PD version	Setting (E) with PR010T

Thermomagnetic releases

	MF	MA	TMF	TMD	TMG	TMA
						
Compatible circuit-breakers	**T2**	**T2-T3-T4**	**T1_1p**	**T1-T2-T3-T4**	**T2-T3-T5**	**T4-T5-T6**
Applications	Motor protection		Distribution	Distribution	Generator protection	Distribution
Basic protections						
L	–		I1=In	(M) I1=0.7-1 In	(M) I1=0.7-1 In	(M) I1=0,7-1 In
I	(M) I3=13 In (M) I3=(6-12 In T2 T3) (6-14 In T4)		I3=10 In	(M) I3=10 In	(M) I3=3 In (I3=2.5-5 In T5)	(M) I3=5-10 In
Rc	RC221 (T2-T3) RC222/RC223 (T4)		RC221	RC221 (T1-T2-T3)-RC222 (T1-T2-T3-T4-RC223 (T3-T4)	RC221 (T2-T3)-RC222 (T2-T3-T5)-RC223 (T3)	RC222 (T4-T5)-RC223 (T4) RCQ (T6)

KEY

L-Protection against overload
S-Selective protection against short-circuit
I- Instantaneous protection against short-circuit
G-Protection against earth faults
Rc-Protection against residual current
OT-Protection against overtemperature
U-Protection against phase unbalance
UV-Undervoltage protection

t=k relation t=f(I)

t=k/I2 relation t=f(I)

OV-Overvoltage protection
RV-Protection against residual voltage
RP-Protection against reverse active power
UF-Protection against under frequency
OF-Protection against over frequency
S2-Selective protection against short-circuit
D-Protection against directional short-circuit
R-Protection against rotor blocking

PR010T-Test and Configuration Unit
PR_ _ _ D-M-Communication module mod-bus
PR_ _ _V Measurement module
BT030-Wireless communication unit

PR021K-Signalling unit

(M)-Manual setting
(DS)-Setting with Dip Switch
(E)-Electronic setting with external apparatus
(BT030 or PR010T) or remotely with communication
(ME)-Manual electronic setting on front of panel

RC_ _ _-External residual current release for moulded-case circuit-breakers
RCQ SACE-Panel residual current with toroid and opening coil

Basic Measurements
Phase, Neutral, Earth currents

Advanced Measurements
Currents (phase, Neutral, Earth)
Phase voltages (phase-phase, phase-neutral, residual)
Power (Active, Reactive, Apparent)
Power factor
Frequency and Peak Factor
Energy (Active, Reactive, Apparent)

Version
F- Fixed
P- Plug-in
W- Withdrawable

	PR223DS	PR223EF	PR231/P	PR232/P	PR331/P	PR332/P
						
	LSIG	**LSIG**	**LS/I-I**	**LSI-LSIG**	**LI-LSI-LSIG**	**LSIG**
	T4-T5-T6	T4-T5-T6	T7	T7	T7-X1-T8	T7-X1-T8
	Distribution	Zone selectivity	Distribution	Distribution	Distribution	Distribution
	(E) I1=0.4-1 In	(E) I1=0.18-1 In	(DS) I1=0.4-1 In	(DS) (E) I1=0.4-1 In	(DS) (E) I1=0.4-1 In	(ME) (E) I1=0.4-1 In
	(E) t1=3-18 s t=k/I2	(E) t1=3-18 s	(DS) t1=3-12 s t=k/I2	(DS) (E) t1=3-18 s t=k/I2	(DS) (E) t1=3-144 s t=k/I2	(ME) (E) t1=3-144 s t=k/I2
	(E) I2=0.6-10 In	(E) I2=0.6-10 In	(DS) I2=1-10 In	(DS) (E) I2=0.6-10 In	(DS) (E) I2=0.6-10 In	(ME) (E) I2=0.6-10 In
	(E) t2=0.05-0.5 s t=k/I2 or t=k	(E) t2=0.05-0.5 s t=k/I2 or t=k	(DS) t2=0.1-0.25 s t=k/I2	(DS) (E) t2=0.1-0.8 s t=k/I2 or t=k	(DS) (E) t2=0.1-0.8 s t=k/I2 or t=k	(ME) (E) t2=0.05-0.8 s t=k/I2 or t=k
	(E) I3=1.5-12 In t3=instantaneous t=k	(E) I3=1.5-12 In t3=instantaneous t=k	(DS) I3=1-10 In t3=instantaneous t=k	(DS) (E)I3=1.5-12 In t3=instantaneous t=k	(DS) (E) I3=1.5-15 In t3=instantaneous t=k	(ME) (E) I3=1,5-15 In t3=instantaneous t=k
	(E) I4=0.2-1 In	(E) I4=0.2-1 In	–	–	(DS) (E) I4=0.2-1 In	(ME) (E) I4=0.2-1 In
	(E) t4=0.1-0.8 s t=k/I2	(E) t4=0.1-0.8 s t=k/I2	–	–	(DS) (E) t1=0.1-0.8 s t=k/I2 or t=k	(ME) (E) t4=0.1-0.8 s t=k/I2 or t=k
	RC222 (T4-T5)-RC223 (T4)	RC222 (T4-T5)-RC223 (T4)	RCQ SACE	RCQ SACE	RCQ SACE	(ME) (E) IΔ=3-30 A
	RCQ SACE (T6)	RCQ SACE (T6)	–	–	–	(ME) (E) tΔ=0.06-0.8 s t=k
	–	–	–	–	–	T=85° C
	–	–	–	–	–	t=instantaneous t=k
	–	–	–	–	–	(ME) (E) I6=0.02-0.9 I1
	–	–	–	–	–	(ME) (E) t6=0.5-60 s t=k
	–	–	–	–	–	(ME) (E) U8=0.5-0.95 Un
	–	–	–	–	–	(ME) (E) t8=0.1-5 s t=k
	–	–	–	–	–	(ME) (E) U9=1.05-1.2 Un
	–	–	–	–	–	(ME) (E) t9=0.1-5 s t=k
	–	–	–	–	–	(ME) (E) U10=0.1-0.4 Un
	–	–	–	–	–	(ME) (E) t10=0.5-30 s t=k
	–	–	–	–	–	(ME) (E) P11=-0.3/-0.1 Pn
	–	–	–	–	–	(ME) (E) t11=0.5-25 s t=k
	–	–	–	–	–	(ME) (E) f12=0.90-0.99 fn
	–	–	–	–	–	(ME) (E) t12=0.5-3 s t=k
	–	–	–	–	–	(ME) (E) f13=1.01-1.10 fn
	–	–	–	–	–	(ME) (E) t13=0.5-3 s t=k
	–	–	–	–	–	–
	–	–	–	–	–	–
	Dialogue unit available with Modbus protocol -PR021/K remote signalling	Dialogue unit available with Modbus protocol - PR021/K remote signalling	–	–	PR021/K remote signalling	With PR330/D-M -protocol Modbus- BT030 communication wireless -PR021/K remote signalling
	advanced with VM210	advanced with VM210	–	Basic-with PR010T or BT030	Basic-BT030	Basic included as standard-advanced with PR330/V
	Setting (E) with PR010T or with BT030-HMI030 Interface front of panel	Setting (E) with PR010T or with BT030-Protection EF ultra-rapid trip- HMI030 Interface front of panel	–	Setting (E) with PR010T or with BT030	Setting (E) with PR010T or with BT030-Interface front of panel HMI030	Adv. Prot. PR330V-Setting (E) with PR010T or with BT030-Interface front of panel HMI030

Main release characteristics

Residual current releases		RC221	RC222		RC223
Sizes		**T1-T2-T3**	**T1-T2-T3**	**T4 and T5**	**T3 and T4**
Version		3/4 Poles F	3/4 Poles-F, P, W-	4 Poles-F, P, W -	T3 4 Poles F, T4 250 4 Poles-F,P,W -
Type		shape "L"	shape "L"	Underneath	Underneath
Technology		With microprocessor	With microprocessor	With microprocessor	With microprocessor
Action		Solenoid	Solenoid	Solenoid	Solenoid
Primary operating voltage	[V]	85…500	85…500	85…500	110…500
Frequency of operation	[Hz]	45…66	45…66	45…66	45…66
Self-supply		●	●	●	●
Field of test operation	[V]	85…500	85…500	85…500	110…500
Rated service current	[A]	up to 250 A	up to 250 A	up to 500 A	up to 500 A
Adjustable trip thresholds	[A]	0.03-0.1-0.3-0.5-1-3	0.03- 0.05-0.1-0.3-0.5-1-3-5 -10	0.03- 0.05-0.1-0.3-0.5-1-3-5 -10	0.003-0.05-0.1-0.3-0.5-1
Adjustable trip times	[s]	instantaneous	instantaneous 0.1- 0.2- 0.3- 0.5- -2- 3	instantaneous 0.1- 0.2- 0.3- 0.5- -2- 3	instantaneous 0.1- 0.2- 0.3- 0.5- -2- 3
Tolerance over trip times			± 20%	± 20%	± 20%
Absorbed power		< 8 W at 400 V AC	< 10 W at 400 V AC	< 10 W at 400 V AC	< 10 W at 400 V AC
Local trip indication		●	●	●	●
OS with changeover contact for trip signalling		●	●	●	●
Input for remote opening		–	●	●	●
NO contact for signalling pre-alarm		–	●	●	●
NO contact for signalling alarm		–	●	●	●
Indication of pre-alarm from 25% IΔn (tolerance ± 3%)		–	●	●	●
Indication of alarm timing at 75% IΔn (tolerance ± 3%)		–	●	●	●
Type A for pulsating alternating current, AC direct current		●	●	●	●
Type AE with remote release		–	●	●	●
Type B for pulsating current and direct current		–	–	–	●
Type S selective		–	●	●	●
Button for insulation test		●	●	●	●
Power supply from the top and bottom		●	●	●	●
Assembly with three-pole circuit-breakers		●	●	–	–
Assembly with four-pole circuit-breakers		●	●	●	●
Conversion Kit of cb with residual current from fixed to plug-in		–	●	●	●

RCQ SACE

Characteristics		All 3/4 poles
Power supply voltage	AC [V]/DC [V]	80…500/48…125
Frequency of operation	[Hz]	45…66
Inrush power consumption		100 [VA]/100 [W]
Service power consumption		6 [VA]/6 [W]
Adjustment of trip threshold		
1st range of Adjustments	[A]	0.03-0.05-0.1-0.3-0.5
2st range of Adjustments	[A]	1- 3-5-10-30
Adjustment of trip times IΔn	[s]	instantaneous-0.1-0.2-0.3-0.5-0.7-1-2-3-5
Adjustment of pre-alarm threshold	[%] x IΔn	25…75% x IΔn
Range of use of closed transformers		
Toroidal transformer Ø 60 [mm]	[A]	0.03…30
Toroidal transformer Ø 110 [mm]	[A]	0.03…30
Toroidal transformer Ø 185 [mm]	[A]	0.1…30
Range of use of openable transformers		
Toroidal transformer Ø 60 [mm]	[A]	0.03…30
Toroidal transformer Ø 110 [mm]	[A]	0.03…30
Toroidal transformer Ø 185 [mm]	[A]	0.1…30
Pre-threshold pre-alarm indication		Yellow flashing LED 1 changeover contact N.O. 6A-250 V AC 50/60 Hz
Signalling of residual relay trip		Magnetic indication and two changeover contacts (N.O. N.C. ; N.O.). 6A-250 V AC 50/60 Hz
Remote opening control		N.O. contact Trip time 15 ms
Connection to the toroidal transformer		By means of 4 twisted conductors. Maximum length: 5 m
Dimensions L x H x D	[mm]	96 x 96 x 131.5
Drilling for assembly on door	[mm]	92 x 92
Degree of protection on the front		IP41
Degree of protection on the rear		IP30

Communication/Signalling/Measurement

PR330/D-M

PR330/D-M

The PR330/D-M communication module is the solution for connecting the ABB moulded-case circuit-breakers to a Modbus network, for supervision and remote control of the circuit-breaker

SACE PR021/K

PR021/K

The SACE PR021/K is able to convert the digital signals provided by the PR222DS/PD, PR223DS, PR223EF, PR331, PR332, PR333 protection units into electric signals by means of normally open electrical contacts, and allow remote signalling of alarms and release trips.

VM210

The VM210 accessory, combined with the protection devices, provides different measurements of the electrical values of the plant. It is able to provide measurements relative to a maximum of 5 electronic releases. The connection distance between the module and the release is a maximum of 15 metres; for distances greater than 1 metre, it is necessary to use a shielded multi-pole connection cable.

HMI030

Can be used with all the protection releases fitted with dialogue, is designed to be installed on the front of the panel. It consists of a graphic display where all the measurements and alarms/events of the release are displayed. Thanks to its high precision, the device can replace traditional multi-meters without the need of current/voltage transformers. The HMI030 is connected directly to the protection release by means of a serial line and requires a 24 V DC power supply.

PR330/V

PR330/V

The internal PR330/V module can be added to the trip unit and allow the phase and neutral voltages to be measured and processed, transferring these data to the protection release itself, so that a series of protection functions and measurements can be implemented.

BT030

BT030

The BT030 is un device to be connected to the Test connector of PR222DS, PR223DS, PR223EF, PR232/P, PR331/Pand PR332/P. It allows Bluetooth communication between the protection release and a hand-held PC or a laptop with a Bluetooth port. T

PR010/T

The unit SACE PR010/T is an instrument able to carry out the Test, programming and parameter reading functions for the protection units which equip the circuit-breakers. For T4, T5, T6 and T7, the test, programming and parameter reading functions are available. It is possible to store the results of primary interest regarding the tests inside the unit itself and to send them to the PC. In both automatic and manual mode, the SACE PR010/T unit is able to test: – protection functions L, S, I, G – protection functions L, R, I, U (for PR222MP) – monitoring of correct operation of the microprocessor.

Emax air circuit-breakers for distribution

Common data			
Voltages			
Rated service voltage	Ue	[V]	690 ~
Rated insulation voltage	Ui	[V]	1000
Rated impulse withstand voltage	Uimp	[kV]	12
Service temperature		[°C]	-25...+70
Storage temperature		[°C]	-40...+70
Frequency	f	[Hz]	50-60
Number of poles			3-4
Version			Fixed-Withdrawable

				X1			E1	
Levels of performance			[A]	B	N	L	B	N
Currents: rated uninterrupted current (at 40 °C)	Iu		[A]	630	630	630	800	800
			[A]	800	800	800	1000	1000
			[A]	1000	1000	1000	1250	1250
			[A]	1250	1250	1250	1600	1600
			[A]	1600	1600	-	-	-
			[A]	-	-	-	-	-
			[A]	-	-	-	-	-
Current carrying capacity of neutral pole for 4-pole cbs			[%Iu]	100	100	100	100	100
Rated ultimate short-circuit breaking capacity	Icu	220/230/380/400/415 V~	[kA]	42	65	150	42	50
		440 V~	[kA]	42	65	130	42	50
		500/525 V~	[kA]	42	50	100	42	50
		660/690 V~	[kA]	42	50	60	42	50
Rated service short-circuit breaking capacity	Ics	220/230/380/400/415 V~	[kA]	42	50	150	42	50
		440 V~	[kA]	42	50	130	42	50
		500/525 V~	[kA]	42	42	100	42	50
		660/690 V~	[kA]	42	42	45	42	50
Rated short/time withstand current	Icw	(1s)	[kA]	42	42	15	42	50
		(3s)	[kA]	-	-	-	36	36
Rated making capacity in short-circuit (peak value)	Icm	220/230/380/400/415 V~	[kA]	88.2	143	330	88.2	105
		440 V~	[kA]	88.2	143	286	88.2	105
		500/525 V~	[kA]	88.2	121	220	88.2	105
		660/690 V~	[kA]	88.2	121	132	88.2	105
Category of use	CEI EN 60947-2			B	B	A	B	B
Isolation behaviour	CEI EN 60947-2			•	•	•	•	•
Overcurrent protection								
Electronic releases for applications in AC				•	•	•	•	•
Operating times								
Closing time (max)			[ms]	80	80	80	80	80
Breaking time for I<Icw (max) (1)			[ms]	70	70	70	70	70
Breaking time for I>Icw (max)			[ms]	30	30	12	30	30
Overall dimensions								
Fixed: H =418 mm-D =302 mm	L	(3/4 poles)	[mm]	H=268 mm-D=181 mm-L(3/4)=210/280			296/386	
Withdrawable: H =461-D =396.5 mm	L	(3/4 poles)	[mm]	H=343 mm-D=254 mm-L(3/4)=284/354			324/414	
Weights (circuit-breaker complete with releses and CT, accessories excluded)								
Fixed 3/4 poles			[kg]	11/14	11/14	11/14	45/54	45/54
Withdrawable 3/4 poles (including the fixed part)			[kg]	32/42.6	32/42.6	32/42.6	70/82	70/82

(1) without intentional delays (2) the performance at 600 V is 100 kA

			X1 B	X1 N	X1 L	E1 B-N		
Rated uninterrupted current (at 40 °C)	Iu	[A]	800	1250	1600	800	1000/1250	1600
Mechanical life with regular ordinary maintenance		[No. operations x 1000]	12.5	12.5	12.5	25	25	25
Frequency of operations		[Operations/hour]	60	60	60	60	60	60
Electrical life	(440 V ~)	[No. operations x 1000]	6	4	3	10	10	10
	(690 V ~)	[No. operations x 1000]	3	2	1	10	8	8
Frequency of operations		[Operations/hour]	30	30	30	30	30	30




	E2				E3					E4			E6	
	B	N	S	L	N	S	H	V	L	S	H	V	H	V
	1600	1000	800	1250	2500	1000	800	800	2000	4000	3200	3200	4000	3200
	2000	1250	1000	1600	3200	1250	1000	1250	2500	-	4000	4000	5000	4000
	-	1600	1250	-	-	1600	1250	1600	-	-	-	-	6300	5000
	-	2000	1600	-	-	2000	1600	2000	-	-	-	-		6300
	-	-	2000	-	-	2500	2000	2500	-	-	-	-	-	-
	-	-	-	-	-	3200	2500	3200	-	-	-	-	-	-
	-	-	-	-	-	-	3200	-	-	-	-	-	-	-
	100	100	100	100	100	100	100	100	100	50	50	50	50	50
	42	65	85	130	65	75	100	130	130	75	100	150	100	150
	42	65	85	110	65	75	100	130	110	75	100	150	100	150
	42	55	65	85	65	75	85	100	85	75	100	130	100	130
	42	55	65	85	65	75	85	100	85	75	85	100	100	100
	42	65	85	130	65	75	85	100	130	75	100	125	100	125
	42	65	85	110	65	75	85	100	110	75	100	125	100	125
	42	55	65	65	65	75	85	85	65	75	100	130	100	100
	42	55	65	65	65	75	85	85	65	75	85	100	100	100
	42	55	65	10	65	75	75	85	15	75	100	100	100	100
	42	42	42	–	65	65	65	65	–	75	75	75	85	85
	88.2	143	187	286	143	165	220	286	286	165	220	330	220	330
	88.2	143	187	242	143	165	220	286	286	165	220	330	220	330
	88.2	121	143	187	143	165	187	220	187	165	220	286	220	286
	88.2	121	143	187	143	165	187	220	187	165	187	220	220	220
	B	B	B	A	B	B	B	B	A	B	B	B	B	B
	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	80	80	80	80	80	80	80	80	80	80	80	80	80	80
	70	70	70	70	70	70	70	70	70	70	70	70	70	70
	30	30	30	12	30	30	30	30	12	30	30	30	30	30
	296/386				404/530					566/656			782/908	
	324/414				432/558					594/684			810/936	
	50/61	50/61	50/61	52/63	66/80	66/80	66/80	66/80	72/83	97/117	97/117	97/117	140/160	140/160
	78/93	78/93	78/93	80/95	104/125	104/125	104/125	104/125	110/127	147/165	147/165	147/165	210/240	210/240

	E2 B-N-S				E2 L		E3 N-S-H-V							E3 L		E4 S-H-V		E6 H-V			
	800	1000 1250	1600	2000	1250	1600	800	1000 1250	1600	2000	2500	3200	3200	2000	2500	3200	4000	3200	4000	5000	6300
	25	25	25	25	20	20	20	20	20	20	20	20	20	15	15	15	15	12	12	12	12
	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
	15	15	12	10	4	3	12	12	10	9	8	6	6	2	1,8	7	5	5	4	3	2
	15	15	10	8	3	2	12	12	10	9	7	5	5	1.5	1.3	7	4	5	4	2	1,5
	30	30	30	30	20	20	20	20	20	20	20	20	20	20	20	10	10	10	10	10	10

Emax air circuit-breakers for specific applications

			X1	E1		E2		
Circuit-breakers with full section neutral conductor								
Poles		[No]	Standard version	Standard version		Standard version		
Current carrying capacity of the neutral of 4p circuit-breakers		[% Iu]						
Iu	(40 °C)	[A]						
Ue		[V~]						
Icu	(220...415 V)	[kA]						
Ics	(220...415 V)	[kA]						
Icw	(1s)	[kA]						
	(3s)	[kA]						
Switch-disconnectors								
			X1B/MS	E1B/MS	E1N/MS	E2B/MS	E2N/MS	E2S/MS
Poles		[No]	3-4	3-4	3-4	3-4	3-4	3-4
Iu	(40 °C)	[A]	1000-1250-1600	800-1000-1250-1600	800-1000-1250-1600	1600-2000	1000-1250-1600-2000	1000-1250-1600-2000
Ue		[V~]	690	690	690	690	690	690
Icw	(1s)	[kA]	42	42	50	42	55	65
	(3s)	[kA]		36	36	42	42	42
Icm	(220...440 V)	[kA]	88.2	88.2	105	88.2	121	143
Circuit-breakers for applications up to 1150 V AC								
			X1B/E			E2B/E	E2N/E	
Poles		[No]	3-4			3-4	3-4	
Iu	(40 °C)	[A]	630-800-1000-1250-1600			1600-2000	1250-1600-2000	
Ue		[V~]	1000			1150	1150	
Icu	(1000 V)	[kA]	20			20	30	
Ics	(1000 V)	[kA]	20			20	30	
Icw	(1s)	[kA]	20			20	30	
Switch-disconnectors for applications up to 1150 V AC								
			X1B/E MS			E2B/E MS	E2N/E MS	
Poles		[No]	3-4			3-4	3-4	
Iu	(40 °C)	[A]	1000-1250-1600			1600-2000	1250-1600-2000	
Ue		[V~]	1000			1150	1150	
Icw	(1s)	[kA]	20			20	30	
Icm	(1000 V)	[kA]	40			40	63	
Switch-disconnectors for applications up to 1000 V DC								
				E1B/E MS			E2N/E MS	
Poles		[No]		3-4			3-4	
Iu	(40 °C)	[A]		800-1250			1250-1600-2000	
Ue		[V-]		750 (3p) 1000 (4p)			750 (3p) 1000 (4p)	
Icw	(1s)	[kA]		20			25	
Icm	(750 V)	[kA]		42			52.5	
	(1000 V)	[kA]		42			52.5	
Isolating truck								
				E1 CS		E2 CS		
Iu	(40 °C)	[A]		1250		2000		
Earthing switch with making capacity								
				E1 MTP		E2 MTP		
Iu	(40 °C)	[A]		1250		2000		
Earthing truck								
				E1 MT		E2 MT		
Iu	(40 °C)	[A]		1250		2000		

(*) The performance at 1000 V is 50 kA

	E3			E4			E6	
				E4S/f	E4H/f		E6H/f	
	Standard version			4	4		4	
				100	100		100	
				4000	3200-4000		4000-5000-6300	
				690	690		690	
				80	100		100	
				80	100		100	
				80	85		100	
				75	75		100	

	E3N/MS	E3S/MS	E3V/MS	E4S/MS	E4H/MS	E4H/f MS	E6H/MS	E6H/f MS
	3-4	3-4	3-4	3-4	3-4	4	3-4	4
	2500-3200	1000-1250-1600-2000-2500-3200	800-1250-1600-2000-2500-3200	4000	3200-4000	3200-4000	4000-5000-6300	4000-5000-6300
	690	690	690	690	690	690	690	690
	65	75	85	75	100	85	100	100
	65	65	65	75	75	75	85	85
	143	165	187	165	220	187	220	220

		E3H/E			E4H/E		E6H/E	
		3-4			3-4		3-4	
		1250-1600-2000-2500-3200			3200-4000		4000-5000-6300	
		1150			1150		1150	
		30(*)			65		65	
		30(*)			65		65	
		30(*)			65		65	

		E3H/E MS			E4H/E MS		E6H/E MS	
		3-4			3-4		3-4	
		1250-1600-2000-2500-3200			3200-4000		4000-5000-6300	
		1150			1150		1150	
		50			65		65	
		105			143		143	

		E3H/E MS			E4H/E MS		E6H/E MS	
		3-4			3-4		3-4	
		1250-1600-2000-2500-3200			3200-4000		4000-5000-6300	
		750 (3p) 1000 (4p)			750 (3p) 1000 (4p)		750 (3p) 1000 (4p)	
		40			65		65	
		105			143		143	
		105			143		143	

		E3 CS			E4 CS		E6 CS
		3200			4000		6300

		E3 MTP			E4 MTP		E6 MTP
		3200			4000		6300

		E3 MT			E4 MT		E6 MT
		3200			4000		6300

Accessories for Emax air circuit-breakers

Circuit-breaker version	Circuit-breakers			
	Circuit-breakers with full section neutral			
	Circuit-breakers for applications up to 1150 V AC			
	X1		E1-E6	
	Fixed	Withdrawable	Fixed	Withdrawable
Service releases				
Shunt opening/closing release and second shunt opening release	●	●	●	●
SOR test unit	●	●	●	●
Undervoltage release	●	●	●	●
Delay device for undervoltage release	●	●	●	●
Remote control				
Geared motor for automatic charging of the closing springs (M)	●	●	●	●
Electric signals				
Electric signalling overcurrent release tripping	●	●	●	●
Electric signalling overcurrent release tripping with remote control	●	●	●	●
Electric signalling of circuit-breaker open/closed [1]	●	●	●	●
Electric signalling of circuit-breaker open/closed, supplementary external			●	●
Electric signalling of circuit-breaker connected/racked-out/racked out for test		O		●
Signalling contact for closing springs charged	●	●	●	●
Signalling contact for the undervoltage release de-energised (C. Aux YU)			●	●
Signalling contact for “ready to close”	●	●		
Accessories for electronic releases				
Current transformer for the neutral conductor outside the circuit-breaker	●	●	●	●
Homopolar toroid for the earth earthing conductor of the mains supply (star centre of the transformer)	●	●	●	●
Homopolar toroid for residual current protection	●	●	●	●
Controls and locks				
Mechanical operation counter	●	●	●	●
Lock in open position: key	●	●	●	●
Lock in open position: padlocks	●	●	●	●
Circuit-breaker lock in connected/racked-out/racked out for test position		●		●
Accessories for lock in racked-out/racked out for test position		●		●
Accessory for shutter padlock lock				●
Mechanical lock on compartment door	●	●	●	●
Opening and closing pushbutton protection	●	●	●	●
IP54 door protection	●	●	●	●
Sliding contact locks	●	●	●	●
Interlock between circuit-breakers [2]	●	●	●	●
Automatic network-generator transfer unit				
ATS021/ATS022 automatic network-generator transfer switch [3]	●	●	●	●

KEY

● Optional accessory on circuit-breaker fixed or moving part

O Optional accessory on fixed part

● Optional accessory on moving part

[1] For the circuit-breaker the 4 auxiliary contacts for electric signalling of circuit-breaker open/closed are included in the normal supply

[2] Incompatible with the versions with full section neutral E6/f

[3] For E1-E6, incompatible with the range of circuit-breakers for applications up to 1150V AC. For X1, incompatible with the range of circuit-breakers for applications up to 1000V AC

	Switch-disconnectors (MS) Switch-disconnectors for applications at 1150 V AC Switch-disconnectors for applications at 1000 V DC				Isolating truck (CS)	Earthing switch with making capacity (MPT)	Earthing truck (MT)
	X1		**E1-E6**		**E1-E6**	**E1-E6**	**E1-E6**
	Fixed	Withdrawable	Fixed	Withdrawable	Withdrawable	Withdrawable	Withdrawable
	●	●	●	●		● (YC)	
	●	●	●	●			
	●	●	●	●			
	●	●	●	●			
	●	●	●	●		●	
	●	●	●	●		●	
			●	●		●	
		○		○	○	○	○
	●	●	●	●		●	
			●	●			
	●	●					
	●	●	●	●		●	
	●	●	●	●		●	
	●	●	●	●		●	
		●		●	●	●	●
		●		●	●	●	●
				○	○	○	○
	●	●	●	●		●	
	●	●	●	●		●	
	●	●	●	●		●	
	●	●	●	●			
	●	●	●	●			

Main characteristics of releases

Combination of release with circuit-breaker

		X1	E1	E2	E3	E4	E6
	In	630/1600	800/1600	800/2000	800/3200	3200/4000	3200/6300
	Version	F-W	F-W	F-W	F-W	F-W	F-W
Electronic	PR331/P	●	–	–	–	–	–
	PR332/P	●	–	–	–	–	–
	PR333/P	●	–	–	–	–	–
	PR121/P	–	●	●	●	●	●
	PR122/P	–	●	●	●	●	●
	PR123/P	–	●	●	●	●	●

Electronic releases

	PR331/P	PR332/P	PR333/P
			
Electronic releases	**LI-LSI-LSIG**	**LSIG**	**LSIG**
Compatible circuit-breakers	T7-X1	T7-X1	X1
Applications	Distribution	Distribution	Distribution
Basic protections			
L	(DS) (E) I1=0.4-1 In	(ME) (E) I1=0.4-1 In	(ME) (E) I1=0,4-1 In
	(DS) (E) t1=3-144 s t=k/I2	(ME) (E) t1=3-144 s t=k/I2	(ME) (E) t1=3-144 s t=k/I2
S	(DS) (E) I2=0.6-10 In	(ME) (E) I2=0.6-10 In	(ME) (E) I2=0.6-10 In
	(DS) (E) t2=0.1-0.8 s t=k/I2 or t=k	(ME) (E) t2=0.05-0.8 s t=k/I2 or t=k	(ME) (E) t2=0.05-0.8 s t=k/I2 or t=k
I	(DS) (E) I3=1.5-15 In	(ME) (E) I3=1.5-15 In	(ME) (E) I3=1.5-15 In
	t3= instantaneous t=k	t3= instantaneous t=k	t3= instantaneous t=k
G	(DS) (E) I4=0.2-1 In	(ME) (E) I4=0.2-1 In	(ME) (E) I4=0.2-1 In
	(DS) (E) t1=0.1-0.8 s t=k/I2 or t=k	(ME) (E) t4=0.1-0.8 s t=k/I2 or t=k	(ME) (E) t4=0.1-0.8 s t=k/I2 or t=k
Rc	RCQ SACE	(ME) (E) IΔ=3-30 A	(ME) (E) IΔ=3-30 A
	–	(ME) (E) tΔ=0.06-0.8 s t=k	(ME) (E) tΔ=0.06-0.8 s t=k
OT	–	T=85 °C	T=85.°C
	–	t = instantaneous t=k	t= instantaneous t=k
U	–	(ME) (E) I6=0.02-0.9 I1	(ME) (E) I6=0.02-0.9 I1
	–	(ME) (E) t6=0.5-60 s t=k	(ME) (E) t6=0.5-60 s t=k
Advanced protections			
UV	–	(ME) (E) U8=0.5-0.95 Un	(ME) (E) U8=0.5-0.95 Un
	–	(ME) (E) t8 =0.1-5 s t=k	(ME) (E) t8 =0.1-5 s t=k
OV	–	(ME) (E) U9=1.05-1.2 Un	(ME) (E) U9=1.05-1.2 Un
	–	(ME) (E) t9 =0.1-5 s t=k	(ME) (E) t9 =0.1-5 s t=k
RV	–	(ME) (E) U10 =0.1-0.4 Un	(ME) (E) U10 =0.1-0.4 Un
	–	(ME) (E) t10 =0.5-30 s t=k	(ME) (E) t10 =0.5-30 s t=k
RP	–	(ME) (E) P11 =-0.3/-0.1 Pn	(ME) (E) P11 =-0.3/-0.1 Pn
	–	(ME) (E) t11 =0.5-25 s t=k	(ME) (E) t10 =0.5-25 s t=k
UF	–	(ME) (E) f12 =0.90-0.99 fn	(ME) (E) f12 =0.90-0.99 fn
	–	(ME) (E) t12 =0.5-3 s t=k	(ME) (E) t10 =0.5-3 s t=k
OF	–	(ME) (E) f13 =1,01-1,10 fn	(ME) (E) f13 =1.01-1.10 fn
	–	(ME) (E) t13 =0.5-3 s t=k	(ME) (E) t13 =0.5-3 s t=k
S2	–	–	(ME) (E) I2=0.6-10 In
	–	–	(ME) (E) t2=0.05-0.8 s t=k
D	–	–	(ME) (E) I7=0.6-10 In t=k
	–	–	(ME) (E) t7=0.2-0.8 s t=k
R	–	–	–
Communication	PR021/K remote signalling	With PR330/D-M - Modbus protocol- BT030 communication wireless -PR021/K remote signalling	With PR330/D-M as standard-Modbus protocol
Measurements	Basic-BT030	Basic included as standard-advanced with PR330/V	advanced- harmonic analysis
NOTES	Setting (E) with PR010T or with BT030-Interface front of panel HMI030	Adv. Prot. PR330V-Setting (E) with PR010T or with BT030-Interface front of panel HMI030	–

	PR121/P	PR122/P	PR123/P
			
	LI-LSI-LSIG	**LI-LSI-LSIG**	**LI-LSI-LSIG**
	E1-E2-E3-E4-E6	E1-E2-E3-E4-E6	E1-E2-E3-E4-E6
	Distribution	Distribution	Distribution
	(DS) (E) I1=0.4-1 In	(ME) (E) I1=0.4-1 In	(ME) (E) I1=0.4-1 In
	(DS) (E) t1=3-144 s t=k/I2	(ME) (E) t1=3-144 s t=k/I2	(ME) (E) t1=3-144 s t=k/I2
	(DS) (E) I2=1-10 In	(ME) (E) I2=0.6-10 In	(ME) (E) I2=0.6-10 In
	(DS) (E) t2=0.1-0.8 s t=k	(ME) (E) t2=0.5-0.8 s t=k/I2 or t=k	(ME) (E) t2=0.05-0.8 s t=k/I2 or t=k
	(DS) (E) I3=1.5-15 In	(ME) (E) I3=1.5-15 In	(ME) (E) I3=1.5-15 In
	t3= instantaneous t=k	t3= instantaneous t=k	t3= instantaneous t=k
	(DS) (E) I4=0.2-1 In	(ME) (E) I4=0.1-1 In	(ME) (E) I4=0.1-1 In
	(DS) (E) t4=0.1-0.8 s t=k	(ME) (E) t4=0.1-1 s t=k/I2 or t=k	(ME) (E) t4=0.1-1 s t=k/I2 or t=k
	–	(ME) (E) IΔ=3-20 A	(ME) (E) IΔ=3-30 A
	–	(ME) (E) tΔ=0.06-0.8s t=k	(ME) (E) tΔ=0.06-0.8 s t=k
	–	T=85° C	T=85° C
	–	t=instantaneous t=k	t=instantaneous t=k
	–	(ME) (E) I6=5...90%	(ME) (E) I6=5...90%
		(ME) (E) t6=0.5-60 s t=k	(ME) (E) t6=0.5-60 s t=k
	–		
	–	(ME) (E) U8=0.5-0.95 Un	(ME) (E) U8=0.5-0.95 Un
	–	(ME) (E) t8 =0.1-5 s t=k	(ME) (E) t8 =0.1-5 s t=k
	–	(ME) (E) U9=1.05-1.2 Un	(ME) (E) U9=1.05-1.2 Un
	–	(ME) (E) t9 =0.1-5 s t=k	(ME) (E) t9 =0.1-5 s t=k
	–	(ME) (E) U10 =0.1-0.4 Un	(ME) (E) U10 =0.1-0.4 Un
	–	(ME) (E) t10 =0.5-30 s t=k	(ME) (E) t10 =0.5-30 s t=k
	–	(ME) (E) P11 =-0,.3/-0.1 Pn	(ME) (E) P11 =-0.3/-0.1 Pn
	–	(ME) (E) t10 =0.5-25 s t=k	(ME) (E) t10 =0.5-25 s t=k
	–	(ME) (E) f12 =0.90-0.99 fn	(ME) (E) f12 =0.90-0.99 fn
	–	(ME) (E) t10 =0.5-3 s t=k	(ME) (E) t10 =0.5-3 s t=k
	–	(ME) (E) f13 =1.01-1.10 fn	(ME) (E) f13 =1.01-1.10 fn
	–	(ME) (E) t13 =0.5-3 s t=k	(ME) (E) t13 =0.5-3 s t=k
	–	–	(ME) (E) I2=0.6-10 In
	–	–	(ME) (E) t2=0.05-0.8 s t=k
	–	–	(ME) (E) I7=0.6-10 In
	–	–	(ME) (E) t7=0.2-0.8 s t=k
	–	–	–
	PR021K Alarm signalling	With PR120/ D-M	With PR120/ D-M
	–	Basic: included as standard- advanced with Accessory PR120/V	advanced- harmonic analysis
	–	Adv. prot. PR120V-Diff. with homopolar toroid- Sett. (E) with PR010T, BT030-USB, PR120/D-BT	Residual with homopolar toroid-Setting (E) with PR010T, BT030-USB, PR120/D-BT

KEY

L-Protection against overload
S-Selective protection against short-circuit
I-Instantaneous protection against short-circuit
G-Protection against earth faults
Rc-Protection against residual current
OT-Protection against overtemperature
U-Protection against phase unbalance
UV-Undervoltage protection

t=k relation t=f(I) 

t=k/I2 relation t=f(I) 

OV-Overvoltage protection
RV-Protection against residual voltage
RP-Protection against active power reversal
UF-Protection against under frequency
OF-Protection against over frequency
S2-Selective protection against short-circuit
D-Protection against directional short-circuit
R-Protection against rotor block

PR010T-Test and configuration unit
PR_ _ _ D-M-Communication module modbus
PR_ _ _V Measurement module
BT030-Wireless communication unit

PR021K-Signalling unit

(M)-Manual setting
(DS)-Setting with Dip Switch
(E)-Electronic setting with external apparatus
(BT030 or PR010T) or remotely with communication
(ME)-Electronic manual setting on front of panel

RC_ _ _-External residual current release for moulded-case circuit-breakers
RCQ SACE-Panel residual current with toroid and opening coil

Basic Measurements
Phase, Neutral, Earth currents

Advanced Measurements
Currents (phase, Neutral, Earth)
Phase voltages (between phases, phase-neutral, residual)
Power (Active, Reactive, Apparent)
Power factor
Frequency and Peak Factor
Energy (Active, Reactive, Apparent)

Version
F- Fixed
P- Plug-in
W- Withdrawable

Main characteristics of releases

RCQ SACE

Characteristics		All 3/4 poles
Power supply voltage	AC [V]/DC [V]	80…500/48…125
Frequency of operation	[Hz]	45...66
Absorbed power on inrush		100 [VA]/100 [W]
Absorbed power running		6 [VA]/6 [W]
Adjustment of trip threshold		
1st range of Adjustments	[A]	0.03-0.05-0.1-0.3-0.5
2nd range of Adjustments	[A]	1- 3-5-10-30
Adjustment of trip times I∆n	[s]	instantaneous-0.1-0.2-0.3-0.5-0.7-1-2-3 5
Adjustment of pre-alarm threshold	[%] x I∆n	25…75% x I∆n
Range of use of closed transformers		
Toroidal transformer Ø 60 [mm]	[A]	0.03…30
Toroidal transformer Ø 110 [mm]	[A]	0.03…30
Toroidal transformer Ø 185 [mm]	[A]	0.1…30
Range of use of openable transformers		
Toroidal transformer Ø 60 [mm]	[A]	0.03…30
Toroidal transformer Ø 110 [mm]	[A]	0.03…30
Toroidal transformer Ø 185 [mm]	[A]	0.1…30
Pre-threshold pre-alarm indication		Yellow flashing LED 1 changeover contact N.O. 6A-250 V AC 50/60 Hz
Signalling of residual current release trip		Magnetic indication and two changeover contacts (N.O. N.C. ; N.O.). 6A-250 V AC 50/60 Hz
Remote opening control		N.O. contact Trip time 15 ms
Connection to the toroidal transformer		By means of 4 twisted conductors. Maximum length: 5 m
Dimensions L x H x D	[mm]	96 x 96 x 131.5
Drilling for assembly on door	[mm]	92 x 92
Degree of protection on the front		IP41
Degree of protection on the rear		IP30

HOMOPOLAR TOROID FOR RESIDUAL CURRENT PROTECTION

The PR332/P LSIRc, PR332/P LSIG (with PR330V) PR122/P LSIRc, PR122/P LSIG (with PR120/V) e PR123/P electronic trip units can be used with this accessory, which allows activation of the residual current protection. RC protection can be activated only when the dedicated rating plug for residual current protection and external toroidal transformer are present.

HOMOPOLAR SENSOR

Homopolar sensor for main power supply earthing conductor (star centre of the transformer).

Communication/Signalling/Measurement

PR330/D-M - PR120/D-M

PR330/D-M

PR120/D-M

The PR330/D-M (for Tmax) and PR120/D-M (for Emax) communication modules are the solution for connection the ABB circuit-breakers to a Modbus network, for remove supervision and control of the circuit-breaker.

SACE PR021/K -PR120/K

PR021/K

PR120/K

The SACE PR021/K and PR120/K (only for PR122 and PR123) signalling units are able to convert the digital signals supplied by the PR331, PR332, PR333, PR121, PR122 and PR123 protection units into electric signals by means of normally open electrical contacts, it allows remote signalling of the release alarms and trips.

HMI030

This can be used with all the protection releases fitted with dialogue, it is designed to be installed on the front of the panel. It consists of a graphic display where all the measurements and the release alarms/events are displayed. Thanks to its high level of precision, the device can replace the traditional multi-meters without the need of current/voltage transformers. L'HMI030 is connected directly to the protection release by means of a serial line and requires a 24 V DC power supply.

PR330/V -PR120/V

PR330/V

PR120/V

The internal PR330/V (for PR332/P) and PR120/V (for PR122/P) modules can be added to the releases and allow the phase voltages and neutral to be measured and processed, transferring these data to the protection release itself, so that a series of protection and measurement functions can be implemented.

BT030 - PR120/D-BT

BT030

PR120/D-BT

The BT030 is a device to be connected to the Test connector of PR222DS, PR223DS, PR223EF, PR232/P, PR331/P and PR332/P. It allows Bluetooth communication between the protection release and a hand-held PC or a laptop with a Bluetooth port. The BT030 can also be used with Emax circuit-breakers equipped with PR121/P, PR122/P and PR123/P. For the PR122 and 123, the PR120/D-BT Bluetooth communication module is available, which can be inserted inside the release.

PR010/T

The SACE PR010/T unit is an instrument able to carry out the Test, programming and parameter reading functions for the protection units which equip the circuit-breakers.

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